



Annex

Assumptions and demand calculations to
support the Low-carbon Ammonia Roadmap

OCTOBER 2026

Annex A

Policy and regulation assumptions

The UK Ammonia Alliance assumes that UK Government and European Union (EU) stated policies, and implementation timelines, will remain as currently published. This includes:

UK

- The Hydrogen Allocation Rounds (HAR) – the UK Government’s subsidy scheme to support domestic hydrogen production – progress as stated. This includes HAR2 completion in 2026; HAR3 launch in 2026; HAR4 launch in 2028; and future HARs delivered from 2030 onwards.
- The Hydrogen Transport and Storage Business Models open in 2026 and the first regional hydrogen T&S network is operational by 2031.
- The Hydrogen to Power Business Model launches in 2026.
- The UK Emissions Trading Scheme (ETS) expands to include domestic maritime emissions on 1 July 2026. Emissions from offshore vessels are included from 1 January 2027. The UK ETS expands to include emissions from international maritime voyages from 2028.
- The UK Carbon Border Adjustment Mechanism (CBAM) comes into force on 1 January 2027.
- The UK Government takes the necessary action to meet its legally binding Sixth Carbon Budget, targeting a 78% reduction in emissions by 2035 against the 1990 baseline.

European Union and rest of world

- FuelEU Maritime, which came into force from 1 January 2025, remains in place. This directive requires an initial 2% annual average carbon intensity reduction for energy used on board compared to the 2020 average. This applies for vessels above 5,000 tonnes calling at European ports.
 - This rises to a 6% reduction by 2030 and 14.5% by 2035.
- International Maritime Organisation continues to develop interim guidelines for the safety of ships using ammonia as a fuel, providing an international standard. The latest guidelines were issued in February 2026.

Anticipated Policies

The UK Ammonia Alliance has also taken the position of anticipating the following come into force:

- The key policy measures set forth in the UK Maritime Decarbonisation Strategy are adopted / implemented.
- IMO Net Zero Framework is adopted in late 2026 and sets enters into force in spring 2028.
- Our base case ‘policy support’ forecast assumes that Government promptly backs a bespoke ammonia to power subsidy, with an initial round for pilot scale projects designed and launched in 2027, and two 50MW projects allocated by 2028.
- Revenue support for ammonia to power is provided at similar levels to hydrogen to power, but with a lower overall full chain subsidy intensity.

Annex B

Supply: domestic production assumptions

Summary

We expect the Hydrogen Production Business Model (HPBM) electrolytic allocation rounds to bring forward sufficient volumes of domestic green ammonia production to eventually replace the 1.1MT production capacity that has been lost.

This will enable the UK to regain security of supply for a key component in nitrogen-based fertilisers, supporting UK food security. In addition, the domestically produced ammonia can also be used for other purposes, such as chemical manufacture, marine fuel or flexible low carbon power.

This section presents a framework for securing the supply of low-carbon ammonia required to meet growing demand. Growth in demand is expected as the UK moves closer to its legally binding net zero target, particularly with new technologies using ammonia as a clean fuel or hydrogen carrier mature, and as global trade increases. The UK will secure its supply of low-carbon ammonia by balancing imports to drive near-term investment and market creation and, over the longer term, a renewal of domestic production using the UK’s abundant wind capacity. With the anticipated development of Small Modular Reactors (SMRs) across the UK, in the future there may also be the possibility for low-carbon ammonia production from nuclear power.

Breakdown of forecast HAR Volumes

Based on government published dates for nearer Hydrogen Allocation Rounds (HAR) and extrapolation for future rounds, we expect HAR timing to follow the pattern below:

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
HAR 2	Award	Construction	COD									
HAR 3	Launch		Award	Construction			COD					
HAR 4			Launch	Award	Construction		COD					
HAR 5					Launch	Award	Construction		COD			
HAR 6							Launch	Award	Construction		COD	

The time between launch and award is streamlined as allocation moves towards price-based competition instead of bi-lateral negotiation.

We forecast the following capacity being brought through:

	Round	MWe	KT/Yr	Comment
2026	HAR 2	70	55	UKAA Member Pipeline
2032	HAR 3	370	290	UKAA Member Pipeline
2033	HAR 4	280	220	UKAA Member Pipeline
2035	HAR 5	370	290	UKAA Member Pipeline
2037	HAR 6	370	290	New project development
	Total	1460	1145	

The figures for HAR 2-5 are based on actual projects in UKAA members’ pipeline, however, after HAR2 we expect there to be additional competitors with ammonia production projects. We assume one project is brought forward each round.

	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Capacity MWe	-	-	70	70	70	440	720	720	1090	1090	1460
Production Kt/Yr	-	-	55	55	55	345	565	565	855	855	1145

Wider system benefits

Ammonia is relatively easy to transport, meaning that unlike many other hydrogen demands there is a choice over where production is located. This is particularly important prior to the 100% hydrogen Project Union pipeline being built.

For example, locating hydrogen (and associated ammonia) production in Scotland, behind system constraints, reduces wind curtailment and network build requirements. Respected third party modelling shows that shifting 1.5GWe of hydrogen production behind constraints, instead of in the south of the UK, drives a £3.8 billion to £4.8 billion Net Present Value system benefit.¹



Annex C

Existing usage: fertiliser and industrial processes assumptions

Direct ammonia usage

The annual figures for direct ammonia use have been sourced from government trade statistics. Data downloaded from HMRC as of 5 May 2026 for the full 2025 trade year, showed net ammonia imports to the UK of 361,000 tonnes. As there is no significant domestic ammonia production, imports can be equated with direct current usage – predominately for fertiliser production.

Historically, the UK produced significant volumes of ammonia, and onward processed it to nitrate based fertilisers. The CF Fertilisers plant at Billingham is currently the only large-scale fertiliser producer in the UK, but it now imports ammonia rather than producing it domestically. The fertiliser manufacturing taking place at this plant represents the large majority of the UK’s direct ammonia usage.

Indirect ammonia usage

The UK uses more nitrate-based fertiliser than it produces. Therefore, the UK indirectly imports ammonia in the form of processed products, such as ammonium nitrate, nitric acid, urea and urea ammonia nitrate, calcium ammonium nitrate and other nitrogen-based fertilisers.

The UK Government estimates the total amount of nitrogen mineral used as fertiliser in the British Survey of Fertiliser Practice2 table AA1.7 (extract).

Crop year	Nitrogen kt N				Equivalent Ammonia Kt	
	England & Wales	Scotland	N Ireland	UK	Conversation factor	UK
2022	687	118	57	862	1.21	1047
2023	692	114	65	871	1.21	1058
2024(p)	690	112	70	872	1.21	1059

The amount of nitrogen mineral used is converted to equivalent tonnes of ammonia required to produce it (i.e. the mass of nitrogen in a tonne of ammonia is 14/17).

This converted figure can then be used to calculate the indirect amount of ammonia that is used by the UK, imported in the form of processed chemicals.

Indirect split	Kt NH3/Yr
Total Ammonia required for Niotrogen based fertilisers	1059
Less Net Imports	361
Indirect ammonia usage	697

Future projections

In line with conversations with various industry parties, we assume that the UK’s underlying total nitrogen-based fertiliser demand will be stable going forward. However, domestic production of low-carbon ammonia could spur investment in further UK based fertiliser plants, increasing direct ammonia demand.

Other existing usages

In future iterations, the UKAA will seek to include volumes for additional existing usages such as defence and munitions manufacturing. Therefore, the existing ammonia usage figure derived via the methodology in this roadmap is likely to underestimate current indirect usage.

Annex D

Transport: ammonia marine fuel assumptions

Summary

The forecast figures for ammonia demand for marine fuel are sourced from the Seventh Carbon Budget’s ‘Balanced Pathway’ projections. The Seventh Carbon Budget projects that fuel switching will drive shipping decarbonisation to 2050, but the balance of different fuels is uncertain. Low-carbon ammonia and synthetic methanol are the dominant fuels used in their ‘Balanced Pathway.’

In the Budget, the ‘Balanced Pathway’ is compared to a hypothetical baseline pathway, which does not include any further policy intervention or climate action, and would result in no adoption of ammonia for shipping.

However, using the ‘Balanced Pathway’, we assume that the Government puts in place the relevant policies needed to meet this Budget.

These policies could include:

- Continuing to support ammonia production via the Hydrogen Production Business Model (HPBM). Domestically produced ammonia would be well placed to serve UK shipping (domestic or international).
- Making low-carbon ammonia a development fuel and aligning Renewable Transport Fuel Obligation (RTFO) power sourcing with the Low Carbon Hydrogen Standard. At present, the RTFO provides a subsidy for marine applications, although it cannot be utilised in conjunction with HPBM. Under RTFO, use of ammonia as a fuel also receives a significantly lower subsidy than use of hydrogen as fuel. Therefore, as currently designed, the RTFO is unlikely, on its own, to bridge the cost gap of switching to low-carbon ammonia.
- Working with existing owners of ammonia storage and import terminals as key UK ports to ensure infrastructure is repurposed to allow for ammonia bunkering. There are several storage terminals at industrial ports remaining from when there was domestic grey ammonia production in the UK – there is a risk that these get decommissioned, which would be a wasted opportunity. The UK’s domestic shipping demand will require UK bunkering. More broadly, there are significant economic benefits from the UK hosting low-carbon fuel bunkering facilities.

Annex E

Ammonia to power assumptions

Summary

Combustion based ammonia to power is a fast-maturing technology with commercialisation imminent by the end of this decade. Ammonia can be easily transported, stored more cheaply, and in a greater variety of locations than hydrogen storage, and does not require the same costly pipeline infrastructure.

Small scale ammonia to power via modular fuel cells is already commercially available, and in some instances can be supported by the RTFO, however these volumes are small and therefore not included in the below forecast. If module sizes are scaled up, these could play a greater role.

Underpinning assumptions

We assume that revenue support for ammonia to power is provided at similar levels to hydrogen to power, but with a lower overall full chain subsidy intensity.

The ammonia power generation capacity brought forward will therefore be heavily influenced by the decisions of policy makers. Given the complementary advantages of ammonia to power, compared to CCUS or hydrogen to power, we believe it is rationale that ammonia to power will be supported through a funding mechanism, and therefore base our ammonia to power demand calculations on this assumption.

The roadmap utilises the projections in the below ‘Policy Support’ forecast for ammonia to power. However, given the policy uncertainty affecting this use case, we have set out below multiple scenarios for ammonia to power demand, for reference.

1. Unsupported

No change in policy. Small, immaterial volumes are brought forward via fuel cells.

2. Policy Support

				2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Tech	CF	Efficiency		New MWp installed														
Subsidy Pilot scale				Launch	Allocated													
Subsidy Commercial					Launch	Allocated R1	Launch	Allocated R2	Launch	Allocated R3	Launch	Allocated R4						
Turbine BTM	90%	53%						50	50									
Turbine Flex	30%	60%								500		500		500		500		
MWH per Tonne	LHV	5.17																
				Cumulative MW														
Turbine BTM	MW			-	-	-	-	-	50	100	100	100	100	100	100	100	100	100
Turbine Flex	MW			-	-	-	-	-	-	-	500	500	1,000	1,000	1,500	1,500	2,000	2,000
Turbine BTM	MWHe	CF	90%															
Turbine Flex		CF	30%															
MWH of NH3				-	-	-	-	-	394,200	788,400	788,400	788,400	788,400	788,400	788,400	788,400	788,400	788,400
Tonne of NH3				-	-	-	-	-	-	-	1,314,000	1,314,000	2,628,000	2,628,000	3,942,000	3,942,000	5,256,000	5,256,000
				-	-	-	-	-	743,774	1,487,547	3,677,547	3,677,547	5,867,547	5,867,547	8,057,547	8,057,547	10,247,547	10,247,547
				-	-	-	-	-	143,863	287,727	711,324	711,324	1,134,922	1,134,922	1,558,520	1,558,520	1,982,117	1,982,117
				-	-	-	-	-	144	288	711	711	1,135	1,135	1,559	1,559	1,982	1,982

Our base case ‘policy support’ forecast assumes that Government promptly backs a bespoke ammonia to power subsidy, with an initial round for pilot scale projects designed and launched in 2027, and two 50MW projects allocated by 2028. This technology exists today and is ready to be deployed.

These initial projects are assumed to be behind the meter, co-locating power with the production of green steam in industrial centres such as Teesside, Humber or the North West. This results in a high, 90% capacity factor, to maintain a constant supply of steam and power for heavy industry that runs 24/7.

A full subsidy for larger flexible grid connected projects is launched in 2028, and allocated in 2029, with subsequent rounds launched and allocated every two years, bringing forward one 500MW full scale ammonia to power turbine each round. These grid connected projects provide flexible power to complement a grid mainly powered by renewables, and therefore have a much lower [30%] capacity factor.

3. Delayed Policy Support

			2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Tech	CF	Efficiency	New MWp installed														
Subsidy Pilot scale					Launch	Allocated											
Subsidy Commercial							Launch R1	Allocated R1	Launch R2	Allocated R2	Launch	Allocated R3	Launch	Allocated R4			
Turbine BTM	90%	53%							50	50							
Turbine Flex	30%	60%										500		500		500	
MWH per Tonne	LHV	5.17															
			Cumulative MW														
Turbine BTM	MW		-	-	-	-	-	-	50	100	100	100	100	100	100	100	100
Turbine Flex	MW		-	-	-	-	-	-	-	-	-	500	500	1,000	1,000	1,500	1,500
Turbine BTM	MWhe	CF	90%	-	-	-	-	-	394,200	788,400	788,400	788,400	788,400	788,400	788,400	788,400	788,400
Turbine Flex		CF	30%	-	-	-	-	-	-	-	-	1,314,000	1,314,000	2,628,000	2,628,000	3,942,000	3,942,000
MWH of NH3				-	-	-	-	-	743,774	1,487,547	1,487,547	3,677,547	3,677,547	5,867,547	5,867,547	8,057,547	8,057,547
Tonne of NH3				-	-	-	-	-	143,863	287,727	287,727	711,324	711,324	1,134,922	1,134,922	1,558,520	1,558,520

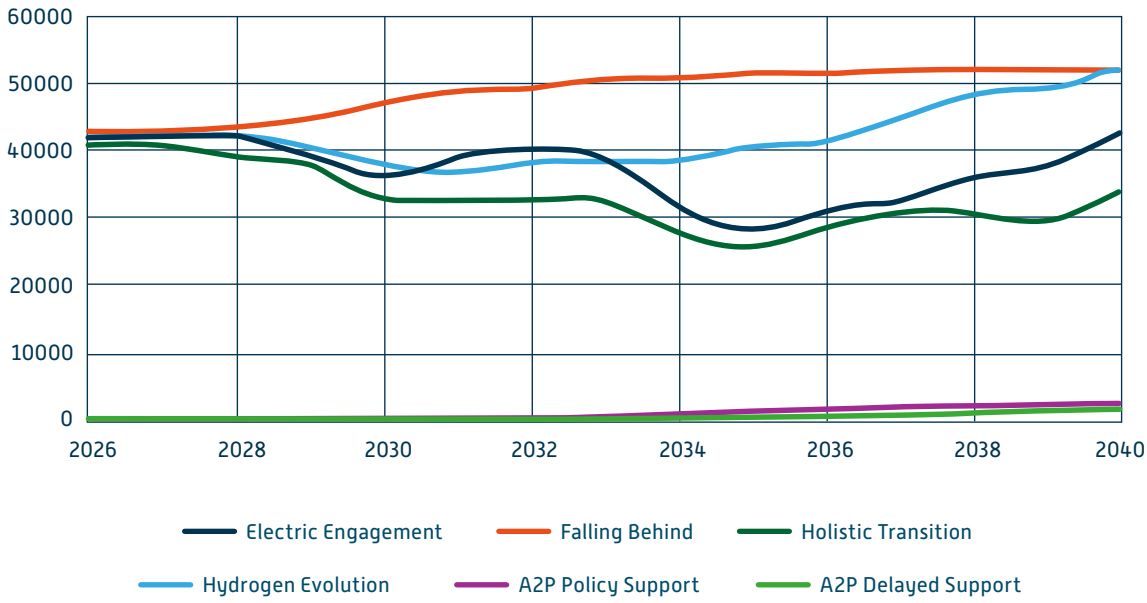
Our ‘delayed policy support’ forecast has similar assumptions to the ‘policy support’ scenario, but the pilot scheme roll out is delayed by a year, and the full scale support by two years. Projects from the fourth round are not completed until after the 2040 forecast horizon.

Why does full subsidy chain matter?

Subsidy Chain	Domestic			Imported	Gas CCUS
	CCUS H2	Electroytic H2	Ammonia	Low carbon Ammonia	E.g Teesside
Production	HPBM SP	HPBM	HPBM	—	—
CO ₂ Transport	HPBM Extra payment				DPA Extra payment
CO ₂ Storage	HPBM Extra payment				DPA Extra payment
H ₂ Transport	HTBM	HTBM			
H ₂ Storage	HSBM	HSBM			
Flex Power	H2P	H2P	A2P	A2P	DPA Availability

The hydrogen to power chain is very heavily subsidised, with CCUS hydrogen receiving six different subsidy payments, and four for electrolytic hydrogen. Teesside’s Dispatchable Power Agreement (DPA) has additional subsidy payments for CO2 storage and CO2 transport, in addition to the main availability payments. In contrast, ammonia to power would require only a single ammonia to power subsidy (plus HPBM support for domestically produced ammonia), and would still be competitive with the hydrogen to power subsidy level.

Dispatchable Power FES 2025 MW



The capacity from the ammonia to power forecasts above are plotted against the dispatchable power capacities under NESO’s four Future Energy Scenarios (FES) 2025 pathways. They equate to an average of approximately 4% or 5% of total dispatchable power by 2040, dependent on the pathway. The percentage is lower if total flexibility is considered (which includes storage assets and demand side response).



Annex F

Ammonia to hydrogen assumptions

Summary

This annex sets out the assumptions used to estimate the potential demand for low-carbon ammonia as a feedstock for hydrogen production through ammonia cracking. Ammonia cracking is assumed to be relevant to three broad sources of hydrogen demand:

- Hard-to-abate industries
- Sustainable aviation fuel production
- Hydrogen for pipeline filling

The principal focus of this annex is hard-to-abate industrial demand. These sectors are expected to require hydrogen to replace a proportion of natural gas use in furnaces, kilns, high-temperature heat applications and chemical processes, particularly where direct electrification is not technically or economically viable.

Hard-to-abate sectors

The UK Hydrogen Strategy sets out a range of illustrative hydrogen demand scenarios for 2030 and 2035. Hydrogen is considered “critical to decarbonise industrial processes that would be hard to abate with CCUS or electrification.” To meet the Sixth Carbon Budget, the industrial demand for hydrogen would need to grow to “up to 45 TWh by 2035”.

In the time since the Hydrogen Strategy was published, the timeline for the development of hydrogen production and associated infrastructure has slowed. The Seventh Carbon Budget has also since been published, which sees hydrogen play a “small but important role” in decarbonising industry by 2040. The estimates in this sector are therefore based on a ‘mid range’ of the potential for fuel switching to hydrogen and the role that ammonia cracking could play in supplying hydrogen, as set out below.

NB The UKAA is mindful that the government’s Hydrogen Strategy has since been updated and is due to be published by DESNZ “as soon as possible”. The updated Strategy will likely set out updated demand scenarios. The UKAA will account for this in future versions of the Roadmap.

The hard-to-abate sectors included in this analysis are:

- Petrochemical refining
- Chemicals and specialty chemicals
- Steel and other metals plants, including metals processing plants
- Cement
- Glass
- Bricks and tiles

For each sector, the number of active manufacturing plants operating in the UK has been identified. Each facility is then categorised according to low and high estimates of potential hydrogen demand. Taking the midpoint between the low and high estimates, has provided an average daily hydrogen demand figure measured in tonnes of hydrogen per day. This figure is multiplied by 365 to provide an annual hydrogen demand estimate. Finally, the annual hydrogen figure is multiplied by 5.68 to calculate the theoretical volume of ammonia that would need to be cracked to produce the equivalent quantity of hydrogen.

Deployment assumptions

For each of the hard-to-abate sectors, ammonia cracking deployment is assumed to begin in either 2027 or 2028. Initial conversion rates are modest, beginning at approximately 1% of relevant natural gas demand.

Conversion rates then increase steadily over time as ammonia cracking technologies are demonstrated, commercialised and adopted by a wider range of industrial users. By 2040, sectoral conversion rates are assumed to reach approximately 10% or 15% depending on the sector and the suitability of ammonia-derived hydrogen for the relevant industrial process.

This approach reflects the expectation that ammonia cracking will initially be used in targeted applications, particularly at dispersed industrial sites or sites without early access to hydrogen pipeline infrastructure. Over time, ammonia cracking could provide an important route to low-carbon hydrogen supply for industries that require hydrogen but are not located close to the first regional hydrogen transport and storage networks.

Hydrogen for sustainable aviation fuel

The UK Government has legislated for a Sustainable Aviation Fuel (SAF) Mandate. This mandate is designed to increase supply and uptake of SAF over time. The SAF Mandate came into effect in 2025 at 2% of total UK jet fuel demand. It will increase to 10% in 2030 and 22% in 2040.

The Sustainable Aviation Fuel Mandate: Final stage Cost Benefit Analysis notes that demand for domestically produced low-carbon hydrogen for the purposes of SAF production “could be between 3.9 TWh and 7.4 TWh by 2040”. Converted using hydrogen’s lower heating value of approximately 33.3kWh/kg, this amounts to a range from 117,000 to 222,000 tonnes of hydrogen per year by 2040.

Converted to range per day, this implies demand for between 320 and 610 tonnes of low-carbon hydrogen per day. The mid point of this range gives an assumed hydrogen demand of 465 tonnes per day. Multiplied by 365 days per year, this equates to 169,725 tonnes of hydrogen per year. The analysis assumes that 50% of this hydrogen demand could be supplied via ammonia cracking.

On this basis, 84,863 tonnes of hydrogen per year are assumed to come from ammonia cracking for sustainable aviation fuel production. Applying the ammonia-to-hydrogen conversion factor of 5.68 gives the corresponding ammonia requirement.

NB This analysis does not account for the estimated levels of imported hydrogen required for SAF production in the period to 2040. Government estimates that this could increase hydrogen demand to a range between 8.4 TWh and 9.5 TWh by 2040.



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