Facilitating the Hydrogen Roll-out with Ammonia Cracking

Dr. Zac Cesaro
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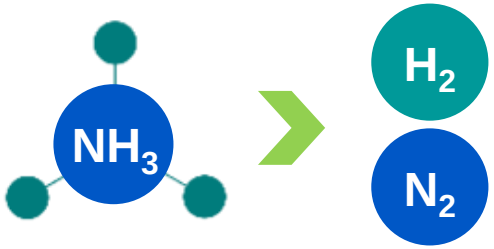
Programme Manager – Ammonia Cracking

Leveraging ammonia as a simple and cost-effective carrier molecule to overcome challenges in hydrogen supply

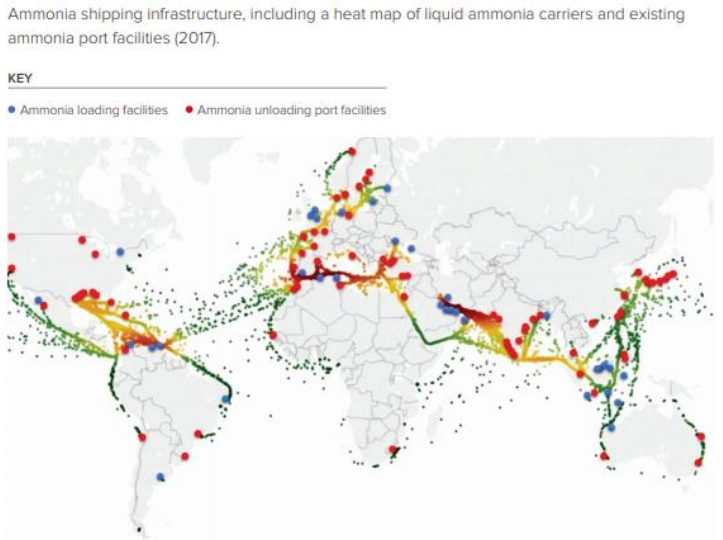
Ammonia cracking to release hydrogen **when** and **where** it is needed



- Ammonia cracking is well known process
- Used today in metal annealing processes
- New applications require H_2/N_2 separation (e.g. PEM fuel cell purity H_2)
- Safe to vent nitrogen

Ammonia benefits from a **mature**, **low-cost**, existing infrastructure

- Produced in >60 countries at all income levels
- Handled at many ports around world
- 20 Million tonnes shipped per year
- >3,000 miles NH3 pipeline in USA for farm fertiliser



Source: "Ammonia: zero-carbon fertiliser, fuel and energy store," The Royal Society, London, 2020.

Two different scales of ammonia cracking users & technologies

Decentralized | Small-scale

- Targeting higher price mobility markets
- Several VC-backed start-ups
- Markets include Hydrogen refuelling stations (HRS), onboard cracking (for ships, aviation, drones, and trucks), and off-grid power

Centralized | Large-scale

- Energy / hydrogen import – Announcements at ports (Immingham, Hamburg, Rotterdam, Antwerp, etc.)
- Green/Blue ammonia will be widely traded by 2030

  "Nearly all of (the 12 Mt) export-oriented hydrogen project plans have been announced in the last two years (are) ***choosing ammonia*** *as the preferred option"* – IEA Global Hydrogen Review 2022

InnovateUK funded AC200 £3.5m Ammonia Cracker Prototype

- **Product size**: ~200 kgH2/day
- **Partners**: Fortescue Future Industries (FFI)(Australia), GeoPura (UK)
- **Location**: Build in Newcastle (UK), operate at customer in UK
- **Timeline**: Commission in late 2023
- **Key outputs:**
  - Prove technology: H2 purity reliably met for PEM fuel cells
  - Prove business case: cost targets and customer interest validated
- **End customer**: Filling H2 tube trailers to serve GeoPura's off-grid power units at Netflix, BBC, HS2, etc.

Learn more

Photo: GeoPura Hydrogen Power Unit (HPU) at a customer site providing off-grid green electricity from green hydrogen via a PEM Fuel Cell system.

Contact

Dr. Zac Cesaro

Zac.Cesaro@siemens-energy.com

Programme Manager, Ammonia Cracking and e-fuels

Oxford, UK