



TNCHE Asia 2025 Conference
**%Accelerating Industrial Decarbonization:
Digital-AI and Energy Transformation %**
#Presenter,s Biodata & Abstract



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Current Position ###1) Senior Process Engineer, 2) Program Leader

Title of Presentation ##Integration of Electricity, Sustainable Feedstock, Methanol,
Ammonia technologies into Ethylene Plants



Presentation Abstract=

Toyo Engineering Corporation (TOYO), a global leading engineering contractor for Petrochemical industries such as Ethylene as well as Ammonia and Methanol related technology provider, currently engages in Energy Transition focusing on various areas, especially for Ammonia Cracking, e-Methanol (TOYO's own process "g-Methanol™"), Waste Plastic Recycle, utilizing own technologies as well as licensor's technologies such as electrification and decarbonization of ethylene plant.

As innovative technologies toward achieving Net Zero for Ethylene Plant, the following TWO technologies are introduced,

1. Electrical Furnace

There are several technical approaches to reducing CO₂ emission by fuel source transition for cracking furnace from Methane rich off gas to ZERO carbon fuel, such as Electricity, Hydrogen and Ammonia. Electrical furnace is one of the attractive options where renewable energy can be supplied sufficiently while the required amount of power for electrical furnace is large. In this presentation, the technology of electrical furnace by each technology holders and other electrical cracking technology are summarized.

2. Motorization of 3 Main Compressors

One of the solutions which are proven technology and retrofitting of existing plant for reducing CO₂ emission is replacing existing turbines for 3 main compressors to motor. Motorization can contribute the reduction of steam generation from steam boiler and as a result CO₂ emission



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can be reduced by utilizing renewable power. Motorization has an impact on the existing steam system drastically and to maintain the balance of steam system, the installation of Steam Turbine Generator is one of the options which can also cover an additional demand of power. As per the study of motorization, motorization of 3 main compressor can contribute the reduction of fuel consumption while the feasibility of boiler operation during emergency scenario such as Charge Gas Compressor trip and total power failure should be carefully studied considering number of boilers in normal operation which can be reduced from existing operation.

In addition, the following TOYO's approaches are introduced as potential candidates for integration with ethylene plants.

3. Waste Plastics Recycle

The chemical recycling of waste plastics by liquefaction is attracting significant attention as a process capable of producing virgin plastics by using the oil derived from waste plastics as feedstock for ethylene plants. Since 2021, TOYO and Circular Plas, an affiliate company of SCG Chemicals Public Company Limited have been jointly developing the innovative liquefaction process for waste plastics. The latest status is introduced in this section.

4. Ammonia Cracking

As previously mentioned, converting the fuel source of cracking furnaces to hydrogen is an effective measure towards achieving Net Zero for ethylene plants. TOYO's approach with ammonia cracking technology H2ACT®, licensed from KBR, is introduced as one of the viable hydrogen sources.

5. Methanol Synthesis

In the context of the fuel source transition for cracking furnace of ethylene plants, the treatment of the Methane rich off gas remains a challenge. TOYO proposes converting this by-product gas into methanol and introduces the latest information on TOYO's methanol synthesis technologies.