

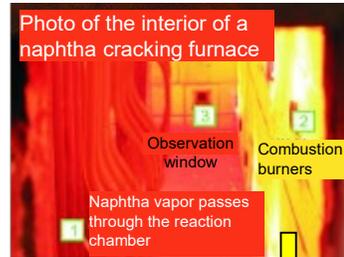
# Development of Technology for Producing Raw Materials for Plastics Using CO<sub>2</sub> and Other Sources (Amount covered by the government: Up to 126.2 billion yen)

- Most of the raw materials for plastics are derived from naphtha (crude gasoline), which is obtained from refining petroleum, and about half of the CO<sub>2</sub> emitted by the chemical industry is due to processes like cracking naphtha to produce basic chemicals such as ethylene and propylene.
- In addition, about 84% of waste plastics are recycled, but some 57% of these are used as a heat source for waste-to-energy plants, etc. (thermal recycling), and are eventually discharged as CO<sub>2</sub>. So, drastic measures are therefore necessary.

## [R&D Item 1] Development of advanced technology for naphtha cracking furnaces by adopting carbon-free heat sources

- Currently, the heat source is off-gas (methane, etc.) generated from naphtha cracking furnaces.
- In this project, develop the world's first technology to **change** the heat source of naphtha cracking furnaces to **carbon-free sources (eg. ammonia)**.

[Aim to reduce CO<sub>2</sub> emissions by about 70%]



Change the heat source of furnaces that crack naphtha at about 850°C to **ammonia**

## [R&D Item 2] Development of technology for producing chemicals from waste plastics and rubber

- Establish **technology for producing raw materials such as ethylene and propylene from waste plastics and rubber**.
- Produce them at a yield ratio of 60 to 80%, and also aim to reduce the CO<sub>2</sub> emitted from the production process by about a half.

[Aim to reduce CO<sub>2</sub> emissions by about a half]



Waste plastic pyrolysis oil (Raw material for plastics)

## [R&D Item 3] Development of technology for producing functional chemicals from CO<sub>2</sub>

- Functional chemicals such as polycarbonates theoretically be and polyurethanes can synthesized from CO<sub>2</sub> without requiring hydrogen.
- Work to **improve the functionality, such as electrical, optical, and mechanical properties**.

[Aim to turn CO<sub>2</sub> into raw materials]



High-performance polycarbonate (Camera lenses)

## [R&D Item 4] Development of technology for producing chemicals from alcohols

[Produced chemicals from green hydrogen and CO<sub>2</sub>]

- Improve the catalyst yield (80-90%) for **producing olefins such as ethylene and propylene from methanol and other materials (MTO)**.
- Aim to commercialize artificial photosynthesis by **developing a photocatalyst capable of achieving both high conversion efficiency and mass productivity**.



MTO demonstration



Large-scale demonstration of photocatalytic panels