

GREEN AMMONIA: ENVIRONMENT

NEWS: SECI floats green ammonia tender to decarbonise fertiliser production

WHAT'S IN THE NEWS?

SECI has issued a tender to promote green ammonia production using renewable energy, aiming to decarbonize India's fertilizer sector and support clean fuel, storage, and industrial applications. Green ammonia addresses the significant CO₂ emissions of conventional ammonia production.

About the Tender

- The Solar Energy Corporation of India Limited (SECI) has issued a tender to promote the production of green ammonia, specifically aimed at decarbonizing India's fertilizer sector.
- This initiative aligns with India's broader goals of reducing carbon emissions and transitioning to clean, renewable energy sources in critical industrial sectors.

About Ammonia

- Ammonia (NH₃) is a pungent, colorless gas widely used in producing agricultural fertilizers.
- It has a sharp, suffocating odor and dissolves easily in water to form ammonium hydroxide, which can cause burns and irritation.
- Though ammonia itself is not highly flammable, its containers can explode under high heat conditions.
- It is usually transported as a compressed liquid in steel cylinders, requiring careful handling due to its toxic and corrosive nature in gaseous form.

Green Ammonia

- Green ammonia refers to ammonia produced entirely through renewable and carbon-free processes, unlike conventional methods that rely on fossil fuels.
- Decarbonizing ammonia production is essential as ammonia plays a crucial role in fertilizer manufacturing, energy storage, industrial applications, and emerging clean-fuel sectors.

Production Process of Green Ammonia

- *Hydrogen from Water Electrolysis:* Renewable energy-powered electrolysis splits water into hydrogen and oxygen, generating clean hydrogen.
- *Nitrogen from Air:* Nitrogen is extracted from atmospheric air using air separation units.
- *Haber Process (Haber-Bosch Process):* The extracted hydrogen and nitrogen are combined under high temperatures and pressures using the Haber process to form ammonia. When powered by renewable energy, this process is carbon-free.

Current Ammonia Production and Emissions

- Traditional ammonia production involves Steam Methane Reforming (SMR), which uses methane as the feedstock and releases substantial CO₂ emissions.

- Approximately 90% of the CO₂ emissions from ammonia production come from the SMR step.
- Globally, ammonia production accounts for about 1.8% of total carbon dioxide emissions.

Applications of Green Ammonia

- *Fertilizer Production:* Green ammonia is a vital input for producing urea and other nitrogen-based fertilizers, which are crucial to feeding the world's population sustainably.
- *Zero-Carbon Fuel:*
 - Ammonia can be burned in engines, serving as an alternative to diesel and marine fuels, particularly in shipping.
 - It can also be used in combustion engines and fuel cells for electricity generation, with nitrogen and water as the only by-products—resulting in a zero-carbon fuel cycle.
- *Energy Storage:*
 - Ammonia can be stored in bulk at moderate pressures or at -33°C in refrigerated tanks, making it an efficient medium for storing renewable energy over long periods.
 - With established infrastructure, ammonia can be distributed globally via pipelines, tankers, and ships.
 - *Hydrogen Carrier:* Ammonia serves as an effective hydrogen carrier, simplifying storage and transport challenges associated with hydrogen's high-pressure or cryogenic storage requirements. Ammonia can be cracked and purified to release hydrogen when needed for use in fuel cells or other applications.

Significance

- Transitioning to green ammonia not only helps decarbonize fertilizer production—a significant source of CO₂ emissions—but also positions ammonia as a crucial link in future clean energy and hydrogen-based economies.
- The SECI tender represents a major step in achieving India's commitments toward reducing greenhouse gas emissions and building a sustainable industrial base.

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