

MAKING NET-ZERO, 1.5°C-ALIGNED AMMONIA POSSIBLE



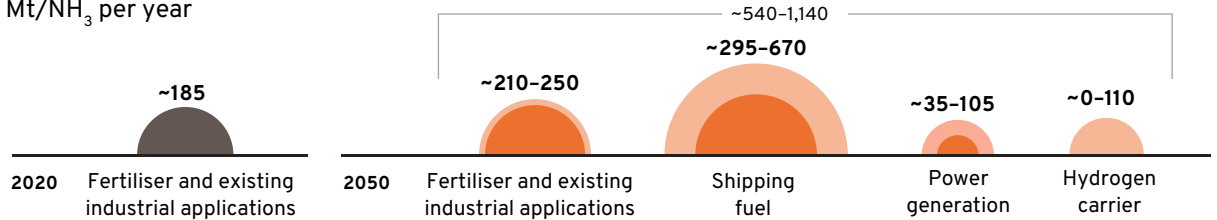
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1 Ammonia use could grow dramatically in a decarbonised economy

Ammonia demand, Mt/NH₃ per year

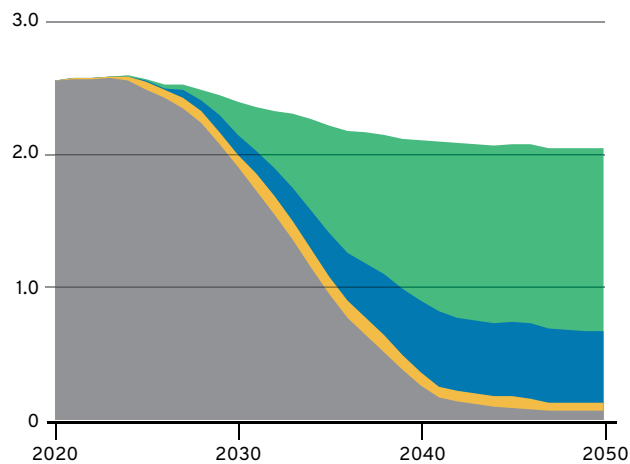
Ammonia use could grow dramatically in a decarbonised economy to enable the decarbonisation of other sectors



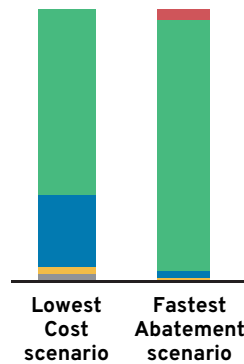
Note: The Lowest Cost demand in 2050 (580 Mt) and Fastest Abatement demand (830 Mt) lie within these ranges.

2 The solutions: Green ammonia to become the leading decarbonisation driver by 2050

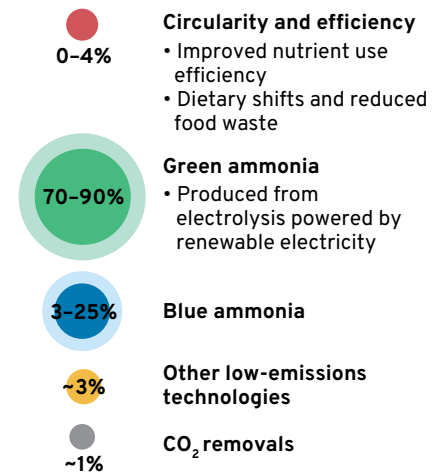
Scope 1 & 2 CO₂ emissions intensity, t CO₂/t NH₃



Share of emissions intensity reductions by 2050, %

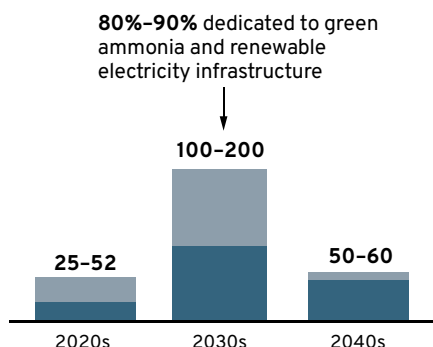


Emissions intensity reduction in 2050



3 What it will take

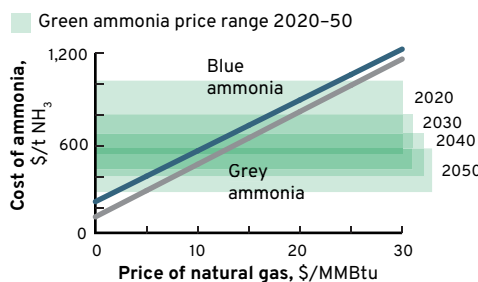
Massive investments culminating in the 2030s, billion \$ annual capital investment



Note: Compared with regular investments of \$18 billion per year (also required in a Business-as-Usual future)

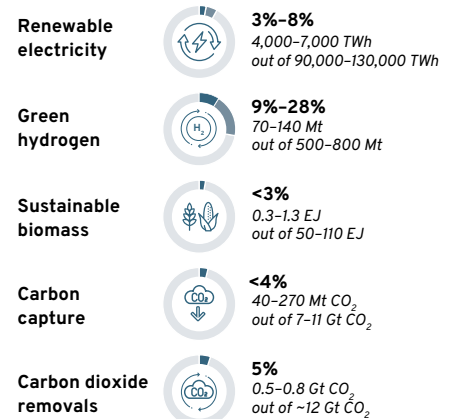
Large cost reductions in green ammonia compared with alternatives

Levelised cost of ammonia production pathways at different gas prices

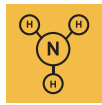


By 2030, green ammonia becomes cost competitive with blue ammonia in lowest cost regions and by 2040 in almost all other regions.

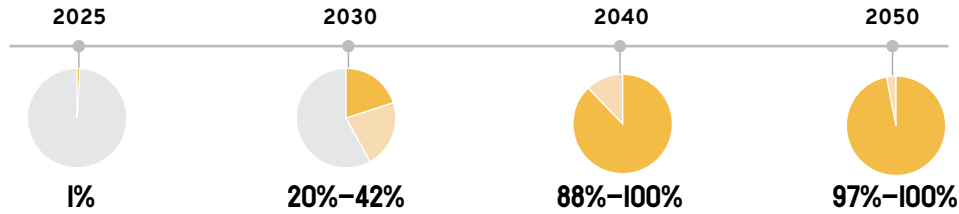
Resource requirements, share of global demand by 2050



4 Key milestones



Supply share of near-zero-emissions ammonia



Near-zero-emissions ammonia produced

=100 Mt

2 Mt

50–120 Mt

420–660 Mt

560–830 Mt



Number of green ammonia plants*

=100 plants

1

40–140

400–840

560–1,090



Electrolyser capacity for ammonia production

=100 GW

2–3

70–210

590–1,190

780–1,500



Number of blue ammonia plants*

=100 plants

1

15–25

25–180

25–210

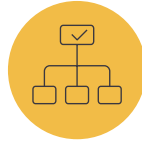
*Assumed daily production capacity of 2,000 t NH₃ and 95% capacity utilisation

5 Priorities for this decade



GOVERNMENT ACTION

- **Certify and regulate use of ammonia** for new applications as a zero-carbon energy carrier
- **Mobilise funds, grants, and loans, and expand tax credit frameworks** to de-risk electrolyser and CCS expansion (e.g., US 45Q / 45X / 45V tax credits)
- **Implement market-based mechanisms to level the playing field versus conventional grey ammonia**, (e.g., CfDs, ETSs, carbon pricing schemes, and subsidies)



SUPPLY CHAIN AND INNOVATION

- **Scale renewable energy capacity** to 300–1,100 TWh and expand electrolyser manufacturing capacity to meet the demand for 70–210 GW of installed electrolyser capacity
- **Reduce upstream Scope 3 emissions** from fossil fuel extraction by 20%–30%
- **Build all new fossil fuel-based production with carbon capture, and retrofit a fifth of existing plants with carbon capture**



AMMONIA DEMAND

- Scale demand** for near-zero-emissions ammonia this decade in the following sectors:
- **Fertiliser:** Commit to ambitious emissions reduction plans and put in place low-emissions fertiliser certifications
 - **Shipping:** Players should enter multiyear offtake agreements and collaborate to implement zero-emissions corridors
 - **Power generation and as a hydrogen carrier:** Scale ammonia transport and storage infrastructure, particularly at ports, to enable the long-distance transport of ammonia around the world



FINANCE ACTION

- **Mobilise capital** to reach average annual investments of \$25 billion–\$52 billion to scale near-zero-emissions production
- **Establish climate-aligned investment principles for near-zero-emissions ammonia production**, allowing a swift identification of assets and faster channelling of capital flows
- **De-risk investments in new near-zero-emissions ammonia production plants** via public-private partnerships