

News Release

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New Energy and Industrial Technology Development Organization (NEDO)

Mitsui Chemicals, Inc.

Maruzen Petrochemical Co., Ltd.

Toyo Engineering Corporation

Sojitz Machinery Corporation

World-Class 85% Ammonia Co-firing Achieved in a Naphtha Cracking Furnace

- Toward 100% Ammonia Firing for the Decarbonization of the Petrochemical Industry -

Translation of Japanese NEDO news release posted on September 17, 2026

NEDO (New Energy and Industrial Technology Development Organization, "NEDO"), Mitsui Chemicals, Inc. (Chiyoda-ku, Tokyo; Satoshi Ichimura, President & CEO, "Mitsui"), Maruzen Petrochemical Co., Ltd. (Chuo-ku, Tokyo; Katsuyuki Funahashi, President, Representative Director, "Maruzen"), Toyo Engineering Corporation (Chiba City, Chiba; Eiji Hosoi, President and CEO, "TOYO"), Sojitz Machinery Corporation (Chiyoda-ku, Tokyo; Kiyoaki Tsuda, President and CEO, "Sojitz") have achieved an ammonia co-firing rate of 85% on a heat-input basis across an entire naphtha cracking furnace through operation of a test furnace equipped with newly developed ammonia-fired burner. This achievement was realized under the Green Innovation Fund Projects by NEDO, "Development of Technology for Producing Raw Materials for Plastics Using CO₂ and Other Sources," specifically the project entitled "Development of advanced technology for naphtha cracking furnaces by adopting carbon-free heat sources."

Because ammonia exhibits a lower laminar burning velocity than conventional fuels and generates fuel-derived NO_x (Nitrogen oxides) emissions, its application to naphtha cracking furnaces requires the simultaneous achievement of stable combustion, appropriate heat transfer to cracking tubes, and suppression of NO_x emissions. The achievement of a world-class 85% ammonia co-firing while maintaining NO_x emissions at levels comparable to those of existing furnaces represents a significant milestone toward the decarbonization of naphtha cracking furnaces.

Moving forward, NEDO and the four participating companies will pursue the realization of 100% ammonia firing across the entire furnace and further promote the practical application of ammonia fuel in the petrochemical industry.

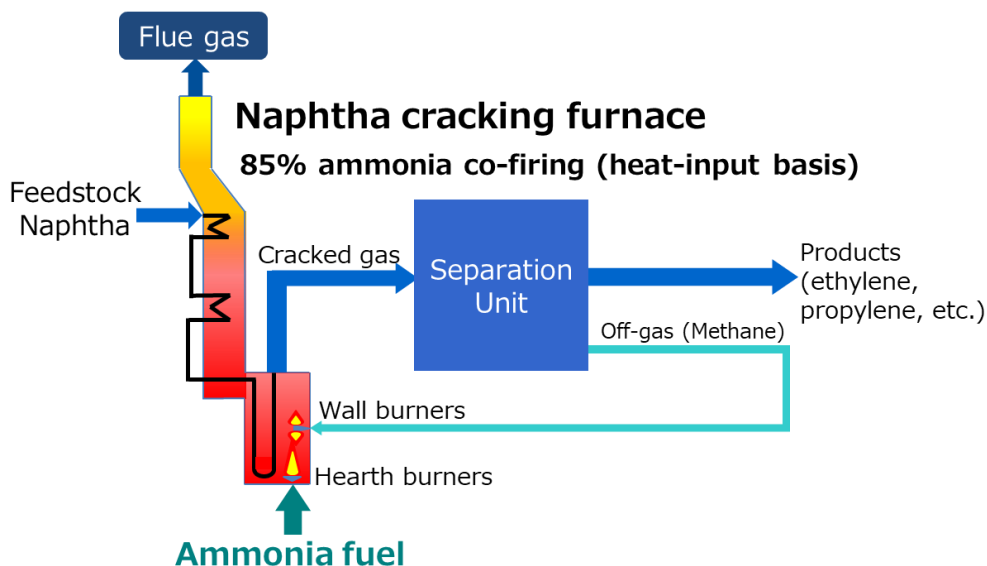


Figure 1. Conceptual Illustration of a Naphtha Cracking Furnace

1. Background

A naphtha cracking furnace is a key equipment used to thermally crack naphtha derived from crude oil at high temperature to produce basic petrochemical products such as ethylene and propylene. While it plays an essential role in supplying feedstocks for plastics, synthetic fibers, and synthetic rubber, it is also one of the major sources of CO₂ emissions at petrochemical complexes, making its decarbonization a challenge to address.

Conventionally, naphtha cracking furnaces use off-gas as fuel, primarily composed of methane generated as a by-product. Replacing this fuel with ammonia, which emits no CO₂ during combustion, is expected to significantly reduce combustion-related CO₂ emissions.

Against this background, Mitsui, together with NEDO, Maruzen, TOYO, and Sojitz, has been engaged since FY2021 in the development of ammonia firing technologies for application to naphtha cracking furnaces under this project¹. The project aims to develop ammonia-fired burners specifically for naphtha cracking furnaces and ultimately realize 100% ammonia firing across an entire furnace.

2. Achievement

(1) Development of Ammonia Burners for Naphtha Cracking Furnaces

Under this project, two types of ammonia-fired burners, hearth burners and wall burners, were developed for application in naphtha cracking furnaces. A hearth burner provides the primary heat input to the furnace, while a wall burner is used to optimize flame shape and furnace temperature distribution.

(2) Achievement of a World-Class 85% Ammonia Co-firing Rate in a Test Furnace

Compared with methane, ammonia exhibits a lower burning velocity and generates fuel-derived NO_x emissions. Its application to naphtha cracking furnaces requires the simultaneous achievement of stable combustion, appropriate heat transfer to cracking tubes, and suppression of NO_x emissions.

In this demonstration, ammonia co-firing rate was increased step by step, and furnace operation was conducted under the following conditions:

- Hearth burners: 100% ammonia firing
- Wall burners: 100% off-gas methane firing (with future application of ammonia planned)

As a result, 85% ammonia co-firing on a heat-input basis across the entire furnace was achieved, representing a world-class level². Furthermore, NO_x emissions were confirmed to be comparable to those of existing commercial furnaces.



Figure 2. Overview of the Test Furnace



Figure 3. Flame during Ammonia Firing

3. Future Plan

A distinguishing feature of this achievement is that 100% ammonia firing was realized in the hearth burners, which provide the main heat input to the furnace, resulting in an overall 85% ammonia co-firing on a heat-input basis across the entire furnace.

NEDO and the four participating companies will proceed with the application of ammonia to wall burners and aim to achieve 100% ammonia firing throughout the entire furnace.

Furthermore, by advancing technology development and demonstration toward application in commercial-scale naphtha cracking furnaces, NEDO and the four participating companies will contribute to both the decarbonization of the petrochemical industry and the stable supply of basic chemical products.

[Notes]

*1 Project Overview

Project Name:

Green Innovation Fund Project / Development of Technology for Producing Raw Materials for Plastics Using CO₂ and Other Sources / Development of advanced technology for naphtha cracking furnaces by adopting carbon-free heat sources / Commercialization of Ammonia-Fueled Naphtha Cracking Furnaces

Project Period:

FY2021 to FY2030 (planned)

Project Overview:

NEDO Green Innovation Fund Special Website: [Green Innovation Fund Website](#)

*2 World-Class Level

As of August 2026, this represents a world-class ammonia co-firing rate achieved in test-furnace operation using ammonia fuel for naphtha cracking furnaces, based on a survey of publicly available information conducted by Mitsui, Maruzen, TOYO, and Sojitz.

4. For more information, please contact:

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