Powershoring in the Global South: Unlocking Green Industrial Potential

energy transition

Catalographic Card

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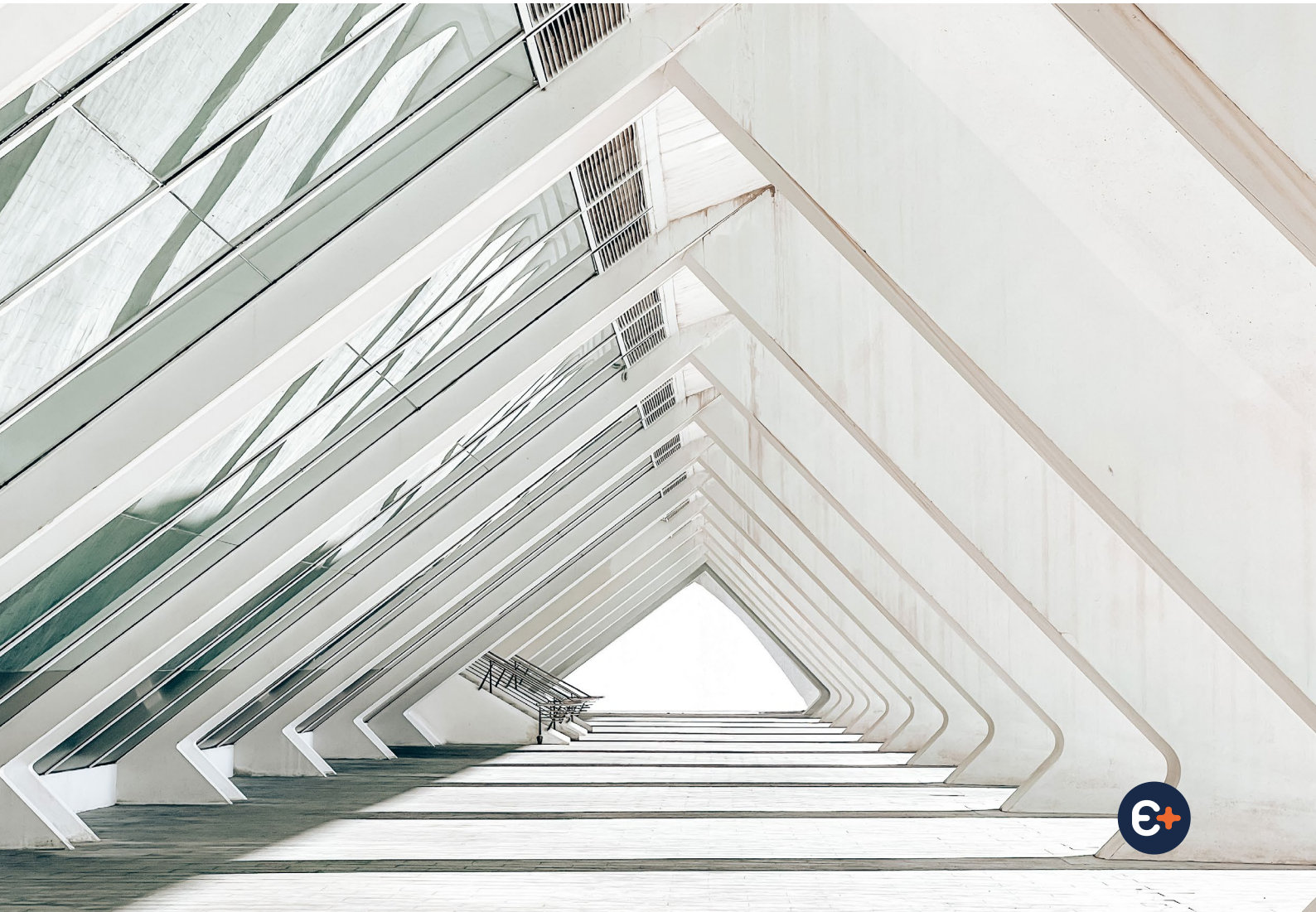
Executive Summary

This policy paper explores opportunities for strategically positioning resource- and energy-abundant economies within low-carbon global supply chains. By leveraging comparative advantages in natural assets and clean energy, these countries can attract investments in energy-intensive sectors and low-carbon technologies. Realizing this potential requires integrated public policies, including technical training, regulatory harmonization, and trade facilitation. Such economies are well-placed to assume leadership roles in emerging green industrial dynamics. Achieving this will depend on effective collaboration between governments, the private sector, and civil society.

- Powershoring refers to the strategic relocation of industrial production to countries with abundant, affordable, and clean energy, or with the potential to rapidly develop such a platform. This emerging dynamic is driven by climate commitments, energy cost differentials, and geopolitical pressures, opening new pathways for low-carbon industrialization.
- The global response to the climate crisis creates a window of opportunity for developing economies to reposition themselves within global value chains by hosting energy-intensive, low-carbon manufacturing activities.
- Brazil serves as a compelling example of this potential, given its predominantly renewable electricity mix and its existing industrial base in high-potential sectors.
- The cost advantage of producing renewable-rich regions is increasingly quantified in the literature. Relocating production of materials such as steel, urea, or ethylene can reduce costs by 18 to 38 percent relative to fossil-based production in higher-cost countries.
- Seizing these gains requires focused and intentional policy interventions. Not all sectors benefit equally from green energy advantages. A **microtargeted approach** is needed to identify the specific segments where potential can translate into durable competitiveness.

- One notable case: Brazil currently exports high-purity quartz and produces metallurgical-grade silicon. With the right investments and coordination, it could develop capacity in solar-grade silicon—moving further up the clean technology value chain.
- Powershoring is not confined to any single national context. It represents a broader opportunity for the Global South to shape the geography of clean industry, provided there is deliberate industrial strategy and institutional readiness.
- Low labor costs positioned China as a manufacturing powerhouse in the late 1990s. Now access to abundant and competitive clean energy is emerging as the key comparative advantage in the era of climate-constrained industrialization. Countries that can harness this asset stand to play a central role in shaping the next generation of global value chains.



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1. Introduction

Powershoring has emerged as a strategic opportunity for countries with abundant clean energy to reposition themselves in the global industrial landscape. The concept refers to the relocation or expansion of energy-intensive industries to regions where renewable energy is both cheap and available at scale — driven by climate policy, energy security concerns, and shifting trade patterns. In Latin America and some places in Africa, where several countries already rely heavily on hydro, wind, solar, and biomass for electricity generation, powershoring offers a timely chance to leverage these structural advantages. But realizing this potential will depend on whether governments can align industrial policy, infrastructure, and institutional coordination in a timely and strategic manner around targeted value chain segments.

As progress is made in the environmental agenda, particularly concerning commitments to reducing greenhouse gas emissions, the consolidation of low-carbon supply chains becomes imperative to maintain or achieve a competitive advantage in the global economy. The establishment of CBAMs (Carbon Border Adjustment Mechanisms) by both the European Union and the United Kingdom, as well as the creation of carbon markets worldwide, indicate that the market economy is moving toward pricing the negative externalities of production processes on the environment.

This phenomenon coincides with several events that have influenced the global economy since 2020. The World Health Organization declared COVID-19 a global pandemic on March 11, 2020, and since then, while the world economy is still recovering, supply chain disruptions have intensified, putting upward pressure on prices. In addition, geopolitical tensions have escalated between Russia and Ukraine to the point of military conflict, exacerbating stress on global supply chains, particularly for food and energy. Lastly, the intensification of trade competition between the world's two largest economies, the U.S. and China, has triggered a series of U.S. policy actions aimed at protecting specific industrial sectors from Chinese competition.

These shocks have forced companies to reassess where they operate and source from. Rising energy costs, logistical fragility, and mounting sustainability pressures have driven a marked shift in corporate location strategies. Reflecting this trend, recent global surveys reveal that most business executives are willing to relocate operations or supply chains to countries with abundant and affordable renewable electricity soon (E3G et al. 2025).

The desire for greater energy security, stable electricity prices, and emissions reductions shows the strength of the powershoring argument.

McKinsey has also documented a sharp uptick in regionalization and dual sourcing of production networks, particularly in response to volatile energy prices and the need for resilient supply chains (McKinsey & Company, 2023). Access to renewable electricity has become a top criterion in corporate investment decisions, with potential implications for national competitiveness and trade orientation, creating a veritable 'renewables-pull effect' (Samadi et al. 2023).

In addition to energy prices, China's advances in various supply chains and the loss of manufacturing jobs in the global North have reignited discussions about industrial policies. These policies were recognized as essential for acquiring new comparative advantages in the past and are now crucial for seizing "green windows of opportunity." Although industrial policy lost prestige between 1980 and 2018, the scenario has shifted (Cherif and Hasanov 2019). the clearest example of this has been the US's Inflation Reduction Act (IRA). This act integrates industrial and environmental policies to promote energy transition, combat climate change, and strengthen strategic sectors of the U.S. economy related to green manufacturing.

This background highlights a process of fragmentation in trade relations and a decline in globalization as has been known since the 1990s. A new reorganization of production chains is expected, influenced by new international cooperation arrangements and greenhouse gas emission reduction targets.

Countries in the so-called Global South with notably renewable electricity mixes—such as Brazil, Uruguay, Colombia, and Paraguay, as well as African nations like Mozambique, Angola, Ethiopia, and Kenya—have a favorable starting point to benefit from this emerging scenario, thanks to a range of natural advantages that can be leveraged to strengthen their industrial base. An initial approach focuses on energy-intensive industrial segments, given that energy prices are a significant component of production costs for many critical goods and emerging low-carbon technologies. Cost savings in energy, combined with the growing demand for low-carbon inputs, will likely incentivize the relocation of energy-intensive industries to countries endowed with abundant renewable resources.

This opportunity can be a first step for a "catch-up" process for south economies as the gap between the global North and South has narrowed since 1950 but has not been fully bridged during the continued liberalization and economic integration process. Although there have been some successes, such as China and certain West Asian countries, a significant number of nations—referred to as "The Bottom Billion"—remain behind.

In this document, we use Brazil as a case study that illustrates a replicable pathway for other emerging economies. Brazil's advantages go beyond its natural resource endowment. The country benefits from a highly decarbonized and reliable electricity grid, managed through a nationally integrated transmission system that provides resilience to growing industrial demand. It also has a diversified industrial base across sectors such as chemicals, metallurgy, aviation, and automotive.

Another important asset is its extensive network of technical training institutions, as well as a robust public development bank (BNDES) with the capacity to finance large-scale industrial and infrastructure investments.

However, the viability of this framework hinges on the ability of states to coordinate coherent initiatives that dismantle long-standing structural rigidities in their productive models. In many emerging economies, inward-oriented industrial trajectories—anchored primarily in domestic demand—have limited deeper integration into global value chains. These patterns often reflect chronic underinvestment in innovation, the absence of long-term industrial planning, and systemic disconnects between industrial, energy, and trade agendas. Despite having abundant renewable resources and diversified industrial capacities, several countries remain peripheral to global manufacturing, lacking the institutional coordination required to respond effectively to technological and environmental transitions.

At the same time, any forward-looking strategy for industrial reintegration must address the geopolitical dimension. Positioning as a credible destination for the relocation of energy-intensive production from advanced economies demands more than competitive energy costs. It requires a proactive geo-economic agenda that aligns trade diplomacy, climate cooperation, and investment policy under a unified vision of structural transformation. In this context, the role of the state is not to retreat, but to actively steer and embed national economies within emerging configurations of low-carbon global production. Creating a favorable environment for clean industrial investment entails substantial political effort, institutional coherence, and long-term strategic commitment.

2. Taking full advantage of Powershoring: vocations, policies, and institutions

2.1 Powershoring in the new geopolitics of the transition

The emergence of a new global energy order is redrawing the map of geopolitical competition, with industrial policy now serving as a central instrument in the race to dominate strategic technologies. This transformation is neither linear nor purely technological; it is a socially constructed and politically contested process, unfolding unevenly across space and time. Advanced economies are mobilizing unprecedented levels of public investment to consolidate clean manufacturing within their borders—illustrated by the United States' IRA, the European Union's Green Deal Industrial Plan, and Japan's Green Growth Strategy. These initiatives reflect a coordinated use of industrial policy to reconfigure energy systems and secure leadership in green production. Meanwhile, most developing countries remain relegated to the extractive periphery of green value chains. Despite contributing most of the global labor and resources, the Global South continues to capture only a marginal share of the value generated in international trade, underscoring the persistence of unequal exchange . Absent deliberate efforts to build sovereign industrial capacity and reconfigure trade relations, the green transition risks reinforcing, rather than redressing, the structural asymmetries of the global economy.

However, this trajectory is not predetermined. It can be altered if emerging economies adopt strategic policies that move beyond extractivism and assert control over key nodes of green industrialization. While current dynamics risk reinforcing historical asymmetries, they also present a narrow but significant window for repositioning, if states are willing and able to coordinate industrial, trade, and energy policy toward long-term productive transformation. In this sense, the relocation of green manufacturing is not an automatic gain for the South, but a contested opportunity that must be actively shaped.

Addressing this new reality, powershoring emerges as a concrete industrial policy strategy tailored to the imperatives of a low-carbon economy.

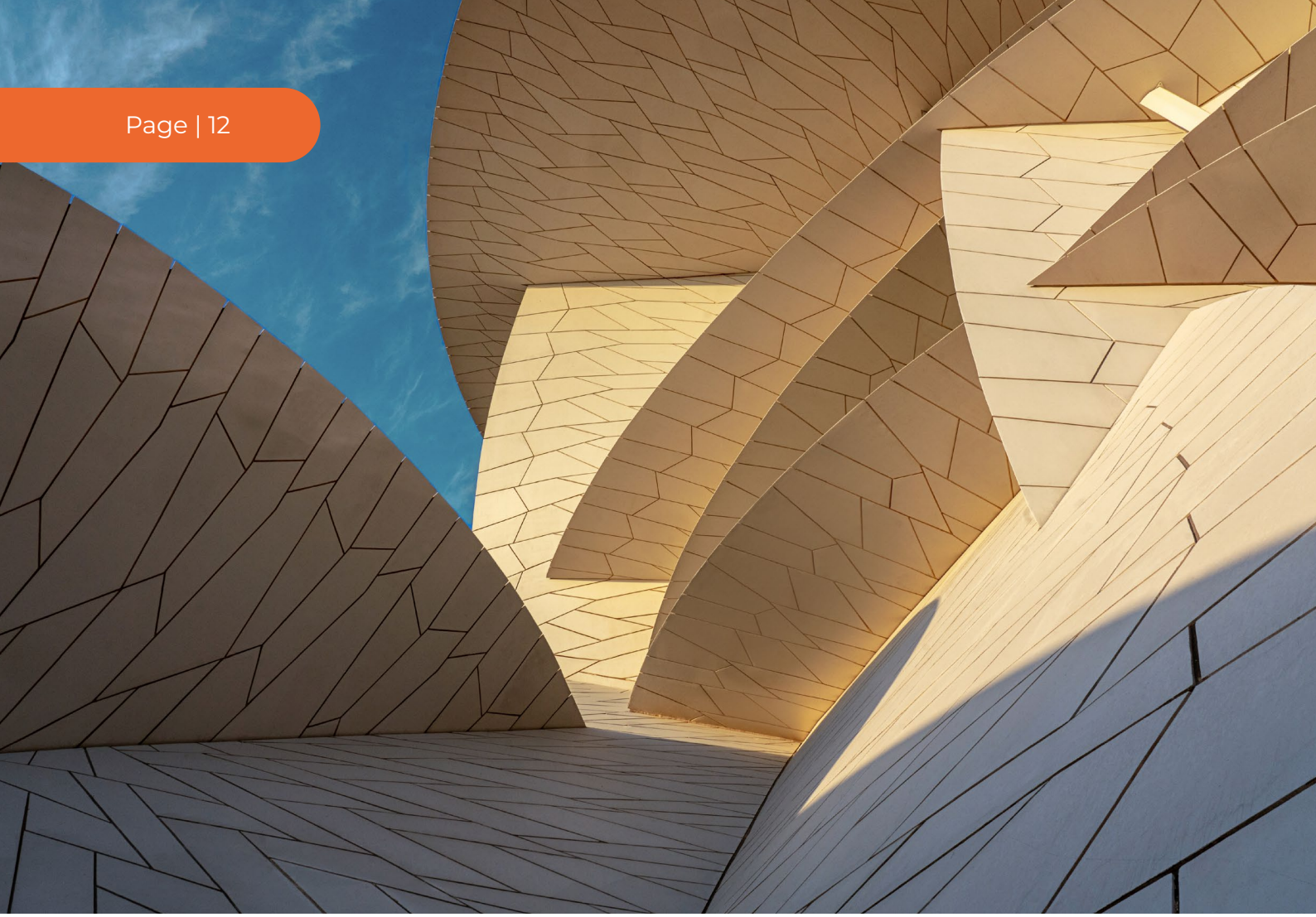
Powershoring refers to the deliberate effort to attract and anchor industrial production in territories endowed with abundant and stable renewable energy, positioning clean energy as a foundational asset for competitiveness.

By leveraging this advantage, countries can reposition themselves to capture a greater share of green industrial value chains through the strategic allocation of energy-intensive manufacturing.

This dynamic is further amplified as the decarbonization agenda gains momentum alongside the growing imperative to secure competitively priced renewable energy. The drive to attract industrial plants to resource-rich regions is rooted in the locational rigidity of renewable energy, which—unlike fossil fuels—cannot be easily stored or transported. As a result, proximity to clean and abundant energy sources becomes a key strategic advantage, especially as energy prices remain a critical factor in the cost structure of a wide range of industrial goods.

Philipp Verpoort and co-authors have shown that geographic differences in renewable energy prices can create cost advantages that drive “green relocation”—the shift of industrial production to low-carbon regions. Sascha Samadi and others also argue that regions with the most renewable energy resources could potentially be a decisive factor in determining the location of energy-intensive steps in manufacturing, calling it the “renewables pull effect”. Powershoring, green relocation, and the renewables pull effect align in recognizing that investment decisions will favor countries with abundant renewable energy and natural resources.

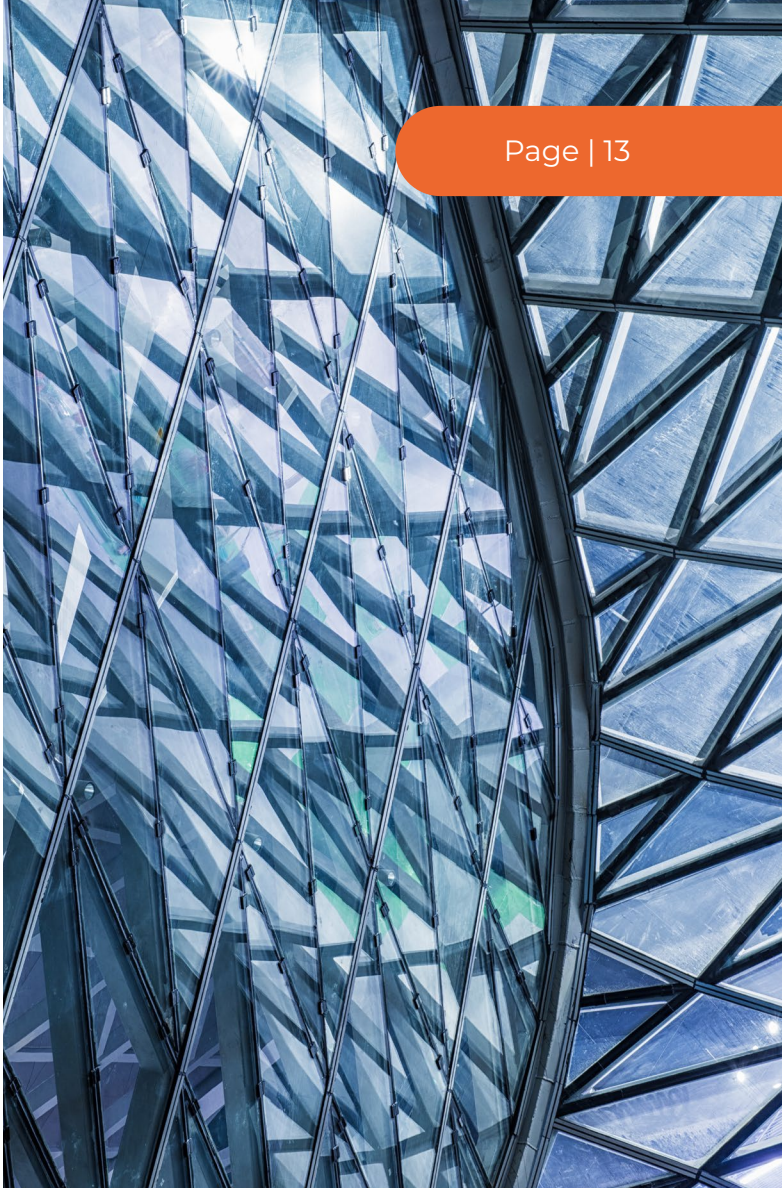
The strategic relocation of industrial processes to countries with abundant and affordable renewable energy presents a major opportunity for developing economies to capture more value in clean production chains. For example, relocating polysilicon refining—an electro-intensive process central to solar photovoltaic manufacturing—to renewable-rich regions can both support global decarbonization efforts and stimulate domestic industrial development. This logic has become even more compelling in light of recent geopolitical disruptions, such as the Russia–Ukraine war and U.S.–China trade tensions, which have underscored the strategic importance of securing resilient and sustainable production environments.



2.2 Powershoring as opportunity for Global South and Brazil as model candidate

As geopolitical tensions rise and climate politics gain urgency, companies around the world are reassessing the geography of production. Driven by regulatory pressures, price volatility, and logistical risks, many are shifting operations closer to renewable energy sources and diversifying supply chains. In this context, countries in the Global South with predominantly clean electricity mixes are emerging as strategic destinations. Latin America combines abundant natural resources, proximity to major markets, and increasingly consolidated platforms for industrial development. At the same time, African countries such as Kenya, Mozambique, Angola, and Ethiopia are making notable progress in renewable electrification. The challenge now is to convert these structural advantages into lasting productive capabilities.

Latin America combines proximity to major markets with abundant renewable energy—hydropower, wind, solar, biomass, and biofuels—alongside growing policy commitments to green growth. These assets are reinforced by access to critical minerals, diverse raw materials, and insulation from major geopolitical rivalries. Taken together, they position the region as a potential hub for green, cost-competitive, and geopolitically stable industrial production at scale.



Among Latin American countries, Brazil is particularly well-positioned to take advantage of powershoring—not only due to the region's general assets, but also because of its relatively robust institutional and industrial foundations. The country benefits from established planning capacities, technical expertise in energy and environmental policy, and a resilient, nationally integrated electricity grid. Public institutions such as the national development bank (BNDES) and vocational training networks offer potential instruments for implementation, even as coordination challenges persist. Moreover, despite enduring decades of deindustrialization, Brazil still retains productive capabilities in strategic sectors such as metallurgy, pulp and paper, and aerospace.

Historically, however, Brazil and Latin America have participated in global value chains primarily as upstream suppliers of raw materials processed elsewhere.

Since the beginning of the century, the region's main commercial connection has been through the export of agricultural and mineral commodities, initially to developed countries and, more recently, to China and other Asian nations. Generally, Brazil has limited integration into global supply chains and relies on the Mercosur markets for manufactured goods exports.

These competitive advantages should be understood as strategic levers to enhance international trade performance—notably by anchoring new manufacturing activities linked to the growing demand for low-carbon goods and the global search for affordable clean energy. To realize this potential, it will be essential to identify the specific segments of industrial production where such advantages can translate into durable competitive gains, moving beyond commodity dependence.

Unlocking this potential will require more than recognizing comparative advantages—it demands strategic focus. Rather than attempting to scale entire sectors at once, countries must identify targeted entry points where these strengths can translate into concrete industrial upgrading.

2.3 Microtargeting and the two axes of powershoring

Powershoring presents a timely opportunity for Latin America, Africa, and other emerging economies to integrate more meaningfully into global value chains and gradually move into higher-value industrial activities. However, such opportunities are not evenly spread across entire sectors. Entry barriers tend to be lower in specific segments or value chain stages that are particularly sensitive to shifts in energy costs, technological configurations, or supply chain realignments. Capturing these openings requires a highly targeted approach—focused on identifying where competitive advantages can be effectively leveraged, and industrial upgrading is institutionally and economically viable.

The low-carbon economy remains in a formative stage, with only a few fully established global leaders across entire value chains. This unsettled environment temporarily lowers barriers to entry—but only for countries that act early, selectively, and strategically. Focusing on specific niches, rather than attempting to compete across broad industrial sectors, offers a more pragmatic and dynamic pathway for industrial upgrading. Within this context, opportunities for insertion can be organized along two main axes [17, Mandacaru et al., 2025]:

- **Low-Carbon Technologies** — Products that enable decarbonization by producing less pollution than their traditional counterparts produce, including wind turbines, solar panels, and batteries.

- **Low-Carbon Goods** — Derived from abundant renewable energy production or new, more efficient processes to develop competitive, low-emission energy-intensive manufacturing and services activities.

Countries with abundant renewable energy and an existing industrial base are particularly well positioned to build productive synergies across low-carbon sectors. The ability to anchor investment in clean technologies—such as wind turbines, solar panels, or batteries—can be significantly enhanced when these efforts are linked to upstream capabilities in energy-intensive industries like steel or aluminum. In such settings, one industrial foothold can help create another.

Brazil offers a useful illustration. Its reserves of high-purity quartz, if processed into solar-grade silicon, could support the growth of a domestic photovoltaic industry

—moving beyond the country's current focus on metallurgical-grade silicon. Similarly, access to low-cost renewable power enables not only green hydrogen production but also the emergence of cleaner value chains in aluminum, fertilizers, and beyond.

The combination of natural endowments and selective state action can thus generate a virtuous cycle: one that attracts investment, fosters technological upgrading, and embeds economies more deeply into global low-carbon production systems. What matters is not just resource abundance, but the institutional capacity to translate it into industrial opportunity.

2.4 Key Sectors

Choosing sectors for powershoring requires careful consideration of multiple dimensions, including their energy intensity and strategic potential for industrial upgrading.

Companies are typically considered electro-intensive when electricity costs account for a substantial share of total operational expenses. Another relevant dimension is the trade profile of the sector: industries with limited exposure to broader markets may face logistical or scale-related constraints that affect their competitiveness, particularly in export-oriented segments. However, powershoring does not imply a one-size-fits-all approach centered exclusively on export potential. Its application must account for national development priorities, including opportunities to strengthen domestic value chains, generate quality employment, and support regional reindustrialization. In Brazil, concrete opportunities already exist in sectors such as aluminum, metallic silicon, steel, fertilizers, pulp, and chemicals—many of which are energy-intensive and partially established. At the same time, there is room to incorporate emerging sectors aligned with national strategic interests, whether export-facing or domestically oriented.

2.5 From Concept to Action: Where Powershoring Strategies Apply

A powershoring strategy identifies both emerging and existing industrial segments that can be upgraded through access to clean, affordable, and reliable electricity. Aluminium is a prime example: its production is highly electricity-intensive, and its carbon footprint varies significantly depending on the energy mix. Countries with abundant renewable energy resources can position themselves as suppliers of low-emission aluminium for critical decarbonization technologies, such as solar photovoltaic systems. When the aluminium value chain—from bauxite mining to smelting—is localized in clean-energy regions, the embedded emissions in solar panel components can drop substantially. For instance, World Bank analysis shows that solar panels manufactured with domestically sourced aluminium in low-carbon contexts can emit less than one-third of the carbon compared to those relying on aluminium smelted in fossil-fuel-based systems like China's. Brazil is used here again as a case study, having increased its primary aluminium production while maintaining one of the lowest carbon intensities globally.

A second illustrative case is industrial-grade silicon, which plays a critical role in both aluminium alloys and photovoltaic supply chains. Silicon production is energy-intensive, and its emissions profile is highly sensitive to the source of electricity and process design. Brazil is again used as a case study due to its access to high-purity quartz and predominantly renewable power mix, which enables significantly lower emissions in the production of metallurgical-grade silicon (MGS) compared to major global producers. This emissions advantage creates a strategic opportunity to move up the value chain into polysilicon and wafer production. While China currently dominates over 90% of the global wafer market,

powershoring strategies can support the emergence of alternative suppliers in energy-abundant regions.

Embedding silicon processing in such low-carbon ecosystems not only adds domestic value but also enhances the global climate performance of solar technologies.

3. Green Relocation as an Emerging Industrial Realignment

Powershoring strategies do not emerge in isolation. They are increasingly embedded within a broader global shift — the geographical reorganization of industrial production in response to clean energy availability and cost differentials. This phenomenon, known as green relocation, is gaining momentum as energy-intensive sectors reconfigure their operations to take advantage of renewable-rich environments. Recognizing this dynamic is essential for understanding the full scope of powershoring: not simply as a national industrial strategy, but as a response to global structural pressures reshaping where and how key materials are produced.

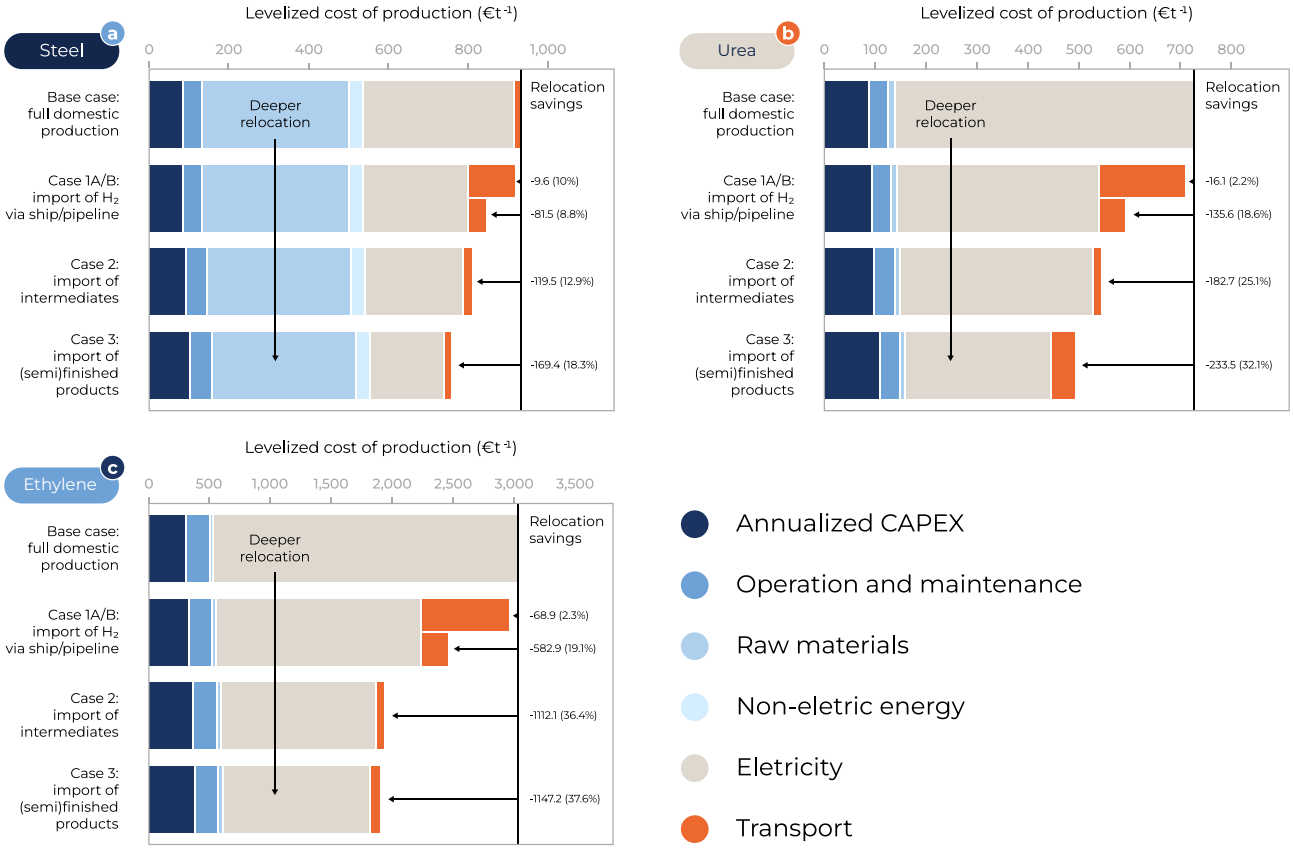
The relocation of industrial production to renewable-rich regions is no longer a theoretical possibility

— it is already unfolding in practice. Recent research has shown that differences in renewable electricity availability can lead to significant disparities in production costs for key energy-intensive goods. For instance, estimates suggest that full relocation to optimal regions could generate cost savings of up to 18% for steel, 32% for urea, and 38% for ethylene — primarily due to lower electricity prices and the availability of clean energy inputs.

These findings give empirical weight to the powershoring proposition. Countries like Brazil, Australia, and South Africa, where renewable resources are abundant and underutilized, are becoming increasingly attractive as hosts for energy-intensive segments of global value chains. In contrast, industrial centers with limited green energy — such as Central Europe, Japan, and South Korea — face mounting pressure due to higher energy costs and growing decarbonization demands.

At the same time, importing green energy carriers like hydrogen or ammonia is still technically complex and economically inefficient. As a result, many countries are beginning to outsource the most energy-intensive steps of their production processes — such as refining, smelting, or chemical conversion — to regions where renewable energy is cheap and available at scale. This shift strengthens the case for green relocation as a global industrial trend. The magnitude of potential cost reductions is illustrated in **Figure 1,** which shows that relocating production to competitive renewable energy zones could reduce costs by up to 18% for steel, 32% for urea, and 38% for ethylene.

Figure 1 - The magnitude of potential cost reductions.



These dynamics create a timely opportunity for renewable-rich economies to position themselves not merely as exporters of green energy but as hubs for low-carbon industrial production. Upstream processing of inputs such as hot briquetted iron (HBI), green ammonia, and green methanol, all more tradable and cost-effective than hydrogen itself, can be localized in clean-energy jurisdictions while downstream manufacturing remains in industrial demand centers. This division of labor improves global efficiency and accelerates decarbonization. The trend is not confined to steel and chemicals. Other energy-intensive sectors that rely on electricity and heat, including aluminium, copper, zinc, polysilicon, and pulp and paper, are also likely to shift their most emissions-intensive stages to jurisdictions with abundant renewable resources.

However, this model raises strategic questions for host countries. Without deliberate industrial policy, there is a risk of reinforcing historical patterns of low-value extraction and limited technological upgrading. Capturing the full benefits of green relocation requires investment in downstream capabilities, enabling infrastructure, and governance mechanisms that ensure renewable endowments translate into sustained productive transformation.

In short, green relocation is no longer a future scenario. It is already underway.

The question for energy-rich economies is whether they will shape the terms of this shift or simply serve as staging grounds for others' industrial decarbonization.

4. Final Considerations

The current landscape of global supply chains is undergoing significant transformation, driven by the environmental agenda and the urgent need to transition toward a low-carbon economy. Despite persistent geopolitical tensions and economic uncertainty, this realignment opens opportunities for emerging economies to reposition themselves within evolving industrial and commercial order. Countries endowed with abundant renewable resources, cost-competitive electricity, industrial capacity, and institutional readiness are increasingly attractive as hosts for cleaner stages of energy-intensive production.

In this context, academic studies have pointed to substantial cost savings from relocating specific industrial activities to regions with more favorable energy conditions. Estimated reductions of 18% for steel, 32% for urea, and 38% for ethylene help explain why many companies are actively seeking to relocate operations in pursuit of cleaner and cheaper electricity. To fully capitalize on these shifts, an integrated and forward-looking policy framework is essential. This includes building technological and human capacities, aligning domestic standards with international regulations, advancing targeted investment strategies, and deepening trade cooperation.

These elements are key to enabling developing economies to anchor themselves in the emerging green industrial landscape.

Brazil, for example, illustrates how countries with the right structural conditions can become strategic players in this transition. At the same time, the broader lesson applies across many contexts: realizing the full potential of green relocation requires coordinated planning between governments, private actors, and civil society. Only through such alignment can countries transform today's disruptions into a foundation for sustainable and inclusive growth.

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