

# g-Methanol<sup>®</sup>

Low-Carbon Footprint Methanol

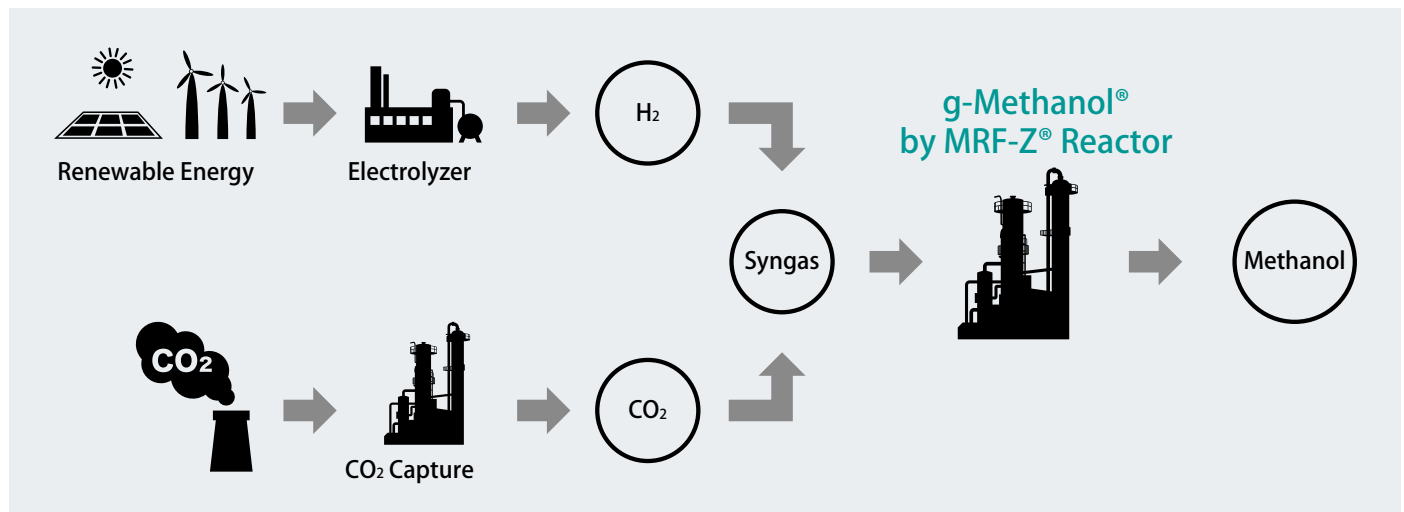


## REALIZE AN ENVIROMENTALLY-FRIENDLY SOCIETY

Toward environmentally-friendly society, one of TOYO's solution is to realize the technology of recycling-oriented society. Our responsibility is to provide solution for "Sustainable supply of clean energy" & "Building value chain" based on own technology and experience in the chemical and energy industries.

## CONCEPT OF g-Methanol<sup>®</sup>

g-Methanol<sup>®</sup> is kind of renewable Methanol by synthesizing CO<sub>2</sub>, which is captured from various exhaust sources and utilized as feedstock of Methanol, and H<sub>2</sub>, which is generated by water electrolysis using renewable electricity.



## WHY CONSIDER g-Methanol®?

- Contributing to Net CO<sub>2</sub> Zero Emission by 2050.
- Creating values from CO<sub>2</sub>.
- Converting CO<sub>2</sub> to olefins via g-Methanol® not fossil resource.
- Reducing greenhouse gas emissions by using g-Methanol® as transportation fuels.
- Energy transition from renewable energy to drop-in fuel.

## TOYO TECHNOLOGY SOLUTIONS OFFERS

TOYO offers appropriate solution to meet the process features of the direct CO<sub>2</sub> to Methanol synthesis process by its proprietary MRF-Z® Reactor.

### Proprietary Methanol Synthesis Reactor; MRF-Z® Reactor

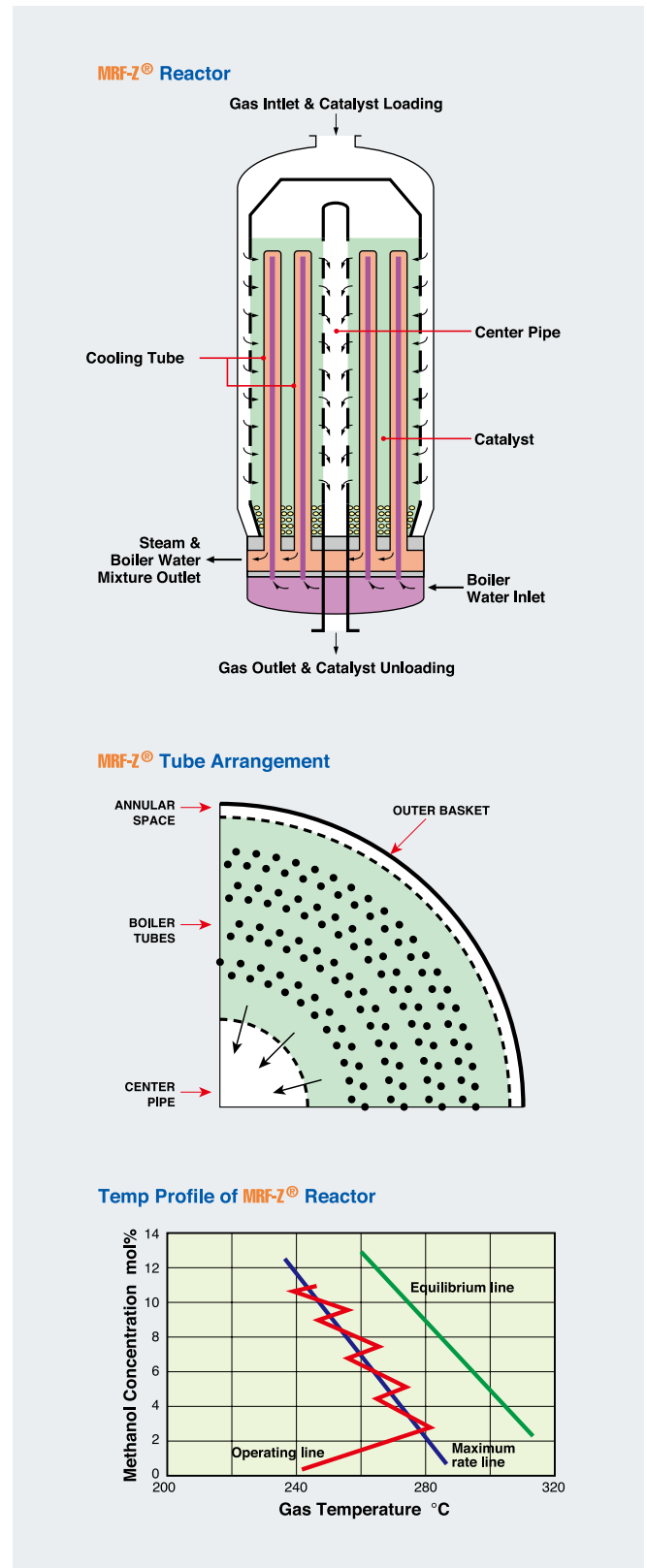
Minimize the catalyst volume by Multi-Stage Indirect Cooling. Suitable heat removal is key technology to produce methanol from CO<sub>2</sub> with minimum catalyst volume. Thanks to Multi-Stage Indirect Cooling, the temperature profile in the catalyst bed is optimized by a suitable cooling tube arrangement. Optimized temperature profile along the maximum reaction rate line provides optimum amount of catalyst.

### Easy Catalyst loading and unloading

Features of MRF-Z® reactor, shell-side catalyst loading and bayonet boiler tubes and TOYO's proprietary mechanical design, result in realization of easy maintenance.

### Other features

- Shell-side catalyst /Wide Range Single Train Capacity
- Steam Raising Methanol Reactor / Best Use of Surplus Heat
- Cross Flow to Cooling Tubes / Maximum Heat Transfer
- Radial Gas Flow / Low Pressure Drop
- Bayonet Boiler Tubes / No Thermal Stress
- Single Responsibility from Process Licensing to EPC including water electrolysis.
- Propose supply chain



### Toyo Engineering Corporation

2-8-1 Akanehama, Narashino-shi, Chiba 275-0024, Japan  
 Tel: +81-47-451-1111  
 E-Mail : jp.toyo-technologies@toyo-eng.com  
<https://www.toyo-eng.com/jp>