

Energy Efficiency, Integration & Capacity Upgrade of a Recent Cracker

Boosting a plant's capacity and performance while reducing its CO₂ footprint

The logo consists of the letters "T.EN" in a bold, blue, sans-serif font, enclosed within a white circle.

TECHNIP
ENERGIES





Overview

Capacity and Efficiency Upgrade of a Major Olefins Plant

In 2020, a client engaged Technip Energies to study a capacity and efficiency upgrade of a production plant to produce more valuable olefins by increasing feedstock availability and processing additional feed streams. Technip Energies successfully completed the feasibility study and designed the project using our proprietary ethylene technology.

Once implemented, production will increase to more than 2.5 million tons of olefins per year, representing more than a 60 percent overall increase of olefins production compared to the initial design. With these production capabilities, the project will retain its position as one of the highest olefins producers from a single production line plant globally. The expansion project also provided cost-effective solutions for various operating improvements.



OLEFINS PRODUCTION OF
MORE THAN 2.5 MILLION
TONS PER YEAR



MORE THAN 15% ENERGY
EFFICIENCY IMPROVEMENT



> 1.5 MTPA AVOIDED
CO₂ EMISSIONS



INVESTMENT REQUIRED FOR
INCREMENTAL CAPACITY < 50%
IN GRASSROOTS PLANT

Challenge

Increasing the capacity of an new olefins plant

Significantly increasing the capacity and energy efficiency of one of the best performing olefins plants was a challenge as the new feed had the potential to impact major sections of the plant, which are already equipped with modern technology.

Technip Energies worked closely with the client as a team to develop innovative solutions for the capacity upgrade, including minimizing construction risks and the required downtime. The innovations involved optimizing the flow scheme, which eliminates the need to add or replace major compressors or turbines.

One of the main challenges was to install the new equipment without forcing a shutdown and complete internal modifications and tie-ins during a typical planned turnaround.



“

Feedback, lessons learned from the operations team, understanding crucial challenges and delivering successful innovations were all key to the success of the project.”

Dharmendra Narang, Chief Engineer

Technologies

This production facility originally was designed to produce about 1.5 million tons of olefins per year. The plant has unique features incorporating high levels of process safety while allowing process flexibility in operations. The facility is highly automated with minimal operator intervention and is equipped with the latest instrumentation, including Wi-Fi, IoT, etc.

The plant operating constraints alleviation derived from the plant operating feedback were considered as improvements to safety, environmental impact and operability, along with capacity upgrade.

“ Technip Energies’ technology expertise is a key asset to drive the optimization of existing industrial facilities and help our customers accelerate the energy transition.”

Yvon Simon, Technology Manager Ethylene



Challenge

Improving energy efficiency

Technip Energies' solutions focused on increasing the plant's capacity and energy efficiency simultaneously by innovating the processing scheme. The processing scheme helps to optimize the required refrigeration energy, meaning the refrigeration compressors and turbines only required partial internal upgrades as did the main cracked gas compressor.

Carbon footprint

Improving the plant's energy efficiency will result in a 15 percent reduction in its overall carbon footprint (tCO₂e/t high value chemicals (HVC)) compared to current operations.

The facility also produces high quality hydrogen. The upgrade will allow the client to partly shut down its hydrogen plants, reducing CO₂ emissions by more than 1.5 million tons per year.

Environmental impact

Despite the increase in the plant's capacity, emission levels will remain well below local regulations. Regarding water requirements, improved energy efficiencies and close-knit heat integration means that cooling water and raw water will stay at nearly the original plant design levels. internal upgrades as did the main cracked gas compressor.



More than 1.5 million tons per year reduction in CO₂ emissions



Results

Technip Energies used its proprietary ethylene technology to develop innovative and cost-effective solutions for a significant capacity and efficiency upgrade of our client's olefins plant. The project cost for revamp will be less than 50 percent of the cost for the same capacity of a grassroots plant.

Our innovative solutions delivers a 60 percent increase in olefins production capacity while reducing specific energy consumption and CO₂ emissions by 15 percent.

“

Technip Energies is proud to have significantly upgraded the plant's capacity while reducing energy and CO₂ emissions. This project has enabled us to continue our long valued relationship with our client.”

Jim Middleton, Manager of Technology and Ethylene Product Line Leader