POLICY BRIEF

Demand- and Supply-Side Measures for the Industry Transition

Key Messages

- Deployment of **near-zero emissions steel and cement remains limited** due to multiple barriers, leaving a **major unrealised market opportunity**. Near-term deployment is critical to ensure technology readiness and commence deep emissions reductions.
- **Voluntary demand has proved insufficient** to secure investments beyond a relatively small number of projects, and **current government policies are not strong enough** to create a robust business case for near-zero emissions production.
- **Demand and supply-side measures targeted specifically at near-zero emissions materials** are needed to catalyse market scale-up. Broadly, **incentives** can help bridge the cost gap for first projects, while **regulations** can help guarantee a market for subsequent scale-up.
- **There is no single, "correct" policy approach for the industry transition**. Rather, governments should consider the policy mix that best aligns with their specific circumstances and objectives.
- **Robust policy design** is key to provide sufficient market confidence while balancing cost efficiency, simplicity and stakeholder acceptability. **International co-operation** can amplify policy signals.

Contents

Why are targeted policies needed?

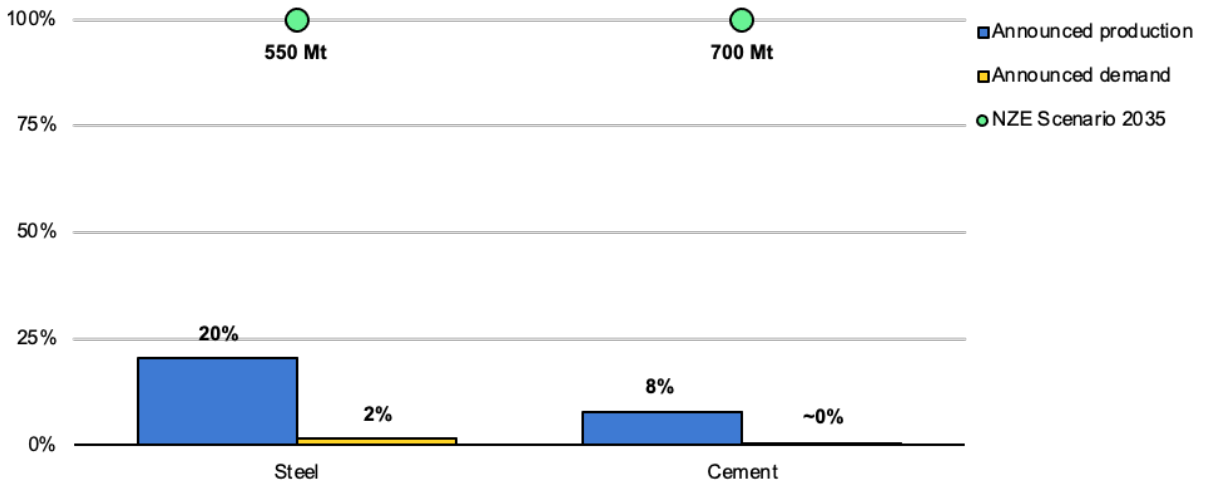
Industry's slow transition leaves untapped market opportunity

Deployment of near-zero emissions materials is falling short of the pace needed for achieving net zero emissions by mid-century. Announced projects for near-zero emissions steel total only 20% of the required level in 2035 in the IEA Net Zero Emissions by 2050 Scenario (NZE Scenario), and cement just 8% of the required level.

Projects are struggling to get off the ground. Of all the announced projects, just 5% of capacity for steel has reached a final investment decision, and 10% for cement. Together, these constitute just under USD 20 billion in confirmed investment globally. These early projects benefited from government subsidies and willingness from ambitious first mover buyers to pay a considerable premium for near-zero emissions materials. Subsequent projects may not have access to these same benefits at comparable levels.

This leaves a significant unrealised market opportunity for near-zero emissions steel and cement. By 2035 in the NZE Scenario, the combined potential market for these materials could reach nearly USD 450 billion. Despite this, announced offtakes are worth only USD 5 billion – just 1% of this total.

Announced global near-zero emissions steel and cement demand and production relative to near-zero emissions production levels in the Net Zero Emissions by 2050 Scenario, 2035



Notes: announced production includes both near-zero emissions and near-zero emissions capable projects. Announced demand includes offtake agreements and statements of intention to purchase through demand aggregation initiatives with publicly announced volumes.

Companies face significant barriers to market growth

Multiple barriers hinder scale-up of markets for near-zero and low-emissions materials, affecting both potential producers and buyers. These diverse barriers can be related to regulatory clarity, availability of these materials, and familiarity with their use, all of which can increase uncertainty and risk for companies.

Cost is perhaps the largest barrier – near-zero emissions materials carry a price premium of 50-150%. Certain first movers are willing to pay this premium, but much of the market perceives it as too high, constraining market growth in the absence of a way to bridge this cost gap.

These challenges come against a backdrop of growing concerns around industrial competitiveness, arising in large part from the international nature of industrial markets. In particular, global excess industrial capacity is depressing market prices, while increasing trade barriers and high energy prices further strain the economic situation for producers and impact competitiveness.

Near-term deployment is needed

For heavy industry, a large portion of the emissions reductions for reaching net zero by 2050 in the NZE Scenario come from technologies that are not yet fully ready for widespread commercial-scale deployment. At the same time, nearly 45% of steel blast furnaces and 70% of cement facilities globally are facing a re-investment decision by 2035. Initial commercial deployment of near-zero emissions technologies within this decade is therefore critical to ensure they are ready for wider scale-up in the 2030s.

Low-emissions production can in some cases serve as a bridge to near-zero emissions production (e.g. direct reduced iron facilities initially operating with natural gas before transitioning to full hydrogen use). When investing in low-emissions production, considerations should be made at the start to ensure a future transition to near-zero emissions, to avoid potential for emissions lock-in. At the same time, near-term deployment of fully near-zero emissions production remains critical to ensure technology readiness and commence deep emissions reductions.

Co-ordinated deployment of enabling infrastructure is equally important. Infrastructure – such as low-emissions hydrogen production and distribution, and CO_2 transport and storage – currently lacks the scale needed for the industry transition. Early and co-ordinated planning is essential to ensure this does not delay investments, especially given the long lead-times that are often needed for permitting, development and construction.

Current policies and voluntary private sector demand are not sufficient to catalyse uptake

Current policies are not strong enough to create a robust business case for near-zero emissions production. Broader government policies such as carbon pricing are being implemented in some regions and send the right signal to markets for emissions reductions. However, current price levels are insufficient to make near-zero emissions materials competitive with conventional ones.

Voluntary private sector demand for near-zero and low-emissions materials is likewise insufficient to secure investments. Markets for near-zero emissions materials are still in their early stages, with announced demand accounting for just 2% of the demand for near-zero emissions steel in 2035 in the NZE Scenario, and close to 0% for near-zero emissions cement. At these scales, uncertainty and risk remain high, especially as robust supply chains and economies-of-scale are yet to be established.

Targeted measures help secure investments

Major industry players are ready to invest in near-zero emissions technologies but do not yet have a sufficient business case given current market conditions. Consequently, industry has been calling on governments to implement targeted policies that can establish the long-term market certainty and investible demand signals needed to reach a positive final investment decision.

Overcoming early market barriers requires tailored solutions. Targeted demand-side and supply-side measures can more effectively address gaps in support. By doing so, these measures can provide companies with the market security and price certainty to drive lead market creation for near-zero and low-emissions materials, while minimising potential impacts on competitiveness for these industries more broadly.

Options for targeted measures

Governments have numerous targeted demand and supply-side policy options that can be implemented to support the market scale-up for near-zero and low-emissions materials and to meet their policy objectives for industry, drawing from a diverse toolbox of policy instruments that can contribute to a comprehensive and effective industrial decarbonisation strategy.

Demand-side measures help secure a buyer or otherwise facilitate a market for near-zero and low-emissions materials – or products made from those materials – despite higher prices. Such policies are most important during the early stages of market formation when conventional materials are still the dominant market offering and demand for lower emissions materials is otherwise insufficient to enable a business case for investment in new capacity.

Supply-side measures help secure the investment needed to get near-zero and low-emissions production off the ground and provide guardrails to efficiently transition away from high-emissions production. Such measures are important to de-risk near-term deployment of near-zero emissions production when costs are still high compared to conventional production and supply chains have not yet matured to benefit from economies-of-scale and learnings.

Policy instruments on both the demand-side and supply-side can be grouped into different policy types depending on their function and common characteristics. These broader policy types can serve as a starting point for comparison, although ultimately each specific instrument will have its own nuances and considerations to take into account during policy selection and design.

Key targeted policy options for scaling up markets for near-zero emissions materials

Policy type	Demand-side	Supply-side
Economic and fiscal instruments	• Public procurement policies for near-zero and low-emissions materials • Product subsidies • Pre-commercial procurement programmes, including advanced market commitments • Contracts for difference	• Tax credits, grants and loans • Contracts for difference • Funding for large-scale demonstration projects • Infrastructure funding
Regulatory mechanisms	• Near-zero and low-emissions materials minimum content regulations • Embodied carbon limits for end-products/projects • Carbon product emissions intensity requirements • Revised construction and infrastructure design standards	• Near-zero and low-emissions production mandates/quotas and certificate trading schemes • Emissions intensity performance standards • Retrofit-ready requirements • Regulations on high-emissions production
Information	• Standards	
Enabling and planning		• Enabling infrastructure coordination, planning and support

Economic and fiscal instruments

Description

Incentives use public funding or finance to encourage companies to electively enter near-zero and low-emissions materials markets. Incentives can either be given to the producer or the buyer, depending on the measure. As such, additional costs are typically borne by the public sector. This helps limit the need to pass additional costs to final customers but requires sufficient government budget allocation.

Examples of instruments

On the demand-side, incentives provide economic benefits or subsidies for the sale or purchase of near-zero or low-emissions materials to cover their price premium. **Public procurement policies for near-zero and low-emissions materials** help leverage the substantial purchase capacity of the public sector, while **product subsidies** encourage private sector procurement and offtakes. Near-commercial materials could be targeted through **pre-commercial procurement programmes**, such as advanced market commitments, that help provide a proof-of-concept for technologies at the edge of commercialisation.

On the supply-side, incentives aim to cover part or all the additional cost of near-zero or low-emissions production, or provide finance, to improve the business case, helping secure a final investment decision and leverage private sector capital. This can be in the form of **tax credits**, **grants**, and **loans** to bridge capital and/or operating cost gaps for commercial-scale deployment or **infrastructure funding** that enables this deployment. Likewise, earlier-stage **RD&D funding for large scale demonstration projects** can enable performance improvements and cost reductions through innovation and scale-up.

Contracts for differences could function as both a demand-side and supply-side measure: for the producer, providing a guarantee to cover the cost differential of carbon abatement and/or related energy inputs; and for the buyer, including a clause that requires the near-zero emissions material be sold at market value.

Considerations for policy choice and implementation

A key feature of incentives is their utility in filling specific gaps in support for the scale-up of near-zero emissions production, which can make the difference in securing final investment decisions and mobilising private capital for the industry transition. This is especially true for near-term deployments that face high risk and cost uncertainty. Incentives typically do not directly increase costs of conventional materials, and in many cases can lower the cost of near-zero emissions production, side-stepping many of the concerns around affordability and effects on competitiveness. As the use of incentives is voluntary, stakeholders often view them more favourability than other types of policies, such as regulations.

Incentives may provide less long-term investment certainty than other measures if they are time limited, and require sufficient funds from government budgets. Specific targeting would be needed if there is a goal to incentivise near-zero emissions materials, as otherwise much of the policy support could end up being directed only to low-emissions materials. As a voluntary instrument, incentives do not guarantee any particular level of market uptake. Transparency in selection and allocation processes is important when awarding incentives, to avoid perceptions of unfairness.

Regulatory mechanisms

Description

Regulations set rules requiring increasing near-zero or low-emissions materials in markets, with penalties for non-compliance. They can apply to demand or supply, and either uniformly to all materials (e.g. minimum standards) or as a market-wide benchmark to be met on average (e.g. via credit trading systems rewarding over-performance). Cost premiums are borne by

material suppliers and/or private sector buyers, who may pass some or all of these costs to final customers to maintain profit margins.

Examples of instruments

Demand-side regulations put in place purchasing requirements. To help expand the share of near-zero and low-emissions materials, **minimum content regulations** set minimum and growing purchase requirements for these materials. **Embodied carbon limits for end-products/projects** and **carbon product emissions intensity requirements** set an upper limit on emissions intensity of end-products or the materials used to make them, respectively. Uniform limits would initially primarily reduce the high-emissions materials share; tradeable standards could provide a market signal for near-zero emissions materials, albeit weaker than minimum content regulations. **Revised constuction and infrastructure design standards** reduce barriers for using innovative materials (e.g. clinker substitutes) that meet safety and performance requirements.

Supply-side regulations put in place production requirements, with generally fewer regulated entities (materials buyers outnumber producers). **Production mandates/quotas for near-zero and/or low-emissions materials** establish minimum and growing selling requirements for producers. **Emissions intensity performance standards** can be uniform or tradeable, resulting in signals similar to the demand-side. **Retrofit-ready requirements** set technical specifications to ensure capacity can be readily converted to near-zero emissions, limiting stranded asset risk. **Regulations on high-emissions production** can include new build moratoria or sunset clauses that require plants to retrofit or otherwise close.

Considerations for policy choice and implementation

Regulations provide long-term certainty on the trajectory of market scale-up, a key prerequisite for investment. Progressively tightening stringency over time can be defined at the outset to match the desired trajectory of ambition, providing foresight and, as a mandatory instrument, a strong signal for markets. Particularly if designed with flexibility (e.g. with a credit trading system), regulatory measures may help spread costs more equitably across markets, and could incentivise deployment of more cost-efficient decarbonisation options to minimise compliance costs. Relative to incentives, they minimise government budget requirements and may therefore be a solid option to spur deployment beyond the first-few-of-a-kind plants.

Since regulations are applied to a broad market, they may not provide project-specific support and there may be trade-offs between flexibility and administrative complexity. They may increase conventional materials prices (the degree depends on policy design), which could be passed to buyers – although in most cases the price-uplift for end-use products would be relatively small (e.g. <2% for a car). Depending on stringency, design features that address potential carbon leakage risks may need to be considered.

Information

Description

Provision of information on emissions performance aims to encourage buyers to choose near-zero and low-emissions materials. These measures do not guarantee a market for these materials and instead rely on voluntary action from buyers to create demand. Information provision could be voluntary or mandated, although the latter still relies on voluntary purchases.

Examples of instruments

Standards provide transparency by measuring, ideally verifying, and then clearly communicating the emissions performance of materials through a label. They may classify materials into categories, such as ‘near-zero emissions’ or levels of ‘low-emissions’, and may be directed to material purchasers, or to final customers on materials in end-products (e.g. embodied carbon labels). While primarily targeted at buyers, standards can provide supply-side support by helping producers justify a price premium.

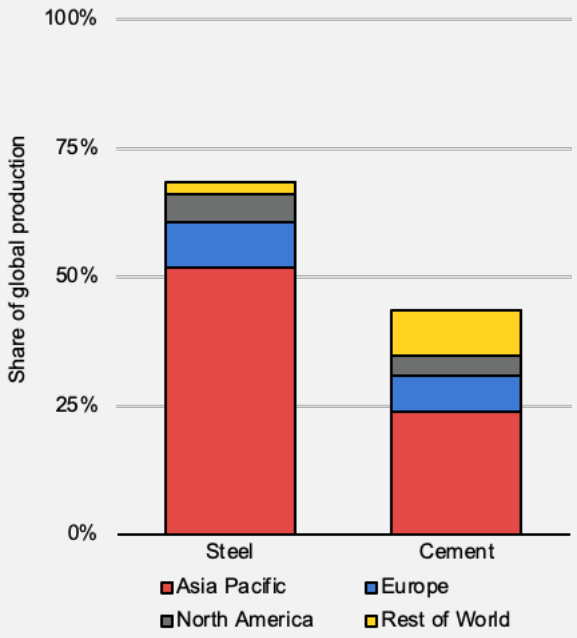
Considerations for policy choice and implementation

Relying on voluntary purchases and without direct financial benefits, information provision may not provide the same pull for deployment as incentives or regulations, and does not guarantee any particular level of uptake. Still, it can be a relatively low-cost way to encourage decarbonisation and can be used in other policies. Policy makers should consider whether existing schemes may serve the intended purpose before designing something new, given that a proliferation of standards places additional burden on market actors.

Voluntary labels as a possible tool for demand creation

Voluntary standards have emerged recently, mainly led by the private sector, to create differentiated markets for near-zero and low-emissions materials. This includes standards leading to certification, as well as rating and labelling systems that can be used to communicate performance. While standards are only just beginning to emerge, their potential coverage based on the members of the organisations developing these schemes is already quite high: almost 75% and 50% of global steel and cement production, respectively. For steel, this is mainly driven by progress in China, the European Union, and North America, thanks to the development of several leading standards; for cement, potential coverage is broadly global, although more limited in China.[1] As markets for these materials continue to form, governments could consider promoting their use or adopting them in policy to spur further demand.

Potential coverage of voluntary labels for near-zero and low-emissions materials



Notes: includes labels already released and under development.
Source: figure adapted from Energy Technology Perspectives 2026.

Enabling and planning

Description

Helps to enable deployment of near-zero emissions production by bringing together diverse private sector actors and streamlining administrative procedures.

Examples of instruments

Co-ordination, planning and support for enabling infrastructure helps accelerate deployment of infrastructure that near-zero emissions production depends on, to help avoid possible delays in developing near-zero emissions production itself, especially given the typical long lead-times for infrastructure. This includes infrastructure for low-emissions electricity and

[1] Leading voluntary standards for steel include China Iron and Steel Association's C2F Steel (China), LESS aisbl's Low Emission Steel Standard (European Union), Responsible Steel's Certified Steel (global) and Global Steel Climate Council's Steel Climate Standard (global). Leading voluntary standards (or related systems) for cement include the Global Cement and Concrete Association's Global Ratings for Cement (global).

hydrogen production and distribution, and CO_2 transport and storage; bioenergy supply to industrial clusters that facilitate access to shared infrastructure are also relevant. Policy interventions include co-ordinated planning; public-private partnerships; and centralised, accelerated permitting. While mainly a supply-side support, these measures can also send a market signal to buyers and indirectly encourage new demand.

Considerations for policy choice and implementation

Such policies enable near-zero emissions production primarily by removing barriers to timely deployment, with potential indirect benefits like lower costs due to accelerated project timelines and reduced administrative burden. When looking to adopt such policies, stakeholder engagement and regional co-operation are important to strengthen public support and ensure project plans are less susceptible to future changes or cancellations.

The role of explicit carbon pricing

Although not a targeted measure, explicit carbon pricing schemes play an important role to shift the landscape towards cost-competitive near-zero and low-emissions materials and create a broad market signal for emissions reduction.

Emissions trading systems (market-based mechanism applied to industrial emitters) or carbon taxes (levy applied to products) aim to incorporate the externality costs of emissions. On the supply-side, they improve the business case for near-zero and low-emissions production by narrowing the cost gap with conventional production and provide a mechanism for stable cost-competitiveness in the long-term. On the demand-side, the increased price for emissions helps encourage purchases of lower-emissions materials.

Carbon pricing can provide long-term certainty on decarbonisation, especially if designed with sufficient foresight, and can be an economically efficient and technology-neutral way to reduce emissions. Revenues may be used to support near-zero emissions investments or to remedy potential inequity effects. Policy design will need to consider administrative complexity, carbon leakage risks, and stakeholder acceptability.

While a central option in the industrial decarbonisation policy toolbox, it may be impractical in the near-term to raise carbon prices enough to close the cost gap between conventional and near-zero emissions materials. That is why complementary targeted measures are likely also needed to create lead markets.

Moving forward to implementation

There is no single "correct" policy approach to industry decarbonisation. Often, a comprehensive policy framework will feature a combination of measures, including supply-side support, demand stimulation, ensuring enabling conditions and broader emissions reduction signals. However, the most effective strategy will ultimately depend on the specific situation and starting point of the jurisdiction implementing these measures. Governments can and should tailor their policy mix to reflect domestic circumstances, market maturity, and industrial structure, and broader considerations like industrial strategy and supply chains.

Policy making involves assessing considerations across a variety of different factors to select, design and implement instruments that provide the best likelihood of achieving multi-faceted objectives. In some cases, one well-designed and robust policy could outperform several weaker ones, especially when administrative simplicity and regulatory clarity are critical to success. To support policy makers in this process, the IEA's *Policy Toolbox for Industrial Decarbonisation* suggests **four indicators – effectiveness, simplicity, stakeholder acceptability** and **economic efficiency**. Assessing likely impacts is important, including quantifying expected increases in near-zero and low-emissions materials. Governments can also take several broader concrete steps to support this overall process.

- **Adopt enabling standards:** underlying many targeted measures are definitions for near-zero and low-emissions materials that establish emissions intensity thresholds, as well as emissions measurement methodologies that outline emissions accounting rules. Governments can establish these enabling conditions, ideally adopting existing definitions and methodologies. If existing standards are modified during policy adoption, governments should do so in a way that allows interoperability and net zero compatibility.
- **Consult with relevant stakeholders:** launching public consultations can be an important step to gather perspectives from domestic stakeholders on selection and design of targeted policies. This can also be an effective way to build stakeholder support around a broader industrial decarbonisation strategy.
- **Announce commitments for demand and supply:** high-level targets for near-zero and low-emissions materials can be a key stepping stone to support effective policy-making. For example, industry transition roadmaps can set out clear objectives and steps for a jurisdiction-specific strategy. Likewise, partaking in high-level collective pledges can signal intent and provide clear targets and momentum for policy design and implementation.
- **Advance international collaboration:** co-ordination of policy ambition across multiple jurisdictions could help reduce overall policy burden and mitigate spillovers like carbon leakage that impact policy effectiveness. Through engagement in international fora (e.g. Climate Club, IDDI focused on public procurement), governments can exchange knowledge on policy design and implementation, as well as seek opportunities to align and/or pool ambition when appropriate to help strengthen market signals. International partnerships could take this engagement a step further, acting as a framework for two or more countries to pursue objectives of mutual interest.

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