

# Green methanol

## Why is methanol so important?

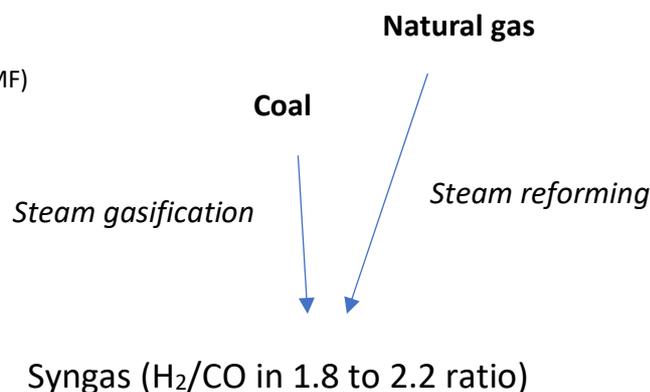
- [One of the most produced organic chemicals](#): 110 million tons per year
- [Used as a base material for wide range of chemical products](#), including polymer fibers, plastic packaging, glues, adsorbents, paints, adhesives, solvents and many more
- [Methanol is used as fuel and fuel additive](#)
- Methanol is used in [Direct Methanol Fuel Cells](#) (DMF) to generate electricity

## Why conventional method is not preferred?

- The conventional method is not sustainable because [it uses non-renewable fossil fuels such as gas and coal as feedstock](#)

## How Green methanol can be achieved?

- [Low carbon emission](#) methanol manufacture
- Recovery of material [through waste gasification and conversion to methanol](#)
- [Power-to-liquid methanol via electrochemistry](#)



**Conventional route**

## What is power-to-methanol conversion?

- Hydrogen obtained from electrolysis is used for a [catalytic reduction of CO<sub>2</sub>](#) from industrial waste to liquid methanol:  $3\text{H}_2 + \text{CO}_2 \rightarrow \text{CH}_3\text{OH} + \text{H}_2\text{O}$

**Methanol**

**Bio-methanol route**

**Syngas**

**Catalytic reduction**

**E-methanol route**

## What is the limitation of Bio-methanol?

- It is costly because the [process requires intensive purification steps](#)

**Gasification or Pyrolysis**

**Waste CO<sub>2</sub> from heavy industry**

**Biomass feedstock**

**Hydrogen**

**Electrolysis**

**Green hydrogen route**

**Water feedstock**

## Renewable energy sources

## What are the limitations of E-methanol route?

- Limited availability of renewable energy sources
- [The catalytic reduction of CO<sub>2</sub> is yet to achieve industrial scale](#)
- The route is [more expensive](#) compared to conventional method

- Solar cells
- Wind turbine
- Hydropower
- Biomass