TNChE Asia 2023 Conference
" Decarbonization of Process Industry and Next-Generation Materials for Sustainability "
Presenter Bio Data & Abstract

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Title of Presentation : TOYO's Solution for Energy Transition in Ethylene Plant – 1. Cold Energy Recovery 2. Green Methanol 3. Fuel Ammonia

Presentation Abstract :

Toyo Engineering Corporation (TOYO), a global leading engineering contractor for Petrochemical industries as well as Ammonia and Methanol related technology provider, currently engages in Energy Transition focusing on various areas, especially for Fuel Ammonia, Green Methanol (g-Methanol®) and Sustainable Aviation Fuel (SAF), utilizing own technologies as well as licensor's technologies.

As innovative technology toward Net Zero of these areas related to the Petrochemical industry, the following THREE technologies are introduced,

1. Cold Energy & Electrical power recovery integrated with the LNG plant

TOYO has experienced several unique Energy Improvement solutions by retrofitting existing Ethylene plants using proven technologies. One of the use cases is cold energy recovery at the Refrigeration system in the Ethylene plant integrated with the LNG plant. Large-scale energy saving is achieved by cold energy recovery from LNG. And the unique design concept is applied for stand-by of existing refrigerant systems by Expansion Turbine. During normal operation by LNG, a refrigerant compressor is operated as minimum load and stand-by to reduce steam consumption at the compressor. Excess gas from a minimum load of the refrigerant compressor is fed to the Expansion turbine which recovers as electrical power.

2. Green Methanol (g-Methanol®)

Due to growing concern about industrial CO_2 emission and unsustainable sourcing of Syngas plant, the feedstock of methanol production is likely shifting to CO_2 from flue gas and hydrogen from electrolysis. "Methanol" is one of the sources of Olefin production feedstock and "ZERO carbon" methanol contributes to the ZERO carbon petrochemical industry.

TOYO has a proprietary methanol synthesis reactor, MRF-Z® Reactor can minimize the catalyst since the temperature profile can be easily optimized by a suitable cooling tube arrangement to trace the maximum reaction rate line.

3. Fuel Ammonia application for Cracking Furnace

There are several technical approaches to reducing CO_2 emission by fuel source transition for cracking furnaces from Methane rich off gas to ZERO carbon fuel, such as Electricity, Hydrogen, and Ammonia. Fuel Ammonia is the most attractive option for Naphtha crackers in Southeast Asia such as Japan and Thailand considering easy shipment & storage for Fuel Ammonia, and more commercial, and industrial with existing widespread infrastructure. TOYO launched a Pilot project with project partners (Mitsui Chemicals, Inc, Maruzen Petrochemical Co., Ltd., and Sojitz Machinery Corporation) aimed at the Commercial use of Fuel Ammonia to Naphtha crackers adopted as NEDO* Green Innovation Fund R&D Project. The trial is expected to run for 10 years until 2030 to be implemented in society after feasibility has been demonstrated in an entirely ammonia-fired commercial cracker.

*NEDO: New Energy and Industrial Technology Development Organization (NEDO)