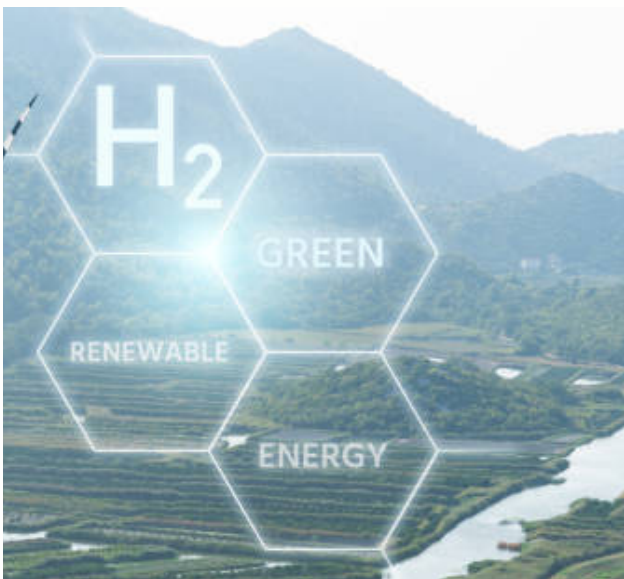




RENEWABLE AMMONIA CATALOGUE

Discover our latest products around the renewable ammonia value chain.
Explore innovative solutions for your needs.



WELCOME

Headquartered in Madrid, Asmain is a Spanish engineering and equipment supply company with a significant international presence. We excel in three primary business areas:

- 1. Marine Projects:** We specialize in ports, shipyards, and vessels, providing cutting-edge solutions to enhance maritime infrastructure.
- 2. Energy Solutions:** Our focus is on the liquid natural gas and renewable hydrogen value chains, driving advancements in energy production and optimization.
- 3. Industrial Equipment Supply:** We provide essential equipment for infrastructure projects, including pipelines, structural steel, and modified marine containers.

With over 20 years of experience, Asmain has established multiple offices and expanded into key international markets, including Europe, Asia, the Middle East, and the Americas. This extensive network allows us to serve a diverse client base and adapt to market needs and regulatory environments.

Our products are highly customizable, easy to install, and maintain. We undertake basic and detailed engineering tasks to ensure the optimal functionality of our solutions. Leveraging our international experience, we integrate global best practices and innovative solutions into our projects, delivering high-quality results worldwide.

At Asmain, our core values of integrity, innovation, and customer success are at the heart of everything we do. We strive for continuous improvement and believe in the power of win-win cooperation to achieve remarkable outcomes. Our results-driven approach ensures that every project we undertake not only meets but exceeds expectations. We are committed to embracing new technologies and innovative practices to deliver cutting-edge solutions that create significant value for our clients and the communities we serve.

Join us at Asmain, your reliable ally!

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INTRODUCTION

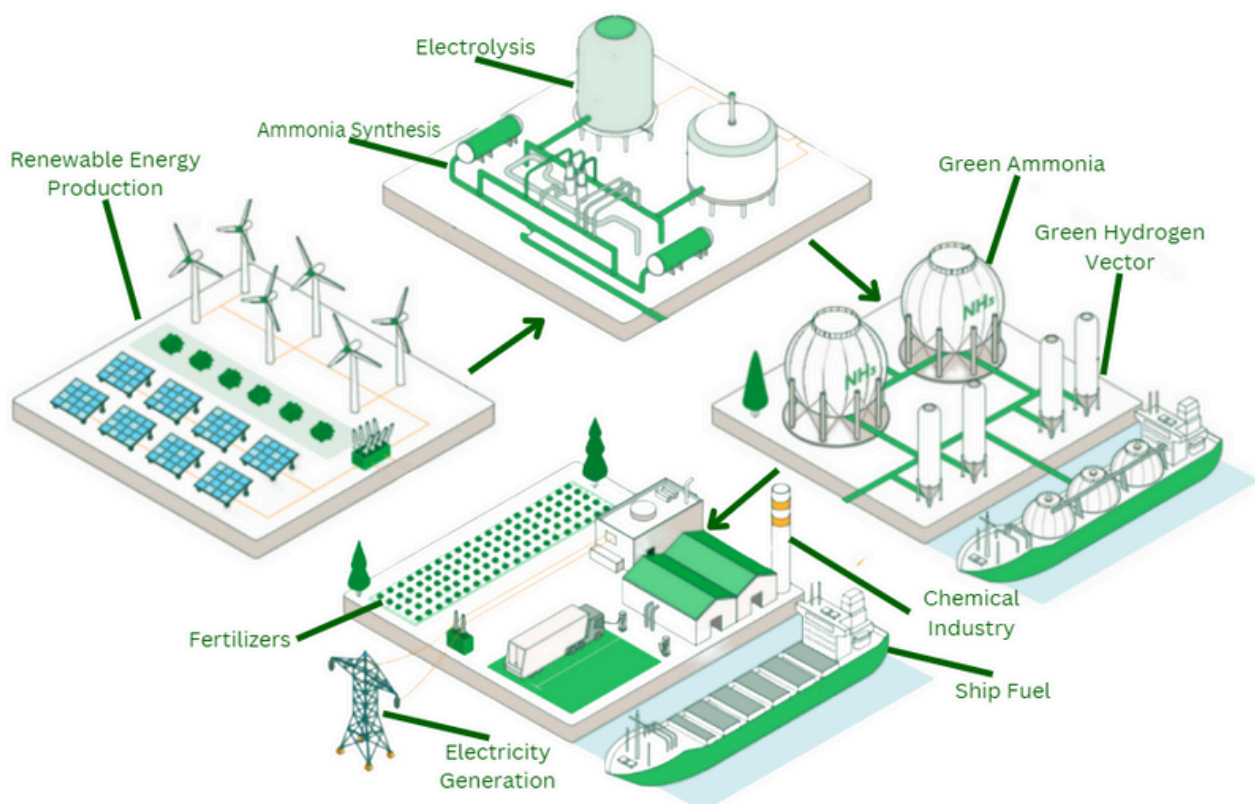
Welcome to the Green Ammonia Production Plant Section!

Green ammonia is the renewable revolution in the chemical industry. It is an emission-free alternative to ammonia produced using sustainable energy sources.

Ammonia (NH_3) is widely used in the production of industrial chemicals and fertilizers. Conventional ammonia is referred to as 'gray ammonia' due to its high emissions. Currently, ammonia is produced from natural gas, and for every tonne of ammonia produced, 2 tonnes of CO_2 are emitted.

On the other hand, green ammonia doesn't emit CO_2 in its production process. To produce green ammonia, first, we have to obtain green hydrogen through water electrolysis. Afterward, the hydrogen is combined with atmospheric nitrogen, in a process called Haber-Bosch synthesis. This process allows the nitrogen and hydrogen to react at high temperatures and pressures to form green ammonia.

The green ammonia technology could also be used as a hybrid solution to help traditional ammonia plants transition gradually, by becoming greener and more sustainable.



GREEN AMMONIA

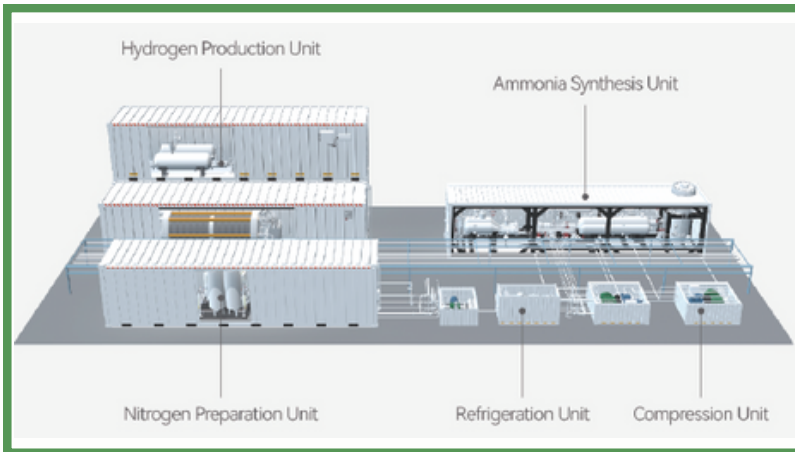
Ammonia is currently used to produce agricultural fertilizers and various chemical products. However, the emergence of green ammonia is creating new demand scenarios due to its role in decarbonizing industry. Firstly, ammonia serves as an energy vector by enabling the efficient transportation and storage of hydrogen, which involves a process to split the ammonia and recover the hydrogen. Additionally, green ammonia can be used as fuel in turbines, engines, and boilers to generate electricity and heat. Finally, ammonia could be used as fuel for ships, significantly contributing to the decarbonization of the maritime industry.



MAIN PARAMETERS OF PRODUCTION UNITS

GA-2000

Layout Dimensions



Unit	Length (m)	Width (m)	Height (m)
Hydrogen Preparation Unit	13	6	5.5
Nitrogen Preparation Unit	10	6	2.9
Compression Unit	10	5	1.7
Ammonia Synthesis Unit	12	2.5	2.8
Refrigeration Unit	6	2.5	2.5

Main Parameters

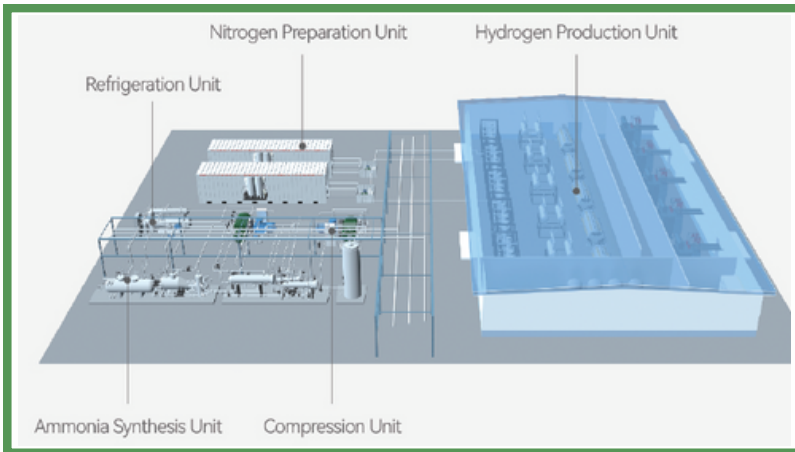
Unit	Hydrogen Preparation Unit	Nitrogen Preparation Unit	Compression Unit	Ammonia Synthesis Unit	Refrigeration Unit
Cooling Water (T/h)	80	10	5	6	20
Electricity Consumption (kWh/h)	2,500	60	55	37.5	85
Floor Area (m ²)	78	60	50	30	15

*Volume ratio of the layout: 0.75 | Demineralized water consumption of hydrogen production unit: 0.5T/h
 *All data are only for theoretical reference, and the specific data shall be calculated according to the actual project background.

MAIN PARAMETERS OF PRODUCTION UNITS

GA-20000

Layout Dimensions



Unit	Length (m)	Width (m)	Height (m)
Hydrogen Preparation Unit	60	28	10
Nitrogen Preparation Unit	15	7	4
Compression Unit	14	10	2.5
Ammonia Synthesis Unit	12	7	4.5
Refrigeration Unit	10	3.5	3

Main Parameters

Unit	Hydrogen Preparation Unit	Nitrogen Preparation Unit	Compression Unit	Ammonia Synthesis Unit	Refrigeration Unit
Cooling Water (T/h)	800	100	50	60	200
Electricity Consumption (kWh/h)	25,000	600	550	132	650
Floor Area (m ²)	1,680	105	140	84	35

*Volume ratio of the layout: 0.75 | Demineralized water consumption of hydrogen production unit: 5T/h

*All data are only for theoretical reference, and the specific data shall be calculated according to the actual project background.

ADVANTAGES

01

Integrated Design

The modular design offers a high degree of integration, facilitating transportation and installation of the modules.

02

Reduced On-Site Construction Cost

The plant's extensive prefabrication and pre-installation significantly cut down on expenses, making it a highly cost-effective investment.

03

Flexible Operation

The plant seamlessly integrates front-end power storage with back-end hydrogen storage, enhanced by automatic controls, to effectively neutralize high-frequency and wide fluctuations.

04

Short Delivery Time

We have developed 20,000 TPA and 2,000 TPA green ammonia production plants, ensuring we can deliver within 8 months at the earliest.

05

Smart System

The plant features advanced intelligent systems like electronic kanban, remote app, and video surveillance, ensuring efficient monitoring, reducing on-site operation and maintenance workload, and enhancing safety, convenience, and efficiency simultaneously.

Low Pressure Operation:
10 – 15 MPa

High Ammonia Net
Value: $\geq 12\%$

System Resistance:
< 0.3 MPa

Highly Efficient Waste
Heat Recovery

Turn-Down Ratio:
30 – 110%

THANK YOU

Thank you for exploring our Renewable Ammonia Production Plant Section!

We hope this journey has provided valuable insights into the potential of ammonia as a way to decarbonize the world around us. As we continue to innovate and drive forward the transition to a greener future, your interest and support are invaluable.

Stay connected with us for the latest updates and developments in renewable energy and sustainable transportation. Together, we can create a brighter, cleaner, and more sustainable tomorrow. Thank you once again for joining us on this journey towards an ammonia-powered future.

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