

NPC: Sustainability of petrochemical industry hinges on innovation



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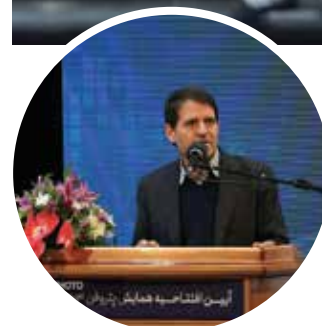
The managing director of the National Petrochemical Company (NPC) believes that the sustainability of the petrochemical industry depends on innovation, describing it as a significant market for domestic manufacturers. Speaking on Sunday, December 22, at the opening ceremony of the "PetroFan 1403" conference, Hassan Abbaszadeh noted that the petrochemical industry is a critical link in the oil value chain, deeply intertwined with technology. "It is impossible to engage in this industry's processes without access to the necessary technology," he said. Abbaszadeh explained that Iran's petrochemical industry has reached middle age, adding, "Innovation is essential for our survival in this field. Many of the processes in the petrochemical industry are outdated and need to be modernized. We must focus on upgrading and improving these processes."

Referring to the industry's trade dynamics, Abbaszadeh stated, "The petrochemical industry exports approximately \$15 billion worth of products annually, while importing goods and equipment costing around \$2 billion. Of this, \$700 million is spent by subsidiaries of the Persian Gulf Holding Company, presenting a significant opportunity for domestic production." The NPC head went on to say that, "Additionally, around \$2 billion worth of petrochemical products not currently produced in the country are imported each year. A major reason for this is the lack of technical knowledge for producing these products." To address this issue, the NPC has introduced 20 value chain project packages. "These projects have been provided to petrochemical companies and investors and are underway. Some technical knowledge is being introduced for the first time, but there is still more work to be done," Abbaszadeh said.

Highlighting the importance of localization in the petrochemical industry, the official noted, "To achieve this, the company has established a new management department focused on research, technology, and domestic production. This department identifies capable new technology-based firms (NTBFs) and connects them with petrochemical firms to reduce foreign currency outflow and strengthen local capabilities." Abbaszadeh also stressed the importance of collaboration among petrochemical holdings. "We aim to increase cohesion and interaction among petrochemical holdings to optimize synergies within the industry," he added.

Developing completing value chain

Abbaszadeh also on Saturday, December 1, underscored the role of the petrochemical industry in the country's economic and industrial development, announcing plans for the second phase of the Petrochemical Special



Economic Zone, saying "This initiative aims to ensure balanced growth while completing the value chain." Speaking at the induction ceremony of the Petrochemical Special Economic Zone Organization CEO, Abbaszadeh described the petrochemical industry as a key driver of value creation and economic development. "In line with the Leader's directive to prevent raw material exports and complete the value chain, the industry is leveraging all available capacities for balanced growth," he said. He noted that Iran's petrochemical production capacity has

reached nearly 100 million tons. "With development programs outlined in the Seventh Development Plan (2024-28), we aim to achieve a 30-million-ton increase, raising total capacity to 131 million tons," the NPC head added. Abbaszadeh highlighted the region's strategic importance, stating, "Iran's petrochemical industry is a regional leader, and Mahshahr serves as a critical hub, producing essential and practical products."

Domestic consumption of Mahshahr products

"Most products produced by the Petrochemical Special Economic Zone are used domestically," Abbaszadeh said, noting that a diverse range of feedstocks enables petrochemical plants to meet the country's needs. He also pointed to the importance of projects such as NGL 3100, which will soon be operational, emphasizing its pivotal role in supplying feedstock to the Petro-

chemical Special Economic Zone. The NPC managing director stressed the importance of supporting the local community, maintaining safety and security in the area, enhancing industrial and social infrastructure, and effective measures for the second phase of the region's development. Abbaszadeh called for greater private sector investment in the petrochemical industry. "We must create favorable conditions for attracting investors and avoid imposing unnecessary restrictions," he said. He also highlighted the development potential of the second phase of the Petrochemical Special Economic Zone, noting its capacity to boost the local economy and create jobs. "The Petrochemical Special Economic Zone is ready to collaborate with organizations and government bodies. We must use all available capacities to serve the honorable people of the region," Abbaszadeh stated.

Iran in dire need of all-inclusive insights to achieve 30m-ton hike in petchem output

By Reza Abesh Ahmadi
Staff writer

Iran's petrochemical industry stands as a cornerstone of the national economy, with a production capacity of nearly 100 million tons annually. Leveraging vast reserves of natural gas and oil, the country has developed an extensive network of production facilities, pipelines, and export terminals. Major hubs like Mahshahr and Assaluyeh are pivotal in producing key petrochemical products, catering to domestic demands and international markets. However, despite its potential, the industry faces challenges, including outdated infrastructure, international sanctions, and gaps in adopting cutting-edge technology. In recent years, the industry has been strained by limited access to advanced machinery and materials due to trade restrictions. Many facilities rely on aging equipment, leading to inefficiencies and higher production costs. Furthermore, global shifts toward sustainability have intensified the need for Iran to align its petrochemical operations with environmental standards to maintain its competitive edge. To address these challenges, Iran needs to initiate measures to modernize its facilities, diversify its product portfolio, and invest



in research and development. Despite these hurdles, Iran remains a regional leader in petrochemicals. The country's Seventh Development Plan (2024-28) outlines ambitious targets, including a 30-million-ton increase in production capacity, raising the total to 131 million tons. Achieving this goal requires adopting innovative technologies and fostering international partnerships to overcome technical and operational challenges.

Rising energy demand, industry pressures

With global energy consumption projected to rise by up to 60% in the next 30 years, Iran's petrochemical sector must address escalating demand. Traditional

energy sources are increasingly under pressure, compelling scientists and industry leaders to explore new methods to enhance production efficiency. The sector's future hinges on integrating sustainable practices and groundbreaking technologies to ensure environmentally friendly operations and products.

Role of nanotechnology in transformation

Nanotechnology has emerged as a game-changing tool in addressing these challenges. By enabling precise manipulation of materials at the molecular level, nanotechnology has opened doors to new possibilities in refining and production. Nanomaterials (NMs), with their superior physical, thermal,



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and chemical properties, are driving innovations across the petrochemical industry. From improving catalytic efficiency to enhancing corrosion resistance, these materials are reshaping the sector.

Catalysts: Enhancing reaction efficiency

Catalysts are vital in refining processes, accelerating chemical reactions without being consumed. Nanomaterial-based catalysts, characterized by their high surface area and porosity, significantly boost reaction efficiency and reduce energy consumption. These advancements play a crucial role in optimizing the conversion processes in refineries, ensuring higher yields with minimal waste.

Addressing industry challenges with nanomaterials

Iran's petrochemical industry has faced several operational challenges, including pipeline corrosion, and inefficiencies in reaction processes due to ordinary materials. Nanotechnology provides innovative solutions, such as nanomaterial-based corrosion inhibitors and gas sensors. These materials offer superior durability, resistance, and precision, addressing long-standing issues and enhancing operational safety and reliability.

Broad applications of nanotechnology

The integration of nanotechnology spans the entire value chain of the petroleum industry. From

enhancing drilling fluid performance to improving oil recovery methods and refining processes, nanomaterials have proven invaluable. Despite these advancements, comprehensive research into the combined applications of nanomaterials remains limited, highlighting the need for focused studies to unlock their full potential.

Future research and development

A detailed exploration of nanomaterial synthesis techniques and their applications in petrochemical operations is essential for driving progress. Such research will not only improve exploration and recovery efficiency but also offer insights into managing extreme conditions, ensuring the industry's sustainability and growth.

Building a comprehensive vision

Iran's petrochemical sector stands at a critical juncture. While challenges persist, the industry has the potential to achieve significant growth through modernization, technology adoption, and international collaboration. By embracing advancements such as nanotechnology, Iran can secure its position as a leading producer in the region, fulfilling its ambitious production goals while aligning with global sustainability trends.