Green Hydrogen in Ammonia Production

Chris Rijksen, General Manager
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Our Mission
Responsibly feed the world and protect the planet

Our Vision
A collaborative society; a world without hunger; a planet respected
Yara Pilbara Fertilisers (YPF)
One of the world’s largest single train ammonia plants
Average production is 840,000 MT
5% of world market / 15% of Yara trade

Yara Pilbara Nitrates
World’s first modular Technical Ammonium Nitrate (TAN) plant
Design capacity of 330,000mt
Yara Pilbara’s Renewable Ammonia Project

- Currently in feasibility study for project to deliver 80 tpd of ‘green’ ammonia
- Integrate green hydrogen into existing facility
- > 100MW, so over 200ha solar array required
- First step in developing a “green” ammonia market
RH₂ Integration in Ammonia production
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Steam → Primary Reformer → Secondary Reformer → High Temp Shift → Low Temp Shift

NG → Primary Reformer

NG (Fuel) → Secondary Reformer → High Temp Shift

Air → Inert Purge

Storage → Ammonia Liquification → Ammonia Synthesis

Purification → Condensation and Drying

Methanation

Solar electricity → Electrolysers

DM water → Electrolysers

PV Solar farm
RH₂ Integration in Ammonia production

Storage → Ammonia Liquification → Ammonia Synthesis

DM water → RH₂ → Solar electricity

Electrolysers

PV Solar farm
Current status of our project

• Feasibility project in execution

• Exploring opportunities with Australian and International stakeholders
  • Market
  • Synergies from partnerships for implementation
  • Liaising with the Yara International Innovation team

• And, second…is the first loser
Current status of our project

Hydrogen
Renewable Ammonia Project

Cost Comparison - Renewable H2 Vs Fossil H2
No Govt. Grant

RH2 cost driven down by lower solar and electrolysis costs, and energy storage option.

Further declines possible via very large scale and use of low cost Climate Bond funding, REC, C tax effect etc. - Not in this comparison cost

Aust Govt $ grants help cover gap
Opportunities created by Yara’s integrated business model

- Produce and distribute “green” at competitive cost
- Market for “Green fertilizers”
- Market for “Green chemicals”
- New market for Ammonia as energy vector (fuel / hydrogen carrier)