S&P Global
Commodity Insights

Case Study

Reaching net-zero goals for refineries and chemical assets

To address climate change, you need to strike the right balance between plant configuration, commercial profitability, and carbon emissions.

S&P Global Commodity Insights developed a tool for you to understand the margin and capital impacts of reducing emissions from refineries and chemical plants.

RAPID (Refinery and Petrochemical Integrator and Decarbonizer) helps you evaluate multiple new or retrofit plant configuration options, all as a function of its CO2e emissions, capital and operating cost, and financial (cashflow) return.

Meet your net-zero goal while maximizing profits and minimizing emissions.

Case Study #1

Challenge: Operating companies who have committed to a net-zero carbon position over the next two–three decades need a viable strategic plan and asset implementation roadmap. The question is how, and which assets can and should be transitioned to maximize the decarbonization of a corporation's portfolio of operating assets.

Solution: The answer is a combination of several decarbonization process technologies aligned with considerations for asset capacity, the energy infrastructure and carbon, and energy security policies in the country/region.

The consideration of emission sources within a refinery sets the hierarchy of a decarbonization roadmap:

- Direct process emissions—venting to atmosphere or flared
- Fuel fired process heaters
- Fuel fired steam generators
- Hydrogen manufacture
- Electricity generation—offsite versus onsite

Outcome: Companies can develop their net-zero pathway by modelling current or planned assets in RAPID. In minutes, RAPID systematically quantifies carbon footprints (Scope 1 & 2) and plant CO2e reductions while testing decarbonization process technology unit options, e.g., carbon capture, electrification, renewable and H2 (green and blue) fuels, and feedstocks, renewal electricity, bio process technology, and more.

Case Study # 2

Challenge: I need a consistent and streamlined approach to optimizing the configuration and operating parameters for new or retrofitted refineries and chemical plants.

Solution: Determine how and where carbon tax can be avoided and be able to systematically quantify in minutes plant carbon emissions reductions. You will need to resolve how in-plant energy uses can be reduced, e.g., via plant scale, energy efficient equipment, heat recovery and/or the use of green technology.

Outcome: Lower operating cost by determining where and how a) carbon tax can be avoided and b) in-plant energy uses decreased through plant scale, energy efficient equipment, heat recovery and/or the use of green technology such as electrification, carbon capture and blue hydrogen. RAPID models real time operating technology efficient evaluates such improvements and carbon abatement retrofits.

Case Study #3

Challenge: I would like to take advantage of lower cost financing available for "green" projects (200 basis points) but need to demonstrate to the financial community the feasibility and "greenness" of my project.

Solution: Develop a financial cash flow model for a proposed project that shows the carbon footprint of the entire plant with a comparison to a corresponding hydrocarbon-based project before decarbonization.

Outcome: Lower cost of capital/interest rates obtained by demonstrating to the financial market a green project as demonstrated in the RAPID analytical/financial model, as an independent source to characterize and quantify the greenness of a capital project e,g., reduction is carbon emissions relative to a conventional-based project.

Case Study #4

Challenge: I need to offer green products to offset decarbonization costs.

Solution: Offer green products to customers to achieve higher product value and revenue, which will offset decarbonization cost of these products. Critical in offering a green product (e.g., polypropylene, polycarbonate, polyester, etc.) is to track and demonstrate the carbon footprint lineage of the feedstock(s) for green products.

Outcome: A 20% increase in the price of the product based on a lower manufacturing carbon footprint of feedstocks, electricity generation, and production processed allocated to the green product. RAPID is designed to model such a product carbon footprint based on carbon allocations.

RAPID helps you:

- Develop a decarbonization roadmap and strategy of existing and future assets.
- Understand CO2e footprint impact, capital spend, and plant/asset economic performance of process technology employed (current and future).
- Test the impact of commercial scenarios (e.g., pricing, carbon regulations and costs, capital escalation, location, etc.) on long-term economic performance of existing or future assets.
- Receive a robust commercial, process technology and carbon database to augment in-house databases.
- Save time as modelling existing or grassroots refinery and/or petrochemical assets on RAPID takes days or weeks, not months.

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