

Industry: investment need to 2050

2021-2050
annual average
investment

\$70 bn

Share of total
low-carbon
investments

2%

Investment needs

2050 targets

Investments in new or existing plants from 2030 onwards are compatible with a net-zero 2050 objective.

Investment needs

Chemicals: investment to develop and integrate carbon capture and storage (CCS) and pyrolysis technologies in the chemicals process.

Steel: investment to transition steel assets to net-zero compatible technologies including hydrogen-based direct reduced iron (DRI) facilities and CCS.

Cement: investment to build and retrofit cement plants equipped with CCS, invest in emerging low-carbon cement production technology as they emerge.

Aluminium: to build and deploy low-carbon technologies at smelters and refineries.

+ Investments in **clean electricity generation** (for both direct electrification and green hydrogen production) for industrial decarbonisation of around **\$540bn** a year – see Power sector.

Investment milestones

\$15bn today → \$70bn/year by 2030 → \$125bn/year by 2040

Where?

China will account for the most investment (~40% of the global need) this decade, as the world's largest industrial producer. The remaining 60% will be relatively evenly split between high-income and lower-income countries.

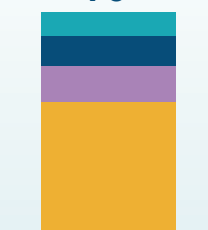
Gross or net?¹

Investments capture the incremental investment needed to build zero carbon industrial assets rather than high carbon ones, for example equipping them with CCS, which are additional costs than would have otherwise occurred in business as usual (BAU).

Global annual investment

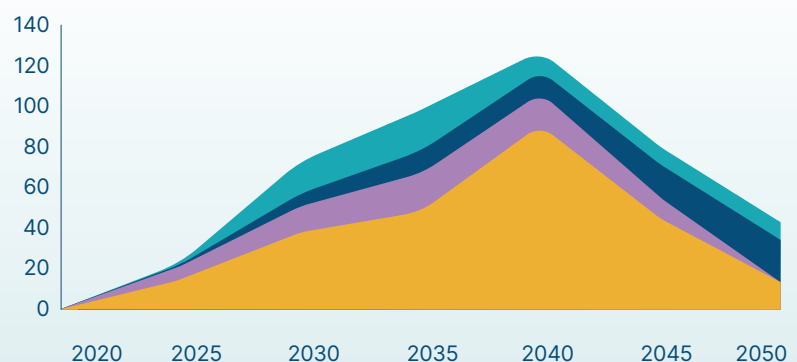
\$ billion per annum

70



Average investment
p.a. 2021-50

Aluminium
Steel
Cement
Chemicals



Outlook to 2030

- There is a critical window of opportunity this decade, as 30% of existing assets will face an investment decision by 2030
- Investment to decarbonise industry are becoming increasingly attractive, for example in the steel sector, the economics of direct reduced ironmaking (DRI) with clean hydrogen are improving.
- But in most cases, there is still a “green premium” with a higher cost for the low carbon technology, requiring real economy policy and financial sector actions.

2030 target

\$70 bn investment

x35 scale up

Sources: SYSTEMIQ analysis for ETC (2022); MPP (2021), *Net-zero steel sector transition strategy*.

¹ The ETC's investment estimates differ in approach by sector. Gross investment refers to the total investment required under a 1.5 degree net zero pathway, regardless of how much investment would have occurred anyway. Net investment is the incremental investment required compared to a BAU scenario.

Note: All figures are in US dollars

Industry: how to mobilise finance

Required real economy policies

Challenges	Real economy policies needed	Priority policy
Create a clear strategic vision <ul style="list-style-type: none"> Lack of a level global or regional playing field. Uncertainty over which decarbonisation route is likely to dominate for steel and chemicals. 	<ul style="list-style-type: none"> International collaboration to define and align a low-carbon steel and cement standard. + Strategic planning for the location of first of a kind (FOAK) plants with access to low-cost zero-carbon electricity, carbon dioxide transport and storage, and hydrogen. Adopt policy mechanisms to counteract competitive distortions and create a level playing field. National sector transition strategies. Long term regulatory certainty in the investment and product environment, for example, clear routes to market for new and alternative technologies in cement. 	
Address the "green premium" challenge <ul style="list-style-type: none"> Green premiums, while falling, are still sizeable and will persist into the 2030s. 	<ul style="list-style-type: none"> Designing, harmonising, and implementing carbon contracts for difference support schemes. + Mandate that green cement and steel must account for a certain share. Green public procurement requirements. Create demand signals and crowd in private investment via strategic offtake agreements. Carbon pricing that rises progressively and predictably. 	
Reduce downside risks <ul style="list-style-type: none"> First-mover risk of investing into first of a kind production plants due to low technological readiness. Uncertainty of returns while demand is scaling up across sectors (e.g., "chicken and egg" problem). 	<ul style="list-style-type: none"> De-risk FOAK projects (e.g., guarantees, long-term offtake agreements). + Support R&D and fund pilot projects. Guarantee utilisation levels of key infrastructure. Create industry consortia to share risks. Demonstration/piloting of FOAK projections. 	
Remove supply bottlenecks <ul style="list-style-type: none"> Risk of insufficient availability of clean power and fuels. Widespread deployment of CCS requires supporting transport and storage infrastructure to be in place. 	<ul style="list-style-type: none"> Coordinating plans and strategies across borders and between sectors for the necessary clean power, enabling infrastructure, and raw materials. + Expand training and development to grow the necessary engineering capacity. Streamline permitting procedures for industrial assets and supporting infrastructure. 	

What obstacles cannot be fully addressed by real economy policies?

Some additional action required

- Further de-risking required:** even with well-designed real economy policy, new technologies that have not reached scale yet can struggle to secure financing.
- Additional support required to scale up key infrastructure:** investment in transport can be held back by the "chicken and egg" problem of uncertain demand – investment in CCS relies on the supporting transport and storage infrastructure being in place.

Additional actions required

Public finance

- Financial incentives (e.g., grants, loans or tax breaks) to support R&D and early stage scale up.

Public investment banks

- Investments and/or access to low-cost finance to support early stages of green steelmaking, cement and chemicals production.
- Funding of demonstrations and pilots.
- De-risking (e.g., guarantees) to mobilise private capital, including development bank finance in lower income countries to overcome high cost of capital.

Financial institutions

- Set out strategies for low-carbon investment in the hard to abate industrial sectors.
- Develop expert teams and capabilities in evaluating FOAK projects (e.g., risks and market opportunities) to increase lending.
- Technology specific investment funds to help pool expertise and aggregate capital.