

# Fertilizer Focus



**The future of the green hydrogen market**

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# The future of the green hydrogen market

Written by

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**“Hydrogen is today enjoying unprecedented momentum. The world should not miss this unique chance to make hydrogen an important part of our clean and secure energy future.”** Dr. Fatih Birol, Executive Director, International Energy Agency

The time is right to tap into hydrogen's potential to play a key role in a clean, secure and affordable energy future, the International Energy Agency (IEA) reported. For the past few years, 'green hydrogen' has been in discussion across company board rooms, government offices, and think tanks, among others. The arduous target set by different countries to take concrete steps towards reducing greenhouse gas emissions and limiting global warming has forced the world to look for fuels that can help limit

global warming. This is the driving force behind the unparalleled race to adopt green hydrogen and make it cost-effective by scaling up the technology. Green hydrogen can be produced through the electrolysis of water using renewable electricity to generate hydrogen and oxygen. The process is emission-free.

The hydrogen fuel used across industries currently is produced from burning fossil fuels. Estimates peg 6% of global natural gas and 2% of global coal are being used to produce hydrogen. In recent times,

all major economies in the world have put up their strategies around green hydrogen. Green hydrogen, produced from renewable sources, plays a crucial role in low-carbon development. It can substitute fossil fuels used in industries including fertilizers, chemicals, petrochemicals, refineries and steel units.

In the long run, green hydrogen can help solve twin problems of economies – energy security and decarbonization. Hydrogen demand by 2050 could vary from 150-500 mn t/y, depending on



ACME Group has set up the world's first integrated pilot project for Green Hydrogen and Green Ammonia plant at Bikaner in Rajasthan

global climate ambitions and the development of sector-specific activities, energy-efficiency measures, direct electrification and the use of carbon-capture technologies, said a PricewaterhouseCoopers report.

## Increasing capacities

Cost is one of the most important factors that the industry is looking at when contemplating changing its fuel source to green hydrogen. The cost of green hydrogen can compare to blue and grey hydrogen owing to the increased scale, demand and advancement in technology. The governments need to rollout policy frameworks that promote competition and innovation and attract private investments. It is noteworthy that government policies will drive the initial demand. Following that, as

**Cost is one of the most important factors for the industry**

more capacities are built, the product will become popular and customers will accept it. It will also drive private capital investments into the production of green hydrogen.

At present, green hydrogen converted to green ammonia is the most feasible commercial and technically available option to be utilized in large volumes by the fertilizer industry worldwide. Green hydrogen when mixed with nitrogen captured from the atmosphere in a cryogenic

environment produces liquid ammonia, which can be transported through pipelines or ships across continents. Currently, a significant volume of non-green hydrogen is utilized in the refining and production of ammonia, which is a base material for urea and other complex fertilizers. Currently, this hydrogen requirement is met by burning fossil fuels.

The fertilizer industry can directly use green ammonia derived from green hydrogen through renewable sources of energy. Around 80% of ammonia produced globally is used in agriculture. There is ready-to-use infrastructure and commercial trade routes for ammonia trade for fertilizer industry.

Globally, there are several studies being undertaken to expand the use of green ammonia. The global shipping industry, which is eyeing for a clean



The plant will help in saving approximately 4400 t/yr of CO<sub>2</sub> emissions

fuel to power vessels to ferry goods across continents, is finding green ammonia a viable alternative. The use of green ammonia to propel ships for several days or weeks offer an environmentally friendly solution to prevent carbon emissions.

JERA, the leading power generation company of Japan, recently called for international bids to buy clean ammonia. The company said that it is been working to reduce CO<sub>2</sub> emissions from its domestic and overseas businesses to zero by 2050, to promote the adoption of greener fuels, and to pursue thermal power that does not emit CO<sub>2</sub> during power generation.

### Collaborative efforts

Kickstarting a small share of green hydrogen to substitute grey hydrogen can create a substantial market. Gradually, with the economies of scale and innovation, green hydrogen could become a competitive fuel. Globally, technologies are evolving

## Technologies are evolving to make green hydrogen cost-effective

to make the production of green hydrogen and its derivatives cost-effective. The IEA analysis suggests that the cost of producing hydrogen from renewable electricity could fall by 30% by 2030 because of declining costs of renewables and the scaling up of hydrogen production. Fuel cells, refuelling equipment and electrolyzers (which produce hydrogen from electricity and water) can all benefit from mass manufacturing.

One of the key factors that will help reduce the cost of green hydrogen is innovation. Collaborative efforts from different governments earmarking public funds for R&D to improve efficiency and upgrade technology can help achieve the goal.

The green hydrogen revolution will inevitably take off with a policy-driven ecosystem. There is a need for incentives to manufacture electrolyzers and storage tanks, as well as funding innovative ideas that will make the clean fuel making a commercial win to replace dirty carbon-emitting fuels.

Green hydrogen and green ammonia are the fuel of the future. The key for a fast transition to clean fuel will depend on the ability of project developers to come up with cost-effective solutions that are scalable. It will also rely on the ability of the financial institutions to provide low-cost, long-term funds to set up and operate large-scale projects. The biggest energy disruption of our lifetime is well and truly underway. ■

# The role of biostimulants in innovative agricultural technology

## Increasing nutrient use efficiency and reducing fertilizer losses to the environment

Written by

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**Fertilizer has been in the spotlight on the world stage in recent years for a variety of reasons. Whether it is rising prices, demand scarcity due to global issues or its impact on the climate, NPK solutions and synthetic fertilizers continue to be under scrutiny. High prices have led to tough decisions for growers when it comes to NPK, which will inevitably impact yields, but growers know that to feed our growing global population they need nitrogen fertilizers to boost output.**

California growers, among many others around the world, struggle not only with fertilizer scarcity, but intense regulation and scrutiny of water use as their water supplies dwindle due to prolonged drought and increased populations. In these times of uncertainty around regulations, supply chain and environmental impact, innovations in agriculture must play a large role in the industry's future success.

Moving forward, growers need to couple soil health best practices, such as applying biostimulants,

## Growers need to couple best soil health practices with applying biostimulants

with fertilizer applications to ensure a higher marketable crop yield regardless of fertilizer availability. Furthermore, even with greater fertilizer availability, crops can only experience the full nutritional benefits of their environment and applied fertilizer if they have the soil health to support their nutrient absorption. Ultimately, healthy soil is the foundation of productive, sustainable agriculture.

In the broad and loosely defined biostimulant category, the goal is to look at issues currently facing the agriculture industry and ask, how can growers add value to further optimize these fertilizer programmes? How do those in the fertilizer and biostimulant field help growers get the maximum amount of yield per unit of fertilizer

applied? How do we make crops efficiently use every ounce of water available while helping the grower realize biostimulant efficiencies in increased yields?

### Soil management

While growers tend to have a robust plan for the physical and chemical management of their soil, biological management is an area that is often neglected. Soil quality refers to the structure of the soil, while soil health refers to the biology living in the soil, or the amount and diversity of soil microbes. The soil microbiome consists of different types of bacteria and fungi. The beneficial microbes are essential for the health of soil, plants, farms and our planet. However,