

How a Tiny Island in the Caribbean is Helping Feed the World

Trinidad and Tobago is a small island nation in the Caribbean with a population of 1.5 million. One of its best kept secrets may come as a surprise to many. Despite the diminutive size of the country, it plays a significant role in feeding the ever-growing global population. This is due to its long history and stable position as one of the largest exporters of ammonia in the world.

Ammonia Production Hub

Trinidad and Tobago boasts of having 11 world-scale ammonia production plants, with a collective capacity of 5.2 million tonnes per year. This production capacity places the nation among the top exporters of ammonia globally, competing and holding its own in the ammonia industry with industrial giants such as China, Russia, India, the United States and Saudi Arabia.

Linkages to Fertiliser Production

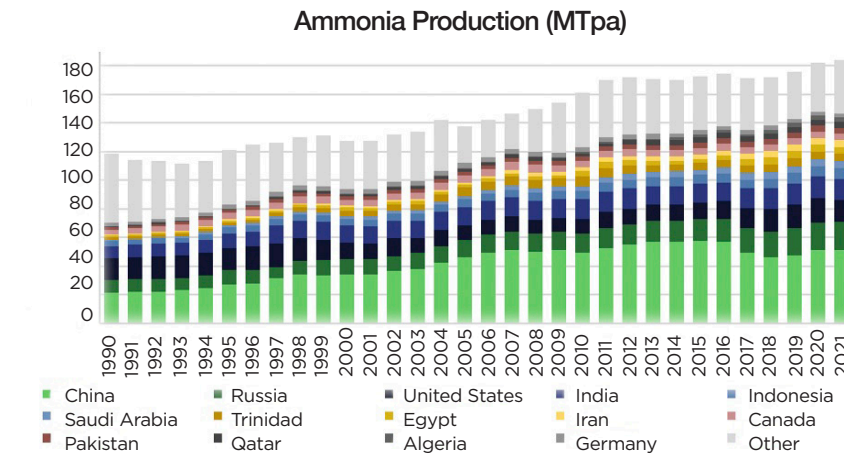
Ammonia, a compound of nitrogen and hydrogen, serves as a critical raw material in the production of fertilisers. Nitrogenous fertilisers, derived from ammonia, are crucial for enhancing soil fertility and promoting plant growth. Trinidad's ammonia output plays a pivotal role in the global fertiliser industry, supporting agricultural activities worldwide.

In 2021, Trinidad and Tobago exported \$748 million worth of nitrogenous fertilisers, ranking as the 15th largest exporter globally. The main destinations of nitrogenous fertiliser exports from Trinidad and Tobago (2021) were: United States, Colombia, France, Mexico, and the Dominican Republic.

The Global Impact of Nitrogen on Food Security

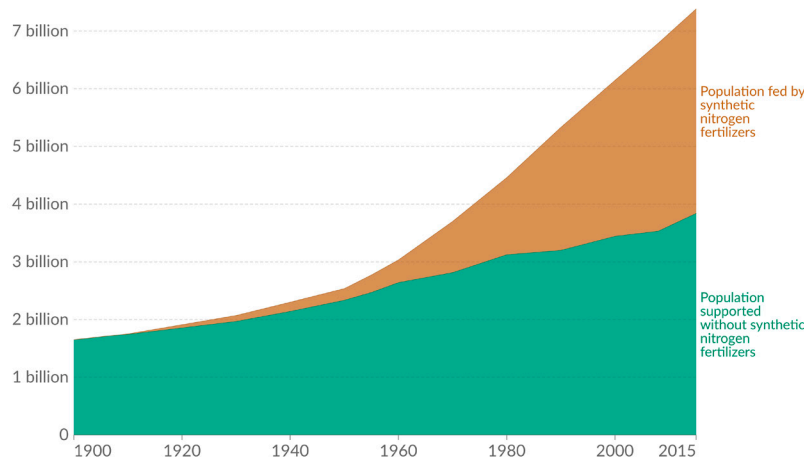
The invention and widespread use of nitrogenous fertilisers produced from ammonia have played a crucial role in significantly increasing global food production. While it is difficult to pin down exactly how many people are fed as a result of nitrogenous fertilisers, general estimates converge on a figure in the range of 40% to 50% percent of the global population of 1.6 billion in the early 20th century to nearly 7.8 billion today.

According to the IEA (2021), "Ammonia makes an indispensable contribution to global agricultural systems through its use for fertilisers. Ammonia is the starting point



World population supported by synthetic nitrogen fertilizers

Best estimates project that just over half of the global population could be sustained without reactive nitrogen fertilizer derived from the Haber-Bosch process.



Data source: Erisman et al. (2008); Smil (2002); Stewart (2005)

OurWorldInData.org/fertilizers | CC BY

for all mineral nitrogen fertilisers, forming a bridge between the nitrogen in the air and the food we eat. About 70% of ammonia is used for fertilisers, while the remainder is used for various industrial applications, such as plastics, explosives and synthetic fibres."

Ensuring Food Security Through Ammonia Exports

The link between Trinidad and Tobago's ammonia production, fertiliser exports, and global food security is undeniable. Nitrogenous fertilisers produced with ammonia from the island contribute significantly to agricultural productivity. They

enhance crop yields, improve soil structure, and ensure the availability of essential nutrients for plants.

Any disruption in ammonia output from Trinidad and Tobago could exacerbate an already vulnerable global food production system. The war in Ukraine, the stresses of climate change on water availability and variability, and the increasing prevalence of pests and diseases, have all converged to drive up food inflation, reduce overall agricultural productivity, and worsen food insecurity in regions already grappling with the challenges of feeding growing populations.

By continuing to reliably and efficiently produce and supply the raw materials for fertilisers in a stable geopolitical environment, Trinidad and Tobago acts as a steady hand in a delicately balanced global food supply system.

Meeting the Challenges of Decarbonisation in Ammonia Production

It is no secret that ammonia production is one of the most carbon-intensive industries. It accounts for approximately 2% of total final energy consumption and contributes 1.3% of CO₂ emissions from the global energy system. The direct emissions from ammonia production are currently estimated to be 450 million tonnes of CO₂, making it an emissions-intensive process. According to the IEA (2021) "ammonia is one of the most emissions-intensive commodities produced by heavy industry...it is nearly twice as emissions-intensive as crude steel production and four times that of cement, on a direct CO₂ emissions basis".

The dilemma faced by the planet is that the use of ammonia as a key component in fertiliser production is expected to continue growing to meet the demand for food, while at the same time, the urgency of reducing global carbon emissions is intensifying.

To address this dilemma, innovative approaches, such as the adoption of greener technologies like green and blue ammonia production¹, and carbon capture, storage and utilisation² (CCUS) to reduce the carbon intensity of ammonia production, will help secure a more sustainable pathway for meeting the growing demand for food across the globe.

Trinidad and Tobago is well positioned to leverage its existing infrastructure in ammonia production to deploy a transition strategy to a lower carbon model that could help the world meet its emissions reduction targets while growing more food sustainably.

Conclusion

Despite its small size, Trinidad and Tobago continues to play a crucial role in addressing the global challenge of food security. Through its significant ammonia exports and its transformation into fertilisers, the island contributes to the sustenance of agricultural systems worldwide. As the demand for food continues to rise, the role of nations like Trinidad and Tobago becomes increasingly vital in ensuring a well-fed and thriving global population while remaining responsive to the need to transition to more sustainable food systems that are resilient to the challenges of climate change.

¹ Green and blue ammonia production represent innovative approaches to ammonia synthesis with a focus on reducing carbon emissions, contributing to sustainability in the chemical industry. Green and blue ammonia production methods aim to address the environmental impact of conventional ammonia synthesis. While green ammonia relies on clean hydrogen from renewable sources, blue ammonia integrates carbon capture technologies into the production process, allowing for more sustainable and environmentally friendly ammonia production.

² Carbon capture, utilisation, and storage (CCUS) is an approach aimed at mitigating carbon dioxide (CO₂) emissions from various industrial processes and power generation. The process involves capturing carbon dioxide emissions, utilising the captured CO₂ for productive purposes, and safely storing it to prevent its release into the atmosphere.

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