bse methanol

Less emissions, more sustainability

In cooperation with

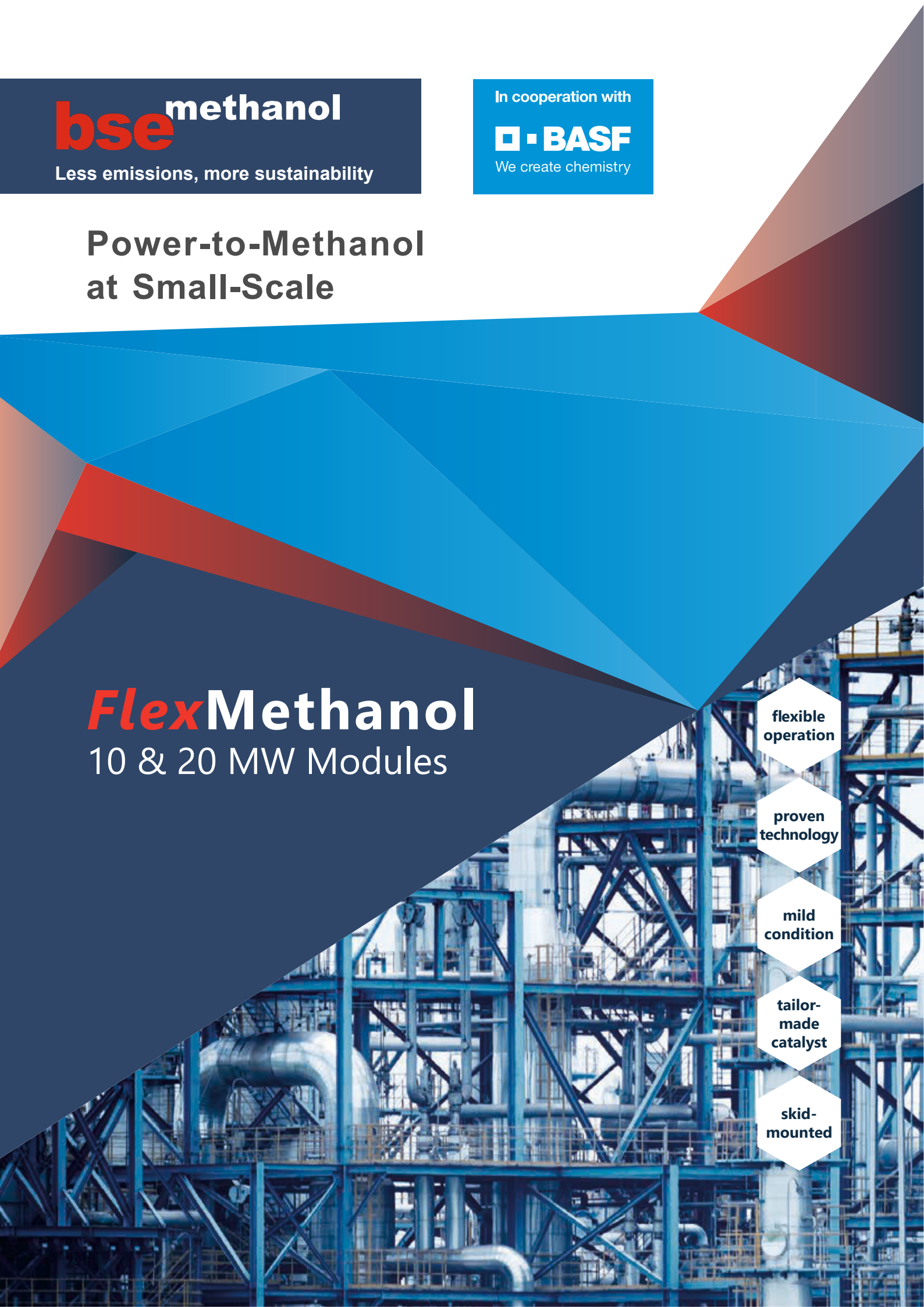
BASF

We create chemistry

Power-to-Methanol at Small-Scale

FlexMethanol

10 & 20 MW Modules



Standardized *Flex*Methanol Units

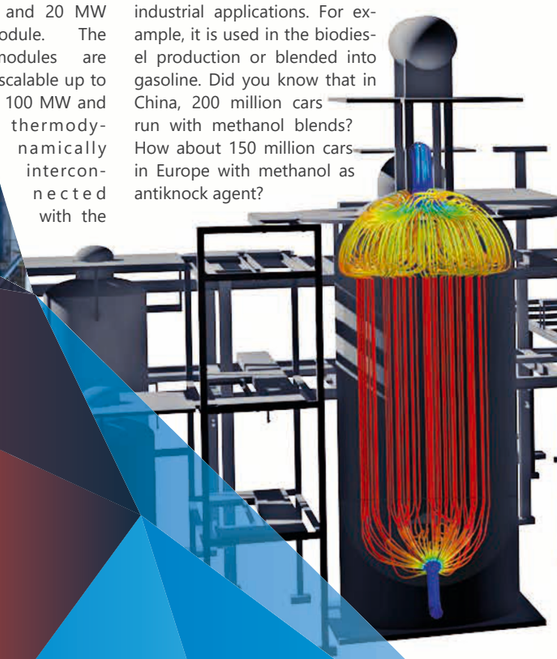
Our Vision

Mankind has always dreamed about endless energy sources produced from air and water which also save the climate. Already today we can tap natural resources like wind and solar power to provide unlimited liquid energy with pure CO_2 and H_2 from water electrolysis. The CO_2 and power from renewable sources are by far unused resources. Methanol, however, is a product that is already used as fuel. A mass market with premium prices has been established for this application. H_2 will then be electro-chemically produced when power is cheap. In the consequence, *Flex*Methanol with a modularized construction increases the value of power in existing stations by transforming power to a liquid form.

*Flex*Methanol means profitable at all times

*Flex*Methanol will enable economically viable transformation of excess current and off-gas CO_2 into the chemical energy storage in small-scale and delocalized production units. Core of the plant is the tailor-made catalyst of BASF to convert CO_2 without a cost intensive prior water-gas-shift reaction.

*Flex*Methanol consists of 4 industrially available process steps (electrolysis, CO_2 scrubbing, methanol synthesis, distillation) as 10 and 20 MW module. The modules are scalable up to 100 MW and thermodynamically interconnected with the existing asset. This increases the total efficiency of the process. *Flex*Methanol stabilizes the revenues significantly by operating in two ways depending on the power price. If the price is above the internal marginal price the plant feeds into the grid. Otherwise the plant uses the excess current to produce H_2 through discontinuous electrolysis. In a second step, methanol is produced from CO_2 and H_2, thus leading to a valorizing of excess current and CO_2 off-stream gas. In the second process step, BASF's catalysts will be used for the methanol synthesis step. Those catalysts have been further tuned and adapted for this specific process to enable the most efficient production of methanol. Methanol is one of the most important basic chemicals used in numerous industrial applications. For example, it is used in the biodiesel production or blended into gasoline. Did you know that in China, 200 million cars run with methanol blends? How about 150 million cars in Europe with methanol as antiknock agent?



*Flex*Methanol 10 & *Flex*Methanol 20

10 / 20	up to 100	12,000 / 24,000	8,200 / 16,400	13,000 / 26,000	17,500 / 35,000
Megawatt Electricity	€/MWh Value of power on generator	Tons/year Carbon Dioxide savings	Tons/year Methanol	Tons/year Oxygen	MWh/year Heat Potential

based on 8,760 hours

Performance

Flexible Operation
Flexibility range 10-120 %
< 15 seconds

Tailor-made BASF Catalyst
High activity / stability, optimized for flexible operation

No tars, no waste
Methanol synthesis works on pure gases without any impurities

Highly efficient
55-74 % efficiency on electricity used, heat integration

Low investment
CAPEX
≤ 3,000 €/kW

Biodegradable Amines
Environmentally friendly and low risk of approval

4 industrial available process steps
Reduction of technical and operational risks

No water-gas shift reaction
There is no need for capital cost intensive Steam Reforming

Mild process conditions
Low pressure 40 bar, 240 °C

Electrolysis
Free choice, can be defined together

Skid-mounted pre-fabricated
Thus short construction time and short start-up time

Gas Loop Operation
Complete conversion of carbon to methanol hot-standby

100 % Premium Fuel
with the use of wind and solar energy

100 % Premium Fuel
with the use of regenerative raw material

100 % Premium Fuel
with the use of recycled non-renewable waste

Execution Steps

Process economic validation
to secure investment intention

Basic Engineering
to prepare final investment decision

Skid Delivery Execution, and Start-up

In cooperation with

bse methanol
- Business Developer
- Engineering and process provider
- Plant Integration

BASF We create chemistry
- World leading chemical company
- Pioneer of methanol synthesis
- Largest catalyst company worldwide

www.catalysts.basf.com

bse construction
- Construction of *Flex*Methanol Skid
- Sales of *Flex*Methanol Skids
- *Flex*Methanol Skid Delivery

AkerSolutions
- Provider of unique CCUS technology
- Just Catch - standard and modular design
- Robust and environmentally friendly solvent
- Verified performance on waste incineration, cement, coal and gas fired power plants

www.akersolutions.com

MAN
MAN Energy Solutions SE
- 250+ years of engineering experience
- Multitube reactor systems
- Pressure containment reactor systems
- > 120 sites globally

www.man-es.com

SULZER
- Most complete portfolio of distillation components
- The leading expert and solutions provider for continuous, single-/multi-stage distillation
- Taylor-made design of highly efficient separation process

www.sulzer.com

We are an experienced & strong consortium who works with passion & skills to provide the best solution for your business.

Ready. Proven. Profitable.

Climate-friendly fuel in a premium market.

Low carbon economy has to circle more carbon to become resource efficent. *Flex*Methanol brings reindustrialisation for:

- Waste incineration plants
- Paper mills
- Heat driven process
- Fossil power plants

More Sustainability

Less Emissons.

bse methanol

CONTACT US

bse Methanol GmbH
Mottelerstrasse 8, D-04155 Leipzig, Germany

+ 49 341 609 12 0

office@bse-methanol.eu

www.bse-methanol.eu