

# Reframing the Strategic Framework for a Climate Just Transition: A Global South Perspective

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## Abstract:

Just transition has moved from the sidelines to the core of global climate governance. However, current narratives largely reflect the experiences of developed economies. Mainly focusing on labor compensation and fossil fuel exit, these frameworks fail to address the Global South's needs for industrialization, energy access, and poverty reduction. To bridge this gap, this study introduces a Development-Decarbonization-Structural Transformation (DDST) Framework. It defines climate just transition as a dynamic process of optimizing development paths under multiple constraints. Setting development as the baseline, decarbonization efficiency as the constraint, and structural transformation as the driver, the model seeks a long-term equilibrium through synergies and trade-offs among the three dimensions. This study shows that priorities vary significantly across various economies of different development stages. Therefore, just transition must shift from a single-target goal to differentiated policy mixes. Based on this, this study proposes a restructuring of international cooperation, which includes reshaping transition narratives, reforming climate finance, removing green trade barriers, and strengthening South-South cooperation. The theoretical contribution of this study lies in moving beyond the "compensatory transition" paradigm. It redefines just transition as a structural strategy that balances development with climate goals. Ultimately, just transition becomes a substantive force in climate governance only when it accommodates the developmental aspirations of the Global South.

## Keywords:

Just transition, Global South, Decarbonization, Development, Structural transformation

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## 1. Introduction

In 2022, the 27th Conference of the Parties (COP 27) to the United Nations Framework Convention on Climate Change (UNFCCC) mandated a standalone work program on just transition. Following three years of negotiations, the Parties at COP30 formally established a just transition mechanism to bolster international cooperation, technical assistance, capacity building, and knowledge sharing (UNFCCC, 2025). This framework aims to foster a globally equitable and inclusive transition. Looking ahead, as the low-carbon transition intensifies, just transition is poised to play an increasingly pivotal role in global climate governance.

Despite its growing prominence, a global consensus on the definition and scope of just transition remains elusive. Developed economies focus primarily on labor market shifts and social protections necessitated by the fossil fuel phase-out. Conversely, the Global South emphasizes the principle of Common but Differentiated Responsibilities (CBDR), asserting that developed nations must mobilize the financial, technical, and capacity-building support required for an equitable transition.

Low-carbon transition transcends environmental and climate imperatives; it is closely linked to energy-mix cleaning, industrial upgrading, and economic growth. Unlike developed economies, Global South nations continue to prioritize fundamental objectives, including economic development, industrialization, energy access, and poverty alleviation. Consequently, in these contexts, just transition is not merely a matter of employment and social security during the phase-out of legacy industries. It instead necessitates balancing development with

emission mitigation, while leveraging multi-stakeholder resources to catalyze structural economic transformation and secure the foundational drivers for sustainable socio-economic progress.

This study posits that the essence of just transition in the Global South lies in achieving a dynamic balance between economic development, decarbonization, and structural transformation. Such a balance requires not only coordinating industrial, energy, and climate policies domestically but also fostering a more inclusive global climate governance system. This international dimension must facilitate technology transfer, mobilize climate finance, and safeguard the industrial development space for developing nations. Accordingly, this paper introduces a new analytical framework—the Development-Decarbonization-Structural Transformation Framework—tailored to the low-carbon transition needs of the Global South. By focusing on economic opportunities and long-term structural changes, this framework provides a theoretical foundation for transition pathways that effectively balance development with emission reduction.

## 2. Limitations of Existing Analytical Frameworks for Just Transition

Just transition did not originate within climate governance; its roots trace back to the North American labor movement of the late 1970s. At that time, labor unions in the US oil, chemical, and nuclear sectors first proposed the concept to shield members from undue unemployment risks arising from increasingly strin-

gent environmental regulations (Gambhir et al., 2028; Wang, 2025). Initially, the core demands focused narrowly on labor rights and job placement. Since 1997, however, the concept has progressively entered the international climate agenda, spearheaded by organizations such as the International Labour Organization (ILO). The 2010 Cancun Agreements first incorporated just transition into formal resolutions, and its inclusion in the preamble of the 2015 Paris Agreement established it as a guiding principle for global climate governance. Following the Silesia Declaration on Solidarity and Just Transition in 2018, COP27 in 2022 mandated the Just Transition Work Programme (JTWP), elevating the issue from a subsidiary concern to a core, standalone pillar of international climate negotiations. By COP30 in 2025, Parties reached a consensus to establish a global just transition mechanism. Through this integration with climate governance, the scope of just transition has evolved from a singular focus on labor protection into a comprehensive framework encompassing energy, social, economic, and regional development.

Just transition research has grown rapidly, centering on three primary themes. First, studies examine the social impacts on workers and communities—such as job losses and regional economic decline—while proposing mitigation through retraining and social safety nets (Pollin & Callaci, 2019; Healy & Barry, 2017). Second, research highlights equity and justice, analyzing the unequal distribution of climate policy costs and benefits and how institutional design can improve social acceptance (Markkanen & Anger-Kraavi, 2019; Jenkins et al., 2016). Finally, a third body of work adopts a governance per-

spective to explore negotiation and participation among governments, businesses, labor unions, and communities (Newell & Mulvaney, 2013; Rosemberg, 2010).

While these studies offer valuable insights into the social impacts of energy transition, they remain largely grounded in the perspectives and historical experiences of Western developed economies. Their focus is primarily on achieving a “just exit” from fossil fuels within established economic structures. However, for much of the Global South, just transition challenges are fundamentally different. First, these nations are still undergoing industrialization and urbanization, where economic growth, job creation, and poverty alleviation remain the most urgent priorities. In 2024, the per capita GDP of the Global South was approximately US\$6,500—only 13.4% of that in developed economies—and for many least-developed countries, this figure falls even below US\$2,000<sup>1</sup>. In this context, just transition is not merely about “phasing out carbon-intensive industries,” especially since many Southern nations lack traditional carbon-intensive sectors to exit in the first place. Instead, the focus is on leveraging local strengths to secure development opportunities and ensure stable economic growth. Second, many Southern countries occupy lower positions in global value chains, relying heavily on resource-based or low-value manufacturing. Without international financial, technical, and capacity-building support, Southern nations struggle to green their industrial sectors or capture benefits from the global green revolution,

and may even face new risks of structural dependency.

Therefore, multiple inconsistencies persist between the Global North and South regarding the conceptualization and requirements of just transition. **First, their primary objectives are misaligned.** Northern nations tend to frame just transition as a technical domestic challenge, focusing on fossil fuel phase-outs, net-zero pathways, and labor re-assignment (Newell & Mulvaney, 2013). Conversely, for the Global South, just transition is not merely an environmental issue but also a fundamental developmental issue. Their priorities encompass energy access for those without electricity, poverty alleviation, economic diversification, and climate adaptation capacity. These nations emphasize the principle of Common but Differentiated Responsibilities (CBDR), arguing that developed states must acknowledge their historical responsibility rather than simply demanding that developing countries synchronize their emission reduction efforts (Hefron, 2021).

**Second, fundamental disagreements exist over financing mechanisms.** Northern countries remain reluctant to provide robust funding through multilateral climate frameworks. Existing initiatives, such as the Just Energy Transition Partnerships (JETPs), are criticized for being debt-heavy and politically exclusive. For example, in South Africa’s US\$8.5 billion package, grants comprise less than 4%; similarly, in Indonesia’s US\$20 billion deal, grants account for only US\$300 million, or roughly 1.5% (Fünfgeld & Wischermann, 2024). Given the

heavy debt burdens facing many Southern nations, the absence of non-debt financing and low-cost technology transfer undermines the dual goals of “justice” and “decarbonization.”

**Third, the gap in implementation capacity.** Current transition models often mirror Northern experiences—such as Germany’s Ruhr region—which benefit from robust social safety nets and fiscal strength (Galgóczi, 2014). In contrast, many Southern countries face limited fiscal space and high levels of informal employment. Direct replication of Northern “coal exit” or carbon pricing policies risks triggering social instability and a return to poverty (Markkanen & Anger-Kraavi, 2019). Furthermore, Northern unilateral trade measures have increased export costs for developing nations, widening the North-South economic divide and creating new forms of injustice (Magacho et al., 2024; Li et al., 2026).

### 3. Reframing the Logic of Just Transition: A Global South Perspective

Existing frameworks often overlook the developmental realities of the Global South. This study introduces the Development-Decarbonization-Structural Transformation (DDST) Framework as a core analytical tool for understanding and designing transition strategies tailored to Southern nations. Departing from the conventional logic of treating transition as mere loss compensation, the DDST framework redefines

<sup>1</sup> Calculated by the author using World Bank population and GDP data. Developed economies are defined as Annex I countries under the UNFCCC; all other nations are categorized as the Global South.

transition as a governance process aimed at re-optimizing development pathways under multi-objective constraints. This shift repositions Global South nations from passive recipients of transition impacts to active shapers of development opportunities.

### 3.1 Safeguarding development space

For the Global South, low-carbon transition must not compromise development space. Transition policies should integrate economic growth, energy access, industrialization, and poverty alleviation as core evaluation dimensions, rather than treating them as ancillary to climate goals. For instance, in Africa, 600 million people—representing 43% of the continent's population—lack access to electricity, with the vast majority residing in sub-Saharan Africa (IEA, 2022). Furthermore, many sub-Saharan African nations currently record an annual per capita electricity consumption of less than 400 kWh, well under the minimum energy threshold for modern living, especially compared to 6,500 kWh in Europe and 11,000 kWh in the United States (Rafael, 2023). For these countries, the immediate priority is affordable energy access rather than fossil fuel phase-outs. Thus, this development baseline is not a rejection of decarbonization, but a pragmatic choice in sequencing transition pathways: prioritizing energy access while adopting clean technologies to enable leapfrog development. Performance metrics for the Global South should therefore utilize composite indicators—such as carbon intensity, reductions in energy poverty, installed capacity of renewable energy, and electrification rates—rather than relying exclusively on

absolute emission levels or peak-year targets. This approach would more accurately reflect Southern decarbonization efforts while offering a more inclusive analytical framework for global transition assessments.

### 3.2 Optimizing decarbonization efficiency

The principle of optimizing decarbonization efficiency centers on achieving maximum mitigation benefits through optimal resource allocation, while acknowledging the distinct historical responsibilities of Northern and Southern nations. The industrialization of the developed economies produced the vast majority of historical cumulative emissions, yet Southern nations bear undue costs from climate impacts. Forcing these nations to self-fund high-cost decarbonization while their developmental capacity is still maturing violates the principle of CBDR and fundamentally weakens the equity of global climate action. Southern nations must instead systematically assess their marginal abatement cost curves (MACC), prioritizing areas with maximum co-benefits and the lowest marginal costs. Notably, the structure of these curves in the Global South differs sharply from those in developed economies. In the latter, most low-cost mitigation opportunities have already been exhausted, leaving only high-cost deep decarbonization challenges. In contrast, the Global South possesses vast low-cost or even negative-cost potential—particularly in energy efficiency, renewable energy deployment, and transport electrification—that remains untapped due to financing barriers and limited technology access (IPCC, 2022). This implies that international climate investment

can leverage significantly higher emissions reductions in Southern nations than in developed ones. To maximize global climate benefits, directing concessional financing and technical support toward the Global South represents the most economically rational choice for global decarbonization.

### 3.3 Driving structural transformation

Global South nations should view low-carbon transition as a strategic opportunity to upgrade industrial structures and redefine global competitiveness. However, this transformation depends on a critical prerequisite: These nations must first strengthen their industrial bases and ensure a reliable energy supply to effectively convert external climate pressures into endogenous growth drivers. Decarbonization pursued in isolation from an industrial foundation is both economically unfeasible and politically untenable. Consequently, Southern nations should systematically leverage their comparative advantages through two strategic pathways.

**First, they must cultivate localized clean energy value chains.** Transition strategies should integrate local manufacturing, operations, and maintenance (O&M) through joint ventures and technology licensing negotiations. For instance, resource-rich nations can extend their critical mineral advantages into downstream sectors like battery materials and energy storage. Similarly, countries with abundant wind and solar resources can leverage low-cost power to secure new positions in the global division of labor, particularly in green steel and green fertilizer production.

**Second, they should foster domestic markets for clean products.** Rapid urbanization, expanding infrastructure needs, and large populations provide the Global South with the potential to nurture massive clean-product markets. By utilizing policy tools such as green public procurement, subsidies, and low-carbon standards, governments can provide the scale-driven early demand necessary to support local green industries and lower entry costs.

Encouragingly, Global South nations now face an unprecedented techno-economic landscape. Between 2010 and 2024, the Levelized Cost of Electricity (LCOE) for solar photovoltaics (PV) and onshore wind dropped by 90% and 70%, respectively; in many Southern nations, renewables are now cost-competitive with or even cheaper than fossil fuels (IRENA, 2025). This offers these nations a viable opportunity to bypass carbon-intensive industrialization and directly establish modern energy systems centered on clean power. However, a significant gap persists between technical feasibility and large-scale deployment. The cost of capital in emerging markets and developing economies (EM-DEs) remains vastly higher than in developed nations, with nominal financing costs up to seven times those in the United States and Europe—and even higher in high-risk sectors (IEA, 2021). Therefore, realizing this leapfrog potential depends on international support, particularly in financing, technology transfer, and capacity building from developed economies.

### 3.4 Interplays and dynamic balance: Development, decarbonization, and structural transformation

Within the just transition of the Global South, economic development, decarbonization, and structural transformation are not inherently aligned policy goals. Instead, they exhibit complex synergies and trade-offs across diverse temporal and spatial scales.

**First, the synergy and trade-off between development space and decarbonization efficiency.** In the short term, these objectives often conflict: Economic growth typically drives energy demand, which increases total emissions if satisfied by fossil fuels. Over the long term, however, this relationship offers significant synergistic potential: Capital accumulation, technological advancement, and enhanced institutional capacity resulting from economic development provide the essential material foundation for large-scale low-carbon transition. Without basic development, Southern nations lack both the fiscal capacity for high-cost mitigation and the political motivation to fulfill climate pledges. Thus, supporting the Global South is, fundamentally, an investment in global mitigation capacity. This necessitates a temporally differentiated strategy: tolerating moderate short-term trade-offs while leveraging international support to shift incremental energy demand toward clean technologies, ultimately achieving a long-term synergy between development and decarbonization.

**Second, the synergy and trade-off between decarbonization efficiency and structural transformation.** Historical evidence suggests that the relationship between structural transformation and emissions is non-linear (Grossman & Krueger, 1995). During early industrialization, the expansion of manufacturing typically drives a continuous rise in total emis-

sions; only when economic structures shift toward service- and high-tech-oriented sectors—coupled with systemic improvements in energy efficiency—do emissions begin to decline alongside rising development levels. Consequently, for Southern nations in the early-to-middle stages of industrialization, structural transformation will not automatically lead to emission reductions for a significant period, making trade-offs between these two objectives a functional reality. Critically, imposing unrealistic emission targets or inappropriate policies—such as excessive carbon pricing, overly stringent industrial standards, or accelerated fossil fuel phase-out schedules—will drive up production costs and **inhibit** manufacturing investment. This risks the failure of both structural transformation and decarbonization goals. Fortunately, the historic decline in global green technology costs now allows Southern nations to adopt low-carbon pathways directly during their industrialization, enabling the simultaneous pursuit of transformation and mitigation. This potential, however, can only be realized if decarbonization policies are designed to incentivize green investment and facilitate technological diffusion, rather than relying primarily on punitive constraints.

**Third, the relationship between development space and structural transformation.** Although some traditional industries exhibit high carbon intensity, they retain significant employment absorption capacity and economic multiplier effects. Resource-based sectors and labor-intensive manufacturing, for instance, remain vital economic pillars for many developing nations. Without effective industrial upgrading pathways, pushing

for structural transformation too rapidly may trigger shocks to employment stability and regional economies. Therefore, policy design must balance short-term economic stability with long-term structural upgrades. Premature green industrial layouts—if decoupled from a nation’s current technical accumulation, human capital levels, and market size—will not only fail to generate real industrial competitiveness but may also crowd out limited resources intended for basic industrial development. The key for the Global South lies in deeply anchoring green industrial layouts to their comparative advantages. Only when transition pathways are aligned with development stages and resource endowments can structural transformation truly become an internal driver of sustained economic growth.

Based on the preceding analysis, this study posits that objective trade-offs and synergies exist among the three dimensions of the DDST framework, exhibiting high heterogeneity across diverse national contexts. For Least Developed Countries (LDCs), the development baseline is the overwhelming priority, to allow for significant flexibility in decarbonization constraints. For middle-income emerging economies, the strategic window for structural transformation is paramount, while the urgency of decarbonization continues to rise. For Southern economies in the middle-to-late stages of industrialization, decarbonization constraints gain prominence, yet the structural transformation process is characterized by an exceptionally high degree of policy complexity. In these cases, the DDST framework does not offer a one-size-fits-all transition template; rather, it serves as a diagnostic

framework for Southern nations to identify their specific transition stages, prioritize the three dimensions, and design tailored policy mixes.

## 4. Redesigning International Cooperation Mechanisms for Just Transition

### 4.1. Reshaping the core narrative of just transition.

In alignment with the DDST framework proposed in this study, Southern nations should strive to elevate just transition from a mere remedial measure for climate policy to a comprehensive, multi-dimensional strategy. The ultimate objective of transition extends beyond carbon reduction to the enhancement of human well-being within the framework of sustainable development. This necessitates that policies explicitly integrate poverty eradication, energy access, and the improvement of living standards as foundational prerequisites for any transition pathway.

### 4.2. Reforming financial support mechanisms to enable diversified and low-cost financing.

Current international climate finance remains critically deficient in scale, structure, and accessibility. Developed nations must fulfill and exceed their climate finance commitments by substantially increasing the proportion of grants under the New Collective Quantified Goal (NCQG) and decoupling funding from restrictive political conditions. Concurrently, international financial institutions should scale up the provision of

grants and concessional loans, while expanding blended finance and guarantee mechanisms to reduce the high-risk premiums currently hindering clean energy projects in the Global South. Furthermore, Southern nations should actively participate in the development of transition finance standards and scientific performance metrics to enhance market transparency and ensure that capital is directed toward the most critical areas.

### 4.3. Mitigating trade barriers to foster a conducive global trade environment.

Unilateral trade measures can impose significant adverse impacts on the industrial development of Southern nations. It is therefore essential to strengthen policy coordination through multilateral dialogue to ensure that the global low-carbon transition drives emissions reductions while simultaneously expanding developmental opportunities for these regions. Concurrently, the policy space for the Global South—including initiatives for green industry cultivation, local content requirements (LCRs), and strategic industrial policies—should be explicitly recognized. This approach prevents the erosion of green industrialization autonomy in the name of climate cooperation and fosters a fair and inclusive trade environment for the global energy transition.

### 4.4. Advancing context-specific transition models.

Southern nations exhibit significant disparities in development stages, resource endowments, and institutional capacities, necessitating a move away from singular just transition templates in favor

of diverse pathways. International cooperation should allow nations to define transition targets and trajectories aligned with their specific national circumstances, shifting the core metric of performance evaluation from commitment timelines to tangible policy outcomes. Furthermore, dedicated support windows should be established for Least Developed Countries (LDCs) and Small Island Developing States (SIDS) to provide tailored transition schemes and prioritized financing. Such differentiated approaches are essential to prevent “one-size-fits-all” mechanism designs from deepening transition inequalities within the Global South.

#### 4.5. Strengthening South-South cooperation.

Southern nations should evolve from being mere “problem-posers” to becoming active “solution-providers.” When facing complex transition challenges, if developing nations—such as China, Brazil, Indonesia—can offer comprehensive, cost-effective, and technically viable transition models, it will significantly bolster the collective influence of the Global South in global climate governance. Furthermore, it is essential to strengthen South-South exchanges on transition governance, policy design, and risk management. Such cooperation can foster a knowledge system for just transition that

moves beyond Western-centric paradigms, reflecting the unique socio-economic realities of the Global South.

## 5. Conclusion

Global just transition is gaining momentum. However, current governing rules still largely reflect the preferences of developed economies. This creates a significant misalignment with the realities of the Global South. To bridge this gap, this study proposes the Development-Decarbonization-Structural Transformation (DDST) framework. The DDST model offers a more adaptable analytical lens. It positions development as the baseline, decarbonization efficiency as the constraint, and structural transformation as the engine. These three dimensions interact through feedback to maintain a dynamic balance. Short-term trade-offs between these objectives are inevitable. Yet, the framework underscores a strong potential for long-term synergy, the realization of which hinges on both robust policy design and sustained international support.

The policy implications of the DDST framework are clear. Domestically, Southern nations must integrate climate policy with industrial and energy strategies. They should safeguard basic development while seizing structural opportunities created by the green industrial revolution. Inter-

nationally, developed economies must fundamentally restructure their support logic. This requires a shift from conditional loans to systemic concessional financing and substantial technology transfer. Furthermore, cooperation must move beyond single-metric decarbonization targets. Instead, the world needs new climate partnerships based on diversified indicators of development, decarbonization, and structural transformation.

Historic declines in green technology costs have created unprecedented conditions for leapfrog transitions in the Global South. However, technical feasibility alone is insufficient. Realizing this potential requires aligned financial structures, trade environments, and governance frameworks. On a broader scale, reframing the just transition is a prerequisite for escaping “Northern-centric” path dependencies in global climate governance. “Justice” must truly encompass the developmental aspirations of the Global South. Without this integration, the term remains a mere empty slogan in climate discourse. Only by addressing these core needs can just transition become a substantive force for reforming the global climate system.

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## References

- UNFCCC. (2025) *Global Mutirão: Uniting humanity in a global mobilization against climate change*. [Online]. [https://unfccc.int/sites/default/files/resource/cma2025\\_L24E.pdf](https://unfccc.int/sites/default/files/resource/cma2025_L24E.pdf)
- Gambhir A, Green F, and Pearson PJ G. (2018) *Towards a Just and Equitable Low-carbon Energy Transition* (Briefing paper No. 26). London: Grantham Institute, Imperial College London.

- Wang M. (2025) Trends and prospects of technical and political games on just transition in global climate governance. *The Journal of International Studies*, 6: 66–84. (in Chinese)
- Healy N, and Barry J. (2017) Politicizing energy justice and energy system transitions: Fossil fuel divestment and a “just transition”. *Energy Policy*, 108: 451–459.
- Pollin R, and Callaci B. (2019) The economics of just transition: A framework for supporting fossil fuel–dependent workers and communities in the United States. *Labor Studies Journal*, 44(2): 93–138.
- Markkanen S, Anger-Kraavi A. (2019) Social impacts of climate change mitigation policies and their implications for inequality. *Climate Policy*, 19(7): 827–844.
- Jenkins K, McCauley D, Heffron R, et al. (2016) Energy justice: A conceptual review. *Energy Research & Social Science*, 11: 174–182.
- Newell P, Mulvaney D. (2013) The political economy of the “just transition”. *The Geographical Journal*, 179(2): 132–140.
- Rosemberg A. (2010) Building a just transition: The linkages between climate change and employment. *International Journal of Labour Research*, 2(2): 125–161.
- Galgóczy B. (2014) The long and winding road from black to green: Decades of structural change in the Ruhr region. *International Journal of Labour Research*, 6(2): 217–240.
- Heffron R.J. (2021) *What is the “Just Transition”? // Achieving a Just Transition to a Low-Carbon Economy*. Cham: Palgrave Macmillan. [https://doi.org/10.1007/978-3-030-89460-3\\_2](https://doi.org/10.1007/978-3-030-89460-3_2)
- Fünfgeld A, Wischermann J. (2024) *Why Just Energy Transition Partnerships Are Not Enough (GIGA Focus Global No. 2)*. Hamburg: German Institute for Global and Area Studies (GIGA).
- Magacho G, Espagne É, Godin A. (2024) Impacts of the CBAM on EU trade partners: Consequences for developing countries. *Climate Policy*, 24(2): 243–259.
- Li M, Sun Y, Xia Y, et al. (2026) The impacts of Carbon Border Adjustment Mechanism (CBAM) on international trade and policy responses: From an economic and environmental equity perspective. *Energy Policy*, 210: 115014.
- Gómez-Jordana Moya R. *Economic Africa*. Atalayar, 2023-05-19.
- International Energy Agency. (2022) *Africa Energy Outlook 2022*. Paris: IEA.
- IPCC. (2022) *Climate Change 2022: Mitigation of Climate Change. Working Group III Contribution to the Sixth Assessment Report*. Cambridge: Cambridge University Press.
- IRENA. (2025) *Renewable Power Generation Costs in 2024*. Abu Dhabi: International Renewable Energy Agency.
- IEA. (2021) *Financing Clean Energy Transitions in Emerging and Developing Economies*. Paris: IEA.
- Grossman G M, Krueger A B. (1995) Economic growth and the environment. *The Quarterly Journal of Economics*, 110(2): 353–377.