

The low-carbon transition and its
**daunting
implications**
for structural transformation

OVERVIEW

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THE LEAST DEVELOPED COUNTRIES REPORT

2022



**United
Nations**

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OVERVIEW

On 28 July 2022, the United Nations General Assembly passed a landmark resolution recognizing that a clean, healthy and sustainable environment is a universal human right. This resolution will certainly contribute towards the design of legal and regulatory schemes to strengthen environmental protection, social inclusion and economic development as envisioned in the 2030 Agenda for Sustainable Development. The resolution was approved at a moment of acute international insecurity, as well as rising inequalities exacerbated by conflict, the COVID-19 pandemic, inflationary pressures, unsustainable debt, environmental degradation, biodiversity loss, pollution and accelerating climate change.

The dual challenge of recovering from the fallout from the COVID-19 pandemic and addressing the escalating climate emergency has rightly been at the core of ongoing multilateral and national efforts to ensure a more inclusive and greener global recovery. The 46 least developed countries (LDCs) – home to about 1.1 billion people, or 14 per cent of the world population – have contributed minimally to CO₂ emissions. In 2019, LDCs were estimated to have accounted for about 1.1 per cent of total world CO₂ emissions from fossil-fuel combustion and industrial processes – the main sources of greenhouse gas emissions globally. Even in per capita terms, the CO₂ emissions of LDCs barely reached 10 per cent of the world average. In contrast, the carbon footprint of an average person in a developed country or a non-LDC developing country was at least eight times larger than that of an average person in an LDC.

Although LDCs bear the least historical responsibility for climate change, they are on the front lines of the climate crisis. Over the last 50 years, 69 per cent of worldwide deaths caused by climate-related disasters occurred in LDCs.

LDCs have set ambitious emission-reduction targets for themselves in their nationally determined contributions. They have committed to climate-resilient development pathways by 2030 and delivery on net-zero emissions by 2050. However, preventing global temperature from rising more than 1.5 °C from pre-industrial levels depends on more systemically relevant countries with larger carbon footprints taking appropriate actions, if not proportionally then at least more in line with the principle of common but differentiated responsibilities and respective capabilities.

Moreover, adaptation to climate change is a pressing issue for LDCs, as they continue to face severe multiple structural challenges not just in accessing climate finance (notably for adaptation and climate-resilience measures, which still constitute a very small share of total climate finance), but also due to their small economies, isolation and remoteness from major markets and vulnerability to external shocks. Such vulnerability is mainly the consequence of the narrow production and export bases, and dependence on food imports of most LDCs. These long-standing challenges have been compounded by the recent COVID-19 pandemic and ensuing global economic downturn, which led to substantive losses in terms of socio-economic development, widened inequalities and pushed an estimated 32 million people in LDCs into extreme poverty (i.e. persons with an income of less than \$1.90 a day) in 2020 alone.

The 27th United Nations Climate Conference – Conference of the Parties (COP27) – presents a unique opportunity to accelerate action towards the goals of the Paris Agreement, the Doha Programme of Action for the Least Developed Countries for the Decade 2022–2031 (DPoA), and, more generally, the 2030 Agenda for Sustainable Development. These goals aim to achieve a mutually beneficial climate- and development-friendly nexus.

LDCs represent the litmus test against which history will judge how effectively the efforts of the international community to make the low-carbon transition take into account the “development dimension” and reflect the principles of equity and differentiated responsibilities and respective capabilities. While they are at the forefront of the negative consequences of global warming, LDCs contribute barely 4 per cent of current greenhouse gas emissions, yet account for 65 per cent of the global population lacking access to electricity. Hence, nowhere is the need for a “just energy transition” starker than in the LDCs.

Despite this harsh reality, international support for LDC adaptation and sustainable development has fallen remarkably short of what is needed, both in terms of climate finance and access to clean technologies. Moreover, institutional and capacity constraints have often undermined opportunities for viable and fairer partnerships, creating scope for maladaptation and painful trade-offs between climate action and accelerated progress towards fulfilling basic human rights, including the right to development.

For its part, implementation of the DPoA requires LDCs to (re)consider the development strategies and policies they need to enact in order to reach the ambitious objectives to which they have committed. Addressing these priorities

requires that the present development framework consider the complex and challenging international economic and environmental context.

The Least Developed Countries Report 2022 explores LDC-specific development challenges as they pertain to low-carbon development and structural transformation. The report contributes to unpacking the multifaceted linkages between climate change adaptation and sustainable development, highlighting potential win-win opportunities as well as potential trade-offs for which international support to LDCs is indispensable.

Navigating structural challenges and addressing existing vulnerabilities

The COVID-19 pandemic shock and its compounded adverse effects on trade, investment and development have exposed major gaps in the sustainability of achievements made towards implementing the 2030 Agenda. The pandemic abruptly revealed deficiencies in development paradigms that have severely reduced the capacity of the State to generate domestic resources for economic, social and environmental investment. Due to a combination of pre-existing factors and the war in Ukraine, LDC populations have experienced a sharp decline in living standards and increasing inequality, while the countries' current account balances have come under additional pressure from rising external debt payments and soaring international energy and food prices.

The rising prices of crude oil and gas – driven by the recovery from COVID-19 and the war in Ukraine – have encouraged some developed countries to delay phasing out fossil fuels and a few developing countries to examine a potential bonanza in their unexploited fossil fuel reserves. Meanwhile, however, a stranding of assets at the global level is already happening. This generates both risks and opportunities to LDCs, and not all countries rich in fossil fuels will be affected equally. Thus far, the concept of fossil fuels as unburnable carbon or “stranded assets” has gained little traction on the agenda of resource-rich LDCs. An aggressive pro-climate agenda may even be perceived as counter-productive and anti-development, especially when set against urgent poverty alleviation and infrastructure needs in LDCs. Hence, the dialogue regarding a “just transition” away from fossil fuels in these countries might best be framed in terms of national goals for sustainable economic transformation.

Against this backdrop, building resilience via a green structural transformation, and making growth sustainable by generating decent jobs, domestic savings, diversification of the economy and exports, and a shift away from dependence on primary commodities, is moving to the forefront of the national development agenda in LDCs. These countries need to abandon the development path that they have been following up until now because in general it has resulted in insufficient progress by most LDCs along the three dimensions of sustainable development: economic, social and environmental. Vulnerabilities and gaps in the current development model acutely exposed by the COVID-19 pandemic require the adaptation of a development strategy that allows for growth and structural transformation, while taking into account environmental aspects.

From the an environmental perspective, the LDCs' search for an alternative development path should avoid following the same patterns of growth and development that developed countries or more advanced developing countries have implemented in the past because: (i) these higher-income countries have been both excessively intensive in material consumption and in the production of waste, emissions and pollution – and hence have followed an environmentally unsustainable path; and (ii) as signatories to the Paris Agreement, LDCs will be required to join the global drive towards environmental sustainability, which involves greater resource efficiency, decarbonization and, potentially, the stranding of their natural assets.

LDCs need to balance these environmental considerations with their imperative for economic growth and social progress, which inevitably entails an increase in their carbon footprint. This will require trade-offs in the pursuit of goals that are incompatible in the short term, as well as the sequencing of priorities and actions over time. *The Least Developed Countries Report 2022* argues for a structural transformation cognizant of the need for a low-carbon transition, reflecting recent discourse focusing on LDCs' development needs while highlighting the constraints they face at international, regional and national levels to achieve net-zero carbon emissions targets and the DPoA. The report assesses how LDCs can navigate this challenging environment of competing priorities and by what means the international community can foster a fair approach to climate change and low-carbon development. The underlying rationale stems from the fact that LDCs have historically contributed little to global greenhouse gas emissions and thus to climate change, while at the same time being severely affected by it. Climate change not only includes a long-term shift in temperatures, but also leads to increased frequency and intensity of extreme weather events, such as droughts, floods and storms, given that the earth is a system.

While climate change is a global predicament, LDCs are particularly vulnerable for several reasons:

- Their geographic location – for example, small island LDCs are highly exposed to floods and storms, and African LDCs, especially in west and central Africa, are very vulnerable to drought.
- LDCs have limited fiscal space to offset the consequences of extreme weather events.
- LDCs are mainly exporters of primary natural resources and are less integrated into regional markets, making them more vulnerable to the negative externalities of new environmental policies of major trading partners. The Carbon Border Adjustment Mechanism (CBAM) adopted by the European Union in 2022 provides an example of the impact that climate-related policies of developed countries can have on LDCs.

Climate change has accentuated pre-existing international inequalities that have placed LDCs in a marginal position in the world economy, at low income levels, and vulnerable to external shocks. At the same time, these countries have limited financial and institutional means to rebound from their adverse consequences (i.e. low resilience). In supporting the global movement towards a low-carbon transition, the international community needs to begin addressing these inequalities.

Green structural transformation to foster resilience in least developed countries

Green structural transformation is understood as combining green growth and structural economic transformation strategies. Structural transformation means a transition from low-productivity, labour-intensive production to higher-value-added and higher-productivity economic activities. The transformation is usually associated, especially at the beginning of the development process, with increased domestic production and consumption and a related rise in greenhouse gas emissions. Therefore, green structural transformation is mainly accomplished by striving to improve the efficiency of the use of resources (materials, energy, land, water) along the development path. A framework of green structural transformation is deemed especially appropriate as a decision-making and policy agenda for LDCs (and for many non-LDC developing countries) because it combines elements that are critical for them – notably, the need to develop productive capacity and engage in socially desirable forms of accelerated structural economic transformation – with theories and practices that have been formulated in the context of climate/environmental policymaking that are valid

for LDCs (but also for higher-income economies), such as green growth, resource efficiency and low-carbon transition.

Green structural transformation also means that the relative growth of some low-emission, emerging, fast-growing “sunrise” sectors and activities should be accompanied by contraction in high-emission, mature, declining “sunset” sectors, while increasing efficiency in resource use, reducing waste production and the generation of pollution, and implementing some degree of nature conservation. There is also a preference for nature-based solutions, for example, in agriculture and in the economic exploitation of forests. In the medium to long term, this implies the relative decoupling of natural resource use and environmental impacts from the growth process.

The environmental footprint of least developed countries and possible paths for their low-carbon transition

The warnings from the scientific community and the Intergovernmental Panel on Climate Change (IPCC) assessment reports could not be clearer. The scientific consensus has documented beyond any reasonable doubt the extent to which human activities have destabilized the world’s climate system, with global warming already triggering multiple cascading effects. Changes in climatic impact drivers are expected to worsen with further increases in global temperatures, causing severe, interconnected, and often irreversible effects on ecosystems and human systems, including through heightened water scarcity, lower agricultural productivity, and mounting physical risks from rising sea levels and climate-related hazards. Critical areas, such as mountain regions, tropical forests, biodiversity hotspots and low-lying coastal regions, are likely to be at the epicentre of this climate crisis, and LDCs are at the forefront.

Climate change and the least developed countries: Key stylized facts

Although polar regions have experienced faster warming, LDCs are already significantly hotter than previously and, moreover, they started from already high

temperatures. Median LDC monthly temperatures in 2021 were 1.3 °C higher than during the reference period 1951–1980, and in as many as 18 LDCs the increase in temperatures exceeded 1.5 °C. Moreover, global warming has caused an increase in the frequency and intensity of weather and climate extremes, such as heatwaves, heavy precipitation, floods, droughts and tropical cyclones. LDCs' heightened exposure in this respect stands out unequivocally. LDCs contain roughly 16 per cent of the world's land surface and 14 per cent of the global population, but over 2017–2021 they suffered 19 per cent of the total number of climate, weather and water-related hazards and accounted for 29 per cent of the globally affected population. What is more, while LDCs are particularly exposed to the impacts of climate change, they also continue to struggle to strengthen their resilience to physical and transition risks. Physical risk refers to exposure to detrimental climate change and/or weather extremes that directly impact the real economy, damage property and disrupt trade. Transition risk stems from regulatory, technological, and demand-side changes that could sharply affect asset prices. In this respect, LDC resilience continues to be undermined by long-standing infrastructure gaps, structural socio-economic challenges and enormous development needs.

Of the 1.1 billion people living in LDCs in 2020, an estimated 244 million were undernourished, 466 million had no access to electricity, 665 million lacked access to safely managed drinking water, and 874 million had no access to clean fuels and cooking technologies. These figures dramatically demonstrate the efforts that will be required to build adequate resilience to climate change, embark on sustainable adaptation, and meet the targets enshrined in Sustainable Development Goals (SDGs) 6 and 7. Such infrastructure gaps also point to specific challenges in terms of both inclusivity and overall climate resilience. Vulnerable, hard-to-reach communities, indigenous people, women, youth and other economically or socially marginalized groups typically suffer the most from inadequate infrastructure and from multiple overlapping deprivations that compound one another. As such, these groups tend to be disproportionately affected by climate change, the shocks from which reinforce existing patterns of inequalities and unequal power relations and structures.

Doing justice to the structural specificities of LDCs requires that the narrative about low-carbon transition fully recognize their formidable sustainable development needs, as well as the corrosive persistence of global climate inequalities. Taken together, the cumulative greenhouse gas emissions of the 46 LDCs between 1750 and 2019 barely reach 78 gigatons of CO₂ equivalent, or 3 per cent of the world total. This is slightly more than Japan, but

less than China, Germany, the United Kingdom, India, the Russian Federation or the United States individually. Meanwhile, developed countries accounted for 1,502 gigatons (58 per cent of the total) and non-LDC developing countries for 1,023 gigatons (39 per cent).

Between-country inequality in greenhouse gas emissions stands out even more starkly when assessed in per capita terms. Total greenhouse gas emissions per person in LDCs have increased only marginally since 1990, and at 1.7 tons of CO₂ equivalent, they remain less than 30 per cent of the world average. What is more, when compared with a hypothetical egalitarian allocation of the available carbon budget, LDC levels of emissions per capita remain, on average, below the indicative threshold, compatible with the 2 °C temperature rise objective and zero emissions by 2050. On the other hand, per capita greenhouse gas emissions in developed countries are on average more than three times higher, and those of non-LDC developing countries on average 1.5 times higher, than those of LDCs. While these estimates are fraught with uncertainties and should be considered as only indicative, they clearly point to the centrality of the equity, as well as the common but differentiated responsibilities and respective capabilities principles of sharing the burden of adjustment.

Natural capital and resource extraction and use

Beyond climate change in a narrow sense, the sustainability of LDC development also depends on the very process through which natural resources are extracted and used. Traditionally, natural capital has played a disproportionate role in LDC wealth accumulation, yet the “economic productivity” with which LDCs have turned natural resources into future income and investments in physical and human capital remains rather underwhelming. This is reflected in the fact that, over 2018–2020, 36 of the 46 LDCs were classified as commodity-dependent – that is, more than 60 per cent of their merchandise exports consisted of primary products. The persistence of this dependence on commodity exports has shaped LDCs’ pattern of integration into the global market, relegating many of them to the role of providers of raw materials and resource-based intermediate products with limited value addition.

This is corroborated by an analysis of LDCs’ economic activities and international trade through an ecological lens that looks in particular at the material footprint and domestic material consumption (included in SDGs 8 and 12). The evidence from environmentally extended multi-regional input-output (EEMRIO) analysis shows that while LDCs had some of the lowest levels of natural resource extraction and

the lowest footprints worldwide throughout the 1990–2020 period, they still acted as net providers of most ecological resources to the world market. Moreover, although in absolute terms LDCs’ levels of extraction, trade and footprints increased 3 to 4 times over from 1990 to 2020, their patterns of net trade – the value-added counterpart to the total value of trade flows – and the relative weight compared with other regions remained broadly unchanged.

Looking ahead, this evidence has two main implications. First, in terms of sustainability, the positioning of LDCs is profoundly affected not only by their own levels of development, but also by the terms of their integration into the global market. While LDCs themselves have a limited footprint – typically within the indicative planetary boundaries on the input side (e.g. resource extraction), as well as on the output side (e.g. greenhouse gas emissions) – their specialization pattern remains largely geared towards the net provision of resources necessary to other regions’ consumption levels (the sustainability of which is increasingly questioned). As such, LDCs are doubly concerned by discussions related to resource decoupling and/or resource efficiency, which have potentially distinct implications for their domestic economy and external sector.

Second, from a more traditional developmental perspective, the evidence of the EEMRIO analysis mirrors LDCs’ sluggish progress in structural economic transformation and the persistence of their commodity development trap. By and large, since the mid-1990s the intensification of resource extraction in the LDCs has failed to bring about a meaningful reversal of their peripheral role in global trade, improvements to their patterns of specialization, relaxation of their structural balance of payment constraints, or an upgrade to their relative positioning within (typically concentrated) global value chains.

In this context, if boosting LDC export capacity remains critical, greater attention has to be paid not only to the sustainability of production methods, but also – and perhaps more fundamentally – to the extent to which resource-intensive industries contribute to LDCs’ structural transformation. Particularly in “hard-commodity” sectors (i.e., those that involve the mining or extraction of natural resources), resource-based industries in LDCs have too often given rise to enclave models, whereby pockets of export-oriented, high-productivity activities have emerged with limited linkages to the local economy. Unless this dynamic is reversed through greater value addition, stronger inter-sectoral production linkages and more effective mobilization of resource rents, further extraction of resources (and the additional environmental pressure) may generate short-term gains, but will fail to redress the pitfalls of the commodity-dependence trap.

Structural transformation in the age of low-carbon transition

The interconnected challenges of heightened exposure to climate change, daunting sustainable development needs and persistent commodity dependence shape the overall LDC development dimension. They also exacerbate the inevitable trade-offs between action on climate change and accelerated progress towards fulfilling the right to sustainable development, since under a business-as-usual scenario, the lack of structural transformation and disregard for the interaction between the environment and the socio-economic system ultimately increase risks of maladaptation. Against this backdrop, the United Nations Conference on Trade and Development (UNCTAD) has long called for a stronger emphasis on productive capacity and green structural transformation, and this recommendation remains as relevant today as ever. However, a similar long-term transformative agenda needs to fully consider the ongoing evolution of the global economy, notably in relation to the imperative to address climate change and promote sustainable production practices.

Even though the worldwide commitments undertaken to date fall dramatically short of what would be required to meet the objectives of the Paris Agreement, it could be argued that over the last decade a global shift towards a low-carbon economy has started gaining momentum, to the point where some authors speak of an emerging “green techno-economic paradigm.” While history suggests that a similar process may take several decades – particularly in relation to the energy transition – it remains clear that this evolution will inevitably entail far-reaching implications for the development prospects and structural transformation options of LDCs, be it through exogenous changes in the international context or through endogenous structural change and deliberate policy choices. The ongoing changes in consumption patterns, regulatory frameworks, technological options and the sustainable development finance landscape are set to affect existing comparative advantages and trigger a shift of productive resources from high-emission (sunset) industries to lower-emission (sunrise) industries. This process of structural change, coupled with changes in environmental conditions, will also affect the economic incentives in resource-intensive sectors, with differential effects across specific sectors and regions, depending on the interplay of the above dimensions.

From an LDC perspective, these developments will entail serious challenges as well as opportunities. On the one hand, the emergence of the sustainability imperative will likely imply more pressure on sunset sectors, some of which to date have played a critical role for LDC economies. This might include risks of heightened price volatility or even stranded assets, especially in relation to fossil fuel sectors.

Moreover, LDCs also face challenges in rapidly pivoting towards “greener” sectors compared to other countries with more sophisticated economies and technological capabilities. As such, LDCs might be heavily exposed to transition risks through declining employment, revenues and foreign exchange in sunset industries.

On the other hand, the emergence of a new techno-economic paradigm may open novel and more sustainable trajectories than those followed by the advanced economies. Sunrise industries could favour the emergence of new “champions,” foster productivity improvements and promote the intensification of inter-sectoral productive linkages. For instance, many LDCs are likely to benefit from the emergence of renewable-based, decentralized electricity generation, or from agricultural practices that combine climate change adaptation with stronger inter-sectoral linkages (ranging from aquaponics or agro-processing to biomass-based electricity generation and nutrient recycling).

Whether LDCs will be able to exploit such “green windows of opportunities” will partly depend on related policy choices domestically as well as internationally. First and foremost, however, it will require a pragmatic consideration of each country’s structural specificities and development dimensions. This translates into three important directions for a green structural transformation agenda: (i) boosting of climate-resilient infrastructure as a key step to strengthening local productive capacities and building endogenous resilience; (ii) linkage development and regional integration to promote economic diversification and local value addition; and (iii) green industrial policies to strategically harness the foreseeable dynamism of green sectors and accelerate the deployment of greener advanced technologies.

How their partners’ trade policies can impede the green structural transformation of least developed countries

The transition risks of LDCs stem not only from their own policy choices and multilateral action, but also – potentially – from the unilateral actions of their trading and financial partners. This is a consequence of the global interdependence that has intensified with the deepening of global value chains and international financial flows. In this context, a new generation of environmental policies of major trading partners may affect LDC export patterns. UNCTAD has conducted an analysis

building on a conventional trade model to examine the potential impact on LDC trade patterns of a new generation of environmental policies that aim to expand the scale of carbon emissions placed under policy control, despite the risk of carbon leakage and other undesirable consequences of fragmented carbon emission policies among countries. Carbon leakage occurs when countries that have stringent carbon emission policies trigger an increase in emissions elsewhere as a direct consequence of the increased cost of abatement in the regulated country.

The European Union's CBAM provides a case study. It is the most advanced carbon policy covering a coalition of countries, but other large trading countries are also considering the adoption of similar schemes. The present analysis focuses on the scheme of the European Union because it is a significant trading partner for the LDCs and its mechanism is one of the most advanced. It therefore allows for a more rigorous analysis of the potential impact of these types of policies.

The initial list of sectors targeted by the CBAM includes iron, steel, cement, fertilizers, aluminium and electricity generation. The spillover effect of a policy of such significance could be devastating for LDCs given the complex trade linkages between LDCs and countries that may fall foul of the policy. To understand the trade impacts, a structural gravity model was used to explain the prevailing trade patterns between LDCs and their developed country partners. The analysis was then extended to identify the potential impact of the implementation of policies on carbon emissions and relative emissions using trade policy instruments. Inclusion of all trade partners in the analysis is critical because the geographic spread of countries affected by these policies will determine the net impact on exports originating from LDCs. Finally, an EEMRIO framework was used to illustrate the impact of carbon policy spillovers on various sectors. The analysis focused on interlinkages between production sectors in LDCs and their trade partners.

Exports and material flows from least developed countries

An export demand model is specified to identify factors that influence exports from LDCs. This is the first step towards establishing a link between trade patterns of the LDCs and the likely consequences of a change in the trade regime of their trading partners. Trade patterns are determined by different factors, including the proximity to growing markets, policies of partner countries, sophistication of the global supply chains in which a country participates, its level of participation, and consumer incomes and preferences in the destination market. A producer

with cost advantages may dominate trade if consumer preferences are identical. Distance between countries raises trade costs, but productive efficiency may considerably lower the cost disadvantages reflected in transportation costs or remoteness measures, and other trade frictions.

The cost of trade (as captured by distance) reduces demand for exports from LDCs by almost the same magnitude as the positive effect of a trade partner's market size. A 1 per cent increase in distance between trading pairs reduces exports of LDCs by 2.2 per cent, while a 1 per cent increase in market size raises exports by 2.4 per cent. The two variables are the most important factors influencing trade. They imply that export supply capacity of smaller LDC economies can be offset by their remoteness from major regional markets, which raises trade costs. By contrast, economies that are closer to larger markets may benefit from better trade ties with them. The proximity to the economic mass offered by larger markets increases the potential of countries to forge business linkages, hence improving trade logistics, while transit systems and transport corridors could facilitate trade and improve the competitiveness of exports.

Non-European Union countries have been more effective in attracting exports from LDCs. The trade creation gap between European Union countries and non-European Union countries is on average 21 per cent, reflecting the changing pattern of trade between LDCs and the European Union, with exports of labour-intensive and resource-intensive manufactures to the European Union becoming gradually more important. In 2020, textile fibres, yarn, fabrics and clothing accounted for 91 per cent of the manufactured exports from LDCs to the European Union. These are low-technology manufactures that have relatively low income elasticity and are subject to trade-limiting rules of origin and margins. More favourable rules apply to LDCs than to other exporting countries, but the issue is potentially critical for some graduating LDCs. Manufactured exports from LDCs to other regions also consist mainly of textile fibres, yarn, fabrics and clothing (75 per cent of manufacturing exports to the Americas and 60 per cent to Asia in 2021), except for Africa (where they account for just 13 per cent).

To complete the characterization of LDCs' trade of goods, UNCTAD examined the patterns of emissions embodied in these traded goods. The analysis shows that the embodied emissions in exports follow a pattern similar to that exhibited by trade in goods examined so far. The flow of embodied emissions in exports also increases with the market size of the importing country, but shrinks with bilateral distance between trading partners. Compared with trade in products, however, sectors with embodied emissions in exports are more sensitive to the

bilateral distance of trading partners. Here, a 1 per cent increase in bilateral distance decreases embodied emissions in exports by 3 per cent.

The emissions model indicates that the introduction of an environmental policy targeting embodied emissions in exports may distort trade and aggravate emission intensities in the exporting countries (LDCs). This would be disastrous if the policy were to displace dirty industries out of developed countries and into LDCs as a way for the former countries to meet their global commitment to reduce emissions. Intensification of emissions would put LDCs on an unsustainable industrialization path unless they raised their environmental standards. However, the incentive to industrialize may be more appealing to low-income countries in the short term than the urgency to move towards a greener structural transformation. This calls for deeper reflection about the options open to LDCs to pursue a green structural transformation based on the importance of the sectors targeted by the new generation of policies that target carbon emissions embodied in trade flows.

The likely impact of carbon border adjustment schemes

UNCTAD constructed two scenarios to simulate the potential impact of CBAMs. The first assumes that there will be a fall in demand from the European Union for goods classified as polluting, and that the change in demand will filter through to the rest of the world's economies regardless of exemptions that may be on offer to certain country groups in the CBAM scheme (such as, possibly, the LDCs). The second scenario assumes that LDCs are not exempted and that they impose a carbon tax on exports of goods classified as "dirty goods" to meet the European Union's environmental standards.

A 1 per cent reduction in demand in the sectors deemed carbon-intensive leads to a slight decline in GDP in 21 (out of 38) LDCs, no change in 8 LDCs, and some gains in 9 countries (including Angola, Bhutan, Madagascar, Mali and Togo.) For Bhutan and Togo, the sectors that drive the gains are extractive industries. Increasing the percentage by which the intermediate demand from the European Union falls widens the loss (or gain) proportionally because the multi-regional input-output model assumes that production technology is fixed.

The introduction of a tax rate that takes into account embodied emissions in imported intermediate goods has a dramatic impact on relative prices for all LDCs and exposes their heavy import dependence, even in the sectors that have positive emissions. This is evident for Senegal, United Republic of Tanzania, Eritrea, Liberia, Guinea, Niger, Lao People's Democratic Republic, Democratic Republic of the Congo, Bhutan, Togo and

Burkina Faso, Ethiopia, Guinea, Haiti, Malawi, Mali, Mauritania and Yemen experience very modest price appreciations because of their low carbon intensities compared to other LDCs. The result may also be due to low carbon content in intermediate goods imported by these countries. The major concern with the imposition of an adjusted carbon tax is the cost it hands down to producers and consumers as its effect is transmitted through the entire value chain from production to consumption.

Implications of partner trade policies

The above characterization of LDC trade patterns highlights these countries' dependence on exporting primary commodities and the extent to which marginalization of LDCs in world trade is determined by trade costs and trade integration failures. LDCs can increase their share of world trade by building closer ties with countries that are geographically closer, hence their policy focus should be on intensifying intra-regional trade and cooperation with neighbouring countries and on improving the quality and diversity of products and infrastructure to unlock intra-regional trade.

Introduction of CBAMs may distort trade generally because of the discriminatory nature of carbon taxes applied to imports. For example, since mirroring sectors in partner countries do not have net zero emissions, CBAM-like policies that introduce cost disparities for exporters may exacerbate trade imbalances for LDCs and could lead to a "race to the bottom" scenario. This is confirmed by the analysis of *The Least Developed Countries Report 2022*, which shows that LDCs are import-dependent even in sectors that are classified as dirty, but they export the raw materials to these sectors. The net effect of a CBAM policy on LDCs would be negative even if they were directly exempted from the application of this policy. The fledging industries in cement, fertilizers and metals targeted may also not attract the much-needed investment in the sector, since investors worldwide are already anticipating the effects that the CBAM policy might entail.

The way forward

For most LDCs, the impact of climate change has become an existential threat to their communities and long-term prospects for economic development. In the past two decades, some LDCs have increasingly experienced water scarcity and drought, while others have had more flooding. These negative externalities from

climate change, combined with low institutional capacity to offset them, have negative knock-on effects on achieving the SDG and DPoA targets regarding health, food security and poverty outcomes.

LDCs continue to rely disproportionately more on natural capital to sustain their wealth than other country groups. Yet, within the United Nations Framework Convention on Climate Change (UNFCCC), the LDCs have led advocacy efforts to ramp up global ambitions to limit warming in line with the IPCC's target of 1.5 °C by 2030. Far from being free riders of actions by other countries to mitigate climate change, LDCs have instead adopted the stance that the environmental benefits of a binding international agreement to limit harmful carbon emissions outweigh the costs to their national economies. Given that the high level of global greenhouse gas emissions is not a problem they created, and yet they face disproportionate impacts of climate change, LDCs are deserving of the special and differential treatment and support needed to failproof their decarbonization efforts.

The outcome of the Durban Climate Conference in 2011 (COP17) blurred the distinction somewhat between the responsibilities for climate action of developed and non-developed Parties to the UNFCCC, but the findings of *The Least Developed Countries Report 2022* confirm that the convention's principle of differentiated responsibilities and respective capabilities is just. At a time when multilateralism is increasingly weakened by geopolitical and national security interests, the present analysis reinforces the importance for the convention to be perceived as fair by all Parties. LDCs have set themselves ambitious emission-reduction targets in their nationally determined contributions. But preventing global temperature from rising more than 1.5 °C from pre-industrial levels hinges on countries that contribute the most to harmful emissions – and therefore have the greatest impact on changing the course of climate change – taking the global lead on climate actions.

The findings of the *The Least Developed Countries Report 2022* can serve to help future climate conferences: (i) examine the merits of different carbon metrics and their implications for directing financial flows to some countries over others; (ii) determine which countries, if prioritized to depollute, can make the most meaningful contributions to mitigating global climate change; and (iii) determine how to better reward countries that contribute more than their fair share. In this context, by assuming more than their fair share of responsibility, LDCs render the rest of the world a peerless service.

By implementing the requirement of the UNFCCC to support LDCs, industrialized Parties will be effectively investing in their own security and defence. And by

expanding and strengthening their effort on climate finance, technology transfer and capacity-building in favour of LDCs, industrialized Parties will, at the same time, bolster the global ambition to address climate change. At stake is a functional global climate change regime capable of acknowledging and resolving issues that are barriers to a just low-carbon transition.

Attaining the green structural transformation of LDC economies requires balance between LDC domestic policymaking and international support in the fields of environment, trade, finance and technology. Therefore, the text that follows presents some domestic and global actions that are urgently needed and constitute mutually reinforcing strategies.

The challenges for least developed countries to attain a just low-carbon transition

LDCs confront a complex set of intertwined challenges that pose severe threats to their development paths, yet they have a limited range of decarbonization paths to follow. The threats are quite different from the projected impact on more developed economies, which are endowed with diverse and historically accumulated capabilities that help expand their decarbonization options. Key dynamics that lead LDCs to pay a disproportionately high price in addressing climate change are as follows:

- The specialization pattern of LDC economies remains largely geared towards the net provision of primary resources. LDC exports embody a high amount of greenhouse gas emissions, and often are inputs to carbon-intensive global value chains (e.g. minerals, metals and fuels). Consequently, the global movement to reduce carbon emissions will adversely impact LDC export sectors. This implies inherent trade-offs between climate change actions, on the one hand, and trade policy goals to boost exports, on the other. At the very least, it implies a radical shift in the export composition of LDCs and reinforces the argument for them to prioritize investments in building new and expanding existing productive capacity, especially in low-carbon activities (i.e. sunrise industries).
- So far, adaptation has received far less emphasis than mitigation in terms of the international support it receives, not only in terms of financing, but also in terms of technology development and transfer, and capacity development and technical assistance.

- There remains no international agreement on financing costs related to loss and damage from fast-onset events related to climate change. LDCs account for almost 22 per cent of all countries with the most recurring appeals for funds (over 10 each) in reaction to extreme weather crises. The economic cost of extreme weather events in 2021 alone was estimated to be \$329 billion globally, the third highest cost for any year on record. This is nearly double the total aid given by the developed nations to the developing world that year.
- Over the next three decades, some LDCs will play a role in meeting global needs for critical minerals necessary for energy decarbonization, with some estimates suggesting that the annual demand from clean energy technologies will reach over \$400 billion by 2050. While this could unlock opportunities for trade and the acquisition of new capabilities, it could also constrain LDCs from escaping the vicious circle of commodity dependence.
- LDCs that are to a great extent dependent on high-carbon-emitting commodities could face severe fiscal constraints should extraction of such commodities come to an abrupt halt. Moreover, there is no guarantee that foreign direct investment that was previously concentrated in carbon-heavy industries will be re-invested in alternative areas in the domestic economy because capital and other resources do not flow seamlessly into new sectors.
- LDCs are extremely vulnerable to trade shocks. Any trade agreements targeting emissions of exports in extractive sectors could have a devastating impact on LDCs, even indirectly if they are exempted, as well as a dramatic impact on relative prices for all LDCs. This further underlines the maelstrom that LDCs increasingly face and the need for trading partners to reconsider unilateral environmental measures targeting international trade.
- Given that embodied carbon emissions in trade follow the general trend in exports, LDCs would enjoy better trade prospects if they were to focus on increasing intra-regional trade and trade in high-value intermediate goods. Imports generally allow for better and/or cheaper access to technology (including green technology), capital goods and working capital, which are all necessary for green structural transformation.

Domestic structural transformation policies for low-carbon transition

Decarbonizing by itself will not remedy existing structural bottlenecks that afflict LDC economies. The imperatives of diversification and transition to more sophisticated production structures through structural economic transformation

remain the most effective way to reduce poverty. Unless steps are taken toward that end, LDC populations and economies will lack the means and resilience to better manage, adapt and respond to climate risks ex ante.

Consistent with various decisions of the UNFCCC, when addressing climate change, LDCs need to adopt “development first” policies, including in the areas of mitigation and climate finance. In terms of mitigation, priority should be given to public policies that operationalize industrial policy with a strategic focus on promoting the adoption of technology and innovation, and on building an environment conducive to technological upgrading and broader innovation. This would need to include policies to expand the development of local entrepreneurship, increase the stock of skills in science, technology and innovation, promote public and private research and development, and provide supportive infrastructure.

In addition, given the high impact of public procurement on the economic development of LDCs, the strategic use of public procurement is a specific objective that could help public policy accelerate green structural transformation and induce positive change by economic actors and consumers. Since well-designed policies are not a sufficient condition for viable green structural transformation, LDCs will also need to prioritize the development of institutional capacities in several priority areas relevant to the identification, planning, monitoring and control of low-carbon pathway options. Moreover, LDCs will need to prioritize strengthening their capacity to improve and pursue new sources of domestic resource mobilization to help finance their low-carbon transition, since their development financing needs far exceed their official development assistance, and prospects for more (and concessional) official development assistance are slim. This will involve revamping taxation, redoubling efforts to reduce and eventually eliminate illicit financial flows, and retrofitting the roles of public development banks and central banks.

Rebooting international support and climate finance

The decarbonization challenge compels a “systems reboot” in international support for LDCs. As a guiding condition, the global community needs to recognize that countries will, inevitably, transition at different speeds. Therefore, the global community needs to provide targeted, sufficiently flexible and long-term development support to address the variety of deep development challenges faced by LDCs. This will likely entail commitment and action by development partners on several fronts to extend special and differential treatment to LDCs,

including in the provision of development finance, and in implementing conducive trade policies and more effective actions on technology transfer and capacity development.

Providing targeted, sufficiently flexible and long-term development finance to LDCs will entail development partners fulfilling commitments already made on providing climate finance under the UNFCCC, including raising the level of ambition on climate finance targets at COP27. Concurrently, it will require increasing the proportion of flexible and concessional forms of climate finance and redressing the current imbalance between the availability of mitigation and adaptation finance available under the UNFCCC. Ideally, this finance should be additional to the funds resulting from donor countries' fulfilling their earlier commitment to provide official development assistance to LDCs corresponding to 0.15–0.20 per cent of donor's gross national income, reiterated in SDG target 17.2 and in the DPoA.

LDCs have yet to enjoy a level playing field in global trade and now face additional headwinds because of the environmental policies of their trade partners. The international community needs to refrain from adopting policy measures (in trade and investment, among others) that limit the policy space of LDCs and increase the likelihood of pollution havens emerging among them. At a minimum, national environmental policies should take explicit account of the interests of LDCs. Urgent steps are needed to strengthen the UNFCCC's role in technology transfer, including by operationalizing mutually reinforcing technology transfer interactions during UNFCCC and World Trade Organization negotiating processes.

The international community is also encouraged to take steps to alleviate the oversized needs of the LDCs in institutional capacity-building by vastly scaling up technical assistance and capacity-building support to all areas of the low-carbon transition, including data and statistical capabilities.

