Diversification and Cooperation in a Decarbonizing World
EXECUTIVE SUMMARY

Diversification and Cooperation in a Decarbonizing World

Climate Strategies for Fossil Fuel–Dependent Countries

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Abbreviations

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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>FFDC</td>
<td>fossil fuel–dependent country</td>
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<td>GHG</td>
<td>greenhouse gas</td>
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<td>LCT</td>
<td>low-carbon transition</td>
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<tr>
<td>NDC</td>
<td>nationally determined contribution</td>
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All dollar amounts are US dollars unless otherwise indicated.
Executive Summary

Introduction

Fossil fuel–dependent countries (FFDCs) face the conundrum of being both highly vulnerable to climate change and exposed to the global efforts to mitigate it. FFDCs that rely on oil, gas, and coal are at greatest risk of upheaval from a low-carbon transition (LCT). Stakeholders in these countries know that an LCT will cause a global decline in fossil fuel industries and related value chains on which their economies depend and find themselves at a crossroads due to the uncertainty about whether and when tipping points will come.

Stakeholders in FFDCs—especially those in emerging market economies facing the development challenges of poverty and lack of opportunity—are deeply concerned about the costs of suddenly shifting away from foundational infrastructure and systems built up over decades on the back of fossil fuels and related industries.

This book provides a road map and proactive strategies that the global community and FFDCs can use to create the right incentives and enabling environments to encourage FFDC participation in the LCT, while acknowledging the constraints that they face. Achieving the objectives of the Paris Agreement requires a realistic assessment of these challenges and resolute action to tackle them.

A Low-Carbon Transition Brings New Structural Challenges to FFDCs

For FFDCs, the transition to a low-carbon future means welcoming mitigation of climate change risks while recognizing that those same response measures entail an eventual shift away from the fossil fuels that power their economies and societies. Although unique in many ways, these countries as a whole represent almost one-third of the global population, 20 percent of direct global greenhouse gas (GHG) emissions, and more than 80 percent of emissions embodied in known oil and gas reserves.

Some stakeholders in FFDCs regard the LCT as an opportunity to deepen diversification, but most consider it a risk to their narrow revenue and employment base in carbon-intensive activities, such as oil, gas, and coal extraction; downstream processing; and fossil fuel–intensive manufacturing including refineries, petrochemicals, steel, cement, and thermal power.
Pursuing their own economic imperatives, FFDCs have universally articulated aspirations to diversify away from a dependence on fossil fuel income and contributed to the objectives of the Paris Agreement by submitting their nationally determined contributions (NDCs). However, it is likely that their existing national strategies do not sufficiently prepare their economies for the many possible impacts of a global LCT.

In addition, the uncertainty of the pace and scope of the LCT hinders the ability of governments, businesses, and other stakeholders to make timely, effective decisions. The uncertainty is particularly deep with respect to policy developments by the largest economies, consumption choices of the growing middle class in developing countries, and structural disruptions in transport, energy, land use, and carbon capture and sequestration.

Uncertainty is not, however, a good excuse for inaction. Successful decisions under deep uncertainty require consideration of multiple plausible futures and being prepared for best-case and worst-case scenarios. This book suggests a framework for action for FFDCs and their partners based on an analysis of two broad strategies—one concerning economic diversification, and the other concerning cooperating on global efforts to stabilize the climate (figure ES.1).

**FIGURE ES.1** How a Low-Carbon Transition Could Unfold and How FFDCs Could Prepare for It

![Diagram showing external drivers, border adjustment measures, unilateral policies in other countries, disruptive technologies, changing social norms and institutions, financial and technology transfers, new market opportunities, and fossil fuel-dependent country.](source: World Bank)
Executive Summary

Economic Diversification during a Low-Carbon Transition

Broader approaches to diversification are better fitted to manage the impacts of a global LCT. FFDCs have long grappled with commodity price volatility using macro-fiscal policies that counterbalance the impacts of commodity price cycles and traditional diversification through vertical, energy-intensive industrialization that branches out from fossil fuel extraction to add value in domestic fuel processing and fuel-intensive manufacturing. Although such diversification strategies help to hedge against cyclical risks in commodity markets, they also increase exposure to the structural impacts of an LCT by deepening economic dependence on traditional emissions-intensive industries.

Rather than focusing on diversifying tradable products in the traditional fossil fuel product space, the diversification strategy today may need to focus more on diversifying the underlying wealth—the portfolio of assets used by an economy, including human capital and renewable natural capital, along with underground assets and produced capital. Such asset diversification (figure ES.2) leads to more productive and competitive economies that are also more flexible and resilient to external shocks, especially if supported by strong institutions and good governance.

Macroeconomic simulations carried out for this book show that asset diversification is the best long-term economic strategy for FFDCs. By reducing knowledge and

FIGURE ES.2 Two Broad Diversification Strategies

- Diversifies outputs and exports through energy- or carbon-intensive industrialization on the back of fossil fuel value chains
- Builds on current comparative advantage and hedges cyclical risks
- Increases greenhouse gas emissions and exposure to low-greenhouse-gas transition
- Relies on energy subsidies to industry; maintains low productivity

- Diversifies the portfolio of national assets (inputs): natural capital and intangible assets (knowledge, innovation, institutions)
- Discovers new comparative advantage and hedges structural risks
- Increases flexibility, resilience, productivity, and climate mitigation co-benefits
- Relies on knowledge and efficiency; increases productivity over time

productivity gaps with the most advanced countries, it is the only growth model that can push consumption and growth above business as usual in the long term.

Asset diversification falls victim to a “tragedy of the horizon,” however. Changing the comparative advantage held by traditional fossil fuel industries unsettles current sources of revenue and requires building new skills, capabilities, and innovation systems from scratch. It carries economic and policy risks because of the need for large upfront investments with delayed returns that appear uncertain and elusive in a time frame that is relevant for current policy makers and business leaders. The upfront investments can also be challenging to justify socially because they compete with short-term consumption aspirations.

Mobilizing investments in asset diversification requires long-term revenue visibility. FFDCs are concerned that an LCT will drain current fossil fuel–related revenues before a critical mass of new capital and capabilities can generate new sources of sustainable income. This book suggests that fuel-related revenues in FFDCs can be lower than expected, but the impact will differ by fuel. Many oil and gas exporters can expect significant revenue flows in the next two to three decades. At the same time, any LCT will quickly erode coal revenues, but the associated systemic risk is negligible because coal is a small part of even the most coal-dominated economies (figure ES.3). Locally stranded labor and regional economic impacts are more challenging for coal countries to deal with than stranded assets on a national level.

**FIGURE ES.3** Fossil Fuel Rents as a Share of GDP for 10 Top Fuel Producers, 2013–17

<table>
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<th>Fuel Type</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
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<tr>
<td>Oil</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Gas</td>
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<tr>
<td>Coal</td>
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*Source: World Bank World Development Indicators. Note: GDP = gross domestic product.*
The impacts of an LCT will vary from country to country. Competition between all fuel producers will increase as demand shrinks and disruptive clean technologies capture more markets. Producers with low extraction costs, lower upfront capital needs, better access to investors and developers, higher accumulated financial strength, lower leverage, and more highly developed export infrastructure will be in a privileged position for maintaining their revenues.

Although low fuel prices can mean limited resources and financial and social challenges for asset diversification, high fuel prices can unleash countervailing economic forces. Interestingly, high extractive export revenues can make asset diversification more, not less, difficult. Windfall profits from exports of oil and gas inflate exchange rates and feed a Dutch disease and a resource curse that crowd out non–fuel related economic activities, deteriorate governance, and increase the power of incumbents to resist change. An LCT could reverse the resource curse and make diversification easier because lower commodity prices and revenues would depreciate local currencies and make manufacturing exports cheaper and imports

**FIGURE ES.4 Countries’ Preparedness for a Low-Carbon Transition**

Source: Based on several databases.

Note: Some likely poorly prepared countries are not in the figure because the full data sets were not available to the authors. Examples include Turkmenistan and Papua New Guinea.
more expensive, triggering increased localization of production of non–fuel related activities in FFDCs.

The countries best prepared for an LCT are those least exposed to its impacts and most resilient to them, able to swiftly adapt to changing external conditions and harness emerging opportunities (figure ES.4). The index of preparedness developed in this study suggests that the least prepared countries, including Iraq and Libya, are exceptionally vulnerable to external shocks from the LCT, given that long-term conflicts have destroyed almost all non-oil tradable industries and tarnished already weak institutions. Equatorial Guinea, Nigeria, and República Bolivariana de Venezuela are among the countries that are both the most exposed and the least resilient, given their poor governance records. Cambodia is vulnerable mainly because of the large share of young coal power plants in the generation mix, as is Guyana because of its recently discovered large oil reserves. Azerbaijan, Botswana, and Kazakhstan share high exposure and relatively weak resilience. Some Gulf Cooperation Council countries can be considered borderline cases—although significantly exposed, they also enjoy relatively high resilience. On the other hand, Norway is more exposed than some less-prepared countries, such as Angola, but nonetheless is well prepared for an LCT thanks to its resilience, in particular its economic flexibility, diversification, and high quality of human capital and institutions.

The Paris Agreement Opens Room to Align Incentives and Ignite Broad Coalitions for Climate Action

Asset diversification alone may not be enough to stabilize GHG emissions in many FFDCs, because their comparative advantage in emission-intensive industries is strong. Simulations realized for this book suggest that even ambitious asset diversification policies may not be able to trigger the major structural shift toward a low-emissions economy. Paradoxically, ambitious unilateral climate policies in the rest of the world can further entrench fuel-intensive economic structures in FFDCs. Rapid unilateral decarbonization in other countries would increase the costs for their energy-intensive industries while depressing global fuel prices and reducing the opportunity cost of using fossil fuels in FFDCs. As a result, industries in FFDCs could expand market share in the globally declining emissions-intensive products, partly offsetting climate mitigation co-benefits of asset diversification. Cooperative domestic climate policies need to complement asset diversification to engage FFDCs in global climate action.

FFDCs have some self-interest in domestic cooperative climate policies. A comparable level of effort of climate policy—for example, in setting carbon prices—can help diversify away from products linked to fossil fuels and prevent possible trade sanctions from being implemented by other countries, enhancing the long-term upside of asset diversification. However, domestic climate policies remain costly for FFDCs over the short term, unless there is a credible threat that other countries may impose trade sanctions on
noncooperative countries. Otherwise, FFDCs have short-term incentives to postpone policies that increase domestic energy costs and to continue prioritizing traditional, pollution-intensive industries, because it is their familiar product space and skill set, even if it exposes them to possible future external LCT impacts and a long-term middle-income trap.

In contrast, net fuel importers and those countries that use relatively less fuel have a fundamental advantage over FFDCs in harnessing opportunities from an LCT. Many have already accumulated skills and capabilities in diversified, clean, and knowledge-intensive economic activities and have an established competitive edge in those market segments that gives them stronger incentives to lead on climate action. FFDCs could be negatively affected by climate policies in these countries. In particular, carbon prices applied by fuel importers—cooperative or not—extract a portion of resource rents from FFDCs, leaving them with less revenues available for risky long-term investments in asset diversification. But these effects do not create an incentive for FFDCs to cooperate on climate action, unless it helps slow down the transition away from fossil fuels (especially oil, which is highly dependent on demand from the transport sector and has more limited domestic uses than coal and gas).

Incentives to implement cooperative climate policies in FFDCs can be strengthened by the international community. The Paris Agreement acknowledged the primacy of domestic self-interest in climate policy and achieved universal participation (at least initially), but at the cost of not allocating any mitigation commitments to individual countries. The architecture of the Paris Agreement (Article 6.1) offers a conducive space for willing parties to form bottom-up clubs to unilaterally ignite ambitious climate action. For such clubs to be effective and comprehensive, their founders would need to complement their individual NDCs with collectively determined contributions, and apply an enforcement mechanism based on reciprocity (“I will if you will”) to build trust, prevent existing club members from defecting, and induce the cooperation of reluctant parties.

New, unconventional international incentives can help overcome weak short-term incentives and capabilities to cooperate on climate action. Among positive incentives, strategic, conditional financial and technology transfers could be an effective alternative to the current retail, project-by-project climate finance that involves large transaction costs and weak incentive effects. Other promising cooperative instruments are bilateral or multilateral technology and policy cooperation agreements between fuel exporters and importers, such as harmonized carbon prices with revenue-sharing agreements implemented through multilateral wellhead carbon tax agreements. Wellhead tax agreements, if designed to prevent negative outcomes on low-income countries, would align international incentives to cooperate, reduce global emissions, and provide FFDCs with the resources necessary for diversification while addressing the social and political impacts of an LCT.
Among the negative incentives are different possible forms of border tax adjustments. Traditional border tax adjustments based on the carbon content of imports from FFDCs may not be enough to encourage cooperative climate policies in many FFDCs. The credible threat of “incentive-based” trade sanctions, such as those proposed by Nobel Prize winner William Nordhaus, could prompt FFDCs to seek cooperative deals, but this is a risky path for all.

Resource-rich, lower-income, and conflict-affected countries (many of them in Africa and the Middle East) pose development and ethical dilemmas. They have not yet converted resource rents into alternative assets and may find it relatively more difficult to attract investors. Other challenging cases include middle-income coal exporters that may also lack the financial and political capital to address local social challenges of the LCT because of sticky, stranded labor.

Simulations suggest that the incentives needed for the most vulnerable FFDCs to participate in a global LCT would cost only one-eighth of the savings that their participation would generate in other countries. The required transfers would still reach a total of $663 billion between 2015 and 2050, and would meet significant practical and political challenges.

**A Road Map to the Low-Carbon Transition for FFDCs**

Successful economic strategies in FFDCs will need to strike a balance between (1) managing traditional carbon-intensive assets and their revenue volatility and (2) managing the transition to knowledge-intensive growth models relying on much broader portfolios of assets. Ultimately, sustainable and resilient development implies an economy that is less exposed and more adaptable to external shocks.

Traditional, emissions-intensive diversification may be a necessary, but temporary enabler of an LCT. It hedges against the volatility of commodity prices and builds on existing strengths and capabilities to allow FFDCs to maintain adequate levels of current revenue and to enable long-term and high-risk investments in innovation systems outside of current comfort zones. Predictable revenue flows help FFDCs establish a new place in the global economic geography and alleviate political economy and social challenges associated with the transition to new asset classes.

But traditional diversification carries a risk of locking FFDCs in a vicious cycle of low productivity, poor governance, and high emissions, thereby increasing vulnerability to impacts of an LCT. Changing the established national comparative advantage requires bold and consistent policy efforts, high-quality institutions, a skilled and motivated workforce, external incentives, and predictable access to finance.
Executive Summary

This book makes a case for international recognition that the contributions of FFDCs to the goals of the Paris Agreement can and should be different from the contributions of net fuel importers. Efforts to pursue asset diversification with mitigation co-benefits could form a core of their NDCs.

However, because the comparative advantage of FFDCs in energy and emissions-intensive products is so entrenched, additional domestic policy efforts would be needed to break away from their dependence on the fossil fuel-intensive value chain. Such policies would include removing resource price distortions and implementing environmental fiscal reforms, mission-oriented research and development (R&D), and innovation systems, as well as regulatory frameworks and a business environment that encourages new, low-carbon private entrants to challenge the entrenched positions of emissions-intensive incumbents, especially those that are state owned.

The international community may need to find ways to encourage and enable structural policy reforms as FFDC contributions to the goals of the Paris Agreement. This book identifies no silver bullet but provides new insights about effective pathways of global cooperation toward the goals of the Paris Agreement, in line with fair and sustainable development for all.

One of the key conclusions of this study is that asset diversification represents a fundamental shift toward a dematerialized long-term growth model, in which fewer material inputs generate higher economic output and welfare. Therefore, the risk of stranded assets is not a helpful focus for dialogue on climate action in the fossil fuel-dependent economies. Changes in the value of underground and produced assets are less relevant indicators of economic performance during an LCT than changes in asset structure, and in income and welfare flows. A low-carbon transition triggers a transition from a traditional capital-intensive growth model to a more labor- and knowledge-intensive growth model, in which human and renewable natural capital, as well as intangibles, increasingly substitute for produced and natural (exhaustible) assets in driving prosperity.
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This book is the first stocktaking of what the decarbonization of the world economy means for fossil fuel–dependent countries. These countries are the most exposed to the impacts of global climate policies and, at the same time, are often unprepared to manage them. They depend on the export of oil, gas, or coal; the use of carbon-intensive infrastructure (for example, refineries, petrochemicals, and coal power plants); or both. Fossil fuel–dependent countries face financial, fiscal, and macro-structural risks from the transition of the global economy away from carbon-intensive fuels and the value chains based on them. This book focuses on managing these transition risks and harnessing related opportunities.

_Diversification and Cooperation in a Decarbonizing World_ identifies multiple strategies that fossil fuel–dependent countries can pursue to navigate the turbulent waters of a low-carbon transition. The policy and investment choices to be made in the next decade will determine these countries’ degree of exposure and overall resilience. Abandoning their comfort zones and developing completely new skills and capabilities in a time frame consistent with the Paris Agreement on climate change is a daunting challenge and requires long-term revenue visibility and consistent policy leadership. This book proposes a constructive framework for climate strategies for fossil fuel–dependent countries based on new approaches to diversification and international climate cooperation. Climate policy leaders share responsibility for creating room for all countries to contribute to the goals of the Paris Agreement, taking into account the specific vulnerabilities and opportunities each country faces.