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An Integration Proposal Between Refineries and Petrochemicals to Support the Reconstruction of Venezuela's Energy and Industrial Sector

The energy industry in industrialized countries is characterized by its flexibility and agility in producing high volumes of refined products, specialty chemicals, and petrochemical inputs that meet local and regional market demands. These industries promote integration among refineries, petrochemical complexes, biorefineries, and natural gas producers. Additionally, they invest in modernization, process control, automation, and real-time monitoring, ensuring safe and continuous operations through AI-based control systems. They also train personnel in new technologies.

The integration of oil production, refineries, petrochemical complexes, and biorefineries allows for the efficient exchange of raw materials, optimizing their use and diversifying product portfolios to enhance business profitability. Refinery streams supply petrochemical complexes, while some petrochemical products are used in refineries to improve fuel quality or as raw materials for other processes. Similarly, biorefineries provide biofuels to refineries, blending them with traditional fuels, improving their quality, and reducing environmental emissions. Natural gas plays a key role in these industries as both an energy source and an essential component in various production processes.

This strategy could become a cornerstone of Venezuela's hydrocarbon industry recovery plan, supported by an approach emphasizing growth strategies and vertical integration among oil and gas production, refining systems, and the petrochemical industry.

From a specialized and competent management perspective, vertical integration between oil and gas production, refineries, and petrochemical complexes provides multiple operational and commercial advantages. These include greater efficiency in processing crude oils of varying qualities, optimizing the utilization of intermediate products and refining byproducts, reducing waste, and enhancing the output of fractions such as LPG, olefins, naphtha, gas oil, sulfur, and petroleum coke.

Additionally, this integration enhances product flexibility and diversification, increasing focus on petrochemical inputs and biofuels, facilitating adaptation to changes in local and regional market demand. It also improves profitability in markets with declining fuel consumption, boosting profit margins across different business segments.

Vertical integration enables production adjustments based on market conditions, increasing the production of petrochemical inputs when refining margins are low. A key aspect of this strategy is its ability to adapt to shifting product demand, as long as the refinery is interconnected with a petrochemical plant.

Furthermore, product and process diversification helps mitigate financial risks by expanding revenue sources, strengthening competitiveness and resilience amid market volatility.

Integration with a Future-Oriented Vision

Vertical integration between oil and natural gas producers, refineries, petrochemical complexes, and biorefineries allows for product diversification, increased profitability, and reduced exposure to oil and fuel price volatility in global markets, ensuring greater operational stability. This has a significant impact on profit margins compared to operating these businesses separately.

By optimizing raw material usage and sharing infrastructure, synergies are created that enhance efficiency and sector competitiveness.

However, an integrated refinery, where a petrochemical plant is built within the same facilities, requires significant investment in infrastructure and technology. Additionally, multiple variables must be considered, including market evolution, oil geopolitics, and ongoing process evaluations to ensure viability and sustainability.

Nonetheless, the integration model does not necessarily require large infrastructure investments but rather focuses on strategic partnerships. This approach leverages existing capabilities, optimizing the value chain without excessive costs, enabling a more agile and efficient integration with petrochemical complexes and biorefineries.

CITGO's Leadership

CITGO Petroleum Corporation is a leading refining company in the U.S. and Latin America, with a crude oil processing capacity of 807,000 b/d. In 2023, CITGO ranked sixth among the largest U.S. refining companies, thanks to the expansion of its Lake Charles refinery's nominal capacity from 425,000 b/d to 483,000 b/d. This facility is the third-largest crude processing refinery in Louisiana and has risen to 16th place in the global ranking of refineries with the highest crude processing capacity.

CITGO's three refineries have a lower processing capacity than the Paraguaná Refining Center (945,000 b/d) in western Venezuela. However, they boast greater refining complexity, demanding highly qualified personnel.

CITGO owns the Corpus Christi refinery in Texas, which is the fifth-largest producer of aromatics in the U.S., while the Lake Charles and Lemont refineries rank first in Louisiana and Illinois, respectively. Notably, the Corpus Christi refinery has one of the highest complexity indexes in the U.S. (16.42) and is the second-largest producer of naphthas. However, it has the lowest crude processing capacity compared to its competitors in Texas.

In the petrochemical sector, CITGO has significant production of aromatics and sulfur, with a strong market presence in the Western Hemisphere. CITGO is currently the second-largest producer of aromatics in the U.S. Moreover, its Lake Charles and Corpus Christi refineries rank fourth and seventh, respectively, in U.S. aromatics production. Aromatics are widely used in the manufacturing of plastics, pharmaceuticals, chemicals, food products, and other consumer and specialty industries.

Out of 68 refineries producing aromatics worldwide, CITGO's Lake Charles and Corpus Christi refineries rank 20th and 25th, respectively.

Additionally, regarding sulfur production and market coverage, CITGO's refineries rank seventh among refining companies in Texas, Louisiana, California, and Illinois. These four states account for approximately 71.5% of U.S. sulfur production. CITGO also ranks 17th in the global refining industry for sulfur production. Sulfur is used in fertilizer production, chemical industries, metal manufacturing, rubber processing, and various industrial applications.

These achievements demonstrate CITGO's operational efficiency, asset value, and highly skilled workforce. Furthermore, they highlight its forward-looking management approach, which meticulously contributes to fulfilling business plans and expansion projects.

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