FY2015 Feasibility Studies with the Aim of Developing a
Joint Crediting Mechanism

Feasibility Study for an Energy Conservation Distillation System in the Kingdom of Thailand

New Energy and Industrial Technology Development Organization (NEDO)

Toyo Engineering Corporation

Feasibility Study for an Energy Conservation Distillation System in the Kingdom of Thailand

Conducted by: Toyo Engineering Corporation

The chemical industry is responsible for a large amount of CO_2 emissions, particularly from distillation processes. While demand for chemical industry products is expected to soar in the future, mainly in emerging nations, CO_2 emissions can be effectively reduced and economic efficiency can be improved at the same time by applying a Japanese low-carbon, energy-efficient distillation system.

Study Summary

CO_2 emission reduction potential through the application of the Japanese technology SUPERHIDIC® will be studied.

Study Items

① Technical survey
② MRV methodology development
③ Economic analysis
④ Market and policy research
⑤ Project development study
⑥ Technology dissemination study
⑦ Field study
⑧ Meeting with government entities
⑨ Report preparation

Partner/Site

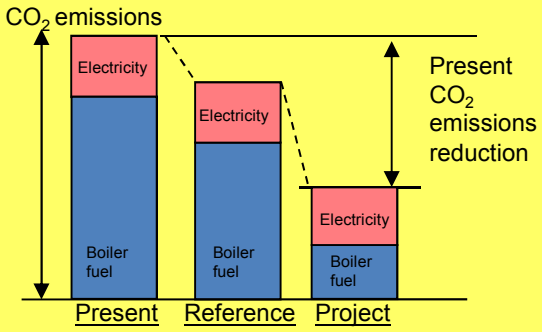
- **Partner: To be determined**
- **Site: The Kingdom of Thailand**

Estimated Reduction Amount

Expected reduction: Approximately 6,000 tons CO_2/year

Reference Emissions

The correlation between feed flow rate and reboiler load of an existing distillation column will be analyzed from the historical record of a certain duration to estimate reference emissions. Measurement errors will be conservatively treated.

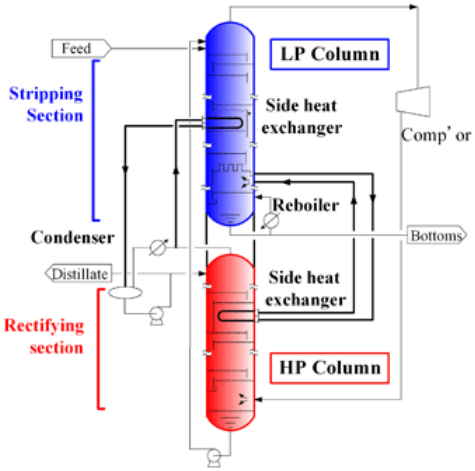


Project Emissions

CO_2 emissions can be reduced by lowering energy consumption during the distillation process with ***SUPERHIDIC®***, an energy-saving distillation system utilizing heat pump technology.

Summary of Introduced Technology

SUPERHIDIC® System



SUPERHIDIC® concept

In the distillation process, the stripping section (the section to generate bottom products) requires heat, and the rectifying section (the section to generate distillate) needs to remove heat. The amount of thermal energy can be significantly reduced if the heat removed in the rectifying section is transferred and utilized in the stripping section. However, heat transfer is not possible in a conventional distillation column because there is a large temperature difference between the rectifying and stripping sections. In a heat integrated distillation column (HIDiC), the rectifying and stripping sections are separated and a compressor is installed between them. The compressor is used to raise the pressure and temperature in the rectifying section to reduce the temperature difference, thereby transferring heat from the rectifying section to the stripping section and achieving a large reduction of thermal energy supplied to a reboiler.

In the 1990s, a distillation column structure to arrange the rectifying and stripping sections in a concentric pattern was considered. However, this structure had several difficulties from an energy saving perspective, such as maintenance, flexibility in component layout for effective heat exchange, and the amount of heat to be exchanged. SUPERHIDIC ® is an energy efficient heat integrated distillation column developed in Japan. In a SUPERHIDIC ®, thermal energy can be distributed in an optimal way due to an effective layout of heat exchangers. In 2014, SUPERHIDIC® was awarded the *NIKKEI Earth Environment Technology Award* owing to its innovativeness and significant potential in GHG emission reduction.