Navigating Business and Financial Challenges for Industry Transition in the Global South.

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Contents

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The imperative for a globally inclusive transition to low-carbon industrial production.

Reduction of greenhouse gas emissions in industrial sectors is not on track to meet the goal of achieving net-zero emissions by the middle of the century. Industrial sector emissions have grown by 70% since 2000 and continued to grow by 3% in 2021 (IEA, 2022a). Steel, cement and chemicals account for 70% of direct CO2 emissions from industrial sectors and nearly 60% of industrial energy demand (IEA, 2020). Productive capacity in some of the most polluting industrial sectors, such as steel and chemicals, is expected to grow the most in developing and emerging economies in the coming decades (IEA, 2021). For this reason, investments in industrial emissions reductions will need to accelerate quickly in these regions to avoid locking us in to long-lived and high-emitting industrial capacity.

This commentary examines the business case and financing obstacles that can arise as actors attempt to mobilize investments into reducing emissions from industrial production in developing and emerging countries. We raise fundamental questions that stakeholders should consider if they are to arrive at a deeper understanding of the task ahead.

We compare the conditions for ongoing investments in renewable energy in developing regions with the case of scaling investment in industrial decarbonization. The point of this comparison is to get a more nuanced understanding of how the challenges and opportunities may differ between these sectors. We also outline the enabling conditions for leaders in industrial decarbonization in developed markets and reflect on how conditions differ in developing regions.

Three types of interventions to deliver reductions in industrial emissions.

There are three basic ways in which industrial emissions can be reduced while continuing to meet growing demand for industrial products:

- improving energy efficiency in current processes
- increasing circularity by boosting recycling and reutilization throughout value chains, and
- moving to green primary production by implementing breakthrough technologies such as hydrogen-based steel production, chemical recycling of plastics, or cement production with CCUS (IEA, 2022b).

Efficiency gains can be particularly important in developing countries that may have yet to implement the most advanced and energy efficient solutions in conventional production methods. However, there are potential trade-offs between investment in energy efficiency and green production. New equipment and machinery that improves efficiency can have long useful lives and could become stranded should production switch entirely to green alternatives

after 2030, or lock-in countries in to high-emitting industrial capacity (Janipour et al., 2020). This means that investments in efficiency need to be compatible with the timeline of implementing low-carbon solutions post 2030.

Key questions:

- To what extent are investments in efficiency in the current stock and pipeline of production plants likely to lead to lock-in effects?
- How much priority should be given to shorter-term emissions reductions from efficiency gains in existing industrial processes in developing regions?
- How do these considerations differ in developing regions compared to more developed regions?

Getting serious about the business case.

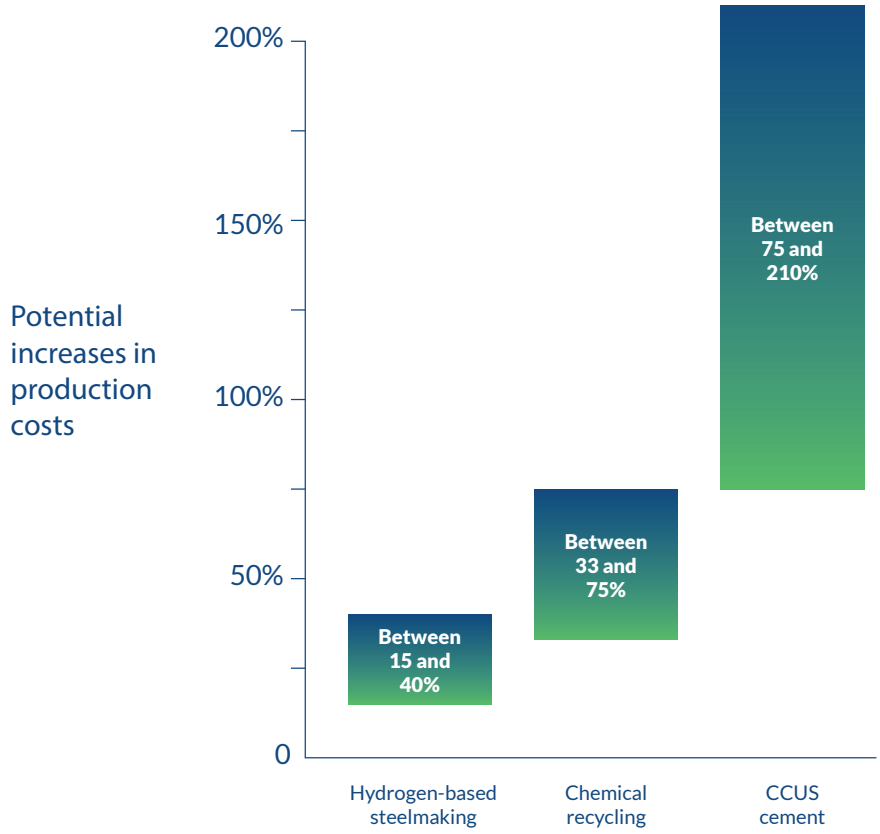
Industrial energy efficiency may suffer from underinvestment even when the business case is positive. Several factors can cause this, including perceived risk, uncertainty over energy prices, or access to finance. Policies to accelerate such investments in developing countries can aim to reduce or transfer risk and enable access to finance that has both economic and climate benefits. But the appeal of these policies depends on judgements on the lock-in question raised above.

For improved circularity, some sectors such as steel already have a large business segment in place for circular solutions, and the question now is how this can play a much bigger role (e.g. Nechifor et al., 2020). For plastics, only a very small share of production gets recycled: to achieve high levels of circularity, there is a pressing need for fundamental changes to the types of plastics produced and how they are used and flow through the economy (Grafström & Aasma, 2021). For the plastics sector, and other sectors where circularity does not yet have an established role, there is a lot left to be done to establish viable business models (Toker & Görener, 2023).

There is a significant projected cost premium for using low-carbon alternatives in the adoption of breakthrough green industrial solutions, even when technologies are at full commercial-scale readiness. A recent estimate by Material Economics (2022) of the green premiums for low-carbon industrial production in Europe found that:

- Moving from conventional to hydrogen-based steel production would increase production costs by 15–40%
- Moving from conventional plastics production to chemical recycling would increase production costs by 33–75%
- Moving from conventional cement production to adding carbon capture and use or storage (CCUS) would increase production costs by 75–210%.

Figure 1. Green premiums for low-carbon industrial production in Europe



Source: Material Economics (2022), Scaling up Europe

This means that new investments in low-carbon production methods face several key business model challenges that must be addressed before finance becomes the bottleneck for investment decisions. In other words, measures to improve the basic business case for green industrial production must be in place before financial risk mitigation at commercial scale can help to solve issues related to access to and cost of finance.

To illustrate these challenges, we can compare the cases of utility scale renewable energy and industrial decarbonization. Renewable energy has faced business model challenges in the past and has been slow to emerge, but, in recent years, as technologies matured, a contractual structure has crystalized and been replicated throughout the world. While progress is not at the pace needed, particularly in developing countries, renewable energy investments have been successful, attracting 88% of blended finance in the climate sector (Convergence, 2022).

Comparison of investment conditions for renewable energy and industrial decarbonization.

Most of the blended finance in the climate space dedicated to renewable energy has been deployed in developing countries (Convergence, 2022). The tools of blended finance include

providing below market (concessional) funds into capital structure of projects, credit enhancement through guarantees and insurance under concessional terms, grant-funded technical assistance, and project preparation to increase viability. Several features of the renewable energy sector make it particularly suitable for such structures and may not apply to industrial decarbonization.

Renewable energy projects in developing regions, often set up under project finance structures, have features related to the structure of the power sector that help to reduce the investment risk and that make blended financing easier to implement. First, in many developing countries, the national energy utility serves as the single buyer of energy from independent power providers. This means that public or international financing can provide risk coverage to a single state-owned utility to insure against the risk that the utility cannot satisfy its power purchase agreements (PPAs) with independent power producers (IPPs) in a way that does not have competition implications (IRENA, 2016). Second, on the other side of this arrangement, PPAs with take-or-pay clauses are long-term energy offtake contracts that effectively de-risk the revenue side for IPP investors. Risk remains in relation to the financial health of the offtaker and/or political decisions that could change the terms for IPPs. These types of risks can be covered through guarantees and political risk insurance. Third, bankable renewable energy projects offer constant steady cash flows with long project lives and have a low-risk/low-return investment profile. This makes such investments attractive for long term investors (IEA, 2022c).

The situation is more complex and challenging for producers of industrial products. First, companies producing steel, chemicals, and cement sell their output in competitive markets to many buyers and many industrial sectors are exposed to highly competitive global markets. Providing concessional financing or other risk mitigation measures designed to mitigate against lack of demand for green industrial products may have to single out specific producers and could raise competition implications. Second, because the market for industrial goods is global, fluctuating, and highly competitive, market risk goes well beyond a single country or the financial health of a single player. This means that there is not a comparable PPA structure that can be easily implemented on the demand side for industrial products and that the risk profile of moving to green production methods is inherently higher.

Third, industrial sectors tend to be riskier than the power sector even without decarbonization. Adopting new technologies that have not been tested at scale in conditions of uncertainty about the technology, policy, and market risks will make these types of investments significantly less attractive for conventional finance. For renewable energy the technology risk is now low, given that solar and wind are at high levels of technological maturity and have come down in cost dramatically over the past decade (IRENA and CPI, 2023). For industrial decarbonization, technologies are in the pilot and demonstration phases, and for most sectors there is no consensus over which technologies and production processes will become dominant and what innovative business models will prevail (Rissman et al, 2020).

Two key conclusions can be drawn from this brief comparison: industrial decarbonization will depend on identifying capital that is willing to accept higher levels of risk, and these investments will depend on identifying ways to create confidence in some level of demand for green industrial products. As it stands, there remain significant uncertainties on how these challenges can be overcome in developing and emerging economies.

Questions:

- How can the risk profile of investments in industrial decarbonization be brought down to levels where existing methods of mitigating financial risk in renewable energy investments can be used for investments in green industrial production?
- What sources of capital could take on the risks for first-of-a-kind low-emissions production sites in developing countries?
- What measures can be taken to address the need for stronger offtake signals for green industrial products for these regions?
- What is needed to ensure the most efficient supply of scrap metal and the scaling up of circular solutions in emerging and developing economies?

Renewable energy (RE)	**Industrial decarbonization**	**Solutions to explore**
Single offtaker: the national utility serves as the single buyer. Providing risk coverage to a single state-owned enterprise (SOE) is simpler and does not have competition implications.	Many emission-intensive industries sell their output on highly competitive global markets to multiple buyers. Offering concessional finance or risk mitigation to one player rather than another may look like "picking winners"	Support can be offered on a competitive basis – ensuring additionality and protecting against market distortions.
Power Purchase Agreements are long-term energy offtake contracts that effectively de-risk the revenue side and remove market risks. The risk stems only from the financial health of the offtaker and/or political decisions. The latter can be covered through guarantees and political risk insurance.	The market for industrial goods is global, fluctuating, and highly competitive. Market risk goes well beyond a single country or the financial health of a single player.	Mobilizing purchasing commitments from "corporate climate leaders", government procurement, and carbon contracts for difference (CCfD) (which are public subsidies).
Bankable renewable energy as an investment offers constant steady cash flows with long project lives, low return/low risk – attractive for long term investors.	The industrial sector is riskier even without decarbonization. With adoption of unproven technologies the risks may make the sector unattractive for conventional finance.	Finance from government and Development Finance Institutions (DFIs) can play the leading role in the beginning, and private investors seeking exposure to low-carbon assets can take over once their level of risk tolerance is met.
Technology has become mature, and costs have gone down significantly. One can now make the case that renewable energy is cheaper than fossil-based energy on a lifetime basis.	Industrial decarbonization technologies are unproven and costly. Adopting them increases costs and affects competitiveness. Their business case without carbon pricing is not net present value (NPV) positive.	The business case for renewable energy was initially helped by increasing and securing revenue (e.g. feed in tariffs), reducing cost (economies of scale) and/or increasing costs of alternatives (carbon prices). A similar approach is needed in industry, for example through carbon contracts for difference (CCfDs).
Innovation is being channelled more towards uses (e.g. adding storage, hydrogen) but the business model of RE per se is quite established.	Industrial decarbonization technologies are in the pilot and demonstration phases. There is no consensus over which ones will become dominant and what innovative business models will prevail.	DFI or government finance could focus on helping these pilots, which may or may not become commercial. Co-development with pilots in OECD countries can also be explored.

Creating the "business case" enabling conditions for industry transitions

Energy intensive industrial production has been widely considered "hard to abate" because of the business model challenges of implementing technological solutions that lead to significant and sometimes large increases in production costs. At the same time, we now see movement towards low-carbon industrial production, especially in more developed markets in the EU, North America, and Asia (e.g. see Leadership Group for Industry Transition, n.d.). Looking at the case of Sweden, we see plans among all the major industrial sectors to implement low-carbon technologies and processes (Maltais et al., 2022). If it is business models that are the key challenge, how has Sweden and the EU been able to take the lead on industrial transitions over the past few years and what does this mean for developing country contexts?

In the Swedish context we see several factors that help to explain early movement on industrial transitions. The state has set out a clear direction of travel by committing to achieve net-zero emissions by 2045 and to be the one of the first countries to achieve carbon neutrality (Government Offices of Sweden, 2021). This national ambition is matched with the EU's Fit for 55 package that aims to reduce greenhouse gas emissions in the EU by 55% by 2030, to put the EU on track to achieve climate neutrality by 2050 (European Council, n.d.). The government also set in motion a sector-by-sector decarbonization roadmap process through the 'Fossil Free Sweden' initiative, which supports sector led decarbonization planning (Fossil Free Sweden, n.d.). Expectations of access to high volumes of low-carbon electricity at relatively low cost (from wind, hydro, and nuclear) and access to sustainable biofuels or bio-based feedstocks are some of the enabling factors in the Swedish context that help to explain why energy intensive sectors have adopted ambitious decarbonization roadmaps (Maltais, et al., 2022).

The government has provided grants for feasibility studies, research and development, and demonstration plants through its 'Industry Leap' programme (Maltais et al, 2022). Swedish industrial projects have also received funding from EU sources such as from the European Innovation Fund and loans from the European Investment Bank (Maltais et al., 2022). To further incentivize industry decarbonization, the Government of Sweden introduced a system of loan guarantees for large industrial investments that contribute to national environmental and climate targets (Swedish National Debt Office, n.d.).

EU plans are another enabling condition for investments in green industrial production, in particular rising EU ETS carbon prices and the phasing out of free allowances for industrial producers by 2034 (European Parliament, 2022). A clear signal on the price of carbon helps to create a business case for the additional production costs of implementing low-carbon technologies, processes, and feedstocks. Linked to this, industrial actors in Europe are increasingly seeing demand signals further down value chains from the buyers of industrial products as they aim to reduce the emissions embedded in their products to meet their own net-zero commitments. For the steel sector in Sweden this has resulted in offtake agreements for green steel that are viewed as significantly reducing the risk of investment in green hydrogen-based production (Maltais et al., 2022). The EU is also implementing a carbon border adjustment mechanism designed to impose a carbon price on imported goods from countries with less stringent climate policies, which further supports demand within the EU for industrial products with low levels of embedded carbon emissions (European Commission, n.d.).

In developing and emerging economies many of these enabling factors may be weaker or missing all together. National net-zero targets may be further out into the future and contingent to a significant extent on international climate finance. There may be less access to direct public financial support for innovation and demonstration projects, weaker or missing carbon price signals (although to the extent that the EU is an important export market some price signals are forthcoming), and demand signals in value chains may be much weaker.

Questions:

- How can the enabling conditions for industry transitions be stimulated in developing regions?
- What are the realistic first steps and where are the hardest gaps to overcome?
- What is the role of IFIs and international climate finance in supporting first movers, and what are the most important modalities of that support?
- What next steps do IFIs with funds for industrial decarbonization need to take to generate a pipeline of projects?

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