

GREEN ECONOMY TRANSITIONS AND TRADE: BRIDGING SUSTAINABILITY AND COMPETITIVENESS

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Introduction

The imperative to reconcile economic growth with environmental sustainability has led many countries to adopt green economy policies. These policies aim to foster growth while reducing ecological harm, and they have gained traction in both advanced economies and transitioning developing countries. The stakes are high: according to the World Economic Forum, the top five global risks this decade are all environmental in nature¹. As Oliver Greenfield of the Green Economy Coalition starkly put it, *“Inequality, poverty, climate change and biodiversity loss are not just connected, they arise from the same root cause: how our economies are organised... Tackling global problems without economic reform is like trying to build a Tesla with wooden tools.”*² This underscores that reshaping economic policy is central to a sustainable future. In this context, governments worldwide – from the European Union to emerging economies – have pledged action (e.g. the Paris Agreement commitments) and begun integrating climate and environmental targets into national strategies³. The big question is how these green economy initiatives interplay with international trade and development: do environmental measures hinder export competitiveness or create new opportunities for trade in green technologies? This article reviews international experiences with green policies, highlights key data on green transition indicators and trade performance, and examines empirical evidence on the relationship between green policies and foreign trade.

Green Economy Policies in Transition vs. Developed Economies

Green economy strategies have not been one-size-fits-all. Developed economies generally have more resources and technology to implement stringent environmental regulations, whereas transition and developing economies face distinct challenges. Advanced economies (e.g. OECD countries) have been pursuing comprehensive climate policies – for

¹ Global action to accelerate green economy... | Green Economy Coalition

<https://www.greeneconomycoalition.org/news-and-resources/press-release-tracking-the-green-economy-transition>

² Global action to accelerate green economy... | Green Economy Coalition

<https://www.greeneconomycoalition.org/news-and-resources/press-release-tracking-the-green-economy-transition>

³ Green Economy Transition in Eastern Europe, the Caucasus and Central Asia | OECD

https://www.oecd.org/en/publications/green-economy-transition-in-eastern-europe-the-caucasus-and-central-asia_c410b82a-en.html

instance, the EU’s Green Deal mobilizing trillions for a net-zero transition⁴ – and many have achieved some decoupling of economic growth from carbon emissions. The European Union collectively aims for climate neutrality by 2050 and employs market-based instruments like emissions trading systems to curb emissions. In fact, many high-income countries show declining carbon intensity: the United States, for example, reduced its per-capita CO₂ emissions at an average rate of about –0.7% per year from 1990 to 2013⁵. By contrast, emerging economies often still have rising emissions as they industrialize (China’s CO₂ emissions per capita grew ~5.6% annually over the same period)⁶, although they are also investing heavily in renewables. Developed nations also tend to use economic incentives for green innovation – reflecting the *Porter hypothesis* that well-designed environmental rules can spur efficiency and competitiveness⁷. It is notable that countries like Germany, Denmark, or Japan, despite strict environmental standards, remain export powerhouses in high-tech and increasingly in clean-tech sectors.

Transition economies and developing countries are increasingly adopting green economy frameworks, but with modifications to fit their development context. All countries in Eastern Europe, the Caucasus and Central Asia (the post-Soviet transition region) have formally adopted the 2030 Sustainable Development Agenda and the Paris climate targets, translating them into national policies⁸. Many have introduced new environmental laws and renewable energy targets, and some collaborate through platforms like the OECD’s GREEN Action Task Force to share expertise. This has yielded measurable progress – for instance, energy and resource productivity in Eastern Europe has improved in recent decades. However, the pace of green transition in these economies remains slower than in Western Europe, and significant hurdles persist. An OECD review notes that EECCA countries’ carbon and energy productivity “*is much lower than the EU averages*”, and populations still suffer from high air pollution exposure⁹. Policy implementation is often stymied by political and economic constraints: “*many [environmental] policies in the region have been slow [to reform] and rely on administrative... approaches still based on Soviet-era practices. Insufficient economic incentives fail to stimulate innovation... [and] direct and indirect subsidies to*

⁴ [greeneconomycoalition.org https://www.greenecconomycoalition.org/assets/reports/GEC-Reports/GEC-Barometer-2020-WEB-EXECSUM.pdf](https://www.greenecconomycoalition.org/assets/reports/GEC-Reports/GEC-Barometer-2020-WEB-EXECSUM.pdf)

⁵ An Empirical Investigation on the Transition Process toward a Green Economy <https://www.mdpi.com/2071-1050/13/23/13151/pdf?version=1638236498>

⁶ An Empirical Investigation on the Transition Process toward a Green Economy <https://www.mdpi.com/2071-1050/13/23/13151/pdf?version=1638236498>

⁷ Environmental Policy and Competitiveness: The Porter Hypothesis ... <https://www.sciencedirect.com/science/article/abs/pii/S0095069698910610>

⁸ Green Economy Transition in Eastern Europe, the Caucasus and Central Asia | OECD https://www.oecd.org/en/publications/green-economy-transition-in-eastern-europe-the-caucasus-and-central-asia_c410b82a-en.html

⁹ Green Economy Transition in Eastern Europe, the Caucasus and Central Asia | OECD https://www.oecd.org/en/publications/green-economy-transition-in-eastern-europe-the-caucasus-and-central-asia_c410b82a-en.html

environmentally harmful activities” remain common¹⁰. In short, while transition economies are committed to greener growth on paper, they face capacity gaps, legacy infrastructure, and pressing social priorities that can delay transformative changes. As Batrancea et al. (2021) observe, “*the green economy model that is applied to advanced economies cannot be implemented [in] low-income economies because of development gaps*”, and emerging economies often “*have other goals and priorities that demand changes in the green economy model*” of the rich world¹¹. This suggests the need for tailored approaches: for example, blending environmental objectives with poverty reduction and job creation, and securing climate finance so that poorer countries can leapfrog to cleaner technologies¹²¹³.

Green Transition Indicators and Trade Performance

To understand progress, it is useful to compare key indicators of green economy transition across countries and see how they relate to trade and economic performance. Common metrics include carbon emissions per capita, renewable energy usage, and natural resource depletion as a share of the economy. Meanwhile, trade performance can be gauged by export growth, trade openness (trade/GDP), or shifts in trade composition (such as rising exports of environmental goods). A cross-country look at these indicators reveals stark contrasts between advanced, emerging, and low-income economies.

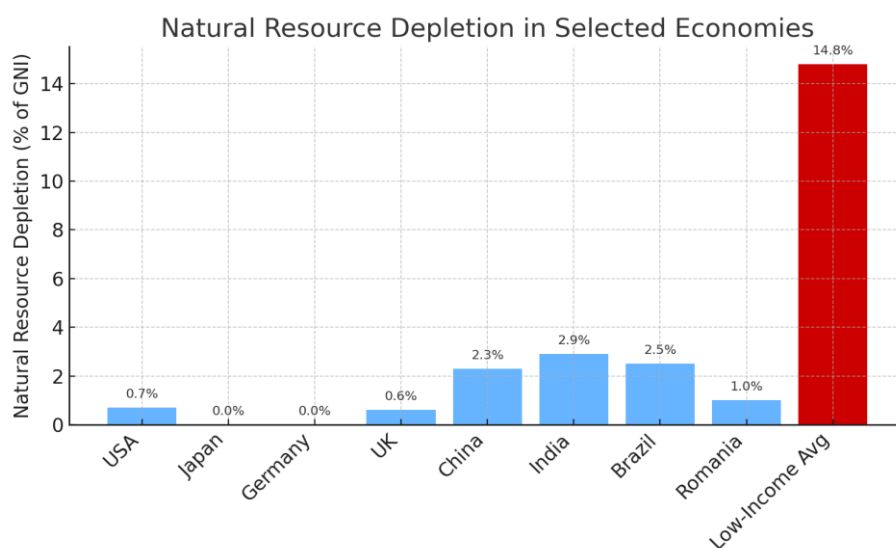


Figure 1: Natural resource depletion as a percentage of GNI in selected economies.

¹⁰ Green Economy Transition in Eastern Europe, the Caucasus and Central Asia | OECD
https://www.oecd.org/en/publications/green-economy-transition-in-eastern-europe-the-caucasus-and-central-asia_c410b82a-en.html

¹¹ An Empirical Investigation on the Transition Process toward a Green Economy <https://www.mdpi.com/2071-1050/13/23/13151/pdf?version=1638236498>

¹² The path to green growth in OECD economies: The role of energy ...
<https://www.sciencedirect.com/science/article/pii/S0140988325002439>

¹³ Green Economy Transition in Eastern Europe, the Caucasus and Central Asia | OECD
https://www.oecd.org/en/publications/green-economy-transition-in-eastern-europe-the-caucasus-and-central-asia_c410b82a-en.html

Advanced economies (USA, Japan, Germany, UK) have minimal depletion rates, often well below 1% of Gross National Income, while emerging economies like China, India, and Brazil exhibit higher rates around 2–3%. Averages for low-income countries are an order of magnitude higher (around 15%), reflecting heavy reliance on extraction of minerals, forests, and other natural resources for income¹⁴. This stark disparity underscores that poorer countries tend to depend on resource exploitation (mining, logging, etc.) to a far greater extent relative to their economic size, which can undermine long-term sustainability. In comparison, wealthier nations have diversified economies where such depletion is negligible in GDP terms, and they often import raw materials rather than deplete their own.

Other indicators reinforce this divide. Carbon emissions per capita in 2013 were 16.4 tons in the U.S. versus 1.6 tons in India¹⁵ – a tenfold difference reflecting higher consumption and industrial activity in the U.S. (albeit also greater energy efficiency per dollar of GDP than many developing countries). Middle-income China stood at about 7.6 tons per person, roughly half the U.S. level, but rising. Renewable energy uptake also varies widely. In 2013 the U.S. and Japan derived only about 7–8% of final energy from renewable sources, whereas China reached 18% and Brazil an impressive 43% thanks to its extensive hydropower and biofuel use¹⁶. (Many developing countries appear to have high renewable shares on paper – e.g. several African countries exceed 90% in Figure 1 – but this is often due to traditional biomass use and lack of modern energy, rather than advanced clean energy systems.) Generally, EU countries fall in the middle with renewables around 10–20% of energy (e.g. Spain ~16%, France ~13% in 2013)¹⁷, and those shares have since grown with policy support. Meanwhile, the growth of clean energy capacity is accelerating worldwide. China’s massive investments have made it the world leader in renewables: by 2024 China alone accounted for over 40% of global renewable power capacity¹⁸. This heavy investment – \$818 billion in energy transition spending in 2024, more than double any other country¹⁹ – reflects an effort to secure energy supply and dominate clean technology markets. Indeed, China’s push for solar and wind has not only greened its energy mix but also created a booming export industry in renewable technologies.

Trade outcomes have started to show signs of greening, albeit unevenly. On one hand, exports of environmental goods and services (from solar panels to water treatment equipment)

¹⁴ An Empirical Investigation on the Transition Process toward a Green Economy <https://www.mdpi.com/2071-1050/13/23/13151/pdf?version=1638236498>

¹⁵ An Empirical Investigation on the Transition Process toward a Green Economy <https://www.mdpi.com/2071-1050/13/23/13151/pdf?version=1638236498>

¹⁶ An Empirical Investigation on the Transition Process toward a Green Economy <https://www.mdpi.com/2071-1050/13/23/13151/pdf?version=1638236498>

¹⁷ An Empirical Investigation on the Transition Process toward a Green Economy <https://www.mdpi.com/2071-1050/13/23/13151/pdf?version=1638236498>

¹⁸ China’s green transition: Remarkable but also sustainable? | World Economic Forum <https://www.weforum.org/stories/2025/07/chinas-green-transformation/>

¹⁹ China’s green transition: Remarkable but also sustainable? | World Economic Forum <https://www.weforum.org/stories/2025/07/chinas-green-transformation/>

are a growing segment of trade for countries investing in green sectors. For example, China’s rise as a clean-tech manufacturing powerhouse means it now exports affordable solar panels, batteries, and electric buses worldwide. This has helped drive down costs of renewables globally, but it also sparked trade frictions – the EU and US have launched investigations and tariffs targeting Chinese clean-tech imports, citing unfair competition²⁰. Such disputes highlight a new facet of trade performance: competitiveness in the green economy can be a source of trade tension, as nations vie for leadership in the industries of the future. On the other hand, countries that remain heavily tied to fossil fuel exports or resource-intensive commodities face *downside* trade risks as the world shifts towards sustainability. For instance, coal and oil exporters may see demand decline; already, financial markets are increasingly wary of carbon-intensive assets. Thus, a country’s trade performance in the long run may depend on aligning its export basket with green economy trends – moving up the value chain to sell more sustainable goods and services, and relying less on depleting natural capital.

It is also noteworthy that many high-income economies have managed to maintain strong trade competitiveness while improving environmental performance. Several European countries have decoupled growth from emissions – e.g. Germany cut greenhouse gas emissions by over 25% since 1990 while growing its economy, and it continues to be a top goods exporter²¹. This suggests that with innovation and policy support, greening the economy does not necessarily hurt trade – it can even enhance a nation’s branding and efficiency. However, in lower-income contexts, the immediate trade-offs can be tougher: restricting certain polluting industries or resource exports can hit export revenue in the short term. This is why international support (technology transfer, climate finance) is vital to help transitioning economies pursue green policies without sacrificing development goals. Global initiatives like the Green Economy Tracker and Barometer are benchmarking countries on these policies²², indicating an increasing global scrutiny (and assistance) for those in transition.

Green Policies and Foreign Trade: Empirical Insights

What does the evidence show about the relationship between green economy policies and foreign trade development? Empirical research offers several insights, though with some mixed findings. One extensive study covering 123 developed and developing countries found that *higher economic development and greater renewable energy use significantly promote “green growth”*, but trade openness appeared to be detrimental to green growth performance²³. In other words, countries that are more open to trade tended to have worse

²⁰ China’s green transition: Remarkable but also sustainable? | World Economic Forum
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²¹ greeneconomycoalition.org <https://www.greeneconomycoalition.org/assets/reports/GEC-Reports/GEC-Barometer-2020-WEB-EXECSUM.pdf>

²² Global action to accelerate green economy... | Green Economy Coalition
<https://www.greeneconomycoalition.org/news-and-resources/press-release-tracking-the-green-economy-transition>

²³ Determinants of green growth in developed and developing countries by Vincent Tawiah, Abdulrasheed Zakari, Festus Adedoyin :: SSRN https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3810667

environmental outcomes on average, potentially because trade openness can encourage polluting industries or increase resource extraction to meet export demand. This aligns with the classic “pollution haven” concern – that open trade might cause dirty production to concentrate in countries with lax standards. However, the same study noted that the impacts differ by development level, implying that policy context matters (a well-governed open economy might export high-tech goods with lower emissions, whereas a poorer open economy might specialize in resource exports with higher environmental costs)²⁴.

On the flip side, some evidence suggests exports can be compatible with lower emissions: one analysis found that in certain cases, rising exports correlated with *lower* domestic carbon emissions, whereas greater imports correlated with higher emissions²⁵. A possible explanation is that competitive export-oriented industries often invest in newer, cleaner technologies to meet international standards, whereas goods produced for domestic use might face less scrutiny. Additionally, stringent environmental regulations can drive innovation that boosts firms’ efficiency and product quality (as hypothesized by Porter), thereby potentially *enhancing* international competitiveness over time²⁶. For example, industries in countries with strong eco-standards (like Germany’s engineering sector or Japan’s auto industry) have often innovated to meet those standards and then turned that into an export advantage (selling cutting-edge clean tech abroad). This suggests a dynamic where initial compliance costs for green policies could be offset by gains in productivity and reputation, leading to stronger trade performance in new green markets.

Overall, the literature indicates a nuanced relationship: trade can either help or hurt the green transition depending on what is traded, under what rules. A recent review of studies noted that only about 20% of analyses find trade has a clear positive effect on environmental efficiency, around 30% find a negative effect, and the rest report mixed or insignificant effects²⁷. This split verdict implies that complementary policies are crucial. Environmental policies (like carbon pricing, clean energy subsidies, and efficiency standards) can shape the impacts of trade by discouraging high-emission activities and encouraging cleaner production geared for export. Likewise, trade policies can support green outcomes – for instance, reducing tariffs on environmentally friendly goods and services, or negotiating trade agreements with strong environmental chapters, can spread green technology and raise environmental norms. A pertinent example is the global effort to eliminate tariffs on environmental goods (such as solar panels and pollution control equipment) to make them cheaper and more widely adopted – a clear win-win for trade and the environment if realized.

²⁴ Determinants of green growth in developed and developing countries by Vincent Tawiah, Abdulrasheed Zakari, Festus Adedoyin :: SSRN https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3810667

²⁵ Empirical study on the impact of international trade and foreign ...

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²⁶ Environmental Policy and Competitiveness: The Porter Hypothesis ...

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²⁷ Interrelationship between international trade and environmental ...

<https://onlinelibrary.wiley.com/doi/10.1002/bse.3270>

Furthermore, international cooperation initiatives, such as green finance for developing countries’ sustainable infrastructure or border carbon adjustment mechanisms, aim to prevent unfair competition by aligning environmental standards across trading partners²⁸²⁹.

Empirical analysis also underscores the importance of timing and sequencing. In the short run, stringent green policies might impose adjustment costs on certain export industries (e.g. coal mining sectors or energy-intensive manufacturing). But in the longer run, they can stimulate structural shifts toward higher-value and greener exports. For instance, China’s heavy investment in renewable energy and electric vehicles was partly driven by domestic environmental goals, and now those sectors are internationally competitive, earning China growing export revenues³⁰. In sum, green economy policies and trade development are increasingly intertwined: robust environmental policy can catalyze new competitive advantages, while active engagement in international trade can facilitate the diffusion of clean technologies – but achieving both goals requires careful policy coordination to ensure competitiveness and sustainability reinforce each other rather than conflict.

Conclusion

The global experience to date reveals both challenges and opportunities at the nexus of green economy transition and foreign trade. Advanced economies have generally led in adopting green policies and show that it is possible to cut emissions and pollution without sacrificing prosperity or export performance. Transition economies and developing countries are taking steps on the green path as well, though they must balance environmental ambition with development needs and often require support to overcome financial and technological barriers. The data make clear that these countries start from different points: many poorer nations still have economies centered on resource extraction and face steep climbs to build diversified, low-carbon industries. Green economy policies – whether investing in renewables, enforcing anti-pollution laws, or reforming subsidies – are therefore not just environmental measures but structural economic reforms. Implemented wisely, they can reduce long-run vulnerability (e.g. to climate shocks or fickle commodity markets) and unlock new sectors for growth (like eco-tourism, sustainable agriculture, clean manufacturing).

For foreign trade, the transition to a green economy presents a classic double-edged sword. In the near term, industries with comparative advantages in carbon-intensive products may struggle or need to reinvent themselves. Countries heavily reliant on “brown” exports face a risk if global markets pivot away from those products. Yet at the same time, the green transition is creating entire new markets – from renewable energy hardware to organic goods – and first movers can capture significant export gains. International evidence suggests that

²⁸ Green Economy Transition in Eastern Europe, the Caucasus and Central Asia | OECD
https://www.oecd.org/en/publications/green-economy-transition-in-eastern-europe-the-caucasus-and-central-asia_c410b82a-en.html

²⁹ China’s green transition: Remarkable but also sustainable? | World Economic Forum
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³⁰ China’s green transition: Remarkable but also sustainable? | World Economic Forum
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countries which *proactively* embrace green innovation tend to be better positioned in the emerging green economy marketplace. Moreover, aligning trade and environmental objectives can yield mutual benefits: for example, harmonizing standards can prevent a race to the bottom, and climate-related trade measures (like carbon border adjustments) can level the playing field while incentivizing cleaner production globally.

In conclusion, green economy policies and trade development need not be in conflict – they can be complementary pillars of sustainable development. However, realizing this synergy requires concerted effort. Governments must design environmental policies that encourage innovation and productivity (so that domestic firms remain competitive), and trade policies that facilitate the spread of green technology and penalize externalized pollution. International cooperation is vital, as no country can transition in isolation: financing mechanisms, knowledge transfer, and fair trade rules are essential to help especially transition and developing economies leapfrog toward greener growth. The empirical analyses highlight that context matters greatly – there is no universal blueprint, but rather a need for *differentiated strategies*. What is universal is the end goal: an inclusive green economy where economic activity and trade flourish within the planet’s ecological limits. Achieving this will be the defining development challenge and opportunity of the 21st century. As global momentum builds for greener policies (with civil society, investors, and even courts pushing for action), the countries that succeed in integrating those policies with a competitive, innovative trade sector will lead the next wave of sustainable prosperity. The task now is to accelerate this transition, closing the gaps between leading and lagging nations, so that green economy benefits and trade opportunities are shared widely – truly a “*win-win*” for both people and the planet³¹.

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