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Country traded ammonia logistics and storage, present and future

Oliver Hatfield, VP Business Development



illuminating the markets

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- **Some background on Argus data and forecasts**
- Ammonia market today and future
- Market projection
- Can we meet the challenge?

Background on Argus Media

Market coverage

- Crude oil
- Oil products
- LPG/NGL
- Natural gas/LNG
- Chemicals
- Power
- Coal
- Bioenergy
- Emissions
- Transportation
- Agriculture
- Fertilizers
- Metals

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Argus Ammonia
Formerly Argus FMB Ammonia

Issue 21-44 | Thursday 4 November 2021

EXECUTIVE SUMMARY

Prices firm, European buying interest slows

Ammonia pricing remains firm, with the Baltic November contract price setting a new benchmark in the market of \$820-822/t fob. But buying interest into Europe appears to have slowed, with the market waiting to see if production will improve in the weeks ahead and ease the supply crunch.

A drop in gas pricing late last week had increased the possibility of some European production resuming in November. But TTF prices have risen again this in the last few days and some producers are likely to wait until mid-November to reveal any potential timeline for restarting. Producers that have shuttered production are unlikely to restart plants until there is a sustained period of lower gas prices.

Contract prices in east Asia are starting to firm following last week's jump in Middle East fob pricing. A sales tender from Qatar which closed on 3 November will provide the next clear direction of pricing in the region.

MARKET DRIVERS

European production

Rising import prices, logistical delays and retaining CO₂ allowances are prompting European producers to look at resuming output at idled ammonia plants.

Baltic ammonia contracts jump \$164-166/t

Yara has settled the November Baltic contract price with two suppliers at fixed prices in the \$820-822/t fob range – a \$164-166/t rise from the October fixed price settlement. The remaining supplier has agreed on a formula basis.

Qatar tender issued

QF/Wuntajat has issued a sales tender for 24,500t of ammonia loading between mid-November and late-December. The tender closed on 3 November but has not yet been awarded.

30-60 DAY OUTLOOK

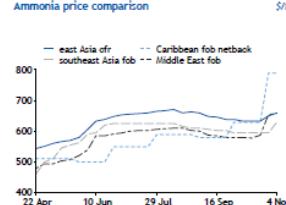
Sentiment is firm until the end of the year. Some European production has started to come back online but the market is forecast to remain tight until energy pricing has stabilized.

KEY PRICES

	4 Nov	28 Oct	\$/t
fob			
Pivdenny	710-710	710-710	▲
Middle East	605-715	590-715	▲
SE Asia and Australia spot	620-640	590-600	▲
cfr			
India	621-665	620-655	▲
East Asia (excl Taiwan)	635-685	620-680	▲
Tampa	825	825	▲

For a full list of prices, see page 2

Ammonia price comparison



DATA & DOWNLOAD INDEX

- Indian ammonia imports
- Indonesia ammonia export line up
- Middle East ammonia exports
- Pivdenny ammonia supply outlook
- Turkey ammonia imports
- China ammonia imports
- Algeria ammonia exports
- Spot ammonia sales
- Trinidad and Tobago export line up
- Morocco ammonia imports
- Maintenance tracker

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Analysis and forecasts

ANALYTICS DASHBOARD: Q4 2021

Energy headwinds raise near-term values, but new capacity and normalisation of fundamentals to ease prices in 2022

Price data (\$/t, metric)	2020	2021	2025	2030	Δ 2021	Δ 2025	Δ 2030	CAGR
fob Middle East	221	524	372	417	303	151	196	5.9pc
fob Pivdenny	204	530	354	401	326	150	197	6.3pc
fob Baltic	203	521	355	402	318	152	199	6.4pc
Operating stats (mn t/yr)	2020	2021	2025	2030	Δ 2021	Δ 2025	Δ 2030	CAGR
Global merchant capacity	49.5	50.4	52.5	51.7	-0.9	3.0	2.2	0.4pc
Global merchant consumption	41.3	43.5	45.4	45.8	2.2	4.1	4.5	0.9pc
Global trade	18.4	18.1	20.0	20.0	-0.3	1.6	1.6	0.8pc
Russian exports	4.2	3.7	4.0	4.4	-0.5	-0.2	0.2	0.4pc
Chinese imports	0.9	0.9	1.0	1.0	--	0.1	0.1	1.0pc
US imports	2.4	2.7	2.0	1.7	-0.3	-0.4	-0.7	-3.1pc
Indian imports	2.6	2.4	3.1	3.2	-0.2	0.5	0.6	1.9pc
Moroccan imports	1.9	1.7	2.6	2.7	-0.2	0.7	0.8	3.5pc
Energy prices (\$/mn Btu)	2020	2021	2025	2030	Δ 2021	Δ 2025	Δ 2030	CAGR
Henry Hub	1.99	4.35	3.32	3.94	2.4	-1.0	0.6	7.1pc
European spot (TTF)	3.17	18.10	7.58	8.69	14.9	-10.5	1.1	10.6pc
Asian LNG	4.36	20.10	8.90	10.02	15.7	-11.2	1.1	8.7pc
Oil (North Sea Dated \$/bbl)	41.60	70.50	62.20	78.20	28.9	-8.3	16.0	6.5pc

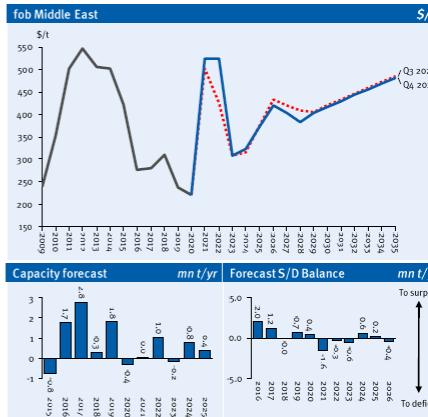
Updates

- Supply decrease: US production losses following Hurricane Ida creating additional import demand
- Supply increase: SMC and Ma'aden to bring on a combined 1.4mn t/yr of merchant capacity over the next two quarters
- Demand decrease: East Asian consumers push back on higher prices, imports likely reduced to end of year
- Demand increase: European production cutbacks off the back of high natural gas prices created additional import demand
- Cost increase: Energy price gains have led us to revise 2021 values as TTF hits highs of \$39.5/mn Btu
- Trade decrease: Plant outages dominated the narrative of 2021 and reduced 2021 trade in the face of increased demand

Fertilizers

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Consultancy

- In multiple formats, but most relevant to this forum: independent economic feasibility support
 - Appeal to sponsors and lenders

And... Argus Green Ammonia Strategy Report

Key benefits



Understand the key market and non-market influences driving the development of ammonia as a fuel.



Discover which sectors are the most promising for the use of ammonia for fuel, and why.



Develop your understanding of the economics of blue and green ammonia production, and how they will evolve in the future.



Assess the existing ammonia market, its buyers, suppliers and infrastructure.



Quantify the potential size of the future 'ammonia for fuel' market using robust underlying data developed by Argus' unique multi-commodity, multi-disciplined team.

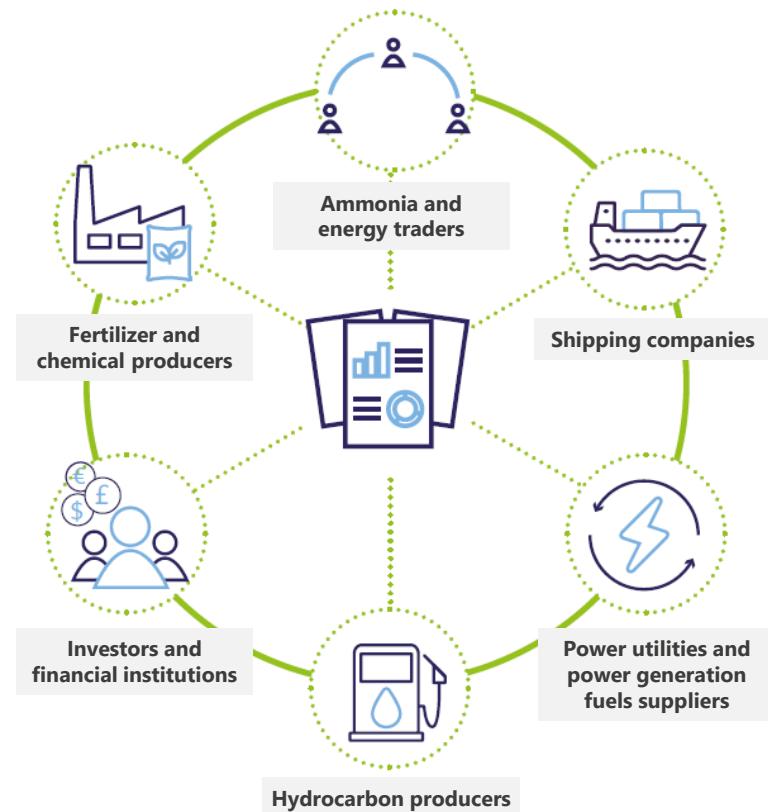


Enhance your strategy to capitalize on this fast-developing market.

Key questions addressed

- Which sectors and end-uses is green ammonia best suited to?
- How quickly will these markets develop and on what scale?
- Will these markets develop without intervention, or will regulation be required?
- What will green and blue ammonia cost to produce and how will these costs change?
- Which countries are best positioned to produce green ammonia and which country and end-use markets are they likely to serve?
- What does the existing ammonia market look like, and how capable is it of adapting to this new end-use?

Who should use this report?



Agenda

- Some background on Argus data and forecasts

- **Ammonia market fundamentals today**

- Market projection

- Can we meet the challenge?

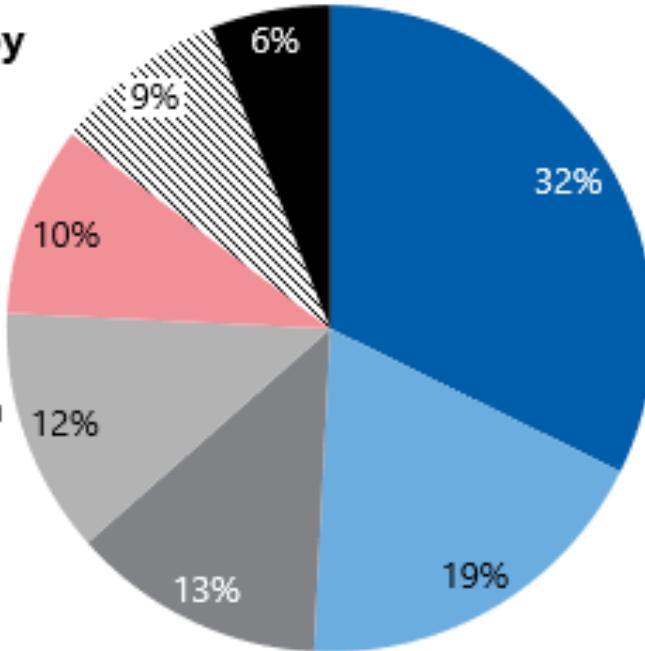
Gross ammonia market fundamentals

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Global ammonia production amounted to 178 mn t in 2020.
Around 80pc for fertilizer use and 20pc for non-fertilizer use.

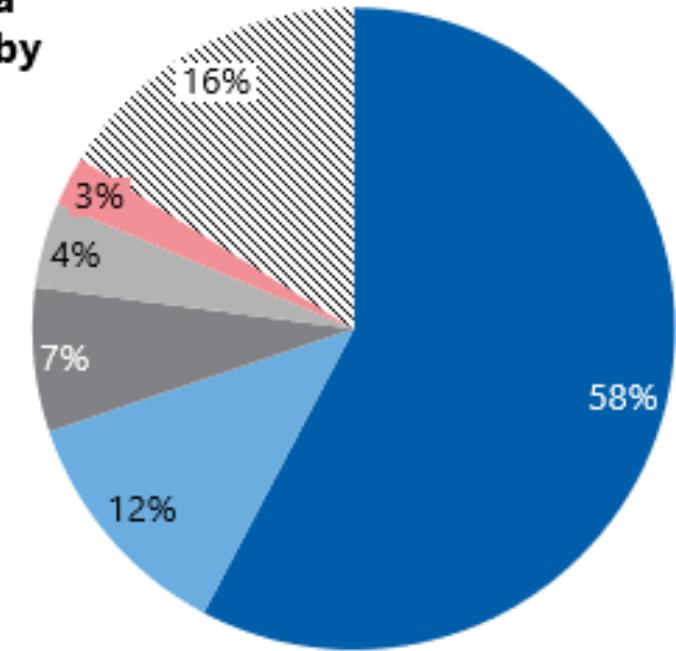
2020 ammonia consumption by region

- NE Asia
- ROW
- N America
- South Asia
- Russia & C Asia
- Middle East
- W Europe



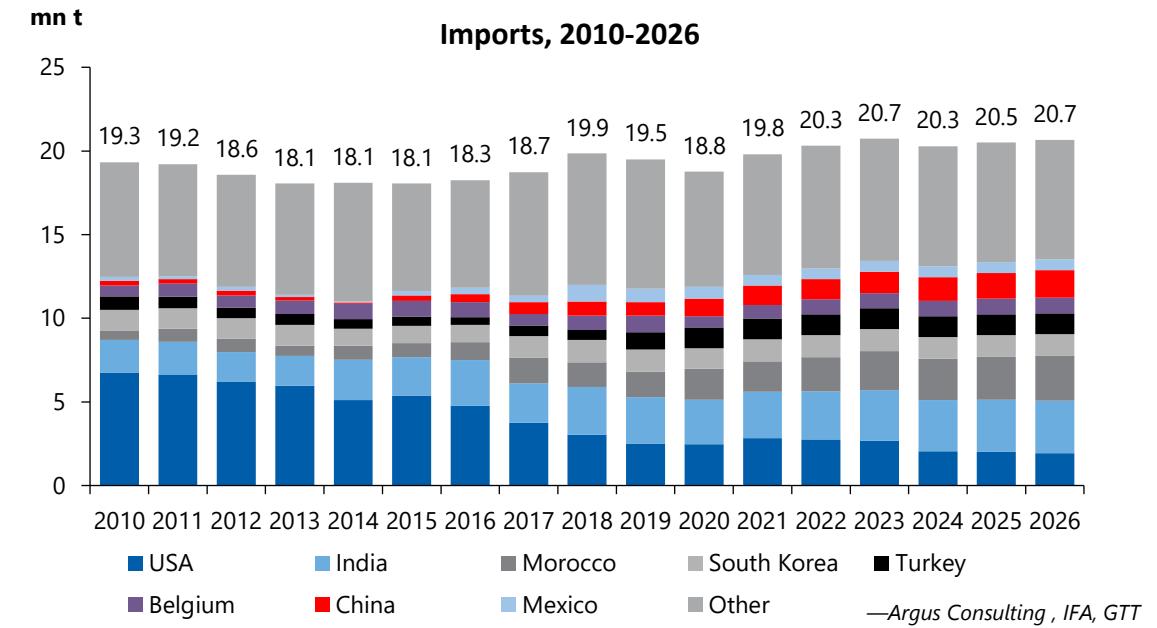
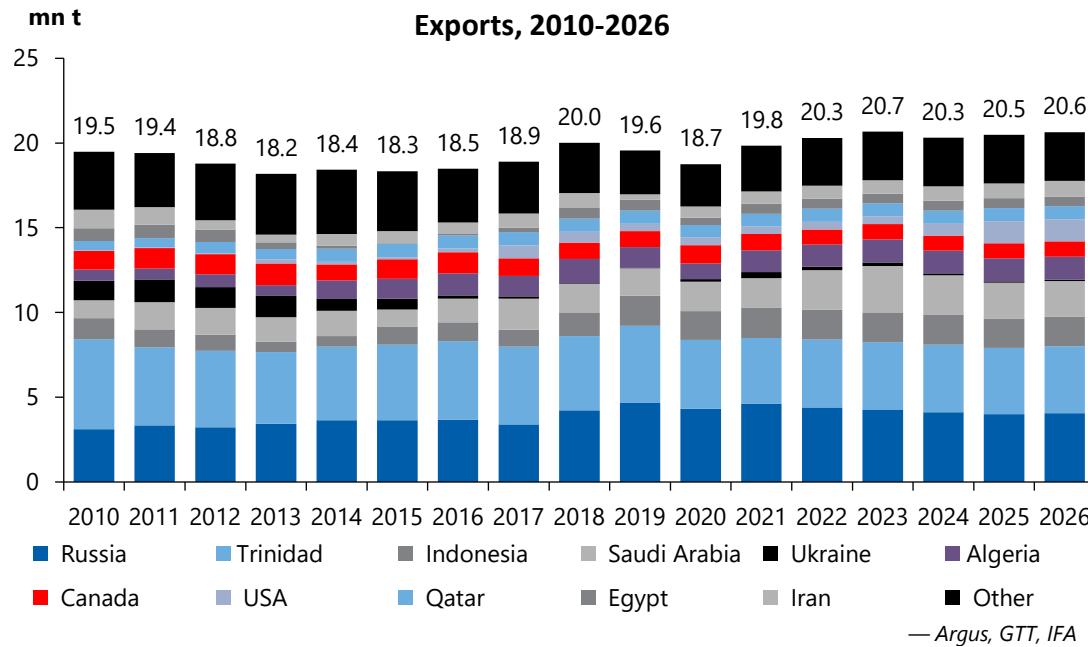
2020 ammonia consumption by end use

- Urea
- AN/CAN
- MAP/DAP
- AS
- Direct application
- Other uses



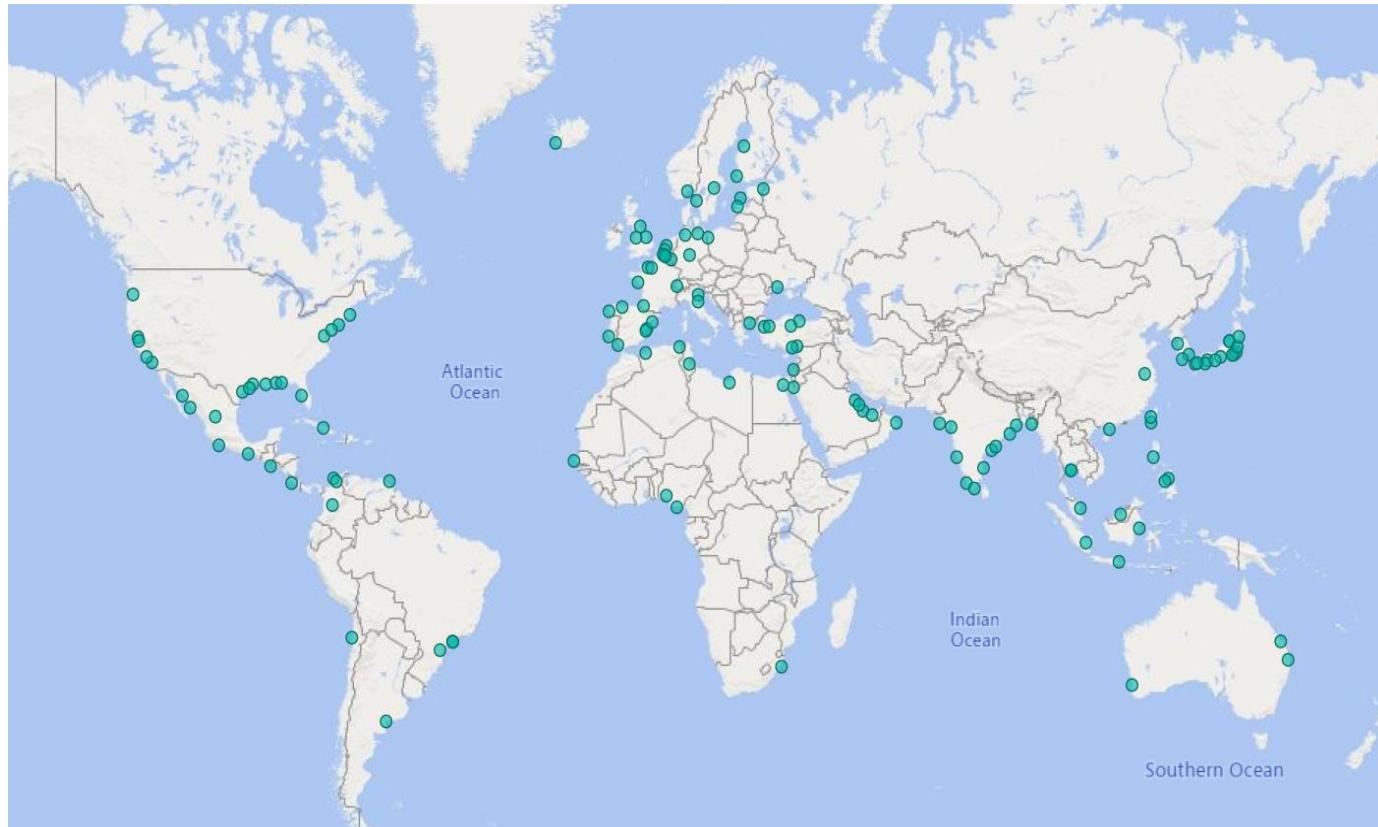
Country traded volumes: exports and imports

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Ammonia logistics

Global ammonia terminals locations

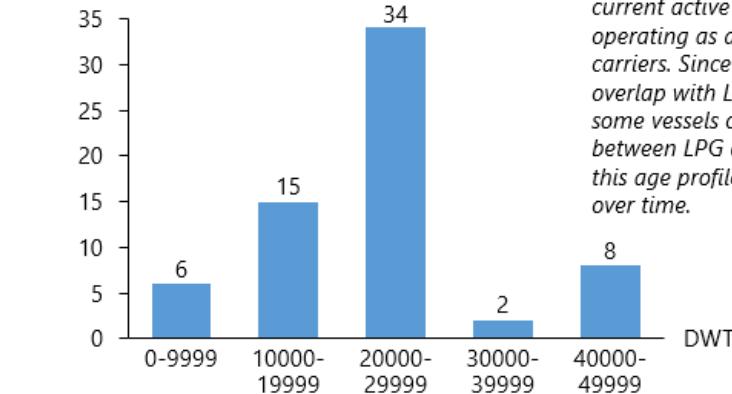


Source: Argus Media

Global ammonia shipping fleet

Ammonia carriers – number of vessels by size*

Number of vessels



*Note that this is based on current active vessels operating as ammonia carriers. Since there is some overlap with LPG (technically some vessels can switch between LPG and ammonia), this age profile might change over time.

Source: Argus, Vortexa

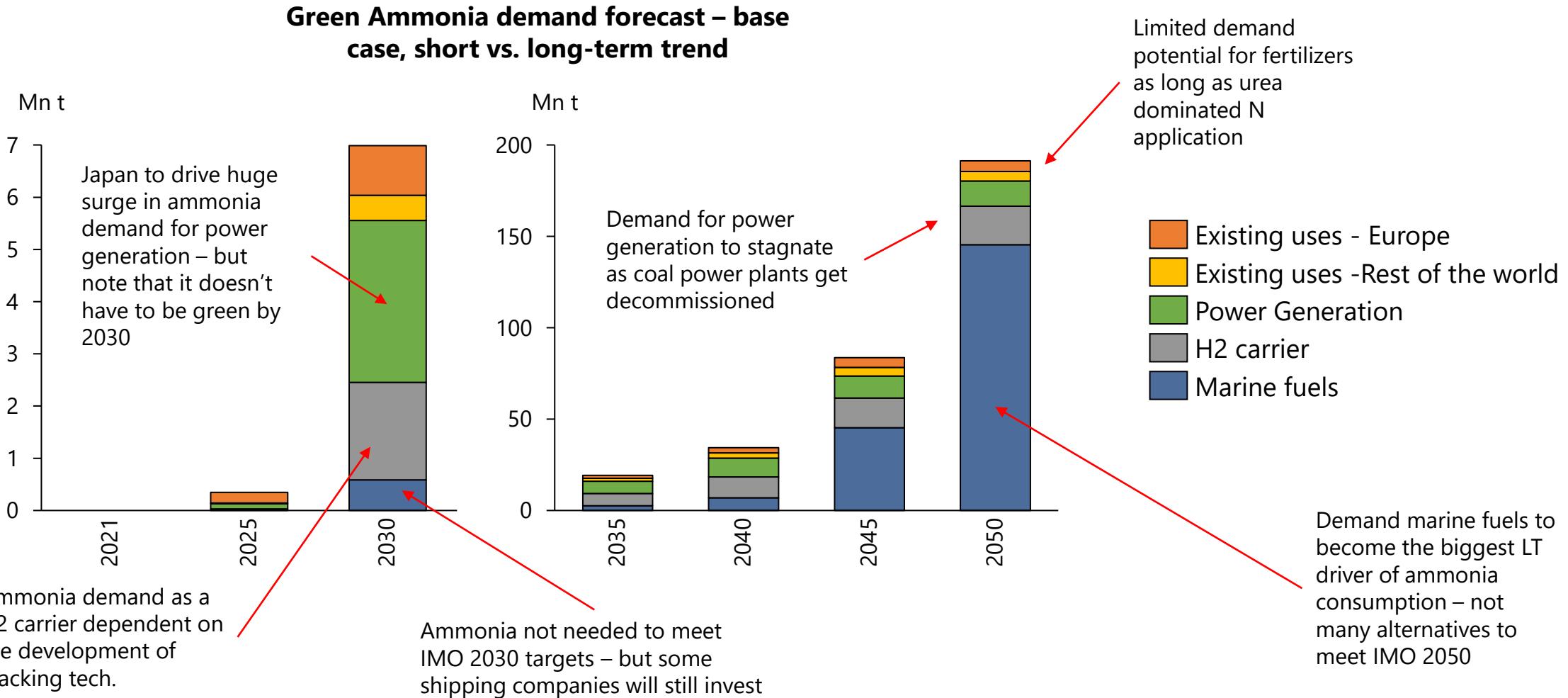
Agenda

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Green ammonia demand forecast – our base case

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Disproportionate increase in merchant market size

- Our base case indicates that the country to country traded ammonia market would grow from 18-20 mt to approaching 200mt+ by 2050
 - Upside case pushes this up to ~300mt
- This would require a massive scaling up in merchant ammonia storage and infrastructure, 10-15x

Agenda

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- **Can we meet the challenge?**

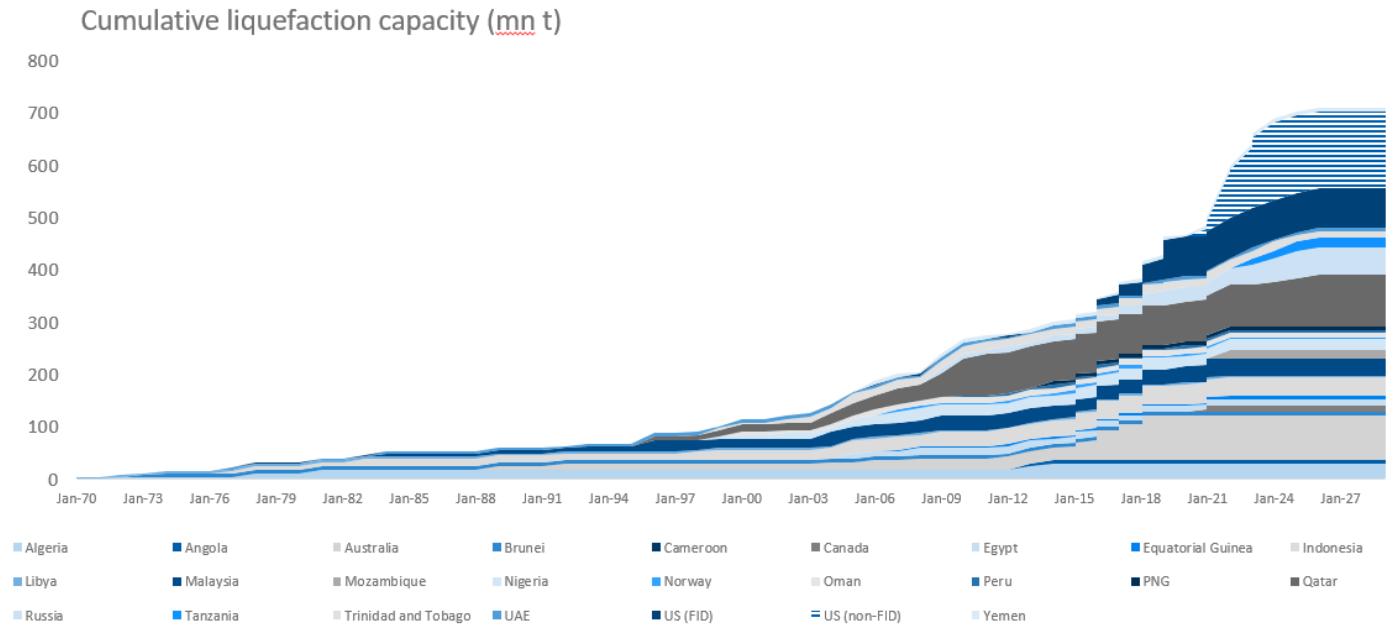
Ammonia storage and logistics are unlikely to wag the dog

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- There would appear to be no additional technical risk/safety barriers beyond those that are already present
- There are significant cost implications
 - But in future the cost of storage/transportation should be smaller % of delivered LCOA, since new green NH₃ production capex is 2-3x > grey
- If the overall business case makes sense, storage and logistics costs and considerations are unlikely to be a significant hurdle

LNG sector provides an interesting recent case study

Three waves of new liquefaction capacity



illuminating the markets

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Thank you for your attention!

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