MISSION POSSIBLE PARTNERSHIP

ITA INDUSTRIAL TRANSITION ACCELERATOR

INSIGHTS REPORT | JUNE 2025

Clean industry: transformational trends

Foreword

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One year on from the launch of our first Global Project Tracker, the pipeline of commercial-scale, clean industrial projects keeps growing around the world. In the past six months, eight projects have reached final investment decision (FID), bringing the number of plants that are operational or soon-to-be to 134 globally; and 692 more projects are in the pipeline. Despite the geopolitical and macroeconomic uncertainties, momentum continues to build. This is in no small part because many companies and governments understand clean industry is an economic opportunity, not just a climate imperative. With clean industry comes the chance to boost economic development and strengthen energy, materials and food security.

Opportunities are emerging across a wide range of geographies. The clean industrial pipeline now spans nearly 70 countries. China, Europe and US still lead the way in terms of investment – with 60% of the $250 billion invested in clean industrial plants to date. But a third of announced projects are now located in emerging markets and developing economies. Just as coal once shaped industrial geography, tomorrow's energy-intensive industries will be attracted to where renewable energy is abundant. This creates new industrialisation opportunities for countries in what we call the 'new industrial sunbelt' — regions rich in solar resources, stretching from the Middle East and Africa to Latin America and Asia.

The clean industrial pipeline now spans nearly 70 countries

Yet the pace of change remains far too slow, with less than 15 projects reaching FID every year. Mission Possible Partnership's Sector Transition Strategies, published 2019-2023, indicated that 700 clean industrial plants needed to reach FID by end of 2026 and be operational by 2030 to keep industrial emissions in line with a 1.5˚ C trajectory. This target will not be met. But given the scale of the existing pipeline of projects, I am still hopeful that we can see a major step change in the coming years, which enables us to catch up with emissions cuts while reaping the full socio-economic benefits of clean industry.

Unlocking investment at scale requires solutions-focused collaboration between project developers, their suppliers and buyers, financial institutions, and governments. The Global Project Tracker enables us to spot and learn from failures and victories. Three critical success factors emerge from the data: lower clean energy and capex costs, higher demand for low-carbon materials, chemicals, and fuels, and a stable, supportive policy framework are essential to project bankability. Our work over the past year, working on the ground with project developers in diverse geographies, has shown that when corporate, finance, and government leaders come together, solutions to these three challenges are found, confidence grows, and projects move faster.

The clean industrial revolution is underway. But to unleash exponential progress, we must roll up our sleeves and lift barriers to investment for project after project—starting now.

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Acknowledgements

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Our work draws on a wide range of publicly available sources, sector-specific databases and contributions from industry experts and organisations:

- Cement and Steel Sectors: Leadership Group for Industry Transition (LeadIT)
- Aluminium Sector: International Aluminum Institute (IAI), ITA Primary Research
- Aviation Sector: Argus Media, Systemiq, ITA Primary Research
- Chemicals (Ammonia) Sector: Ammonia Energy Association (AEA)
- Chemicals (Methanol + HVC) Sector: Methanol Institute (MI)

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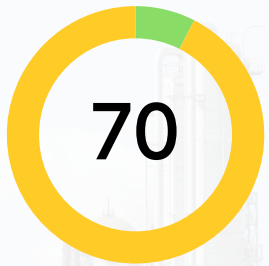
Over 800 clean industrial plants are being planned, built or are operating globally, with chemicals and fuels leading, but bringing the pipeline online will require 5x more investment

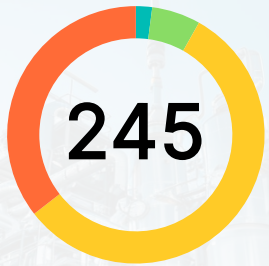
Operational | Reached Final Investment Decision (FID) | Announced | Gap vs. 2030 target

Chemicals	Chemicals	Aviation	Aluminium	Cement	Steel
Ammonia	Methanol & HVC[1]				

Number of plants vs 2030 target[2,3]



Green and blue ammonia plants

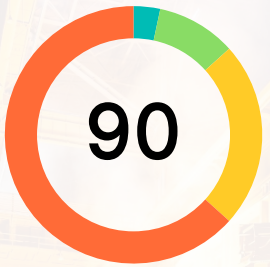


Low-emission chemicals plants

Sustainable Aviation Fuel (SAF) plants

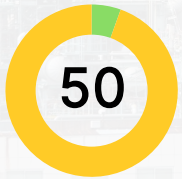
Low-emissions primary aluminium smelters

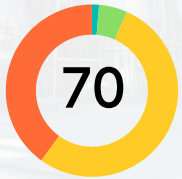
Near-zero-emissions cement plants

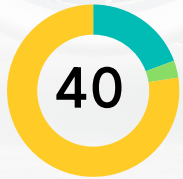


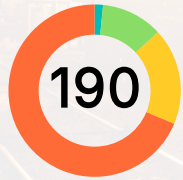
Near-zero-emission primary steel plants

Pipeline capacity (Mtpa) vs 2030 target[2,3]









Source: MPP Global Project Tracker (April 30, 2025).
1. HVC denotes High Value Chemicals.
2. 2030 targets - derived from minimum viable production capacity and number of clean industrial plants required to put each sector on a 1.5°C-aligned trajectory, per MPP's Sector Transition Strategies (STS). New revision - original targets are revised to reflect actual clean plant sizes observed in the Tracker, which are (except aviation) smaller than assumed in STSs.
3. Plants counted in progress towards the target include commercial-scale primary production near zero-emission capable assets. Please see methodology for more information.

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Clean industry transformation continues in the face of six months of intensifying global headwinds

Despite the world economy being in a state of flux...

Heightened global trade tensions and macroeconomic uncertainty

Heightened global trade tensions create a backdrop of macroeconomic uncertainty and market volatility. These tensions will affect equipment costs, impact corporate margins and cost of capital, and lower confidence in long-term trajectories, resulting in a reluctance to invest in assets with 20-year lifetimes, especially when they come with technology and market risks.

Uncertainty around policies and regulations

Major policies and regulations due to shape global markets for materials, chemicals and fuels are being reviewed, upping uncertainty:

- In the US, threats to key Inflation Reduction Act (IRA) incentives (i.e., 45V hydrogen production tax credit, 45Q CCUS credit, etc.) could disrupt financing of brownfield and greenfield clean industrial projects.
- In the EU, the Carbon Border Adjustment Mechanism (CBAM) set to be fully implemented from 2026 is now being reviewed, which could lead to market changes for European producers and producers aiming to export to Europe.

Commodity market overcapacity

Overcapacity in grey commodities is also hindering investment in new capacity, as it lowers commodity prices, making it more difficult for clean products to compete and hampering the ability of industrial leaders to invest. For example, in the steel sector, excess capacity in conventional (grey) steel (primarily in China) has led to oversupply, squeezing the profitability of companies and making it more difficult to progress clean steel projects.

...pipeline progresses steadily, yielding a significant growing opportunity

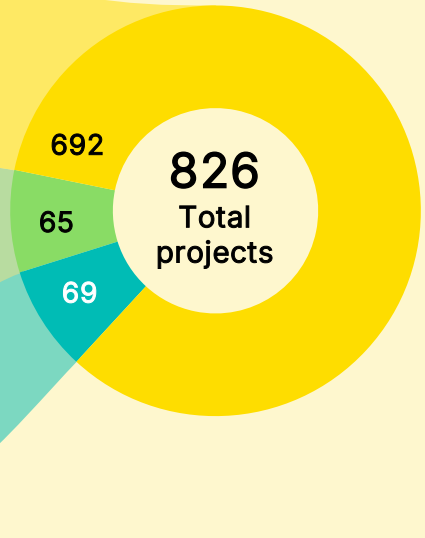
826 projects recorded across 69 countries

As of 30 April 2025, the Global Project Tracker recorded 826[1] clean industrial projects, highlighting that the clean industrial transformation is underway.

692 Announced plants
represent the majority of qualifying plants and signal the large investment opportunity across clean industry

65 FID plants
have secured a final investment decision (FID) marking a commitment to begin construction

69 Operational plants[2]
are already producing at a commercial scale



69 countries

The clean industrial transition is also widely geographically distributed, touching over a third of countries worldwide, with 69 nations hosting at least one project in the Tracker.

1. Due to updates in pipeline figures and methodology, comparisons against the previous Tracker are not directly made. Pipeline changes include newly sourced data, project pauses and cancellations. For full methodology, see Appendix
2. Over half of operational plants are in the aluminium sector, most of which are legacy clean assets

Clean industry transformational trends: key takeaways

Industry is transforming and opening up **new economic opportunities** despite global headwinds. However, clean industrial projects are **slow to move** from the drawing board to construction. To scale-up production of clean materials, chemicals and fuels, **solutions-focused collaboration between companies, financiers and governments** is needed.

Progress in clean industry pipeline steadily continues precipitating broad economic opportunities across the globe

- A total of **826** commercial-scale, clean industrial projects are now recorded in the Global Project Tracker
- Clean industry activity now spans **69 countries** across all continents of the world
- **An estimated $250bn has been invested to date** in both operational and FID clean industry plants
- Eight plants have reached **final investment decision (FID)** in the past six months, signalling continued investor confidence despite geopolitical and macroeconomic turmoil
- **Four sectors** had an FID in the past six months. The exceptions were steel and cement.
- **Chemicals and fuels** sectors are progressing faster than materials – both in terms of projects past FID and in terms of announced projects
- **Green ammonia** is a booming sector with 372 projects on record, boosted by the perspective that it could undercut costs of its grey equivalents by 2035

The birth of a new industrial sunbelt is taking place, with distinct regional trends in the adoption of technology

- 'New industrial sunbelt' nations with **abundant solar energy resources** are beginning to emerge as future industrial centres alongside legacy industrial leaders like the EU, US and China
- Emerging markets and developing economies (EMDEs) within the new industrial sunbelt now account for **one-third of all announcements** and one-quarter of financed projects, signalling increasing global participation in the clean industry revolution
- **Hydrogen-based technologies** represent 60% of tracked projects and are scaling globally, accelerating particularly in sunbelt countries with favourable conditions for production
- **Biomass-based solutions and Carbon Capture, Utilisation and Storage (CCUS)** account for just 19% and 13% of tracked projects respectively, primarily concentrated in advanced economies with legacy industrial assets and where policy support is strongest (e.g., three-quarters of CCUS-based clean cement projects are in the EU), reflecting the role of regulation in enabling scale

Despite the breadth of the project pipeline, the scale and pace of investments is delaying potential economic gains

- Clean industrial plants are on average **half the size of** fossil fuel equivalents, with wider gaps for earlier-stage ones and less difference for mature technologies and retrofits
- They also take **longer to reach operation** than expected: 692 announced projects are currently waiting for FID, many of them have been for several years
- Announced projects represents an investment opportunity of around **$1.6 trillion**
- Less than 15 projects are currently reaching FID every year, delaying the climate, economic and social benefits associated with clean industrial development
- **Ammonia and fuel sector project announcements** have exceeded targets, but only around 12% (on average) have passed FID and a capacity gap persists given small project scale

To unlock exponential growth in clean industry, effective solutions to reduce project costs and grow clean demand are needed

- **Intelligence from project failures and successful progress towards FIDs** picked up by the Tracker point to a similar set of critical success factors
- Access to **abundant, reliable, low-cost clean energy** is key to project economics, benefitting projects in locations with favourable natural attributes and energy policy frameworks
- Keeping other project costs, including the cost of capital, under control is necessary — a goal that **strategic public funding and derisking**, especially capex support, can help achieve
- Projects cannot proceed without **demand for clean products at a premium**, often in the form of offtake agreements; and to scale this demand beyond initial volumes of voluntary purchase, regulations like carbon pricing, standards and mandates are needed
- An **exponential growth** in the number of FIDs over the next five years can bend the curve, materialising the considerable economic and environmental opportunities of clean industry

Chemicals and fuels are leading clean industry developments, while clean materials' production is lagging

Of the 826 projects in the tracker, some sectors are progressing faster than others:

Chemicals sectors are progressing fastest, with clean ammonia and methanol leading the way – both for their established industrial uses and their emerging use as clean fuels in the shipping sector. These sectors make up **70% of all announced projects** and 35% of all projects past FID.

Ammonia, used for fertiliser production and vital for food security, stands out as the most advanced sector in terms of ambition, with an announced pipeline **three times the size of its 2030 target** and with **28 FIDs**, the most of any sector.

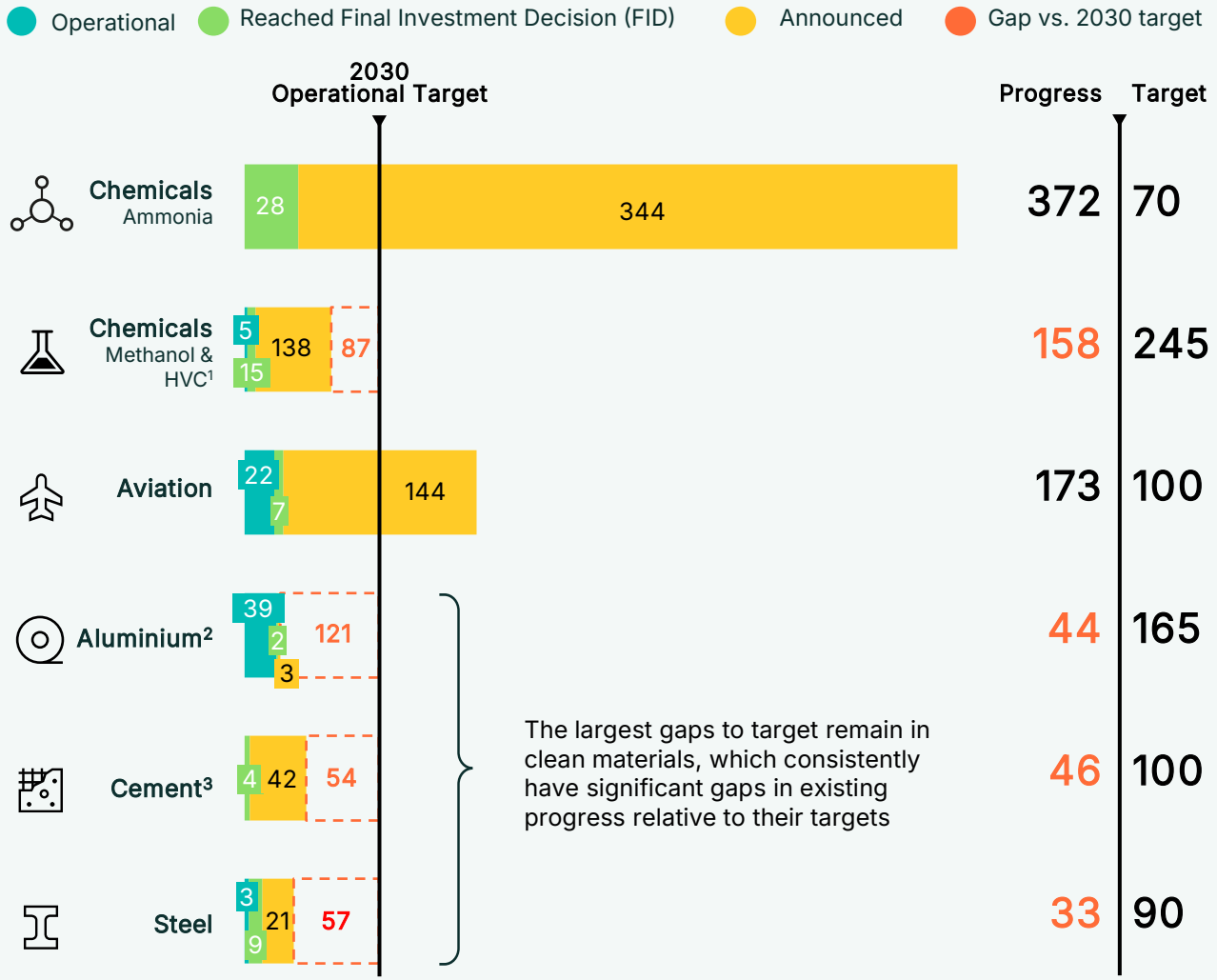
Aviation has 22 plants in operation and a promising pipeline of proposed projects (20% of the total industrial pipeline) that could help exceed its 2030 target if all reach FID.

The **aluminium** sector has the highest share of operational plants, amounting to **more than half of the clean industrial plants in operation** today – 39 plants. However, these are primarily legacy assets that were already powered by hydro power and very few new low-carbon plants are in the pipeline.

Steel and cement lag behind. Together, these sectors account for less than one tenth of the project pipeline and less than 15% of projects past FID. A major scale-up in project development and financing is urgently needed to accelerate progress in these energy-intensive sectors and the appropriate policy frameworks appear to be lacking to drive this change.

Pipeline progress against plant targets

Number of plants, 30th April 2025



1. HVC (High Value Chemicals) includes: Olefins (Ethylene, Propylene), Aromatics (Butadiene, Benzene, Toulene, Xylene)
2. Over half of operational plants are in the Aluminium sector, most of which are legacy clean assets
3. Heidelberg Materials' Brevik CCS plant in Norway began ramp-up operations following a 9 May announcement. As this operating date sits outside of the Tracker data cutoff (30 April), it is listed as 'Reached FID' in this report. Nevertheless, it is currently the only commercial-scale cement plant with CCS in operation worldwide as of May 2025. Sources: MPP Global Project Tracker. For per sector sources, products in scope and technologies in scope please refer to MPP Global Project Tracker

1

With 826 clean industry projects recorded, the door is open to significant, **global economic opportunity** with new growth centres arising

Clean industries are central to a burgeoning new economic era

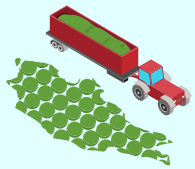
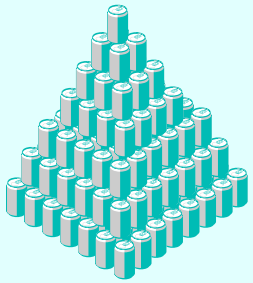
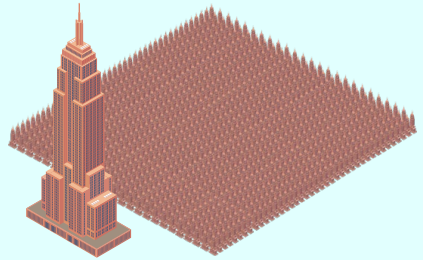
The transformation to clean industries has the potential to bring wide-ranging socio-economic success, drive sustainable growth and long-term resilience. At a time when some may believe the clean-tech landscape is being up-ended, our Global Project Tracker shows that the pipeline of clean industrial plants continues to grow with 134 projects past FID and a further 692 projects announced. The clean industrial transition is already happening in 69 countries around the world and on every continent.

Swift action now can unlock investment and move projects from concept to operation. Without this momentum, the escalating impacts of climate change risk outpacing the solutions and benefits that this clean industrial revolution can deliver.

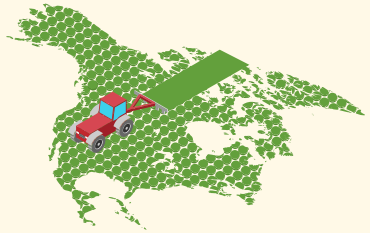
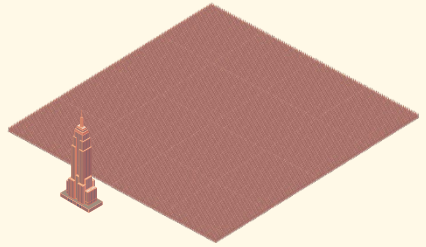
- **For businesses across industrial value chains, the transition brings opportunities to build leadership and tap into new global markets.** Companies can secure long-term supply chain resilience and gain a competitive edge in the new clean economy that will define the century.
- **For governments, faster adoption of clean industry offers a pathway to energy security and early mover advantage.** Alongside traditional industrial centres, opportunities are emerging in the 'new industrial sunbelt', nations and regions from Brazil to India to Australia, where abundant solar resources bring cost advantages and create ideal conditions for advancing new industrial processes. These advancements can drive sustainable economic growth, create jobs, strengthen energy and food security and enable these nations to become significant players in future clean industrial markets.
- **For many societies, clean industry can enhance food security, reducing dependence on imports.** Reliance on imported fertilisers and agricultural inputs leaves many countries open to price volatility and supply disruptions, impacting food prices for everyone. Producing green ammonia locally can help countries shield themselves from this risk, stabilising food production and maintaining a steady price point. For instance, 85-90% of fertilisers used in Brazil to maintain its significant agricultural sector are imported. In a strategic move, the country is actively leveraging its abundant renewable resources to produce green ammonia and reduce dependency on imported fertilisers, make its food value chain more resilient, improve its trade balance and also develop green ammonia exports.
- **Green ammonia is emerging as an engine of growth for clean industry** across all geographies, with projects present in 68% of the 69 countries hosting clean industry ambitions. Bringing announced projects to FID will drive green hydrogen production and positively impact other sectors.
- **Developing countries that are also rich in natural resources stand poised to become new clean industrial growth centres.** Clean industry can create opportunities to unlock new sources of capital, drive inward Foreign Direct Investment, create industrial growth and secure new trading relationships in burgeoning global markets. For example, Ghana has a significant opportunity to capitalise on its abundant bauxite reserves and solar resources to develop a more integrated aluminium industry. Through continuing strategic investments in bauxite mining and alumina refining, Ghana can tap into the growing global demand for aluminium, boost its domestic economy and strengthen its position in the global aluminium supply chain.

The commodities from energy-intensive sectors underpin the fabric of our global society: the potential pipeline capacity from clean projects represents a material difference to the global economy

Financed and operating capacity per sector[1]:

15 Mtpa ammonia for fertiliser	**13 Mtpa** SAF	**18 Mtpa** aluminium	**6 Mtpa** cement	**25 Mtpa** steel
				
~1.5M Km² land fertilised (~the area of Mongolia)	**28%** Projected aviation fuel needs at EU airports in 2030	**~150** Cans per person on earth	**~440** Empire State buildings	**~31%** Passenger cars produced globally

Additional announced capacity per sector[1]:

259 Mtpa ammonia for fertiliser	**48 Mtpa** SAF	**3 Mtpa** aluminium	**65 Mtpa** cement	**35 Mtpa** steel
				
~26.4M Km² land fertilised (~area the size of North America)	**104%** Projected aviation fuel needs at EU airports in 2030	**~25** Cans per person on earth	**~4748** Empire State buildings	**~44%** Passenger cars produced globally

1. Real-life context calculations are illustrative and based on standard conversion factors and global estimates; actual values may vary depending on specific assumptions and data sources

~$250 bn of capital investment has been secured for the transformation of clean industry

Committed capital is steadily flowing into the transformation of clean industry, with around $250 bn[1] in funding already secured across projects that have reached FID or plants that are already operational.

So far, investment has concentrated in the most bankable sectors, supported by **mature technologies** and favourable policy environments. Beyond the legacy low-carbon assets in the aluminium sector (30% of investment to date), ammonia (28%) and aviation (23%) jointly account for~50% of the total capital committed.

Countries with strong fundamentals, in particular renewable energy and mineral resources, are drawing significant investment. They have the potential to capture early market shares and capitalise on nascent opportunities across the value-chain to unlock additional investment in the future.

- Canada, for example, has secured about $22 billion—around 9% of total secured project investments—thanks to its stable environment and resource base
- Similarly, Australia's rich iron ore reserves and renewable energy potential position it as a future leader in green iron and low-carbon steel inputs
- Countries across the Global South have the potential to supercharge their domestic economies, attracting foreign direct investment and building up local infrastructure

In parallel, nations with robust policy support are also playing a pivotal role. China alone accounts for a quarter of committed capital, trailed by the US at 22% and the EU at 14%.

1. Indicative capital investment numbers calculated based on average investment intensity of clean production assets for each sector.

A new 'industrial sunbelt' is set to seize the clean industry opportunity: with a fifth of current financing and over half of the investment pipeline, industrial bases are poised to diversify

Offering abundant, low-cost renewable energy and competitive labour markets, a new clean industrial sunbelt is arising, comprising countries in the Middle East, Africa, Latin America, Asia and Australia. **Within this region, there are significant investment opportunities for emerging markets and developing economies (EMDEs).**[1]

India, Egypt, Brazil, Chile and Oman have the largest clean industrial pipeline among sunbelt EMDEs. Ideal conditions for advancing new industrial processes help provide distinct cost advantages and position the countries as rising clean growth centres. Sunbelt EMDE countries, including India and Brazil, Turkey and those in Sub-Saharan Africa, now account for ~30% of the total planned and realised clean industry project base. Securing investment for clean plants in this region can boost domestic and foreign direct investment, open new industrialisation opportunities, aid the modernisation of local infrastructure, upskill the local workforce and transition economies from carbon-intensive to sustainable growth models.

The total investment potential for sunbelt EMDEs is ~$775 bn, representing almost half of the current global pipeline investment potential while accounting for around a third (220, 32%) of all pre-financed (announced) projects and a tenth (16, 12%) of those passing FID. Recent investment progress, however, has been sluggish. In the past six months, just one of the eight new global FIDs was in the region (India), indicating slow project advancement despite strong pipeline representation.

Across all new industrial sunbelt countries, the investment potential rises to $950 bn – with Australia having 46 pre-financed projects seeking ~$172 bn investment. Several recent policy interventions and tax incentives for green hydrogen and aluminium are helping to keep its momentum going.

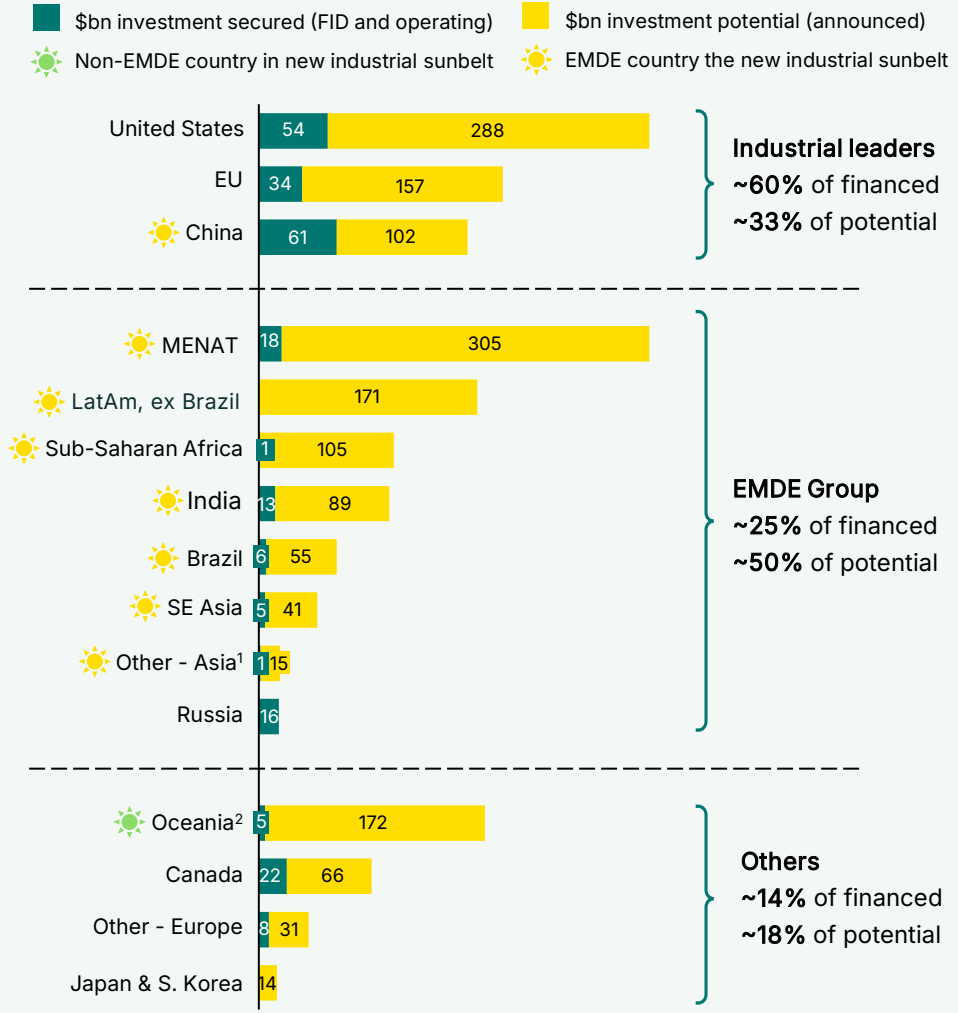
Traditional industrial leaders - the EU, US and China – have secured financing totalling 60% of clean industry investment. They host around half of pre-financed pipeline plants and a third of investment potential.

Notably, China leads with $61 bn secured investment, followed by the US at $54 bn and the EU at $34 bn.

Enhanced efforts are needed to scale investment and move projects from concept to operation.

Share of investments by major countries/regions

$bn, 30th April 2025

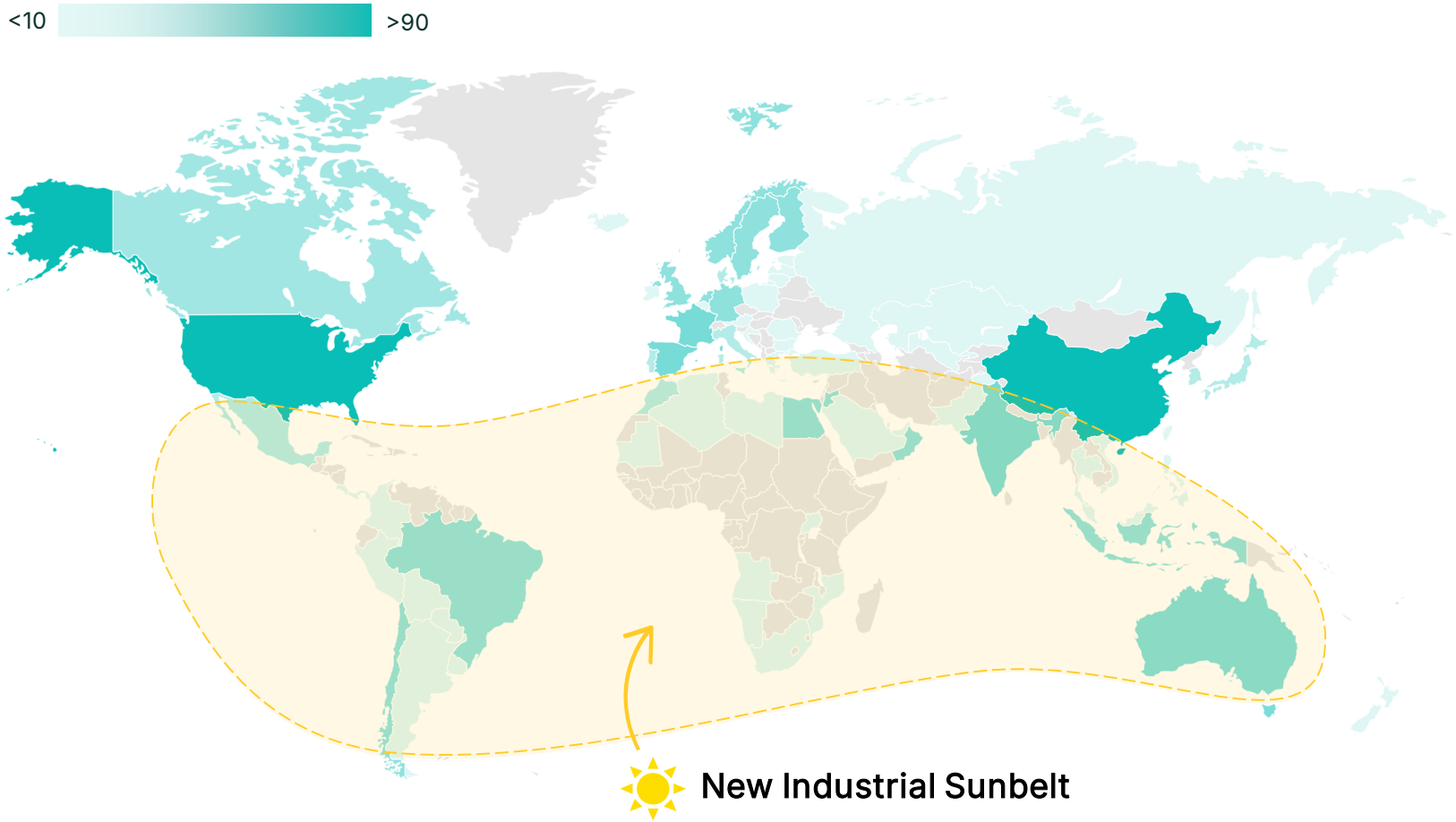


1. Other-Asia consists of Malaysia (sunbelt), Pakistan (sunbelt), Uzbekistan (non-sunbelt), and Kazakhstan. (non-sunbelt)
2. Oceania consists of 48 projects in Australia (sunbelt) and 1 project in New Zealand (non-sunbelt)
3. Other – Europe consists of Iceland, Norway and United Kingdom (all non-sunbelt)

1. Country EMDE assignments in line with IMF WEO classification of Emerging and Developing Economies. See glossary for more info.2. EMDEs include countries outside the new industrial sunbelt.

Clean industrial transformation is happening in ~70 countries around the world

Announced projects per country, 30th April 2025



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Visit the Global Project Tracker online https://www.missionpossiblepartnership.org/tracker/ for more detailed country information and to see the locations of the pipeline of all known commercial-scale clean industrial plants and their status from announced, reached financial investment decision (FID) to operational.

Total and announced projects

Top 20 countries, by total project count

EMDE country in the new industrial sunbelt

Non-EMDE country in the new industrial sunbelt

Country	Announced	Total*
China	96	142
United States	92	108
Australia	46	48
India	36	41
Canada	25	39
France	34	36
Spain	28	32
Norway	19	27
Egypt	25	25
Brazil	19	23
Sweden	19	22
Germany	18	21
Chile	21	21
Oman	15	17
Jordan	14	14
Netherlands	11	13
Finland	11	13
United Kingdom	13	13
Indonesia	11	12
Mexico	9	9

Includes projects that are at the announced, reached final investment decision (FID) and operational

Clean ammonia production, accounting for over 70% of planned green hydrogen use in the Tracker, is increasingly shifting to sunbelt EMDEs, now home to half of all clean ammonia pipeline capacity globally

The new industrial sunbelt—incorporating many EMDEs—is rapidly becoming the centre of clean ammonia production with a growing pipeline of projects. 11 of the top 15 countries (10 EMDEs and Australia) with the largest upcoming clean ammonia capacity are in the sunbelt, collectively representing over half of the pipeline.

Major countries in the region benefit from abundant affordable renewable energy resources, declining electrolyser prices and increasingly favourable policy incentives, enabling their position as low-cost green ammonia producers. Four sunbelt EMDEs – India, Egypt, Chile and Brazil – hold one-quarter of pipeline capacity.

Strategic considerations are equally important in the rise of clean ammonia production in the sunbelt. Many countries are pursuing clean ammonia to export to countries with less favourable conditions for production, to enhance energy security, and reduce reliance on imports of fossil fuels and fossil fuels-based products. India, for example, holds nearly 20% of global financed capacity (2.7 Mtpa) and is positioning itself as a major exporter of green ammonia whilst investing in domestic production to substitute imports of natural gas for domestic fertiliser. This shift could strengthen food security, reduce trade imbalances and stimulate local industrial development—particularly in rural and agricultural regions.

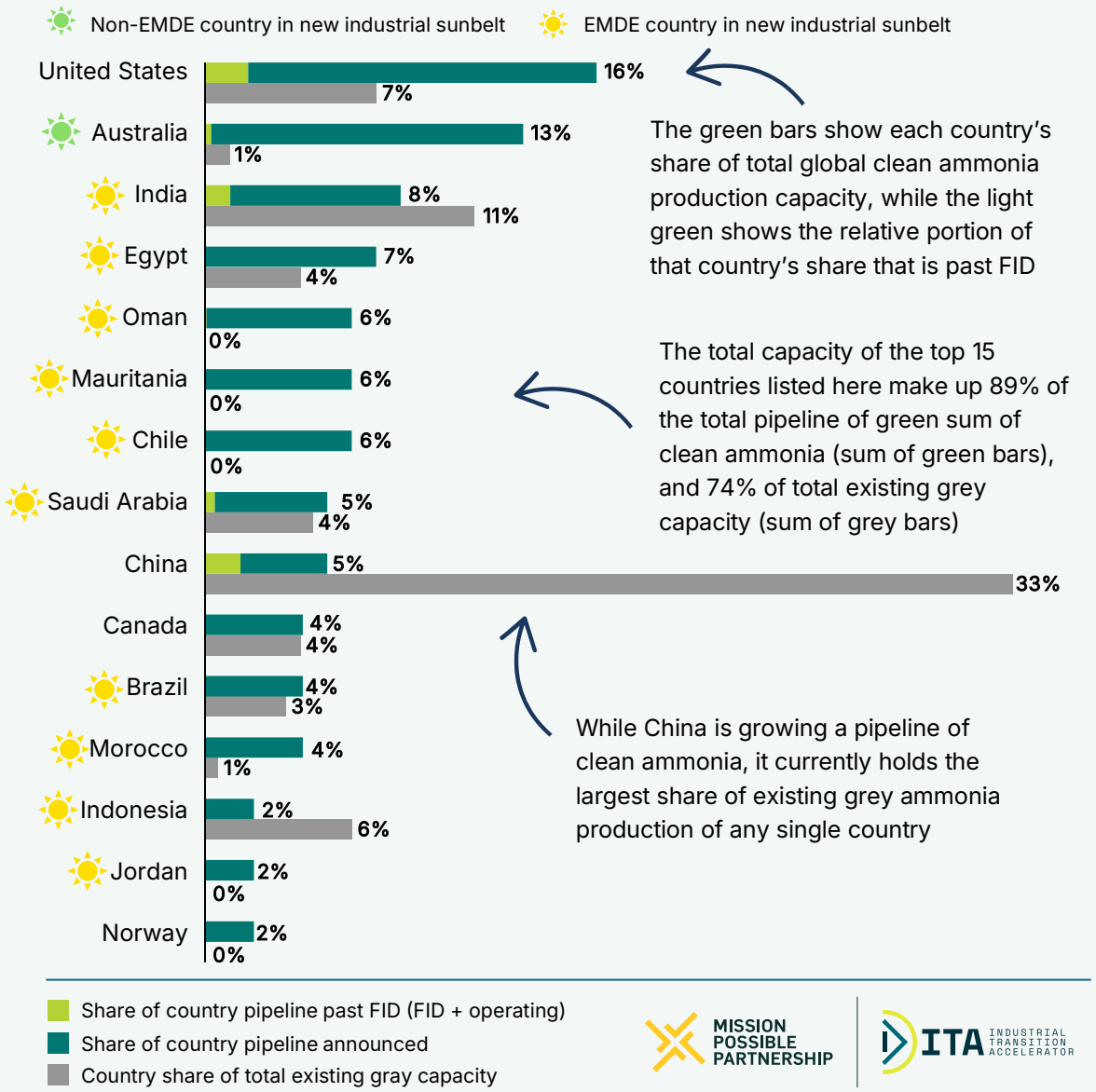
Chile, Egypt and Mauritania have clean ammonia in their sights, but no projects have broken ground yet. Chile, Egypt and Mauritania have announced ambitious clean ammonia projects yet secured no FIDs to date. Successful advancement will require overcoming key challenges such as scaling renewable energy infrastructure, developing logistics and storage capacity, and strengthening policy frameworks to ensure investment certainty and bankability.

Outside the new industrial sunbelt, the US and China, which benefit from diverse energy endowments, hold most of the financed ammonia capacity, with a combined ~60%

China already accounts for about a quarter of financed ammonia capacity and its pipeline is likely underestimated due to a lack of reliable information on early industrial developments in the country. In contrast, the EU holds only 3% of the pipeline - likely due to its higher production costs - and has a single FID (in the Netherlands).

Shares of total clean ammonia production capacity vs. shares of total existing grey ammonia supply, by country

Top 15 countries in GPT by total pipeline (announced through to operating), 30th April 2025



Costs for clean ammonia are expected to decline in some regions more than others, especially in the new industrial sunbelt

Green ammonia: Sunbelt countries, including India, Brazil and Saudi Arabia, are expected to have lower production costs than the EU and US - falling below grey production costs from 2035 onwards in some cases. According to BloombergNEF's latest Ammonia Levelised Cost Outlook 2025, this trend will be driven by falling electricity prices and decreasing electrolyser costs. Between 2025 and 2050, electricity prices in these countries are projected to drop by as much as 40-60% as renewable power capacity, especially solar, expands. Production cost is expected to fall below grey in certain sunbelt countries (e.g. Brazil). Most EMDEs benefit from lower capital expenditure costs, and India and Saudi Arabia benefit from cheaper electrolyser capex costs, which are almost 50% lower compared to Western Europe and the US.

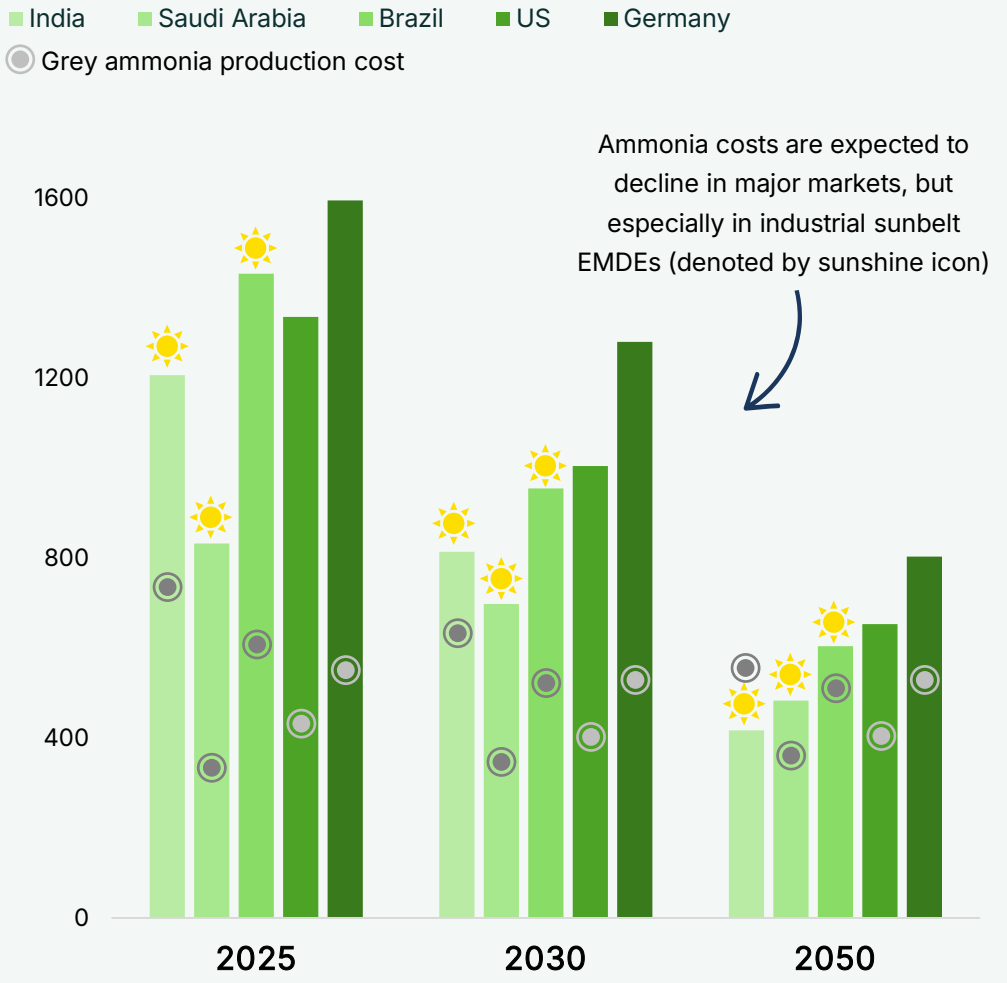
Falling green ammonia costs in the new industrial sunbelt could lead to the emergence of new trade corridors as existing industrial nations without the favourable conditions to produce cheap clean ammonia (Western Europe, South Korea, Japan and others) look to secure a diversified and reliable supply. Early adopters could gain a competitive advantage. Clean ammonia shipped from sunbelt producers and reconverted to hydrogen will be cheaper than producing green hydrogen domestically in countries like the Netherlands.

Blue ammonia: The US and Middle East and North Africa (MENA) region account for over 40% of the pipeline and 80% of blue ammonia capacity. The US holds the largest share of both financed and total capacity, with over 85% of its project pipeline relying on CCUS to produce blue ammonia. In both the US and MENA, the combination of abundant low-cost natural gas and access to CO_2 storage sites makes blue hydrogen more cost-competitive than green.

In the US, this trend may accelerate under the Trump administration, as blue hydrogen and ammonia projects are more likely to benefit from federal support through the 45Q tax credits. In contrast, green hydrogen and ammonia projects face greater funding uncertainty due to the rollback of government support, creating a less favourable investment landscape for those technologies in the short-term.

Outlook for unsubsidised green ammonia production costs in major markets to 2050

Levelised cost of green ammonia production $/tonne (2024 real)



Source: BNEF Ammonia Cost Outlook 2025

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Unlocking the existing project pipeline could significantly reduce emissions by around 1Gt CO_2 per year

This reduction would equate to ~2% of global CO_2 emissions, be accompanied by other wide-ranging environmental benefits, and, most importantly, set the scene for sharper emissions cuts thereafter by opening the way for the exponential deployment of clean production technologies.

For governments and businesses around the world anticipating a mounting frequency and intensity of heatwaves, heavy rainfall and droughts, the transformation to clean industry and transport by the early 2030s presents an opportunity to reduce carbon emissions at a significant scale. This transformation could help mitigate the long-term effects of extreme weather events and their associated disruption to daily life and economic productivity.

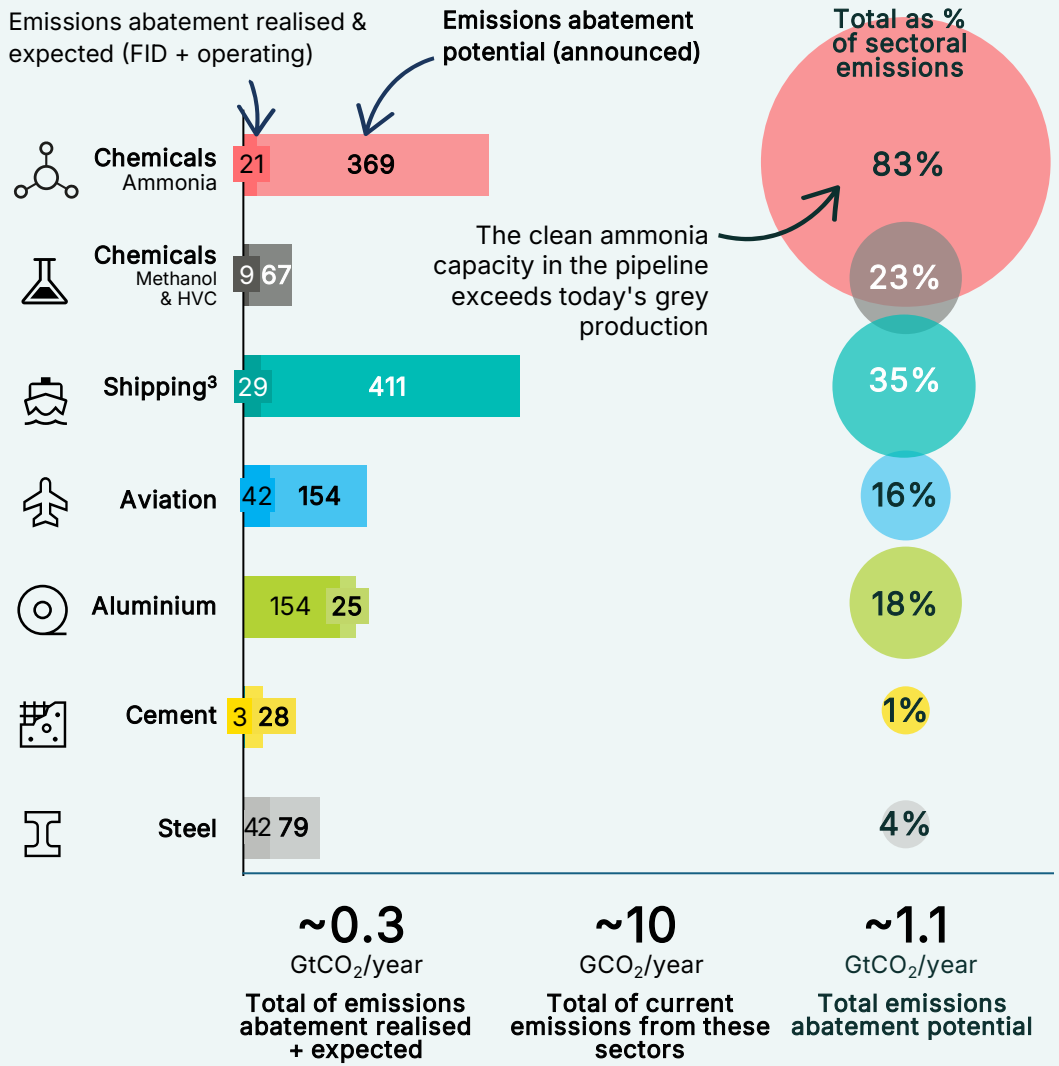
Around 1 Gt of CO_2 emissions per year could be reduced by operationalising all announced projects, equivalent to about 10% of emissions from these sectors and supporting long-term business resilience by lowering exposure to future carbon costs and regulatory risks.

To date, approximately ~200 Mt of CO_2 emissions per year have already been reduced or avoided through the clean tech plants currently in operation. An additional reduction of around ~100 Mt CO_2 per year is on track via projects that have reached FID.

The most significant emissions abatement to date, including FID projects, is contributed by aluminium (51%), steel and aviation sectors (at 14% each). Ammonia and shipping together have the most significant potential for emissions abatement, accounting for ~70% of the total. In fact, the abatement potential in the pipeline exceeds current emissions from the sector, indicating that it may have a substantial impact on the trajectory of industrial emissions in the near-to-medium term.

Emissions abatement by sector

$MtCO_2$/year (2020 baseline)



1. Emissions abatement calculations are approximations based on available data on technology and capacity from data sources. 2. 'Emissions abatement realised' in aluminium sector are primarily avoided emissions through transition of legacy assets to RE. 3. Emissions abatement in shipping sector estimated by dividing the chemicals capacity between shipping and other end-uses in line with their respective shares in the chemicals targets.

2

~700 clean projects are blocked pre-investment, requiring **better conditions** for investment to unlock financing flows

Favourable policy frameworks can reduce risk and improve financial viability to attract private capital

~700 clean industry projects are ready to break ground globally, representing a $1.6 trillion investment opportunity

Growth in the clean industry pipeline is vastly outstripping project investment, with one plant past FID for every five more awaiting investment. This is driven by rapid growth in announcements in recent years against a near static rate of less than 15 projects reaching FID annually.

Encouragingly, investment has continued in the past six months in line with the same period in 2024 – with eight new FIDs recorded – despite major global headwinds. Yet at the current pace of investment, the economic and environmental benefits of clean industry will not be seen at scale in the near term, with a critical mass of operational plants out of sight until the mid-2030s.

The average size of clean plants are also below expected levels for most sectors – reflecting the investment risk of scaling new technology, as well as sector-specific features like companies in China distributing smaller chemical plants close to feedstock providers and customers.

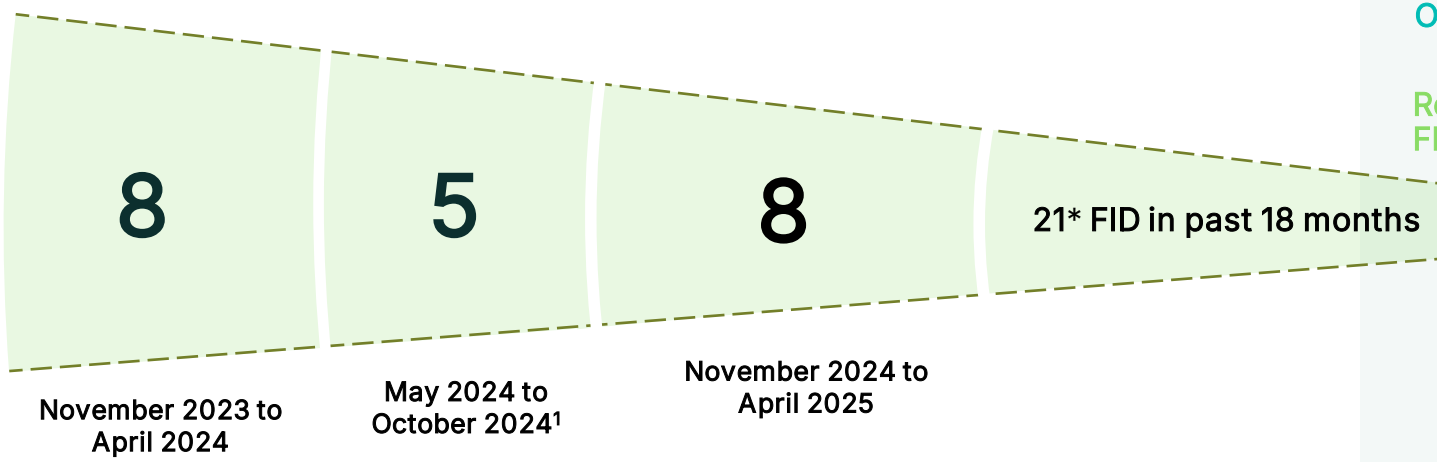
With new pioneering plants coming online and the visibility on planned projects increasing, lessons on how to unlock investment can be drawn and confidence boosted to accelerate progress. Unlocking projects in the pipeline requires favourable policy frameworks which reduce risk and improve financial viability so as to attract private capital. With the right conditions for investment, the adoption of clean materials, chemicals and fuels could become exponential over the next few years, unlocking a range of economic, environmental and strategic benefits.

We are learning more about sector- and region-specific trends, and how to bridge the gap between current pathways and optimal industry transformation milestones. Drawing vital lessons from cancelled and successful projects, identifying the drivers of progress, and highlighting solutions to industry growth barriers, we can chart a practical path from today’s trajectory towards an earlier take-off of the clean industrial revolution.

At <15 FIDs per year, the current pace of progress is steady, but a steep & continued ramp-up is needed to uncork the full force of clean industry

Eight new project final investment decisions (FIDs) have been recorded since November 2024. This is comparable to the same period in the previous year, which also saw eight FIDs.

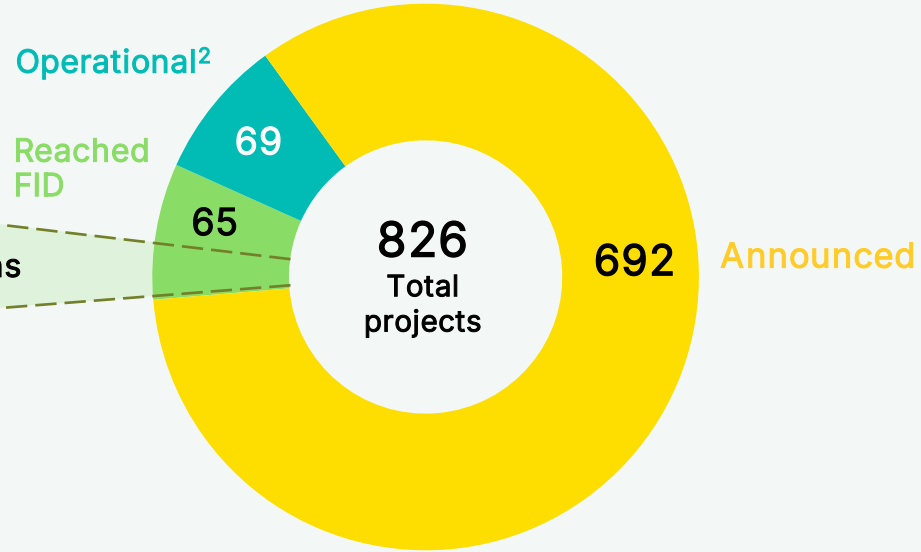
In the recent period, four sectors recorded at least one FID. Chemicals (ammonia and methanol & HVC) led the way with six FIDs, followed by one each in aluminium and aviation. Steel and cement were the exceptions without any FIDs.



Continuing the current pace of conversion from announced to FIDs would result in a **40+ year timeframe** for all of the projects in the pipeline to begin construction. Without a surge in project funding, announced ambitions will stall and a thriving, clean industrial future will remain out of reach. **Overcoming barriers to FIDs is critical** to unlocking the full potential of clean industrial transformation.

Total breakdown of clean industrial projects announced and past FID

30th April 2025



Source: Mission Possible Partnership, Global Project Tracker

2. Over half of operational plants are in the aluminium sector, most of which are legacy clean assets

1. Note that updated methodology to exclude shipping has led to a lower number of reported FIDs in this calculation
*Given updates in the pipeline figures and methodology, comparisons against the previous Tracker are not directly made. Pipeline changes include newly sourced data, project pauses and cancellations. For full methodology, see Appendix.

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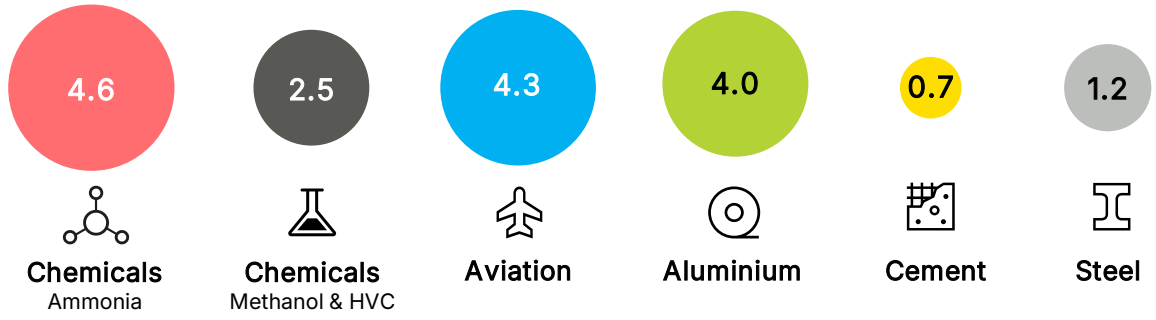
Clean plants in the pipeline represent an investment opportunity of around five times the amount invested to date

Capital needed for announced projects equates to $1.6 trillion signalling that clean industry already represents a major investment opportunity, but also that it is urgent to lift the barriers to investment.

Although not all projects will succeed in reaching final investment decision, especially in sectors with the most aggressive ambitions in terms of scale of the pipeline like clean ammonia, investors should pay attention to this growth and consider the downsides associated with new investment in grey production facilities which typically have a 20-year lifespan and are at risk of becoming stranded assets. Taking the long view is the surer way to futureproof a company, build its competitive edge and secure a return on investment.

Average capital intensity per ton of clean production capacity, by sector $ bn / Mtpa

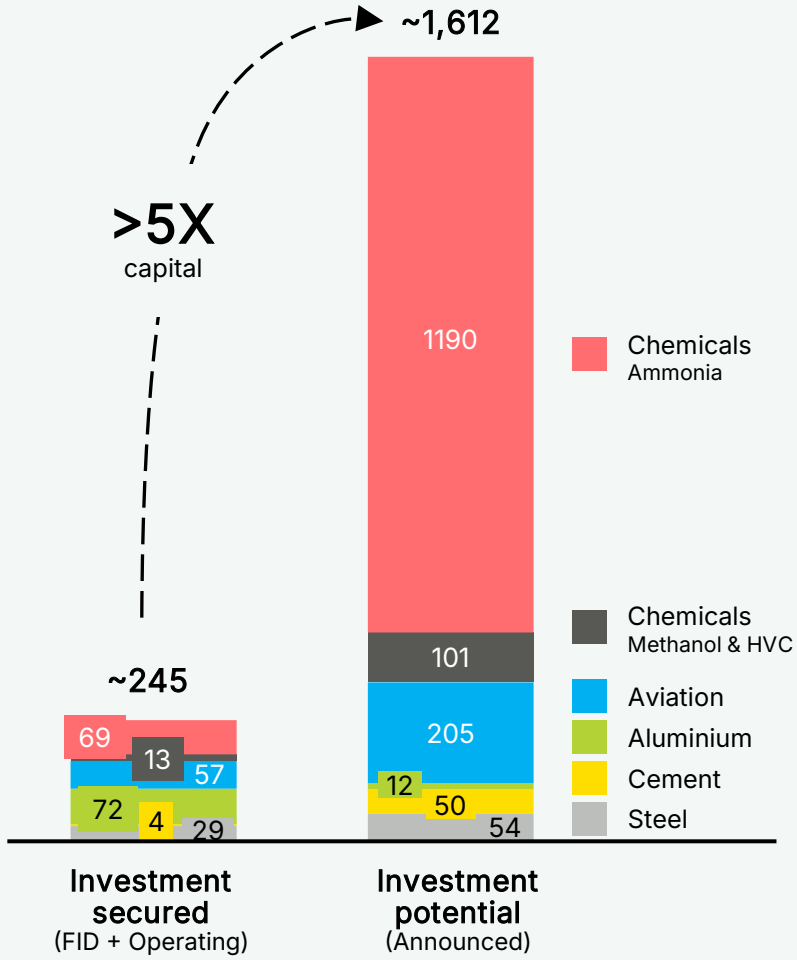


Capital requirements for clean production vary significantly across sectors, largely reflecting differences in capital intensity. Ammonia, for example, accounts for 75% of total investment needs despite representing only 45% of announced projects. This disproportionate share highlights the sector's high capital intensity, as capex for renewable electricity and electrolyser infrastructure is accounted for in a new plant's project cost.

By contrast, clean materials - aluminium, cement and steel - collectively seek to raise approximately $110 billion, or about 7% of total capital needs. This reflects a smaller pipeline of projects and a lower capital intensity in cement and steel. In these sectors, the capital intensity does not factor in the investment required outside the production facility in upstream clean energy infrastructure, as industrial companies rarely bear these costs directly. If these needs were included, which can be as high as 70% of the total investment required in these sectors, the total investment potential across sectors could be up to three times higher than current estimates.

Investments[1] secured to date and potential in the pipeline

$ bn



Note: Shipping viable ammonia and methanol capacity is shown as part of the chemicals sectors

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1. Indicative capital investment numbers calculated based on average investment intensity of clean production assets for each sector

Clean industrial plants are around half the size of conventional plants, so more plants are needed to reach significant production volumes

High investment risks and technology constraints are limiting the scale of clean industrial plants in most sectors. On average, clean facilities are around 40% (between five to 80% depending on the sector) smaller than their conventional counterparts. This is to be expected during the early stages of any transformation, as new technologies and business models are being tested at minimum commercial levels before broader full-scale deployment.

Sectors with relatively mature technologies (aluminium) and those with drop-in solutions (ammonia) show a smaller gap to conventional plant sizes. These technologies benefit from greater investor confidence and more established performance benchmarks, enabling cleaner facilities to be built at scales closer to conventional norms.

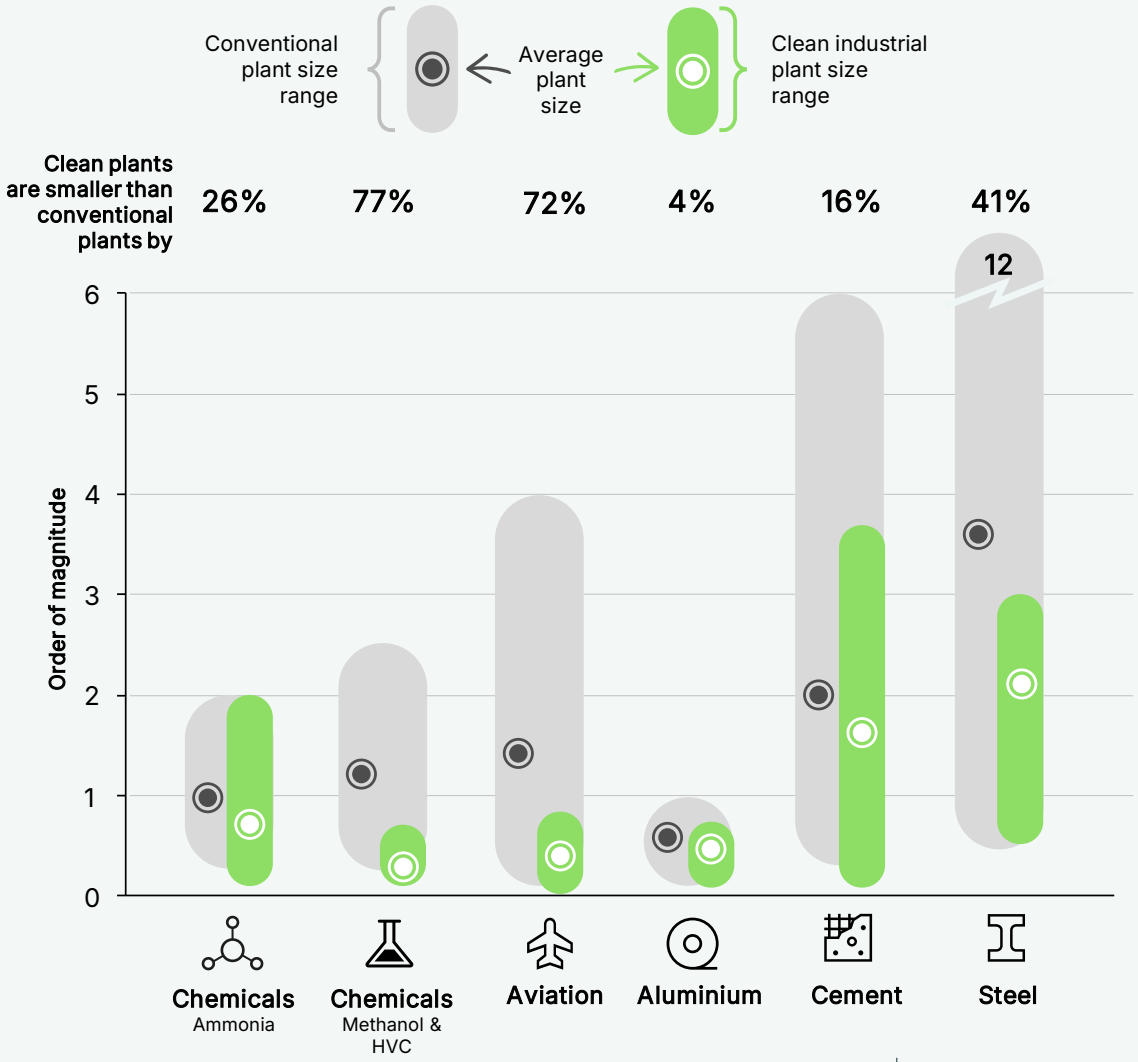
In cement, clean plant sizes also approach conventional scales, largely due to the **prevalence of retrofits to existing brownfield facilities**. Retrofits are also observed in the steel sector. These retrofits allow producers to leverage existing infrastructure, reducing both cost and risk, and enabling larger-scale deployment of clean technologies.

Specific technology constraints can also hinder larger capacity plants, particularly in methanol. A total of 20 chemical plants, primarily methanol, have passed FID and nearly 140 announced projects are in the pipeline, with an average size of just 0.3 Mtpa (vs 1.25 Mtpa for conventional methanol plants). The same cumulative pipeline capacity could be achieved with just a quarter the number of conventional grey methanol plants. The trend is driven by a high share of biomass-based projects, especially in China, which concentrates 45% of the sector's global pipeline. In this case, the availability of bio-feedstock and the option to locate plants closer to feedstock sources and to end users to reduce transportation costs limit plant sizes.

Enhancing project bankability and strengthening clean commodity markets are essential to enabling large-scale deployment of clean production facilities. This is particularly critical for breakthrough technologies based on electrification and green hydrogen, which offer greater potential for scaling but currently face significant investment barriers.

Size comparison of clean industrial plants with conventional fossil-fuel-based plants

As per plant capacities recorded in the Global Project Tracker, 30th April 2025



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Several flagship industrial projects have been abandoned or suspended

Real world challenges to project delivery : Cost/ financial | Market development | Policy

Selected examples — Not exhaustive

Reason	Project name (Location)	Sector	Project details	Cancellation/ suspension	Stated reasons for abandonment / suspension
	Fulcrum Energy NorthPoint SAF facility (United Kingdom)	Aviation	0.08 Mtpa SAF	Sept-2024	- US-based waste-to-SAF producer Fulcrum Bioenergy and its three US subsidiaries, filed for Chapter 11 bankruptcy protection leaving project statuses uncertain - Bankruptcy reasons include technical issues, withdrawn government incentives and subsequent financial struggles
	BP Kwinana Renewable Fuels & H2Kwinana (Australia)	Aviation, Chemicals Ammonia	0.46 Mtpa SAF, HVO, H2	Feb-2025	- **Increase in project costs** compared to initial estimate - **Insufficient local demand** for renewable fuels - H2Kwinana electrolyser **in limbo, dependent on delayed** USD 1.23 bn **Australian Hydrogen Headstart Program** announcement
	Fortescue Green Hydrogen Gibson Island project (Australia)	Chemicals Ammonia	0.4 Mtpa Green ammonia	Nov-2024	- Project initially put **on hold due to high electricity prices**, project partner subsequently sold project land - **Deadline for FID missed** three times
	Hunter Valley Hydrogen Hub (Australia)	Chemicals Ammonia	0.35 Mtpa Green ammonia	Oct -2024	- Main cited reasons include a slower-than-expected hydrogen market development and significant financial and technological risks
	Ørsted FlagshipONE project (Sweden)	Chemicals Methanol & HVC	0.06 Mtpa E-methanol	Aug-2024	- Increase in project costs compared to initial estimate - Insufficient demand, lack of long-term offtake agreements
	ArcelorMittal Europe H_2-DRI projects (EU, multiple)	Steel	9.3 Mtpa H_2-DRI steel	Nov-2024	- FID delayed due to **unfavourable political and market conditions in the EU** - Concerns around CBAM weaknesses, lack of trade protection measures - Insufficient demand, lack of willingness to pay a green premium for steel

For abandoned projects, the average time between project announcement and abandonment is **~30 months**[1]

1. Based on ~20 publicly documented projects across target sectors

Lessons from recent setbacks show that clean industry transformation progress is being hampered by cost increases, slow market growth for clean products and policy uncertainty impacting both cost and market

Understanding industry setbacks is vital to addressing critical drivers of failure, accelerating future progress and avoiding repeated pitfalls. Some of the most common reasons cited by developers include:

Higher project costs:

increase in costs compared to initial estimates, particularly in energy, electrolyser and infrastructure costs, or higher financing costs due to technological and country risks

Insufficient green demand:

slower than expected market development for low-carbon products and low willingness to pay a premium resulting in limited green demand locally and internationally, and lack of long-term offtake at a premium

Policy uncertainty, ambition and geopolitical tensions:

Lowered or insufficient fiscal support, lack of long-term certainty around key regulations, uncertainty around trade tariffs and lack of clean trade protection measures

- **Other common project setbacks** include public opposition (triggering long and costly legal proceedings and high uncertainty on permitting), change of investors' 'risk appetite' and slower-than-envisioned technological progress. These factors are all potential reasons for companies or project partners to **shift strategy or withdraw from projects.**
- Experience also shows that even **securing public funding or an FID does not guarantee that the project will proceed**. For example, Shell's Rotterdam SAF biofuel project reached FID in September 2021, but paused on-site construction in July 2024 to reassess competitiveness in new market conditions.

Progress (across sectors and regions) is happening where these challenges are being mitigated through declining technology costs and strong measures to build supportive policy environments that derisk investment and create demand certainty

3

Cost reduction trajectories, demand-side measures and supply-side policies are **major drivers** of progress

Analysis of project successes highlights three key drivers that can be leveraged to unlock essential benefits of clean industry transformation

Analysis of real-world project data[1] has found three interconnected forces - declining technology cost trajectories, strategic supply-side policy support and strengthened measures to boost clean demand - driving accelerated development and deployment of technologies in the transformation to clean industry.

The presence and impact of these factors varies across sectors and geographies. Investment in ammonia production benefits from a downward cost trend, especially in favourable geographies and from growing domestic and international demand pools for hydrogen across multiple markets – ammonia as a carrier for international trade of hydrogen, as an input to fertilisers and as a shipping fuel – but certainty of demand remains a challenge for many producers. The aviation sector has benefitted from the development of Sustainable Aviation Fuels mandates across multiple jurisdictions. In steel and cement, where progress is slower, the EU stands out for its robust regulatory framework and funding programmes, which are supporting the development of clean materials production plants in the region.

Our survey of real-world project successes shows that a combination of these drivers is often present in successfully advanced projects. Hydrogen-based industry is a notable example where all three drivers can be observed. Declining renewable energy costs, supportive supply-side policy interventions and off-take stimulation measures worldwide have all played a role in pipeline growth. As the most prevalent technology route in the Global Project Tracker, contributing to ~60% of all projects across sectors and geographies, analysis of hydrogen's growth story offers important learnings on how these drivers can potentially be leveraged to accelerate clean industrial progress more broadly.

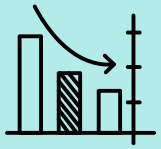
Declining technology costs, strategic supply-side policy support and strengthened measures to boost clean demand are accelerating the deployment of clean technologies, especially in chemicals, shipping and aviation fuels

1. These 3 drivers were identified through an assessment of stated reasons from historical projects that have progressed toward final investment decision (FID), as well as analysis of broader investment and policy trends across the industrial landscape. This approach ensures that lessons learned and potential paths forward are firmly informed by real-world data.

Three key drivers are boosting clean industrial investment: declining technology cost trajectories, measures to boost demand for clean commodities and strategic supply-side policy support

A survey of recent announcements and FIDs reveals three recurring success factors helping projects reach bankability and attract financing —offering insights that, if replicated across regions, could strengthen investment prospects

A



Declining costs of renewable energy with knock-on effects on electricity-based industry projects

Actual and expected cost declines in clean energy technologies (solar panels, battery energy storage systems, etc.) are supporting electrification and green hydrogen-related projects.

Cheap and abundant renewable power is the success story of the past decade and the maturing of this market is creating a positive knock-on effect for industry transformation.

Additionally, access to abundant biomass in certain regions is encouraging the adoption of gasification technologies in the clean fuels sectors, although sustainability of feedstock remains a concern.

B

Corporate off-takes driven by voluntary commitments and regulatory measures

Securing reliable demand through off-take agreements is critical to improving the bankability of clean industrial projects. These agreements provide revenue certainty, reduce market risk and help build a strong business case.

Projects that have reached FID generally benefit from a significant volume of off-takes. Early off-take agreements were often driven by voluntary commitments and strategic corporate partnerships enabling first-mover buyers to secure first volumes of clean products. However, market scale-up tends to be driven by regulatory tools such as mandates and standards, including green public procurement in sectors like cement.

C

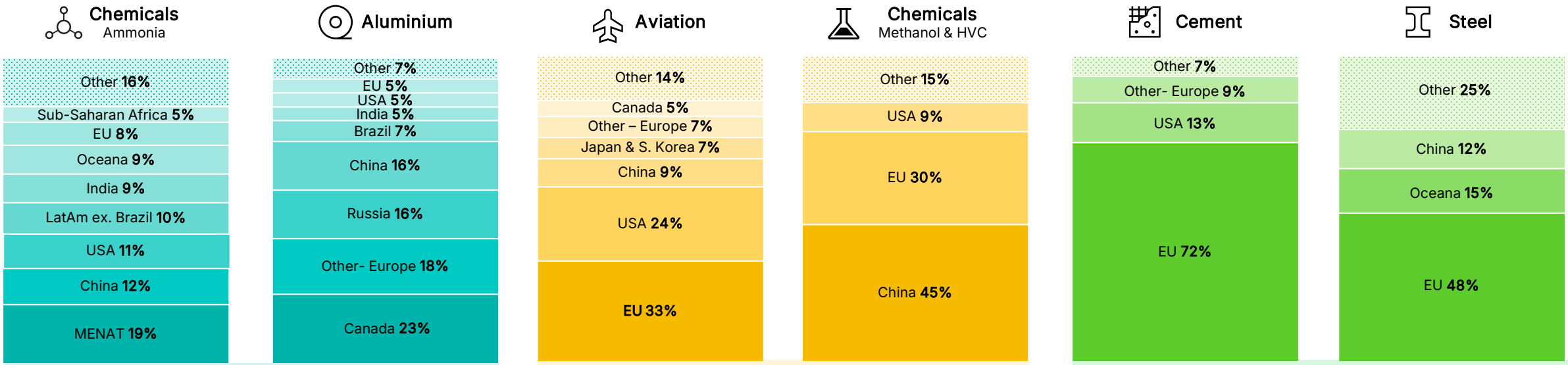
Strong public financing and carbon pricing mechanisms improving bankability

Strategic public funding plays a crucial role in enabling clean industrial projects. Support to capital expenditure (capex)– including government subsidies, tax credits and financial guarantees – is essential for enabling capital-intensive projects, while support to operational expenditure (opex), through mechanisms like Contracts for Difference (CfDs) can provide price certainty for outputs and help ensure long-term project viability.

Additionally, a predictable and high-enough carbon price can greatly enhance the economic viability of low-carbon technologies, especially those with high costs like CCS, while generating revenue for governments.

In electricity-dependent sectors, countries with declining production costs attract investment, while sectors with higher cost hurdles tend to concentrate in countries with appropriate policy support

All GPT projects by sector and geography[1]



A Declining clean costs

Nearly 50% of the ammonia pipeline is situated in sunbelt countries, reflecting high green ammonia production potential due to low clean power prices. The MENAT region has the largest share of the ammonia pipeline plants, capturing ~20%.

Green aluminium production is also concentrated in countries with largely clean electricity grids, although legacy assets are primarily located in well-functioning electricity markets[2] (e.g. Canada) rather than newly industrialising countries.

B Demand side measures

The aviation pipeline is relatively well spread, but the **SAF blending mandate in the EU** and **state-level demand-side regulations in the US** drive investment in these regions, which **account for over half** the global pipeline.

In shipping, **European regulation and upcoming IMO regulations** (designed to stimulate clean fuel demand) and voluntary measures are driving demand for clean methanol, alongside other fuels.

C Supply side support

The EU largely drives the announcements in the steel and cement sectors and accounts for 48% and 72% of the total pipeline in these industries, respectively. The EU's relatively high carbon price of approximately €80 per tonne of CO_2, along with stringent regulations and substantial public financing, provides a more favourable environment for projects in these sectors than in other regions of the world.

1. Only shares above 5% are shown. 2. These countries typically allow companies to procure reliable renewable electricity through long-term Power Purchase Agreements (PPAs). 3. Percentages in columns are rounded for clarity and may not sum to 100%

Project successes show three key emerging drivers at work in enabling progress

Conducting an outside-in assessment of key drivers that lead to advancement toward FID enables better identification of key success factors, facilitating more effective decision-making and accelerating the path to successful project implementation.

Drivers: A Declining costs B Demand-side measures C Supply side policy ☐ Main driver

Observed drivers	Project name	Sector	Details	Status	Observed project advancement drivers
A B C	**CF Industries and JERA Blue Ammonia Plant** $4 bn investment in ATR + CCS (United States)	**Chemicals** Ammonia	1.4 Mtpa Blue ammonia	Reached FID	- Supply-side incentives: US 45Q tax credits expected at USD140/t ammonia. However, uncertainty remains under current administration. Japanese clean hydrogen CfD awards expected in 2H 2025 - Off-take agreements: Partnership with JERA and Mitsui & Co for ammonia off-take and supply to Japanese market. Agreement with 1PointFive for CO2 transport and storage
B A	**Goldwind Green Energy Chemical** ¥3 bn green methanol project (China)	**Chemicals** Methanol & HVC	0.5 Mtpa Green methanol	Reached FID	- Large-scale 0.25 Mtpa (scaling up to 0.5 Mtpa) biogenic and green hydrogen based green methanol production plant launched in Inner Mongolia, China - Long-term off-take signed with German shipowner Hapag-Lloyd
A B C	**NTPC Pudimadaka Green H2 + Derivates Project** $21 bn integrated green H2 + derivatives hub (India)	**Chemicals, Aviation**	2.5+ Mtpa Green ammonia and derivates	Reached FID	- First Green Hydrogen Hub under the National Green Hydrogen Mission (NGHM), which aims to produce other derivatives including green methanol, green urea and SAF, and targeting export markets in the EU and Asia - Potential state support under the SIGHT mission
B C	**OMV Petrom Petrobrazi HEFA SAF Refinery** €750 mn project under construction (Romania)	**Aviation**	0.25 Mtpa SAF, HVO	Reached FID	- Collaboration with Airbus to promote SAF adoption in line with European regulations for 6% SAF adoption at European airports by 2030, and technology partnership with Honeywell - EUR 50 million funding from Romanian National Recovery and Resilience Plan
A C	**Century Aluminium Green Aluminium Project** $500+ mn primary aluminium smelter project (United States)	**Aluminium**	0.6 Mtpa Green aluminium	Announced, advanced planning stage	- Slated to receive USD 500 mn in US government funding from the Department of Energy's Office of Clean Energy Demonstrations (OCED)
A B C	**GravitHy** $2.2 bn project producing low carbon + renewable hydrogen DRI & HBI (France)	**Steel**	2 Mtpa H-DRI steel	Announced, advanced development stage	- Established in 2022 by the initiative of European net zero-focused investment initiative InnoEnergy (EU Innovation engine supported by European Institute of Innovation and Technology), received EUR 60 million investment for development - Supported by various global industry and financial partners including Japan Hydrogen Fund, Marcegaglia (potential off-taker), Rio Tinto, Ecolab, Siemens and ENGIE New Ventures

1. This list does not cover all pipeline FIDs, and includes historical FIDs beyond the past 6 months; Source: MPP Global Project Tracker

Preferred technology levers differ for each sector, based on costs, feedstock availability and policy support

Some sectors rely on a unique, well-identified technology option for clean production:

- In **aluminium**, renewable-powered smelters constitute a mature clean production route, cutting emissions by 70 - 80% vs conventional methods. Additional solutions like inert anodes and Mechanical Vapour Recompression (MVR) refining remain at pilot or demo stage.
- **In cement,** CCUS is the only technology considered in our tracker at this stage, as the only route to near-zero emissions production. However, alternatives like supplementary cementitious materials (SCMs) could offer price-competitive options and up to 25% abatement in the short-term. Globally, there are 16 financed calcined clay kilns with a further six proposed, each with an average capacity of 0.3 Mtpa of clay (or 1.2 Mtpa of cement). In total, financed calcined clay capacity is roughly three times the CCUS-based cement capacity that has been financed to date.

In other sectors, a preferred technology route is dominating the pipeline:

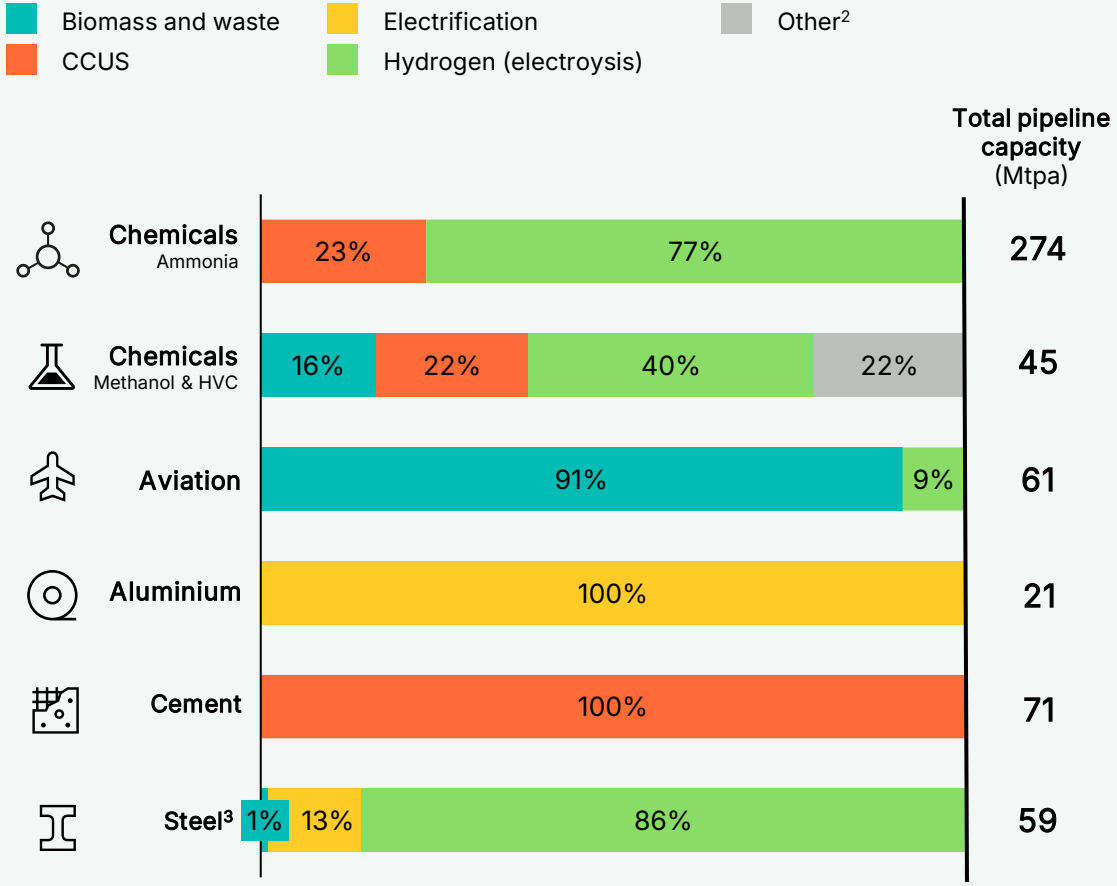
- In aviation, over 90% of the SAF pipeline capacity relies on commercial biomass-based pathways. Synthetic sustainable aviation fuel (E-SAF) via Power-to-Liquid (PtL) holds strong potential as a long-term solution, but developments remain limited due to high costs and low technology maturity.
- In steel, hydrogen-based DRI (Direct Reduced Iron) is the leading technology, followed by direct electrification[1]. However, investment in H2-DRI has been slowing recently as hydrogen projects stall (source: BNEF). Progress on CCUS-based technologies remains very limited, signalling a challenging path to decarbonise the large existing and growing fossil-based Blast Furnace asset base.
- In ammonia, green hydrogen (produced by electrolysis) projects make up two-thirds of pipeline capacity, followed by blue ammonia (CCUS), signalling greater confidence in the cost trajectory for green hydrogen than blue hydrogen.

In methanol and HVC, which encompasses a more diverse set of products, production routes vary more significantly – across green hydrogen, biomass and CCUS – with choices varying by region based on feedstock access, local cost-competitiveness and local policy incentives.

1. Only replacement of BF by EAF is considered

Share of pipeline capacity by sector and type of technology lever[1]

(%, Mtpa)



1. Shipping is not included since shipping viable capacity is calculated using chemicals data.
2. 'Other' technologies include biomass + hydrogen feedstock use in chemicals sector.
3. Technologies for secondary materials production, such as EAFs, for secondary steel production are not counted towards sectoral targets.

Note: Aluminium and cement show 100% as these are the only technology options captured by the Global Project Tracker.

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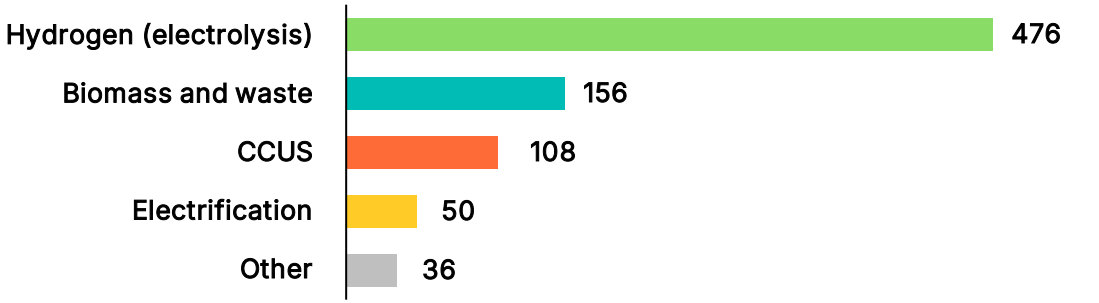
Green hydrogen is the leading technology globally, in almost 60% of clean industry projects tracked

Offering greater scalability than biomass and waste, and lower carbon abatement costs than CCUS, green hydrogen is a central technology for clean industrial developments and is currently dominating the pipeline.

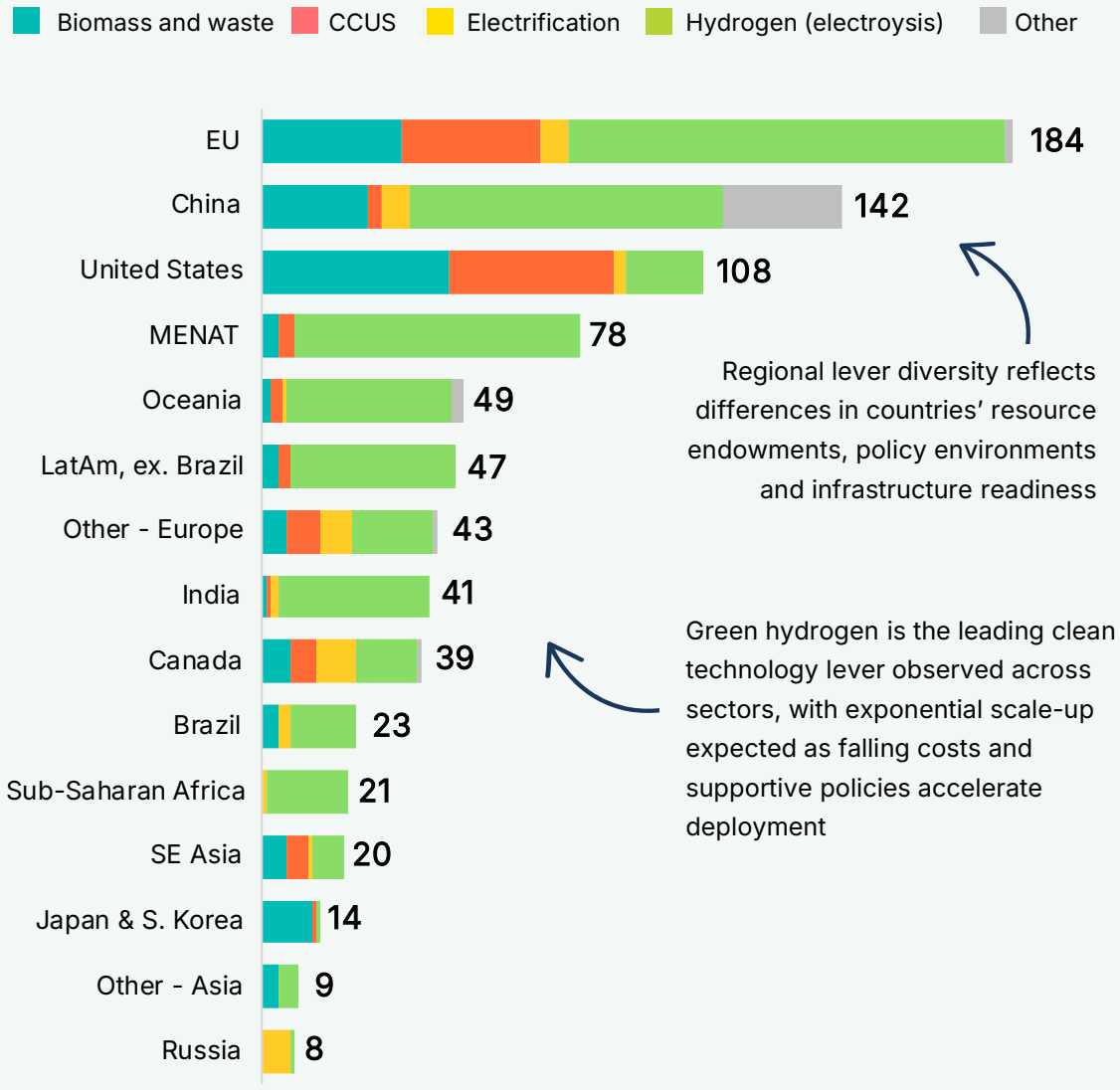
Its widespread adoption is especially evident in sunbelt countries, such as India, where the quasi entirety of the project pipeline is hydrogen-based. This dominance could come with risks if technology costs fail to decline as fast as expected. There are also notable exceptions: countries like Japan and South Korea, with limited renewable potential, are less focused on hydrogen and are exploring alternative biomass-based pathways.

Meanwhile, biomass-based solutions and CCUS account for just 19% and 13% of tracked projects, respectively. These are primarily concentrated in advanced economies with legacy industrial assets, especially those with more limited capacity to scale renewable energy (e.g. Europe, Japan, South Korea) and/or with abundant biomass resources (e.g. US, SE Asia). Electrification is primarily being used as a decarbonisation lever in aluminium production.

Total project count by lever



Total projects[1] in countries and regions by decarbonisation lever



Regional lever diversity reflects differences in countries' resource endowments, policy environments and infrastructure readiness

Green hydrogen is the leading clean technology lever observed across sectors, with exponential scale-up expected as falling costs and supportive policies accelerate deployment

1. Total projects announced through to operating

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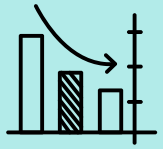
The growth in hydrogen-based production technology serves as a notable example - benefiting from all three drivers of declining clean costs trajectories, demand- support and strategic supply-side policy incentives

A



The main driver accelerating green hydrogen is a decline in renewable generation and storage costs.

Continuing declines in renewable power generation costs—especially solar—are the primary drivers making green hydrogen increasingly viable. As solar electricity becomes more affordable, the economics of electrolysis improve significantly.

Advancements in battery energy storage systems (BESS) which can be integrated with electrolysers and the grid are also valuable to scaling green hydrogen. According to BNEF, global average lithium–ion battery prices reached a record average low of $115/kWh in 2024, driven by declining raw material costs and overcapacity in China and are projected to drop by over 50% by 2035, thanks to efficiency gains and economies of scale.

However, electrolyser capex costs have not come down as fast as initially expected - with projections for green hydrogen costs being revised recently and less optimistic than they were previously.

B

Demand-side measures are currently limited, subject to ongoing uncertainty and they are geographically concentrated, creating risks for clean ammonia projects worldwide.

In 2022 the REPowerEU set an extremely ambitious vision to use 20Mtpa green hydrogen and its derivatives by 2030. The 2023 Renewable Energy Directive sets binding green hydrogen targets for member states, though estimates suggest actual demand incentivised will be 2-3Mtpa if implemented across the EU. Demand could total up to 4-7Mtpa if significant non-mandatory demand can be unlocked.

These targets still need to be transposed into national laws, but so far only Romania and Czechia – which use significantly less hydrogen than Germany or the Netherlands - have done so on time. The major consumers differ in their approaches: Germany has ruled out penalties and set out an 'all carrots' approach to the targets, while the Netherlands proposes a modest mandate (falling short of EU ambition) alongside subsidies.

C

A supportive supply-side policy environment reduces the risk from early technology development.

Governments worldwide are driving green hydrogen growth with a mix of strategic roadmaps, financial incentives or public funding programmes, regulatory mandates and public–private partnerships:

- **Australia** offers a tax credit of AUD 2/kg for green H2 producers
- **India** is subsidising green H2 through its SIGHT program and conducting reverse auctions
- **Brazil** is introducing $3.4 bn in tax credits for green H2 producers from 2028 via competitive auctions
- **Egypt** is offering VAT exemptions for electrolyser imports and a cash investment incentive worth 30 to 55% of the income tax paid on hydrogen production revenues to accelerate project development
- **Japan** has earmarked over $20 bn in H2 subsidies over 15 years, including foreign investment

Several regulatory interventions have been adopted across sectors that have either driven FIDs or a promising pipeline of announced projects, but examples remain limited

Early markets for clean materials, chemicals and fuels are critical to unlock a first wave of commercial-scale clean industry projects, helping to drive down costs and facilitate further adoption in other markets. These lead markets - downstream market segments where the green premium associated with clean commodities is managed via consumer willingness to pay or policy support - play a pivotal role in scaling up clean supply. Voluntary willingness to pay has driven an initial level of demand for clean commodities in these sectors, but regulatory measures are increasingly being adopted with the potential to have impact on a much larger scale.

Sector	Instruments	Description	Indicative green premium on end-product in 2030[1]	Potential impact on project pipeline
Aviation	**EU ReFuelEU:** SAF mandate	Binding SAF blending mandate (2% by 2025 and 6% by 2030)	**+5 to 9%** flight fares[2]	In aviation, the EU makes up 15% of announced capacity and 24% past FID capacity
Shipping	**IMO draft measures (2025):** global marine fuel standard and greenhouse gas (GHG) pricing mechanism	In April 2025, the International Maritime Organisation passed draft measures for the shipping industry, including a fuel emissions intensity standard and a GHG pricing mechanism.	**<1%** increase in cost of imported pair of shoes	*Specific pipeline impact still to be observed*
Ammonia	**EU RED III:** Green hydrogen and derivative mandate	42% H2 used to be Renewable Fuels of Non-Biological Origin (RFNBO) by 2030, and 60% by 2035	**+1%** for consumer goods, beverages, bread, etc.	~75% of planned hydrogen derivative export capacity with a specified destination is targeting Europe – most of which is green ammonia, *but specific pipeline impact still to be observed*
Cement	**France RE2020, Netherlands Plan Z, Sweden, California CALGreen:** Embodied carbon limits	Limits for emissions involved in construction that become increasingly stringent over time.	**0.5%** new 2000 sq. ft house[3]	Jurisdictions with such limits account for 26% of announced abated cement capacity

Uptake varies by sector, transport has seen strong momentum with SAF mandates and new global shipping measures, while examples of demand-side policies for clean materials are much more scarce

Since policies have often taken a long time to implement, or are sometimes limited in terms of ambition, tangible progress is still yet to be observed

Other policies are expected to become increasingly impactful in driving demand for low carbon materials, impacting FIDs over time as limits on embodied carbon become increasingly stringent

1: Unless otherwise stated, indicative green premia assumes 100% substitution of fossil commodities with green.
2: Assumes +200 to 300% and +500 to 900% production costs for HEFA and eSAF respectively, assuming baseline mandate compliance and that fuel makes up 25 to 30% of ticket prices.
3: Assumes +40% production costs for decarbonised cement, that the regulations drive up to 10% decarbonised cement use and that a typical house requires 40,000kg cement.

4

Looking ahead

The pipeline of clean industry projects is near critical mass, spanning a growing number of geographies, and must be unleashed to reap broad socio-economic benefits

Realising the global project pipeline can lead to exponential growth and spur a clean industrial revolution. As production of clean materials, chemicals and fuels scales up, cost will come down, accelerating the growth curve.

Despite the substantial headwinds of the past six months, the data shows that the march of progress for clean industry is continuing and spreading to every continent around the globe. This diversification of industrial bases from a few to many, driven by access to abundant low-cost solar energy supply is creating new centres for growth and opens the door for the opportunities that come with clean industry to spread beyond their traditional centres.

As green ammonia leads the charge, with its associated positive impacts for green hydrogen, new trade corridors will emerge and global commerce will diversify. Through harnessing this potential, governments and countries that lead in clean industry can enhance their security and increase resilience.

Now it is a race to unleash the pipeline and convert announced projects to financed plants. The pipeline of ~700 announcements is building up pressure that once uncorked will bring broad benefits, particularly for new industrial sunbelt countries that are rich in solar resources.

For low-income countries, clean industry can boost industrialisation, encourage Foreign Direct Investment, create jobs and contribute to building out local infrastructure – powering up local communities to be independent and no longer reliant on foreign development aid.

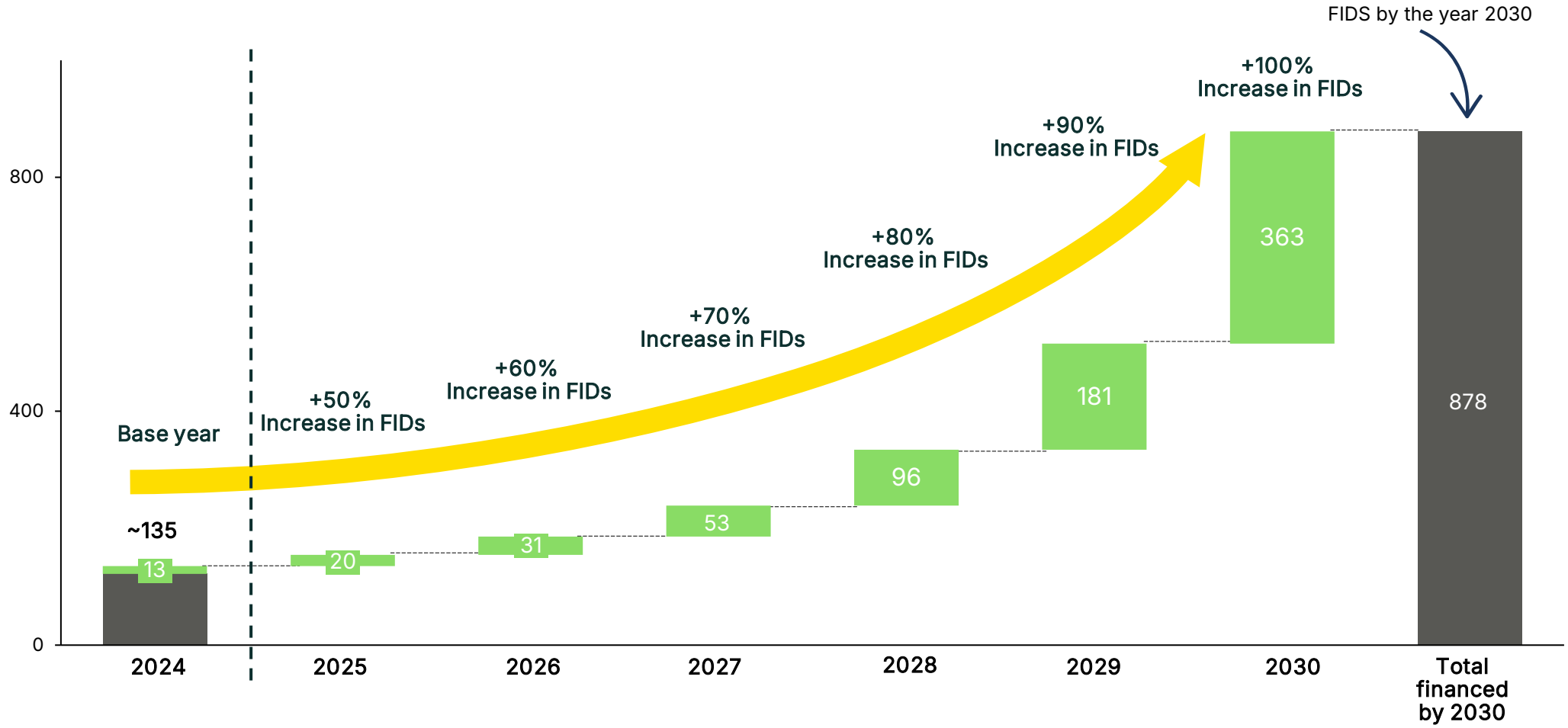
For countries with a long industrial history, the shift to clean industry can reignite innovation, diversify supply of energy and increase the resilience of supply chains. It will allow us to continue using high quality cars and buildings, import goods and take guilt-free foreign travel, while cutting the impact of all of this on the planet to give us and future generations a healthier environment. In the long-term cutting costs and generating economic growth around the world to help all of society to prosper and flourish.

The key now is to move at pace to build market and investor confidence to unleash the critical mass of clean projects in the pipeline to make the step change needed to catch up with emissions cuts while reaping the full benefits of clean industry.

The key now is to move at pace to build market and investor confidence to unlock the critical mass of clean projects in the pipeline

Accelerating the pace of FIDs year-on-year starting now and continuing over the next five years can bend the curve, unleashing exponential growth in clean industry development and major socioeconomic benefits

Illustrative scaling of FIDs with year-on-year acceleration of 50% starting 2024 and increasing by 10% per year



5

Sector snapshots
Overview of sectors in the pipeline

Chemicals (Ammonia)

Pipeline evaluation

A large portion of ammonia capacity is in the pipeline, but less than 5% (16 Mtpa) of the total planned 274 Mtpa has reached FID. Most new projects are concentrated in China, the US and the Middle East, with Chinese green ammonia projects expected to start production as early as 2025/2026. Capacity in the pipeline exceeds the current grey ammonia production capacity.

Enablers

Major policy drivers include the US IRA's 45Q tax credits, which incentivise blue hydrogen and ammonia projects through CO_2 capture subsidies, and Europe's RED III mandate, which requires 42% renewably sourced hydrogen in derivatives. The EU's CBAM could further drive demand for low-emission ammonia by penalising non-compliance with EU carbon standards upon the launch of its definitive phase in 2026. However, the pace of project realisation could be constrained by high capital costs, offtake and limited renewable energy capacity in some regions.

Technology pathway

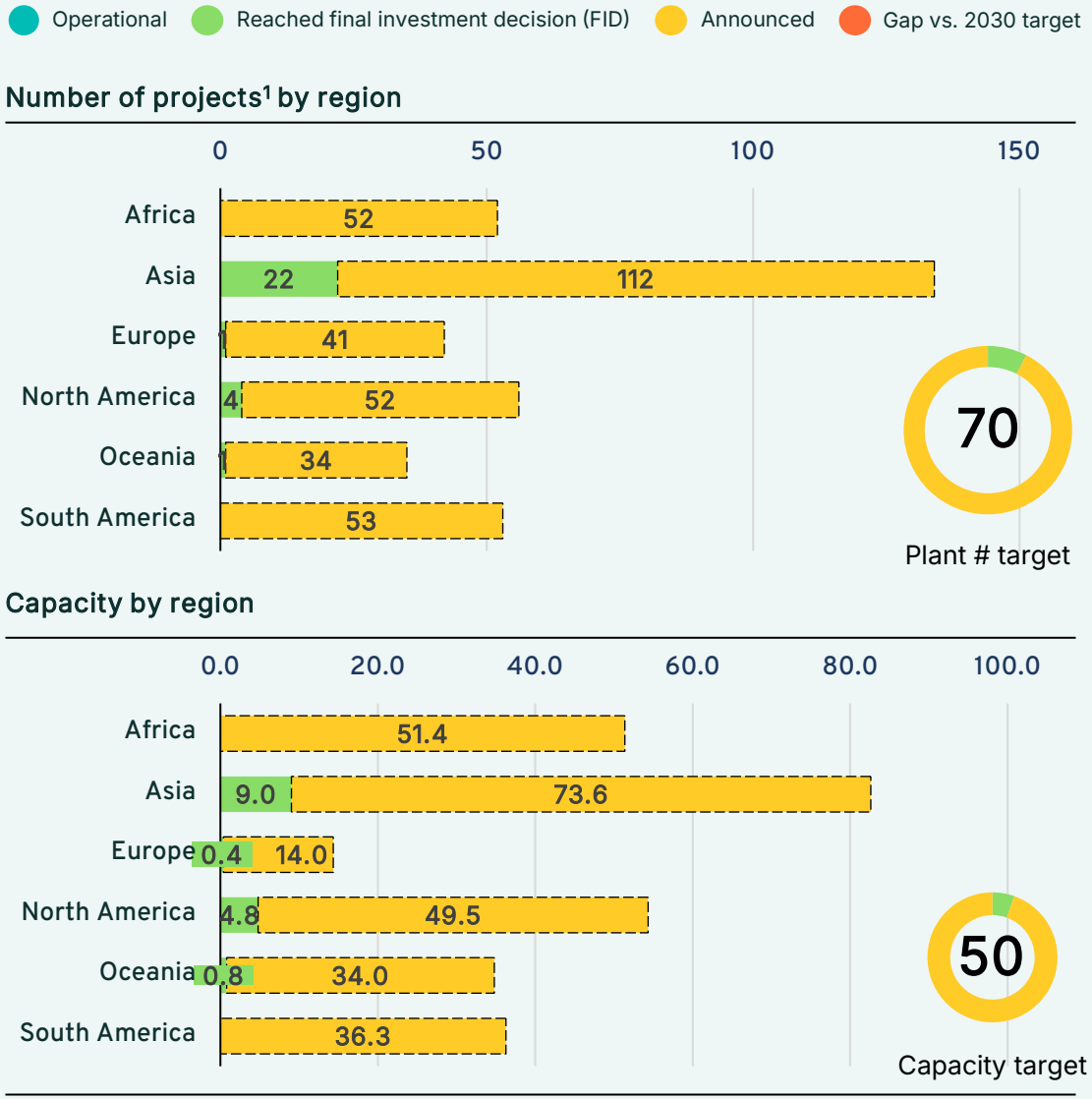
About 30% of the 260 mn tonnes of announced clean ammonia capacity is blue ammonia, while the remaining ~70% is green hydrogen-based (green ammonia). Blue ammonia projects are concentrated in the US and Middle East, supported by tax credits and low-cost natural gas. Over time, green hydrogen projects are expected to outpace blue as renewable energy capacity expands in China, along with India, Brazil, Australia and other sunbelt countries.

Demand and supply-side insights

Global clean ammonia is growing, driven by blue ammonia projects in the US and mixed blue/green projects in MENAT. Australia and emerging markets focus on green ammonia exports and China develops smaller local plants. Demand centers materialising in Europe and China, with dominant uses in fertiliser and industrial applications. However, less than 10% of projects currently have offtake agreements.

Chemicals (Ammonia) projects (near-zero emission plants) by continent

30th April 2025



Primary data sources: Ammonia Energy Association.
1. Total projects announced through to operating

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Chemicals (Methanol & HVC)

Pipeline evaluation

Clean methanol supply is expected to reach 11 Mtpa per year by 2028. Of 158 plants, most projects are concentrated in China, the US and the EU. Only ~10% of projects have passed final investment decision. China leads in number of projects (71), followed by the EU at 48 and the US at 15 projects. China also leads in most FIDs (12 out of 15 globally) and holds two of the five operating plants tracked in the GPT data.

Enablers

China leads in bio- and e-methanol development, supported by financial incentives, tax breaks, preferential electricity rates and national vehicle fuel standards. The US IRA 45Z provides tax credits for low-emission transportation fuels, while the EU's RED III mandates advanced biofuels and RFNBOs, including green methanol, in transport fuels by 2030.

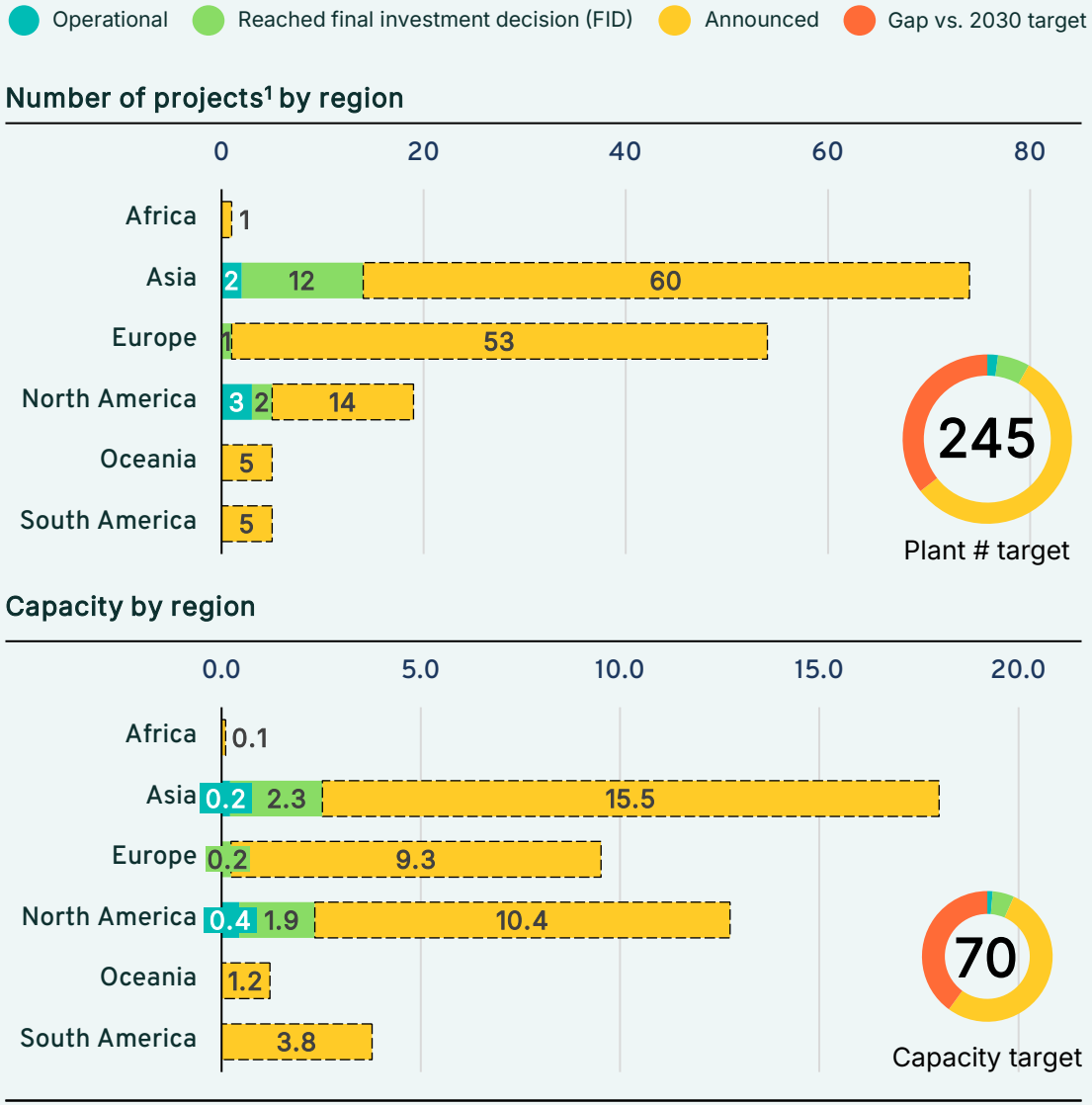
Technology pathway

Green methanol is mainly produced from renewable biomass or by synthesizing methanol from green hydrogen and captured CO_2, both aiming to minimise carbon emissions and fossil fuel reliance. While promising for decarbonising sectors like shipping, less than 10% of e-methanol projects in the tracker have passed FID, with most still in announced stages. The market is growing rapidly, driven by falling electrolyser costs and increasing renewable energy availability.

Demand and supply-side insights

Shipping demand for methanol is projected to grow rapidly, with BNEF estimating demand at 14 Mtpa by 2028, but even with rapid supply expansion, a significant supply shortfall is still forecasted (3 Mtpa), as marine demand may outpace available green methanol production. Project developments are concentrated in China and Europe. Methanol's traditional uses are expanding into maritime and aviation fuels. Major shipping companies have signed long-term green methanol offtake agreements with Chinese producers, supported by growing port infrastructure. While some small projects have been cancelled, most announced projects are still progressing with few reaching FID.

Chemicals (Methanol & HVC) projects (near-zero emission plants) by continent 30th April 2025



Primary data sources: Methanol Institute
1. Total projects announced through to operating

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Aviation

Pipeline evaluation

The sustainable aviation fuel (SAF) pipeline remains active, with expansions like TotalEnergies' La Mède platform and Shell's refinery conversion in Wesseling. However, economic uncertainty and investor caution have caused widespread delays and cancellations of large-scale SAF projects globally.

Enablers

SAF growth is supported by strong regulatory and policy frameworks worldwide, including mandates, tax incentives and subsidies aimed at achieving net-zero emissions by 2050. International initiatives like ICAO's CORSIA and policies in the US, EU and UAE are driving demand and de-risking investments. Airlines' sustainability goals and consumer demand for greener travel also bolster uptake.

Technology pathway

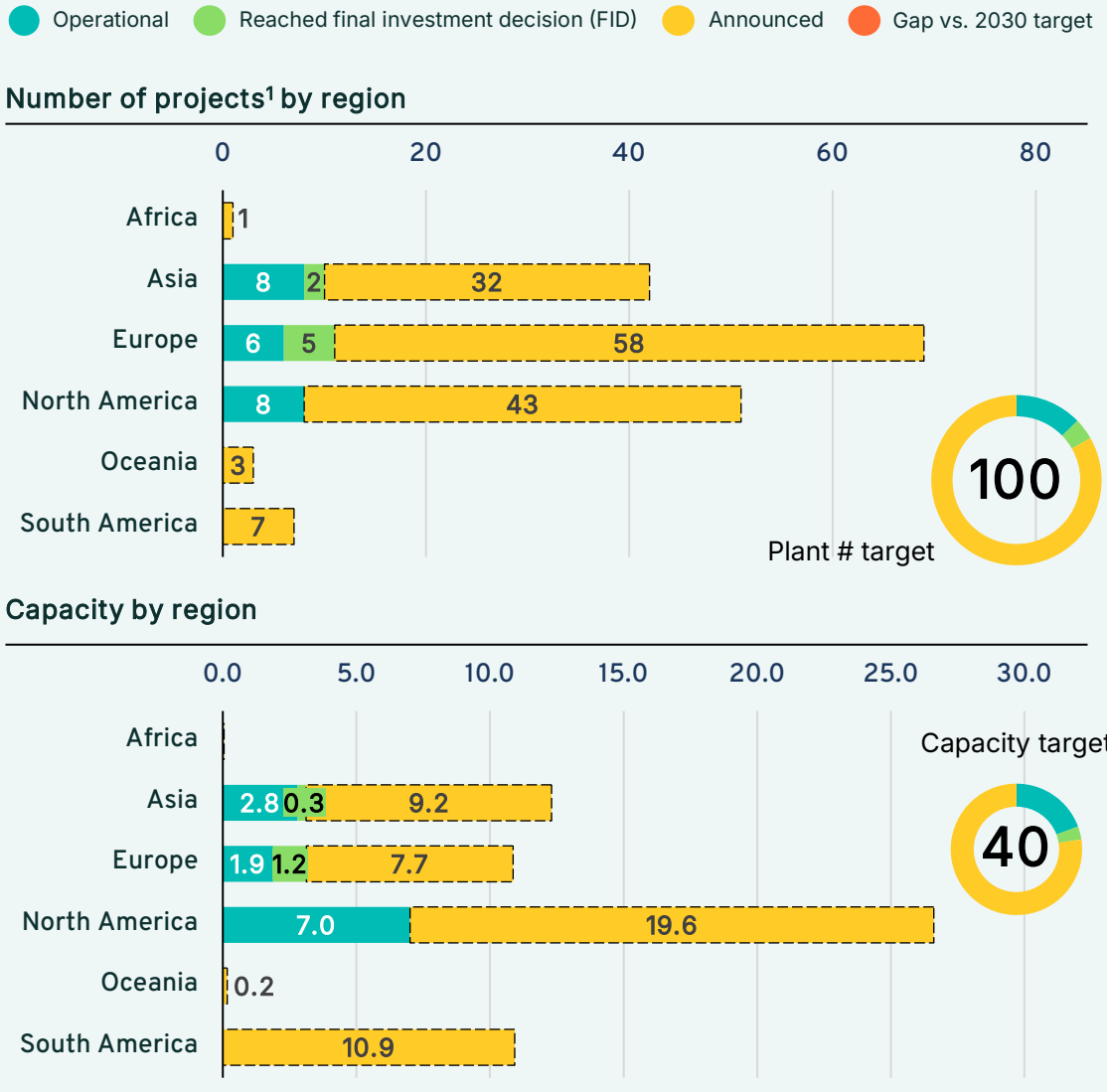
Technological progress continues with biofuels dominating current SAF production, due to their compatibility with existing aircraft and infrastructure. Next-generation synthetic fuels, including Fischer-Tropsch and power-to-liquid, are advancing as technologies mature. Innovations like Synhelion's solar fuel plant and Firefly Green Fuels' waste-to-fuel approach are nascent yet promising pathways to address feedstock and scalability challenges.

Demand and supply-side insights

Demand is rising with air travel growth and net-zero commitments, but supply constraints persist. Bio-SAF production is projected at 9 – 12 Mtpa by 2030, about 30% below IEA's targets. Feedstock competition and high costs have caused project delays and cancellations. The SAF market is forecast to grow from $1.2 bn in 2025 to over $5.7 bn by 2029, but scaling supply remains the main challenge.

Aviation projects (SAF plants) by continent

30th April 2025



Primary data sources: Argus media, Systemiq, ITA Primary Research

1. Total projects announced through to operating

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Aluminium

Pipeline evaluation

Global aluminium production is stable overall, with China accounting for 60% of output and nearing its capacity limit. New smelter projects in China and the West are largely offset by closures, especially in the US and Europe, where high energy costs have idled significant capacity. While there is renewed interest in new and restarted smelters, actual progress is slow and dependent on energy and market conditions.

Enablers

US tariffs and major federal funding are supporting domestic aluminium projects, but high power costs and intense competition for renewable energy remain the main obstacles to industry growth and decarbonisation. Securing affordable, clean energy is essential for new projects to proceed and for classifying aluminium as “green.”

Technology pathway

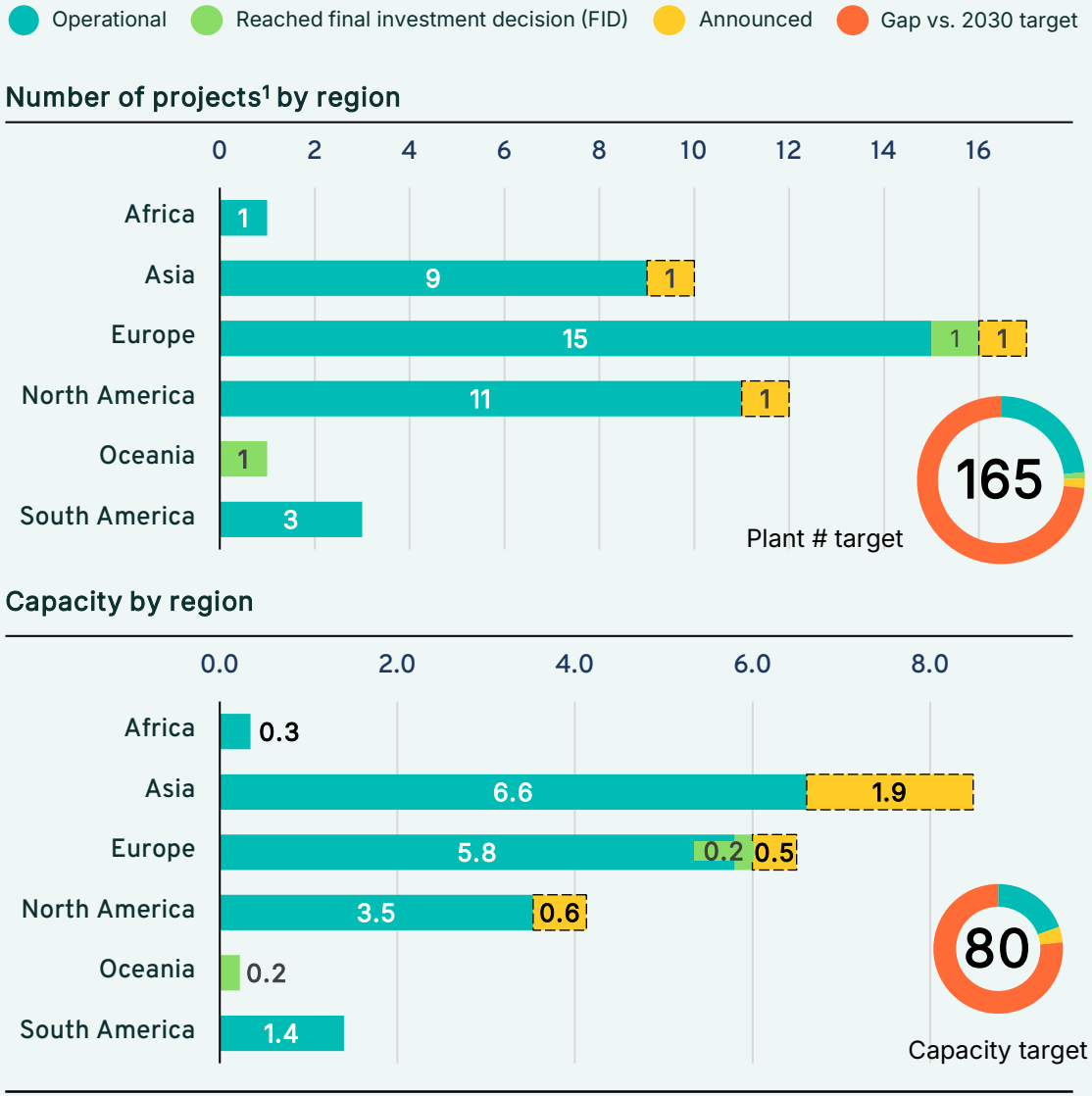
The decarbonisation of aluminium production hinges on access to low-carbon electricity, as the process is highly energy-intensive. About 20% of China’s aluminium is already hydropowered, and industry leaders are targeting net-zero emissions by 2050. However, new green projects are still struggling to secure reliable renewable energy sources.

Demand and supply-side insights

Slowing growth and reduced exports from China are creating new opportunities for US and European producers. Restarts and new capacity depend on favorable power and aluminium prices. Demand remains strong, especially for sustainable, low-carbon aluminium, with market growth driven by sectors like automotive, construction and renewables.

Aluminium projects (low-carbon refineries and smelters) by continent

30th April 2025



Primary data sources: International Aluminium Institute.

1. Total projects announced through to operating

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Cement

Pipeline evaluation

The green cement project pipeline has shown only modest progress in the past six months, with no major new investments reaching final investment. A few projects are advancing-such as Heidelberg Materials' UK planned carbon capture plant and National Cement's CCS project in California-but recent US policy changes have led to grant cancellations and are expected to slow further development.

Enablers

Policy support and funding from government entities like the US Department of Energy and EU are critical for advancing green cement projects. However, recent reversals and grant cancellations pose significant barriers that threaten the pace of industry decarbonisation. For example, the US Environmental Protection Agency has cancelled 21 grants, including those directed to reduce GHG emissions from the cement industry.

Technology pathway

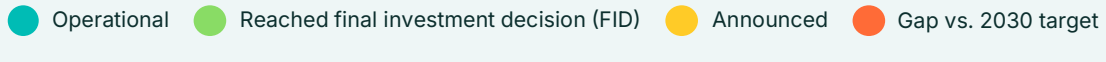
Cement decarbonisation is progressing through two main avenues: the deployment of carbon capture, utilisation and storage (CCUS) at major plants (focus of the tracker) and the rapid development of low-carbon binders and alternative chemistries-such as Limestone Calcined Clay Cement (LC3), which significantly reduces clinker content and emissions. Recent partnerships and funding are accelerating these innovations, with companies piloting new processes. These advances are essential for meeting the sector's climate targets and positioning green cement technologies for broader market adoption.

Demand and supply-side insights

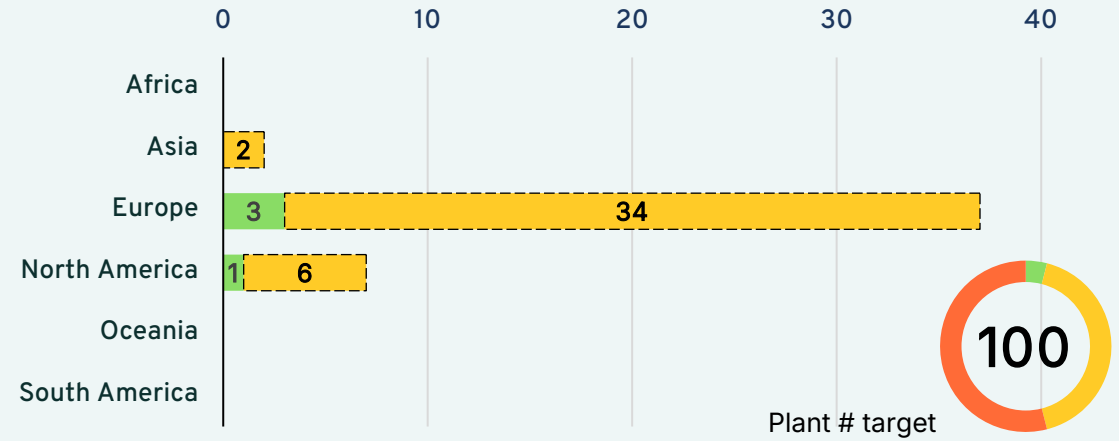
Industry activity and partnerships show ongoing interest in low-carbon cement, but recent policy changes and grant cancellations (such as those in the US) create uncertainty. These factors may slow project development and affect market adoption of green cement technologies in the near term.

Cement projects (low-emission plants) by continent

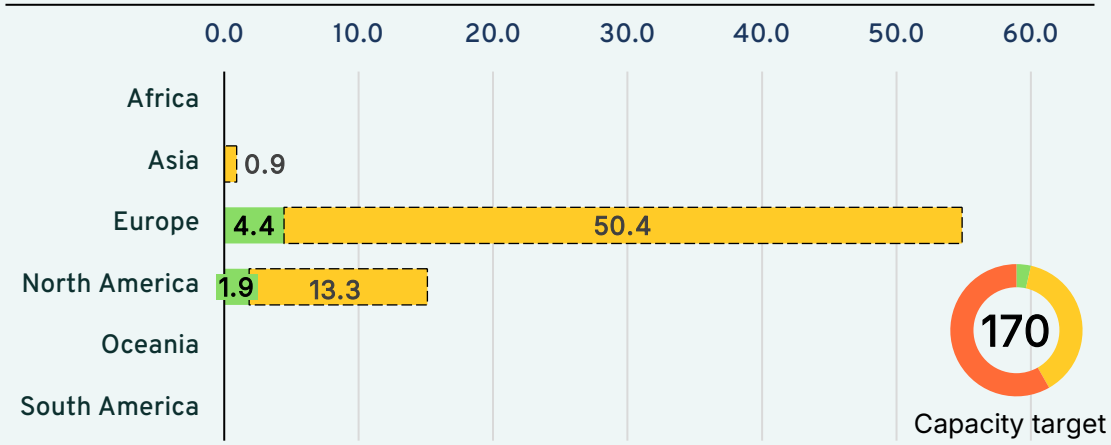
30th April 2025



Number of projects[1] by region



Capacity by region



Primary data sources: LeadIT
1. Total projects announced through to operating

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Steel

Pipeline evaluation

The global green steel pipeline has seen limited progress over the past six months, as the green steel sector appears to be experiencing a stark reversal: BNEF reports that investment in clean steel projects plummeted to $17.3 bn in 2024 — down 57% from 2023's $40.2 bn—to the lowest annual figure in six years. While a few new steel plants in Thailand and Japan have been announced, no major green steel projects have reached FID recently. Some projects, such as Blastr Green Steel in Finland and GravitHy in France, continue to advance, but major setbacks include ArcelorMittal's suspension of FIDs on four large European H2-DRI projects, citing unfavorable market and policy conditions. Three operational plants include one biomass based blast furnace in Brazil and two H-DRI plants in China.

Enablers

Enablers for green steel include new subsidies and supportive policy frameworks, such as Japan's incentive for vehicles made with low-carbon steel and the EU's Action Plan on Steel and Metals, which aims to ensure affordable energy, prevent carbon leakage and support decarbonisation investments. However, policy uncertainty, regulatory ambiguity and a fragmented global policy landscape remain significant barriers to progress.

Technology pathway

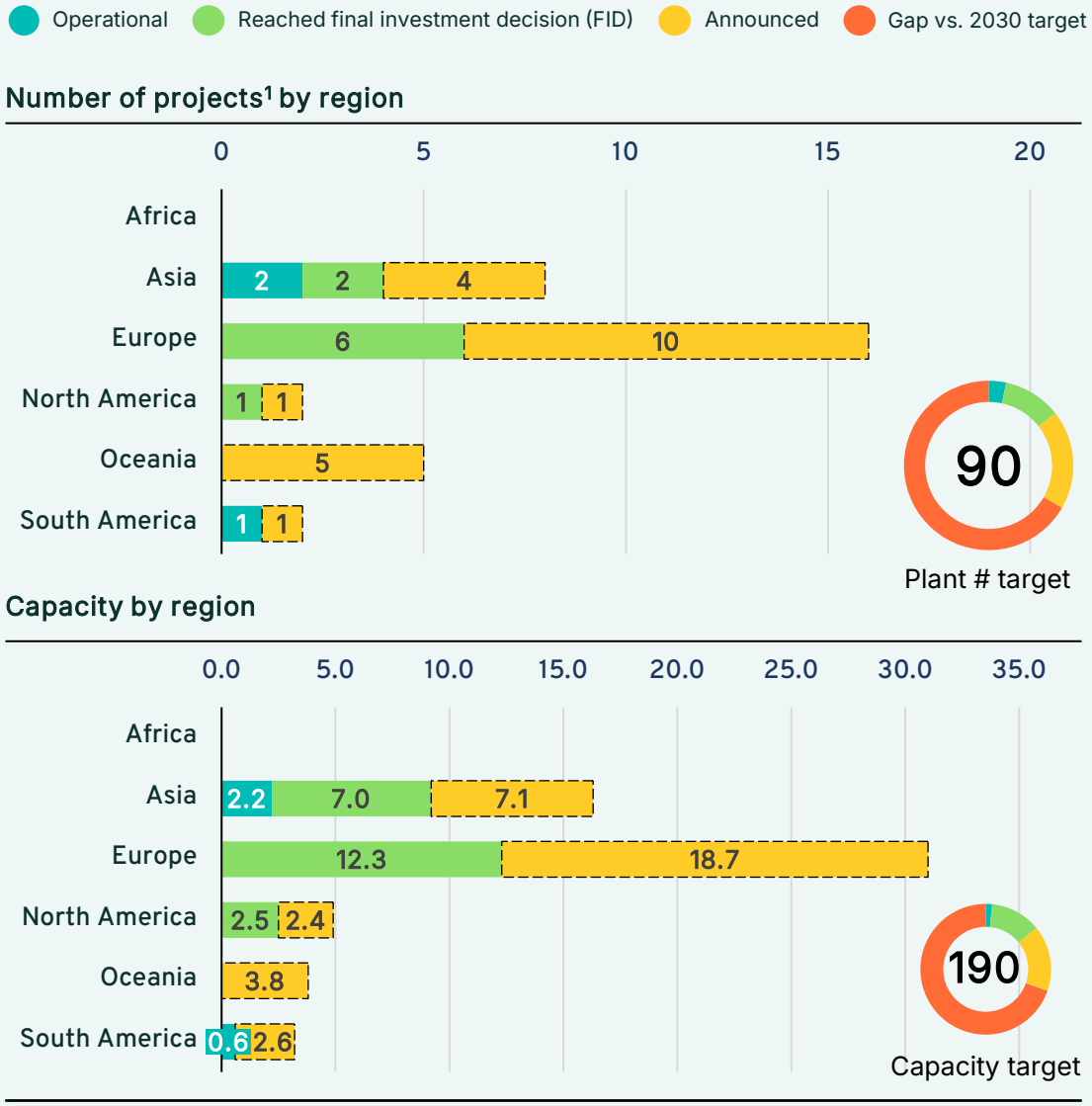
Hydrogen-based direct reduced iron (H2-DRI) and electric arc furnaces (EAF) are the primary technology pathways for green steel production. The sector remains focused on scaling these established technologies, with no major new innovations or pilot projects reported recently. Outside of primary steel, the rise of scrap-based EAFs is a major trend, especially in regions with abundant scrap and cheap electricity.

Demand and supply-side insights

Market willingness to pay a premium for green steel remains limited. The automotive sector is the main adopter, supported by corporate sustainability commitments, but these drivers alone are not enough; stronger demand-side policies are needed to stimulate broader uptake. On the supply side, the China's persistent overcapacity is a defining issue, and the OECD highlights a worsening global steel crisis, with Chinese exports surging and global excess capacity expected to increase by 20% by 2027.

Steel projects (near-zero emission primary steel plants) by continent

30th April 2025



Primary data sources: LeadIT
1. Total projects announced through to operating
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Shipping

Pipeline evaluation

As of January 2025, methanol is leading the clean shipping fuel transition, with ~340 methanol capable ships on order-representing ~10% of the global orderbook. In contrast, ammonia-powered vessels remain at a nascent stage, making up less than 1% of the orderbook, with only 30 ships ordered (majority being container vessels).

Enablers

The adoption of clean fuels in shipping is currently hindered by higher costs compared to fossil fuels on a total cost of ownership basis. This makes strong policy support (incl. carbon pricing) essential. The International Maritime Organization (IMO) has set a sector-wide net-zero emissions target for 2050, approving measures on a new fuel standard and global pricing for emissions, set to be formally adopted in October 2025 and enforced in 2027 for ocean-going ships over 5,000 gross tons. These international measures complement regional efforts such as the EU's ETS and Fuel EU Maritime, which are designed to close the cost gap between conventional and clean shipping fuels and stimulate clean fuel demand.

Technology pathway

While ammonia holds long-term zero-carbon potential, methanol's readiness and safety make it the dominant alternative fuel through the 2030s. The technology is more mature as it benefits from commercially available engines and simpler retrofits, with the vast majority of methanol-capable ships being dual-fuel (methanol and conventional fossil fuels). In contrast, ammonia as a shipping fuel and ammonia dual-fuel vessels are less mature. The handling required for ammonia is more complex as well, as it faces multiple safety, bunkering, and infrastructure challenges.

Demand and supply-side insights

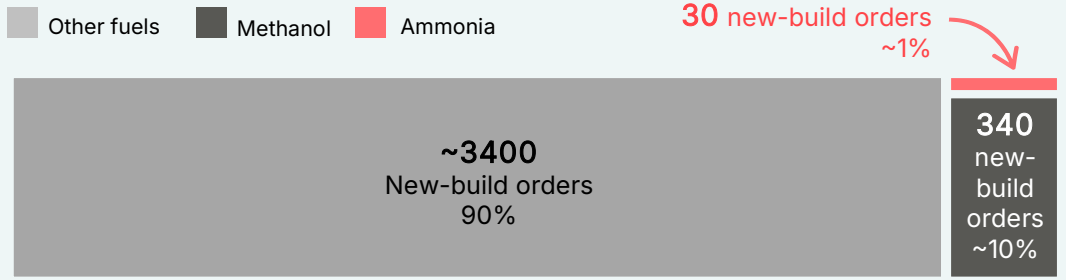
Methanol is currently the preferred alternative fuel in shipping, as evidenced by its dominant share of the orderbook. Demand for methanol capable vessels is strong, while ammonia-powered ships are still in the adoption phase. On the supply side, shipping companies are focusing more on methanol, with significant orders placed, and ammonia vessel orders primarily serving the gas tanker segment.

Shipping related regulation / policy:

Sector breakdown of global shipping demand

Sector	Share of 30 Mtpa shipping target by 2030	Capacity
Chemicals Ammonia	Estimated demand for ammonia as a shipping fuel in 2030 is ~20 Mtpa	~274 Mtpa
Chemicals Methanol & HVC	Estimated demand for methanol as a shipping fuel in 2030 is ~10 Mtpa	~46 Mtpa

Breakdown of global vessel orderbook



Primary data sources: BNEF, ITA Primary Research, MPP Global Project Tracker

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Appendix

The Global Project Tracker

Shedding light on clean industry's transition

Since 2019, Mission Possible Partnership has been working to advance global clean industry transformation in collaboration with a network of partners and in deep engagement with industrial value chains.

Having developed a series of industry-backed Sector Transition Strategies (STSs) for the energy-intensive industrial sectors, we demonstrated that deep decarbonisation of heavy industry and transport can be achieved by mid-century. Launching in April 2024, the Global Project Tracker maps this transition against the STS-derived milestone of building a critical mass of clean industrial plants by 2030. Achieving this milestone would keep industrial emissions aligned with a 1.5°C trajectory.

In six-monthly updates, the Tracker plots the pipeline & geography of all known commercial-scale clean industrial plants, marking their deployment across announced, final investment decision (FID) and operational statuses. As it typically takes four to six years for a project to become operational after FID, it is evident that the deployment target of operating plants will not be met by 2030. However, the window is still open for plants to reach investment.

With a growing pipeline, exceeding 800 plants, all efforts must be focused on securing investment into planned projects to realise the announced pipeline as rapidly as possible. Exponential deployment starting now and continuing into the next decade is essential to open the window for industry to 'catch up' with emissions cuts in the early 2030s.

tracker.missionpossiblepartnership.org

1. For additional information on key data sources, methodologies, and set thresholds for each sector, please refer to the appendix

The Global Project Tracker: 2025 methodology improvements & updates

New pipeline figures give the most accurate and comprehensive view yet of the total global pipeline of commercial-scale primary production net-zero aligned clean industry projects[1]

Overview of key data improvements and notes on changes to the methodology[2]

Enhanced data sources	New credible sources have been identified and relied upon for project tracking for various sectors, improving our data quality and extending our data coverage. While every effort has been made to ensure the accuracy and completeness of data related to the Chinese market, it is important to note that certain limitations may exist. The availability and transparency of publicly accessible information in China can vary significantly across sectors. We have taken every practical step to verify and validate the information included in this report to ensure its accuracy to the greatest extent possible, but some relevant data may be incomplete, undisclosed, or difficult to verify, which could impact the overall reliability of insights drawn from this region
More stringent classifications	Capacity thresholds for what is deemed eligible for project inclusion has been set for various sectors, focusing the emphasis on capturing only true 'commercial-scale' projects
Sector exclusions (Shipping & Trucking)	Shipping remains in scope but is no longer shown as a separate dial. Its progress is tracked based on shipping fuels, with this demand now covered within chemicals (ammonia and methanol). Trucking is excluded due to a focus on materials, chemicals, and fuels—all energy-intensive production processes.
Capacity-adjusted targets	As new capacity data shows, clean industry plants are smaller than anticipated in most sectors (except aviation). The aggregated 'critical mass' plant target has increased accordingly, now totalling 770 (up from 705)
Target deployment date	To bring industrial sectors in line with STS 1.5ºC trajectories, 770 projects must be operating by 2030. With 65 existing FIDs and 69 plants operating, and with current FID rates at less than 15 pa, industry will not meet this target. Yet, with a growing pipeline that now exceeds 800, exponential investment into these plants could enable a fully financed pipeline by the end of the decade, and operational plants by the mid '30s
Comparisons with previous Global Project Tracker versions	With methodology improvements, inclusion of new data sources and capacity-adjusted targets - direct like-for-like comparisons to previous data is not possible

New pipeline figures build on existing research to give the most accurate and comprehensive view yet of the total global pipeline of commercial-scale clean industry projects in key ITA sectors

1. With methodology improvements, inclusion of new data sources and capacity-adjusted targets for 'critical mass' - direct like-for-like comparisons to previous data is not possible
2. For additional information on key data sources, methodologies, and set thresholds for each sector, please refer to the Global Project Tracker at tracker.missionpossiblepartnership.org

Detailed methodology and definitions

The data for this updated version follows an improved methodology across all projects and each specific sector, where plants counted towards the 2030 target (e.g., 90 near zero emissions steel plants) are commercial scale net-zero aligned plants, based on potential capacity (where known) and technology mix

Sector	Data sources	In-scope products	In-scope technologies[1]	Commercial-scale capacity threshold[2]
Chemicals Ammonia	Ammonia Energy Association (AEA), Primary Research	Ammonia	BECCS, CCS (including ATR, Coal gasification, Natural gas, Partial Oxidation, Steam methane reforming) CCUS (including Natural gas, electrolysis, oil), Electrolysis (including ALK, PEM, SOEC)	0.1 Mtpa
Chemicals Methanol & HVC	Methanol Institute (MI), Primary Research	Methanol	CCU + H2 (non-renewable) / ETL, CCUS (Natural gas), Electrolysis + CO2 (biogenic / non-biogenic), Electrolysis + Gasification (biomass), Electrolysis + Gasification (residual waste), Electrolysis + Gasification (biomethane + natural gas), Electrolysis + Gasification (biomethane), Gasification (Biomass), Gasification (Black Liquor), Gasification (Residual waste), Gasification (waste + biomass)	0.1 Mtpa
Aviation	Primary research, Argus media, Systemiq	SAF	AtJ-SPK, G/FT, HEFA, PtL	0.01 Mtpa
Aluminium	Primary research, International Aluminium Institute (IAI)	Primary Aluminium	Renewable Electricity[3]	0.1 Mtpa
Cement	LeadIT, Primary Research	Cement	CCUS (calcium looping), CCUS (cryogenic), CCUS (oxyfuel), CCUS (oxyfuel + post combustion), CCUS (oxyfuel + amine), CCUS (post-combustion)	0.1 Mtpa
Steel	LeadIT, Primary Research	Primary Steel, Iron	BF-BOF + CCS, BF-BOF + CCU, BF-BOF + CCUS, Biomass-BF, EAF (For green iron), Electrowinning, ESF, ESR, H-DRI, H-DRI + EAF, H-DRI + ESF, Hisarna, MOE, Ore Electrolysis	0.1 Mtpa
Shipping	N/A	Ammonia, Methanol	Not considered separately (shipping demand is accounted for in the supply of Ammonia and Methanol, therefore the same in-scope technologies apply)	N/A

1. Includes net zero technologies for each sector for which commercial scale projects have attained in-scope pipeline status definitions, 2. Includes commercial-scale plants, captured via sector specific thresholds, note that pilot, demo, and R&D level projects are excluded (where identified), 3. Assumes fully decarbonized smelting of primary aluminum, does not include projects without ties to specific smelters, decarbonization of other processes for aluminum and alumina

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