

From Bids to Breakthroughs: India's Green Hydrogen and Ammonia Auctions

Trevor Brown

Executive Director, Ammonia Energy Association

October 9, 2025

Ammonia Energy Association



Who we are

The **Ammonia Energy Association** (AEA) is a global industry association established in 2004, with staff in Australia, Netherlands, UK, and USA.

Members: 250+
global and cross-sectoral.

Our mission

To accelerate the responsible adoption of clean ammonia by promoting cross-sectoral collaboration, knowledge sharing, global standards, and supportive policies.

This presentation

1. LEAD: global project pipeline and trends.
2. Ammonia Certification System.

AEA Members: October 2025

* indicates representation on Board of Directors

PLATINUM: CF Industries*, Chevron New Energies, Copenhagen Infrastructure Partners, ExxonMobil*, InterContinental Energy, KBR*, LSB Industries*, Mitsui & Co., Monolith Materials*, Yara*. **GOLD:** ACME Group*, AFC Energy, AirGas*, Ambient Fuels*, Baker Hughes, Casale, Chemenergy Services PTE Ltd, China Energy Group, Clean Hydrogen Works, Enaex*, Eolian Energy, Equinor, Fertiglobe, Fortescue*, Hynfra, JERA, Keppel Infrastructure*, LBC Tank Terminals*, Maersk*, Mitsubishi Heavy Industries, Proton Ventures, S&P Global Commodity Insights, thyssenkrupp Uhde*, Topsoe*, Trigon. **SILVER:** AES Gener, AES Tech, Air Products, Ammonigy, Argus Media, ATCO EnPower, Bechtel, Black & Veatch, Bloom Energy, bp, Burckhardt Compression, Bureau Veritas, Burns & McDonnell, Catator, Cavendish Renewable Technology, Ceres Power, Clariant, CMA CGM SA, Copernic Catalysts, CRU Group, CS Combustion Solutions, CTi Gas Detection Specialists, DNV Energy USA, Duiker Clean Technologies*, Dyno Nobel, EcoEngineers, EIFER (European Institute for Energy Research), Enertrag, Eneus Energy, ENGIE, Fidelis New Energy, First Ammonia, GenCell Energy, Green Energy Park, Green North Energy, Greens Combustion, GTI Energy, H2K B.V., H2Site, Heraeus, HyET NoCarbon USA, Iberdrola*, IHI Americas, Indorama Holdings, ITOCHU Corporation, JGC Corporation, Johnson Matthey, Kiewit Corporation, Linde, Liquium, Lynas Rare Earths, Mabanaft, MAE Energy, Masdar, Mintal Hydrogen, Mitsui OSK Lines, MODEC, Nel Hydrogen, Shell, Starbulk Carriers, Stolthaven Terminals, Switch B.V., Synergen Green Energy, Synergy Marine Pte Ltd, Technip Energies, Trammo, Tsubame BHB, UH2, Vesta Terminals B.V., Woodside Energy. **BRONZE:** AAR Inc., ABB Inc., ACEN Australia, Advanced Ionics, Advanced Thermal Devices, AHEAD Energy*, Alslys Group, AmHyTech, Ammobia, Amogy, Antea Group, Aragon, Ark Energy, AustriaEnergy, Authentix, Avalon International, Brittany Ferries, C-MACC, Carbon-Neutral Consulting*, CDI Engineering Solutions, Chane, Chemical Market Analytics, Chiyoda Corp., Clearway Energy Group, Copenhagen Atomics*, Danaos Shipping, DENSO Corporation, DUBBL Pty Ltd., Ebara Elliott Energy, Energex Partners, Energy Invest, EnRUD Resources, Envision Group*, Eurenco, European Energy, Evrellence, Farm Synthesis, FarmN Pty Ltd, Firebird Future Solutions, Fourth Tack, Fuel Tech, Furstenberg Maritime Advisory, Future Pipe, GASMAR, GE Vernova, George Moundreas & Company S.A., GoSolar Energy, Graphitic Energy, Green Ammonia Power, H2Carrier, Hayward Tyler, Honeywell, Hunt Guillot & Associates, Ignis Group, INPEX, InterOceanic Corporation, IT Power Australia, JouleOne, Jupiter Ionics, Kearney Korea, Klingspor Energy, MadoquaPower2X, Marubeni America Corporation, Marvel-Tech, MAYEKAWA, Mission Possible Partnership, Morrison Energy, Mysore Ammonia Cold Storage, Nebraska Public Power District, NET Srl, NGLStrategy, Nikki-Universal, Northern Plains Nitrogen, NovoHy, NYK Group Americas, Oceanic Vessels, Oriental Trend, P3 Energy Solutions, Pacific H2, Pacifica Energy, Pani Clean, PepsiCo, Polyatomic Ventures, Poten & Partners, Power-to-X Analytics, PX Limited, Rhizo PTX, RTI International, RWE Supply & Trading GmbH, Samson Group, SBM Offshore*, Shrieve Chemical, SIAD Macchine Impianti, Siemens Energy, Southern Devall, Stamford Shipping, Stamford Ship Management, Statkraft, Sumitomo Corporation of Americas, SVT GmbH, Technical University of Denmark, Terrestrial Energy, TGE Gas Engineering, Thermon, TMEIC Corporation Americas, Tolerio Renewables, TRIARC Tank, Uniper, Vahterus, Venture Energy by Wah Kwong, Voltaia, Vopak New Energies B.V., Wärtsilä, Wood Mackenzie, Yokogawa Corp of America.



Low-Emission Ammonia Data



The AEA's project intelligence database – LEAD – has been available to members of the AEA since April 2022, and contains details on all the Low-emission (and Transitional) ammonia production plants that have been announced.

The database has grown quickly:

- December 2022: 103 projects
- August 2025: 562 projects (688 phases of expansion), for a total of 478.8 million tons of annual ammonia production capacity.

Projects are categorized according to technology pathway:

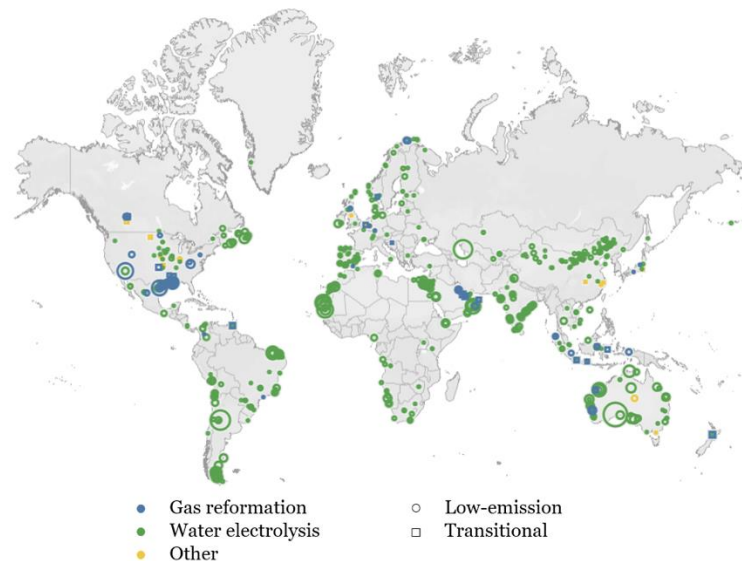
- **Gas reforming** (CCS, CCU, EOR, biogas)
- **Water electrolysis** (renewable, grid, nuclear), and
- **Other** (pyrolysis, gasification, electrochemical, byproduct hydrogen, etc).

This is publicly available at ammoniaenergy.org/LEAD

Low-emission and transitional ammonia plants

*Global announced capacity: 478.8 million tons of ammonia
2025 Q3*

By Location (Operational, Firm, Mature, Developing, Announced)



Low-Emission Ammonia Data, Ammonia Energy Association

<https://ammoniaenergy.org/lead/>

Ammonia project pipeline



**AMMONIA ENERGY
ASSOCIATION**

As of August 2025, 478.8 million tons (MT) of Low-emission and Transitional ammonia have been announced.

By 2030, 46.8 MT could become operational

- 6.5 MT is already Operational (up to Q3 2025)
- 10.8 MT is Firm (eg, under construction / FID)
- 29.6 MT is Mature (eg, offtake / EPC selected / FEED)

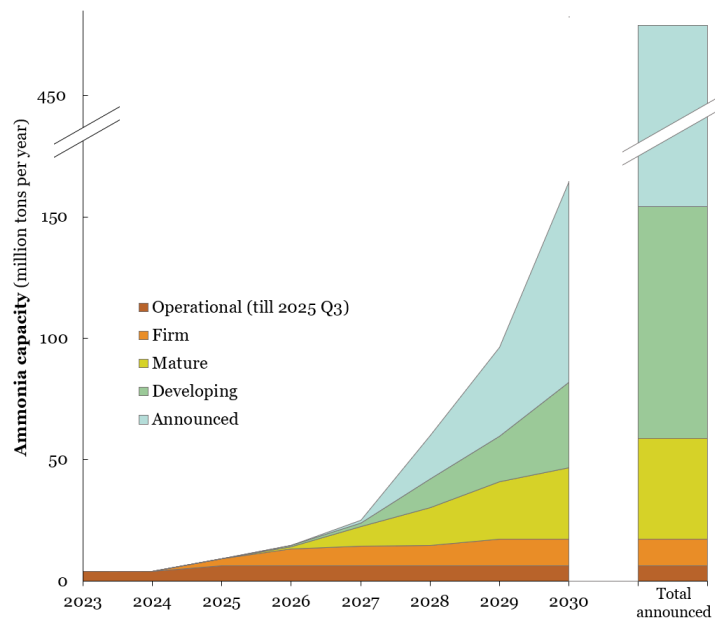
In total, 324.5 MT is classified as Announced with few public details. Another 95.6 MT is Developing (eg, making clear progress to FID), of which 34.9 MT targets to start this decade.

Key conclusions:

- Within the large funnel of projects, a significant number of projects are maturing to meet increasingly clear demand signals.
- Concrete demand, regulatory certainty and successful permitting will be required to move more of these projects towards FID.

Low-emission and transitional ammonia plants

*Global announced capacity: 478.8 million tons of ammonia
2025 Q3*



Low-Emission Ammonia Data, Ammonia Energy Association

<https://ammoniaenergy.org/lead/>

Plants by Project Type

Nearly 80% of the Operational, Firm, and Mature projects is Newbuild capacity by 2030 (37.0 MT), with only 20% representing revamps (9.9 MT). This aligns with the continued growth of ammonia production, combined with a shift of ammonia production to locations with abundant natural gas and to locations with the best renewable potential.

Newbuild projects:

- Gas reformation via autothermal reforming with full CCS, focused on long-term low-emission ammonia markets.
- Water electrolysis projects ranging from small-scale to world-scale.

Revamp projects:

- Gas reformation revamp projects typically have partial CCS (1) to comply with near-term markets in East Asia and Europe, and (2) to benefit from tax credits at production locations.
- Water electrolysis projects have 20-240 MW capacity to decarbonize 5-20% of the hydrogen supply. The exception is India, with various full revamp projects with grid connection.

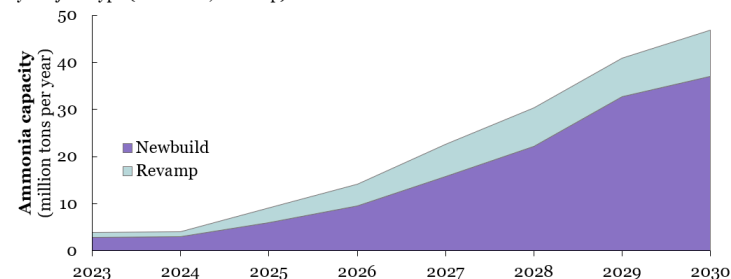


**AMMONIA ENERGY
ASSOCIATION**

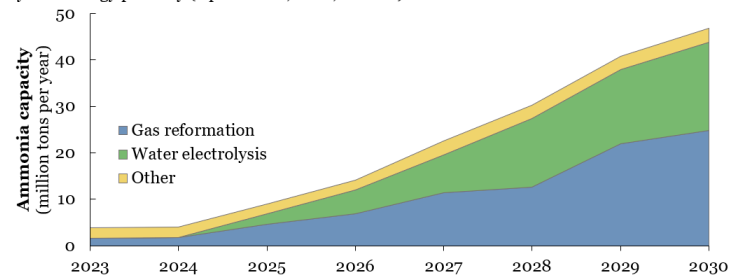
Low-emission and transitional ammonia plants

46.8 million tons of ammonia by 2030 (Operational, Firm, Mature)
2025 Q3

By Project Type (Newbuild, Revamp)



By Technology pathway (Operational, Firm, Mature)



Low-Emission Ammonia Data, Ammonia Energy Association

<https://ammoniaenergy.org/lead/>

Ammonia Certification System

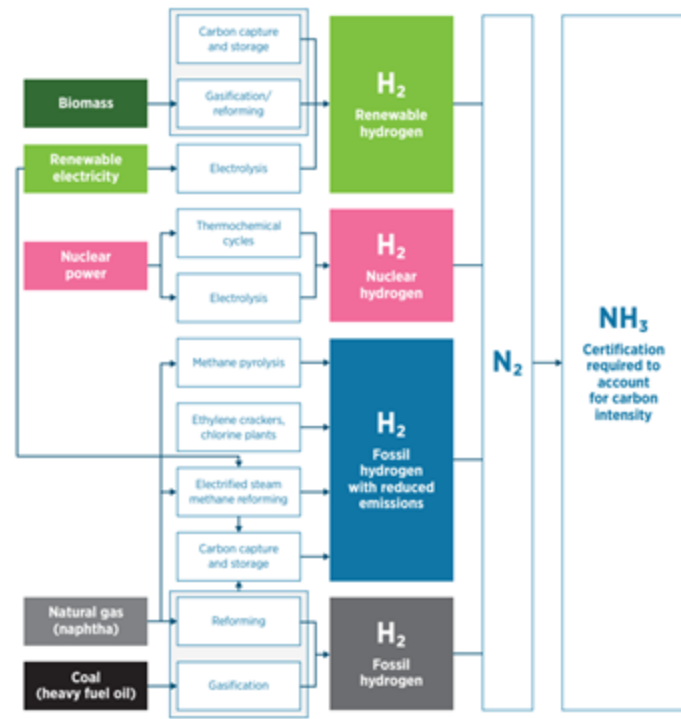


Since 2020, AEA has been developing an ammonia certification system to account for the GHG emissions associated with production. The pilot launched in September 2025, with an operational global registry.

Design Principles include:

- **Technology neutral**, including fossil, renewable, bio, nuclear
- **Absolute GHG emissions**, site-specific, measured not modelled
- **Well-to-gate** boundary, option to include supply chain / transport
- Chain of custody optionality, **Mass Balance or Book & Claim**
- **Tradable**, with certificates hosted on a credible **global registry**.

Our key objective is to support **global alignment** across multiple regions and sectors – an umbrella system, with a global registry as shared architecture, in which multiple certification schemes can co-exist (interoperability).



The Role of Certification



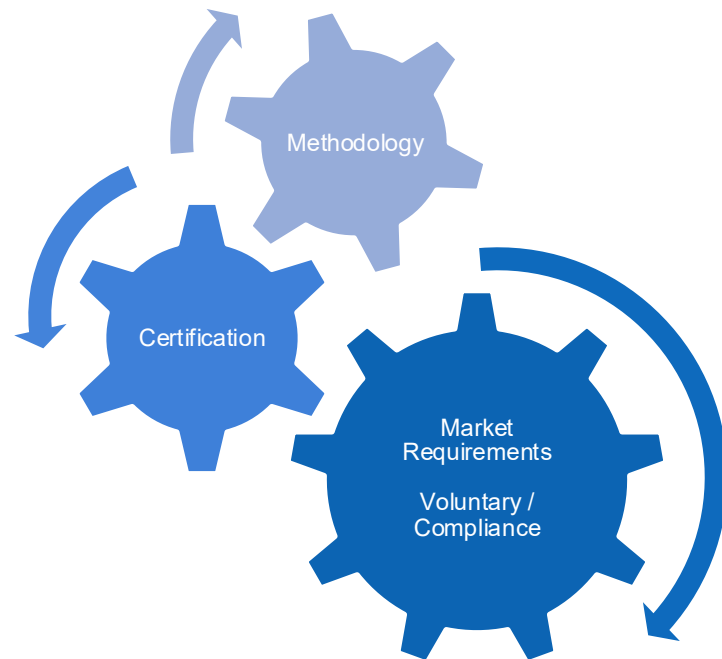
AEA is also leading the development of ISO 19870-3, to standardize the methodology for calculating GHG emissions from ammonia production.

The Ammonia Certification System is not defining colors (green/blue) or labels (clean/low-carbon, RFNBO, ZNZ Fuel). Product specifications are defined in voluntary and compliance markets by customers and regulators.

We are not certifying that the *product* is good but rather that the *data about the product* is good.

AEA aims to build market confidence by collecting robust, verifiable data, enabling producers to demonstrate relevant environmental attributes, and to transfer this data in a format that satisfies traders and consumers of ammonia – meeting the complexity of global supply chains.

While the pilot (2025-2026) focuses on voluntary markets, we built this system to support compliance markets as well.



We analyzed 39 frameworks for the certification of hydrogen and ammonia

Frameworks included policies, regulations, standards, tools, and certification schemes



POLICIES & REGULATIONS

- **California Low Carbon Fuel Standard** (LCFS)
- **Canada Clean Fuel Standard**
- **Chinese Hydrogen Standard**. Standard and evaluation of low-carbon hydrogen, clean hydrogen and renewable hydrogen
- **EU RED II: Guarantees of Origin** (Art. 19)
- **EU RED II: RFNBOs** (Art. 25,27,30)
- **ReFuel EU Aviation**
- **Fuel EU Maritime**
- **International Maritime Organization** – IMO Strategy on Reduction of GHG Emissions from Ships
- **EU Carbon Border Adjustment Mechanism** - CBAM
- **UK Low Carbon Hydrogen Standard**
- **UK Low Carbon Hydrogen Certification Scheme**
- **UK Renewable Transport Fuel Obligation** (RFNBOs)
- **UK Climate Bonds Standard**
- **US Clean Hydrogen Production Standard** (CHPS)
- **US 45V Clean Hydrogen Tax Credits**
- **US 45Q Credit for Carbon Oxide Sequestration**



CERTIFICATION SCHEMES

- **Australia Hydrogen Guarantee of Origin scheme**
- **Bureau Veritas** Ammonia/Hydrogen Certification Scheme
- **CertifHy** Certificates (EU)
- **CertifHy EU Voluntary Scheme for RFNBO (EU)**
- **Fertilizers Europe (EU)**
- **ISCC PLUS**
- **Korean Clean Hydrogen Certification System**
- **Roundtable on Sustainable Biomaterials - RSB**
- **The Fertilizer Institute**. Responsible Ammonia (US)
- **TÜV SÜD** Standard CMS 70
- **TÜV Rheinland** standard H₂21 Renewable and Low-Carbon Hydrogen Fuels



STANDARDS

- **Climate Bonds** Hydrogen/Ammonia Production and Delivery criteria
- **Green Hydrogen Standard – GH₂**
- **India Green Hydrogen Standard**
- **ISO/TS: 19870** Methodology for determining the greenhouse gas emissions associated with the production, conditioning and transport of hydrogen to consumption gate
- **IPHE** Methodology for Determining the Greenhouse Gas Emissions Associated with the Production of Hydrogen
- **Japan, Clean Fuel Ammonia Association – CFAA's** Definition of Clean Ammonia
- **Japan Hydrogen Association – JH₂A** standard
- **Japan, JOGMEC** GHG/CI guideline
- **Together for Sustainability – TFS**. Product Carbon Footprint (PCF) Guideline



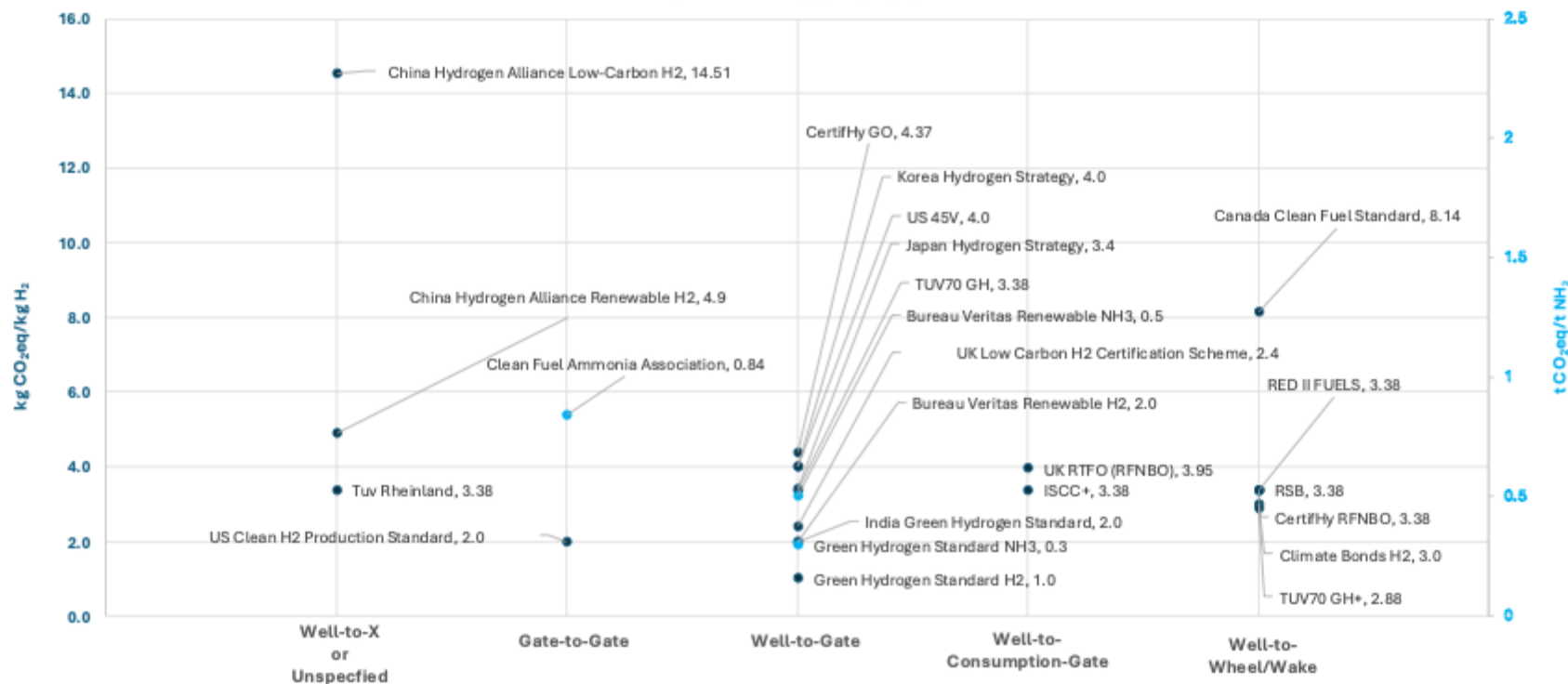
Tools & Other

- Open Hydrogen Initiative – OHI
- US 45V GREET model
- **Other Instruments**
- H₂ Global

Terminology in this area is not harmonized. Policies often incorporate specific certification schemes and adherence to defined standards. As a result, classification might be nuanced

There is little convergence in the definition (labels) for hydrogen and ammonia expressed as maximum carbon emissions thresholds

CFP Thresholds



Left axis shows emissions for H2 in kg CO₂e/kg H₂ and right axis shows emissions for NH₃ in t CO₂e/t NH₃, with a scale factor of 0.155 based on the LHV of H₂ (120 MJ/kg) and ammonia (18.6 MJ/kg)

Ammonia Certification System: Pilot operational since September 2025



Objective of the Pilot Phase: Demonstrate the key elements of the Ammonia Certification System, including carbon footprint methodology, facility audits, chain of custody, certificate transactions, and interoperability.

Participants: Open to all companies in the ammonia value chain (producers, traders, and users); applicable to ammonia produced by any method.

Timeline

- September 2025: System Documents published, Registry operational.
- October 2025: first companies signed up to participate.
- Pilot anticipated to last ~1 year.

To get involved

- E-mail certification@ammoniaenergy.org.

Thank you!

AEA Ammonia Certification System Pilot Now Operational



**AMMONIA ENERGY
ASSOCIATION**

