



Sector focus – Ammonia

Ceres electrolysis technology supports green ammonia

ceres[®]

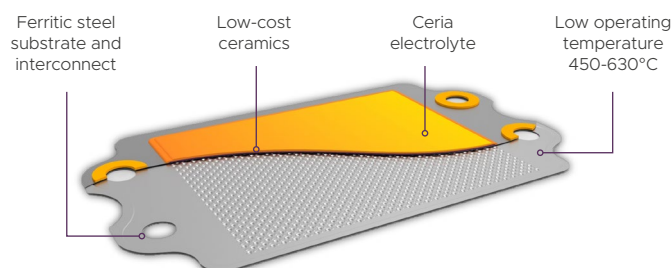
Version 1 – August 2025

Ceres' role in ammonia production

The future market for green ammonia is expected to experience significant growth driven by various factors, including sustainability initiatives, technological advancements, and increasing demand across multiple industries and territories. Cost effective green hydrogen production will be required at large scale to meet demand, with Ceres solid oxide electrolysis ready to support.

Revolutionary solid oxide technology

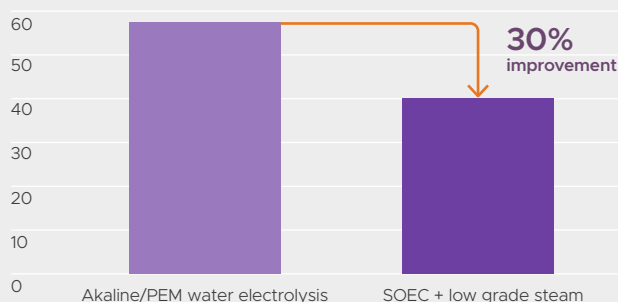
Ceres SteelCell® technology offers class-leading robustness, efficiency, and cost-effectiveness, supporting the ammonia sector with electrolyser solutions that deliver exceptional plant-level efficiency and seamless integration.



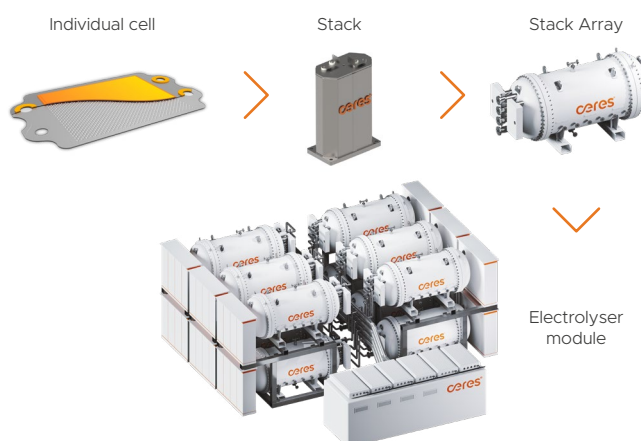
Highest efficiency drives down costs

Electrolysis using Ceres technology is fundamentally more efficient than low temperature technologies, offering ammonia producers significant savings in energy costs.

Energy required (kWh) to produce 1kg of hydrogen



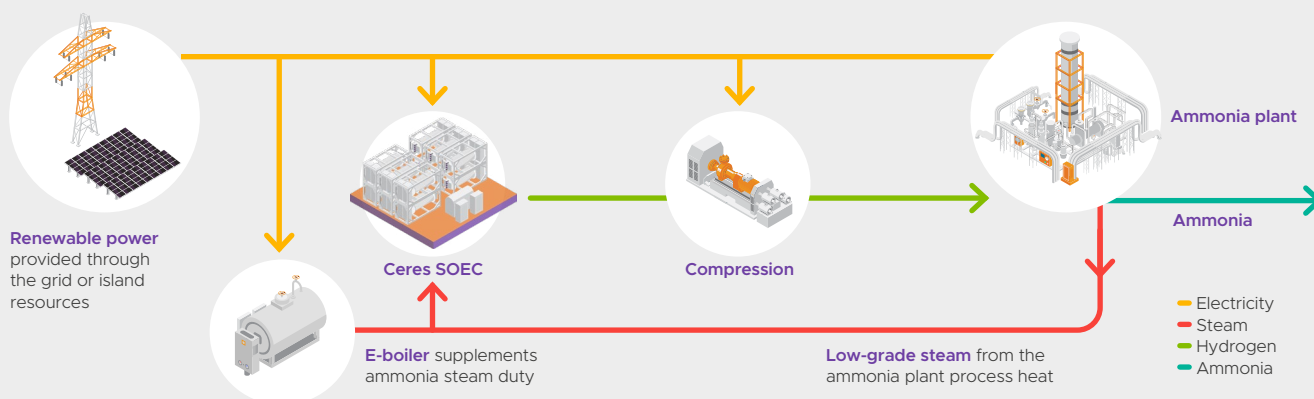
* Only low-grade ~150° saturated steam is required to achieve the added efficiency improvement



Concept **Electrolyser Module** is a standardised 9MW building block delivering 6 tonnes of hydrogen per day at 1.7bar(g).

Close integration with ammonia production

When Ceres SOEC electrolyser modules are integrated with ammonia synthesis, waste heat is used to support raising steam, maximising efficiency of hydrogen production. For projects with dedicated renewables, Ceres SOEC minimises the electrical power required.



Concept electrolyser modules have been developed to integrate SOEC-based hydrogen plants into commercial ammonia production.

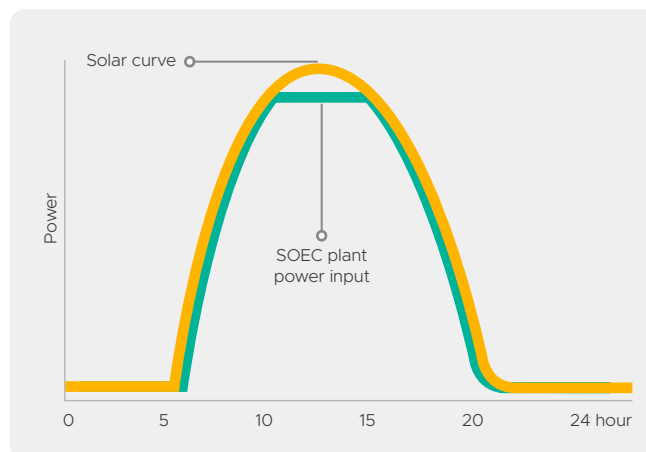
- Standardised building block supports large scale projects
- Pressurised delivery from the electrolyser module at 1.7bar(g) – reducing downstream compression complexity, CAPEX and OPEX



Ready for use with variable renewables

Ceres electrolyser modules can follow variable renewable power - maintaining high efficiency at part load and with the ability to run in a 'hot idle' condition when renewable power isn't available.

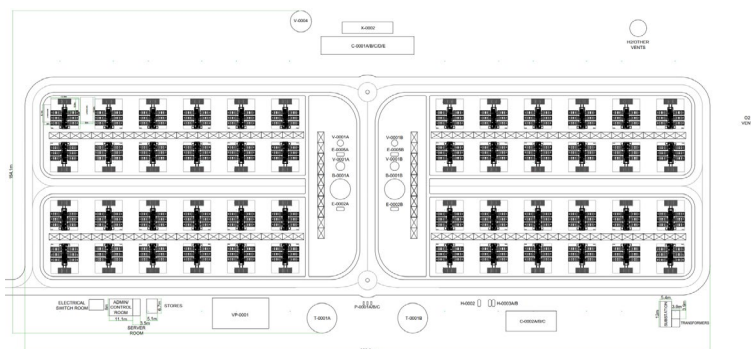
- Fast ramp up of power input to maximise use of solar power.
- Ability to use a hot idle mode overnight to allow fast restart in the morning.



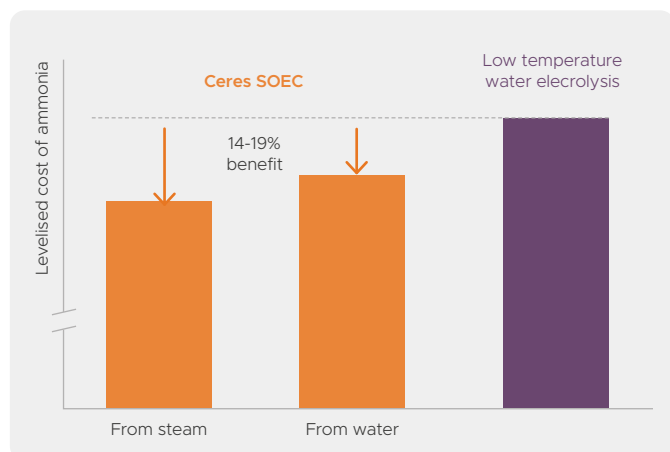
Ceres SOEC offers operational benefits

Ceres electrolyser modules are straightforward to integrate and operate in your green hydrogen plant.

- Electrolyser module does not require a dedicated building*
- Electrolyser module does not require significant cooling
- No liquid electrolyte required for electrolysis process
- Straightforward system maintenance



*In arctic conditions, a basic snow shelter is anticipated.



Ceres SOEC supports competitive green ammonia costs

Using Ceres SOEC electrolysis drives down energy costs, reducing hydrogen cost, supporting competitive green ammonia cost points for your business.

The modelling results shown indicate the positioning compared to alternative electrolyser technology.

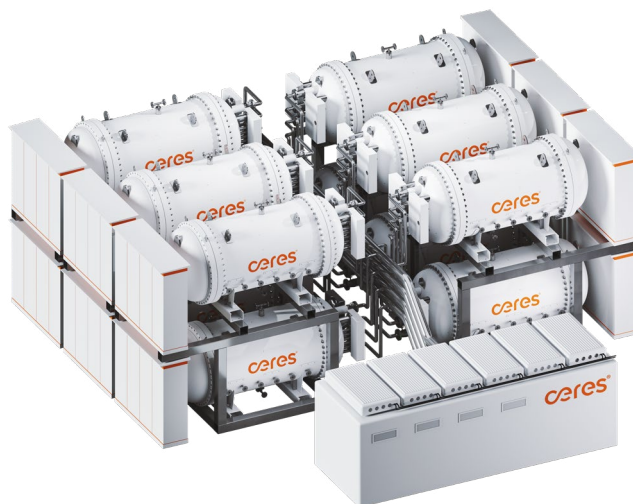
Please contact Ceres to discuss your project scenario in detail.

Key Specification Targets

The concept electrolyser module is a standardised 9MW building block delivering 6 tonnes of hydrogen per day – the target specifications are shown below.

Further details including cost indications can be found in a white paper written in collaboration with Atkins Realis.

Please contact us to discuss how Ceres electrolyzers can support your green ammonia project development.



| Target specification | Electrolyser Module |
|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| AC hydrogen production efficiency, kWh/kg (including stacks, heaters, control system, rectifier, transformer and DC control) | 37 |
| Input electrical power, MW DC (to stacks) | 8.6 |
| Input electrical power, MW AC (rectifier input to power stacks, heaters and control) | 9.2 |
| Hydrogen output, tonnes/day | 6 |
| Hydrogen delivery pressure, bar(g) | 1.7 |
| Footprint, m ² | 220 |
| Hydrogen production density, m ² /(tonnes/day) | 37 |
| Emergency shutdown | Tolerant to uncontrolled shutdowns without forming gas flow |
| Ramp up rate, %/min | 7 |
| Hot idle capable? | Yes |

* Specifications are shown as project targets, and may differ in final configurations

Contact us

About Ceres

Ceres is a leading developer of solid oxide technology: fuel cells for power generation and electrolyzers for the production of green hydrogen. Based in the UK, we partner with multinational corporations to manufacture our technology for a wide range of clean energy applications across global industry.

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