The Coalition of Finance Ministers for Climate Action

The low-carbon challenge facing Ministries of Finance

World Bank

A contribution to the 'Compendium of Practice from a Global Community of Ministries of Finance and Leading Organizations: Economic analysis and modeling tools to assist Ministries of Finance in driving green and resilient transitions'

Topic: Addressing the climate policy questions facing Ministries of Finance: the economic and fiscal impacts the green transition

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Access the full Compendium at www.greenandresilienteconomics.org

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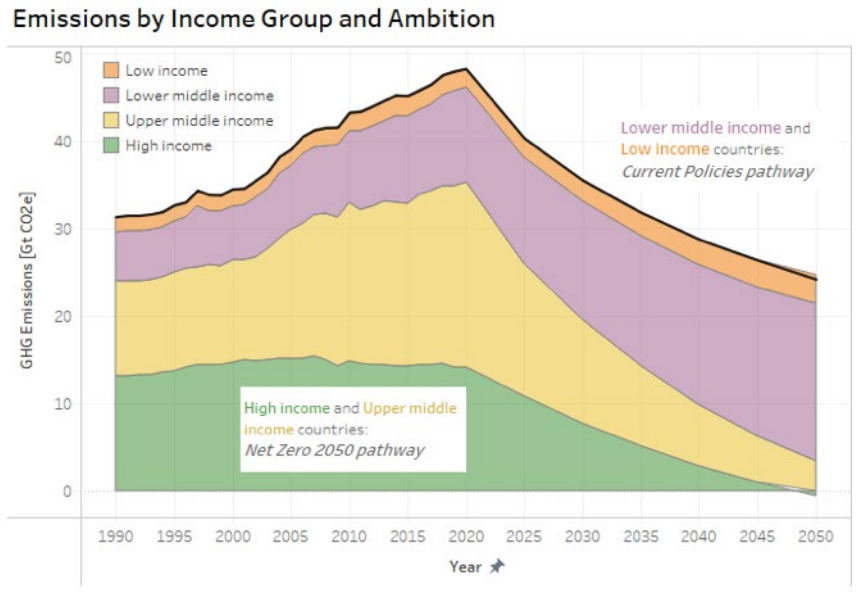
Limiting climate change requires ending net greenhouse gas emissions into the atmosphere. Climate modelers suggest that if net emissions were brought to zero by 2050, the extent of climatic warming could be limited to around 1.5°C (the planet has already experienced temperature increase of about 1.1°C since 1850).

Ministries of Finance will necessarily be at the center of implementing the policies that will support a low-carbon future. While mitigation policy and climate change have for many decades been mainly an academic and Ministry of Environment concern, as recognition of the challenge posed by climate change has grown, so too has recognition of the economy-wide impacts and trade-offs that will inevitably accompany any policy. Traditional policy priorities such as economic growth, competitiveness, employment, poverty reduction, fiscal sustainability, price, and exchange rate sustainability will all be impacted by mitigation policy and trade-offs will necessarily have to be adjudicated by policymakers including Ministries of Finance.

High-income countries have been responsible for the bulk of emissions. High-income countries have been responsible for the bulk of emissions that have accumulated in the atmosphere, and together with middle-income countries, represented 74% of pre-Covid emissions (Figure 1). While reducing emissions in high- and middle-income countries is key, rapid economic growth in the developing world means that unless efforts are made to ensure a low-carbon growth path among poor countries, their share in global emissions could rise to 74%, leaving the world well short of its goal of net zero.

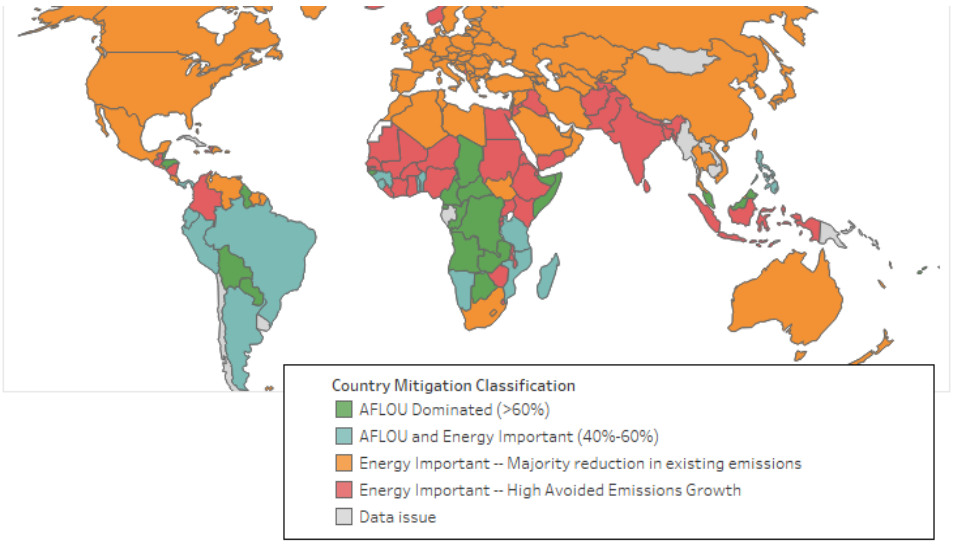
Figure 1. Although developing countries' shares in emissions are small today, as these countries grow, their share will rise, especially if high-income countries decarbonize



Source: World Bank internal analysis based on NGFS scenarios, Phase 2

Reaching net zero requires efforts on multiple fronts. Reaching net zero requires efforts on multiple fronts, including maximizing natural carbon sinks and decarbonizing the power sector, as well as the electrification of end-use sectors. Many high- and middle-income countries (Figure 2) are among those where decarbonizing the energy sector is key (orange), but for low-income countries the focus lies more in increasing carbon sinks (green) and pursuing a low-carbon electrification program (red), or a mixture of the two (blue). Key sectors are identified by comparing future emissions by country and sector between a Current Policies scenario and a Net Zero 2050 scenario. For example, those countries where more than 60% of the emissions difference is from agriculture, forestry, and other land use (AFOLU) sectors are indicated as AFOLU Dominated (>60%).

Figure 2. Country mitigation classification



Source: World Bank analysis based on NGFS Phase 2 Current Policies and Net Zero 2050 scenarios

For many developing countries stopping deforestation may be a cost-effective way to reduce emissions. A World Bank analysis showed that 138 developing countries have committed to stopping deforestation by 2030. Achieving net zero emissions will require a range of policies, including the enforcement of existing forestry laws and regulations, as well as generating alternative livelihoods and development projects for areas and communities currently benefitting from deforestation (NGFS Scenarios Phase 2).

Decarbonizing the power sector in high- and middle-income countries is a priority. Eliminating coal-fired plants is essential and may require retiring one power plant every day until 2040.[1] This capacity will need to be replaced with cleaner and reliable energy.

For many low-income countries expanding access to low-carbon electricity is the focus. About 0.7 billion people in the poorest countries do not have access to electricity, and a further 1 billion lack reliable access to electricity (Figure 3).[2] Increased energy demand as economies grow means large-scale investments in renewable power systems will be required. Building renewable energy capacity is very capital intensive, and financing constraints often make this option hard to implement (see World Bank COP26 Climate Brief on Climate Finance[3]).

1 Data as of December 2019 from the Platts World Electricity Power Plants Database.
2 Preliminary data show that the number of people without electricity, after decreasing by 9% annually on average between 2015 and 2019, remained static between 2019 and 2021 globally, and this number of people actually increased in sub-Saharan Africa in the latter period.
3 https://thedocs.worldbank.org/en/doc/56224c04d469647fb1ba32654a07fd06-0020012021/original/COP26-ClimateBriefs-Climate-Finance-Final-2610.pdf

Figure 3a. Around 1.8 billion people lack access to electricity or reliable electricity

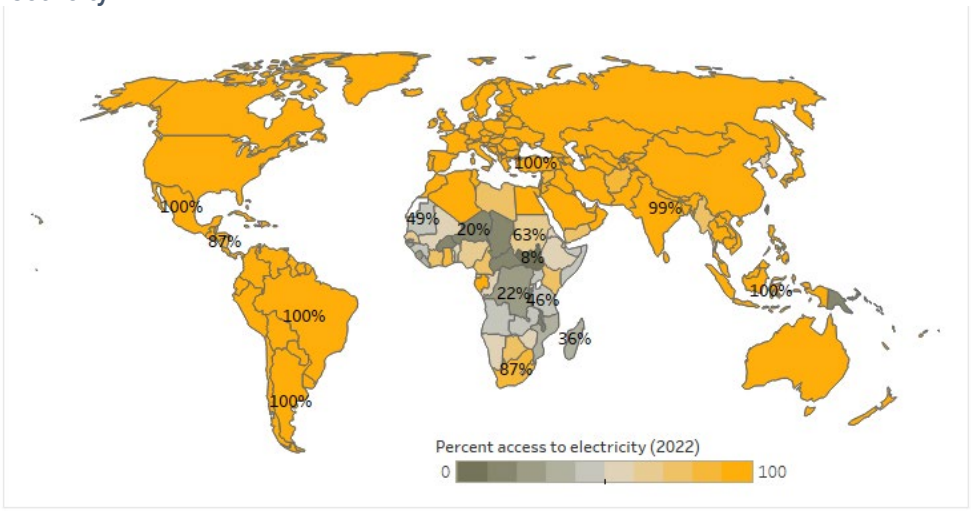
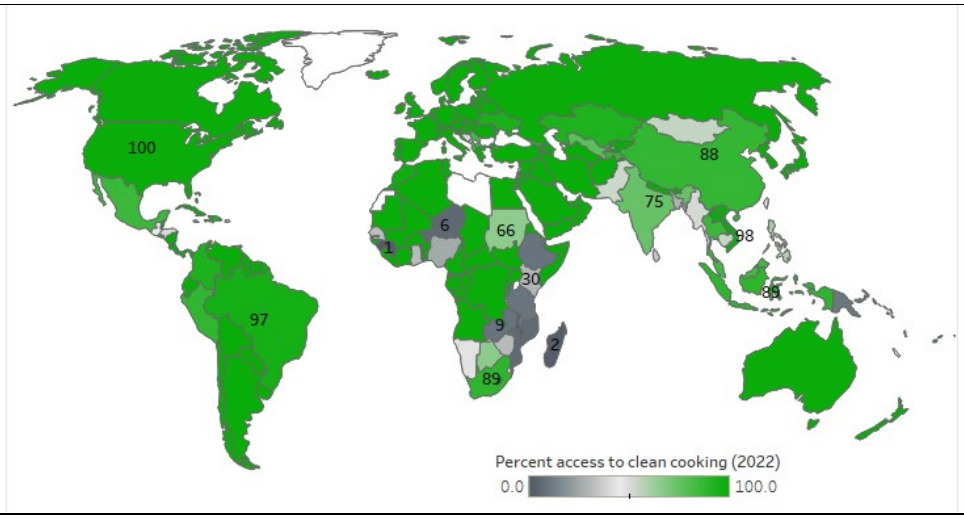


Figure 3b. Share of the population with access to clean cooking



Source: Word Development Indicators, World Bank

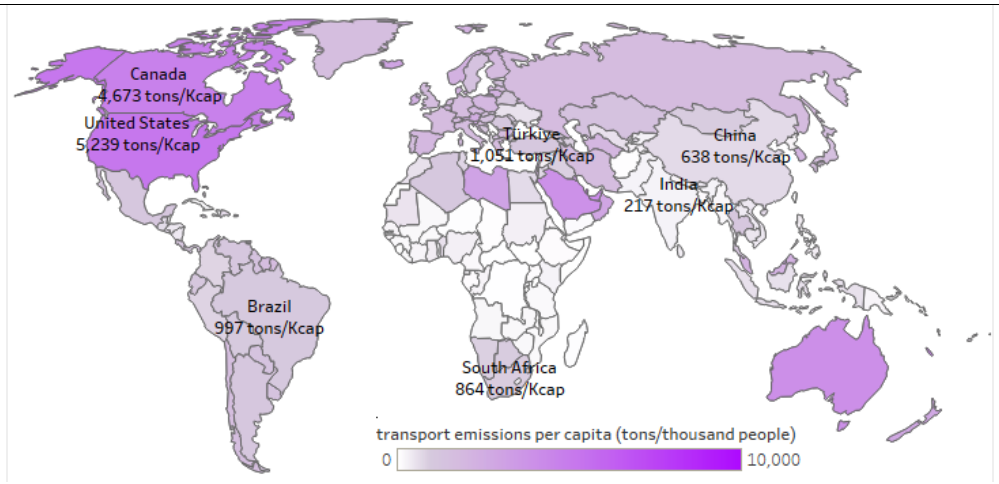
Getting to net zero requires increasing energy efficiency and electrification in transportation and industry. Transportation is responsible for 17% of global greenhouse gas emissions, with about 75% of transportation-related CO_2 emissions coming from road traffic. Transport emissions per capita are especially high in North America. Shifting to public transit (in cities) and rail (for intercity traffic) and electrifying road traffic are all part of the solution.

Heating and cooling emissions can be reduced by shifting to clean electrical power sources and by increasing the energy efficiency of buildings. While energy consumption from air conditioning is low in many countries, it will rise rapidly as temperatures increase and incomes grow. In many developing countries, adopting clean cooking and heating techniques means moving away from emissions neutral biomass toward electrified cooking and heating.

Emissions reduction in heavy and light industries: for light industries, a combination of electrification for heat, machinery and equipment, and increased energy efficiency will be the main source of emissions reduction. Heavy industries that rely on high temperatures (where electricity is inefficient) will require the development of low-carbon fuels for energy (e.g., hydrogen) and solutions to reduce emissions from process-based emissions (e.g., clinkerization). Process innovations (e.g., carbon-free steel) can avoid emissions, but economic incentives may be required to speed their development and

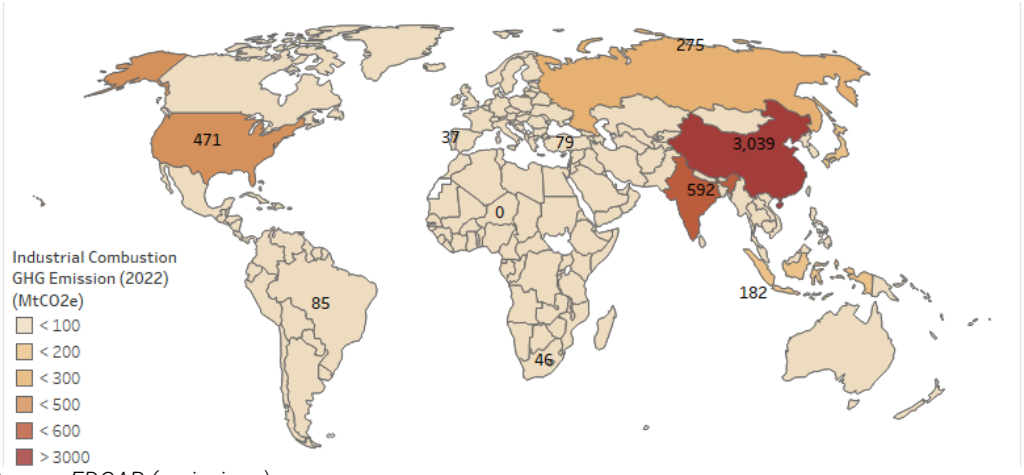
adoption. In other cases, such as cement, there is no process available to fully avoid emissions, and carbon capture and sequestration is the only solution. Implementing these solutions will require factories to be located near appropriate geology (for long-term carbon storage) and good renewable energy resources (because the processes are even more energy intensive with capture).

Figure 4a. Emissions from transportation per capita (2022 data)



Source: World Bank WDI (population); EDGAR (emissions).

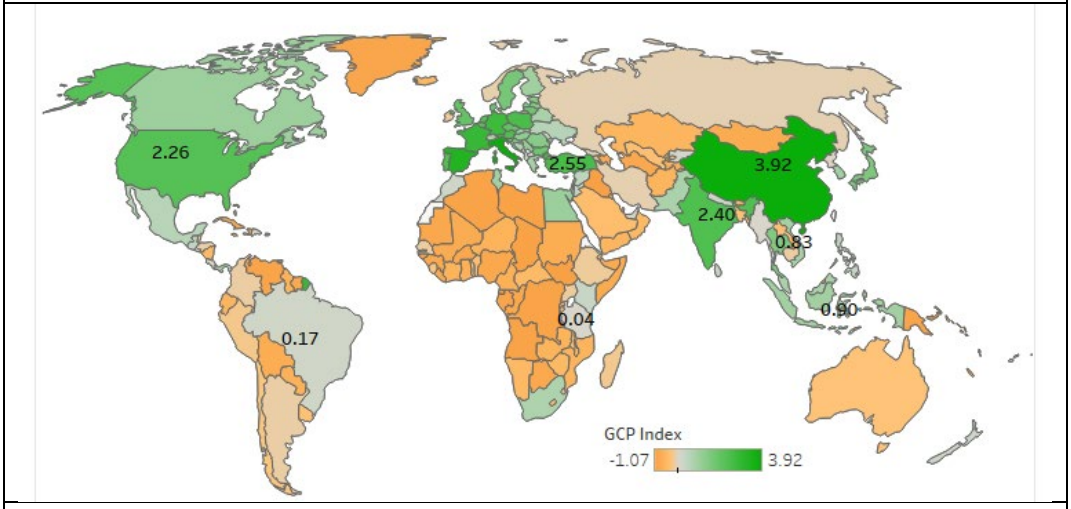
Figure 4b. Industrial combustion emissions ($MtCO_2e$)



Source: EDGAR (emissions)

The green transition creates many economic opportunities for countries as new markets are opened up. Figure 5 reports the extent to which countries will likely be able to diversify into green technologies. While high-income countries dominate in this dimension, countries such as Türkiye, India, Indonesia, China, Brazil, and South Africa also have significant potential they can transform into jobs, income, and exports.

Figure 5. Countries with the potential to benefit from the green transition



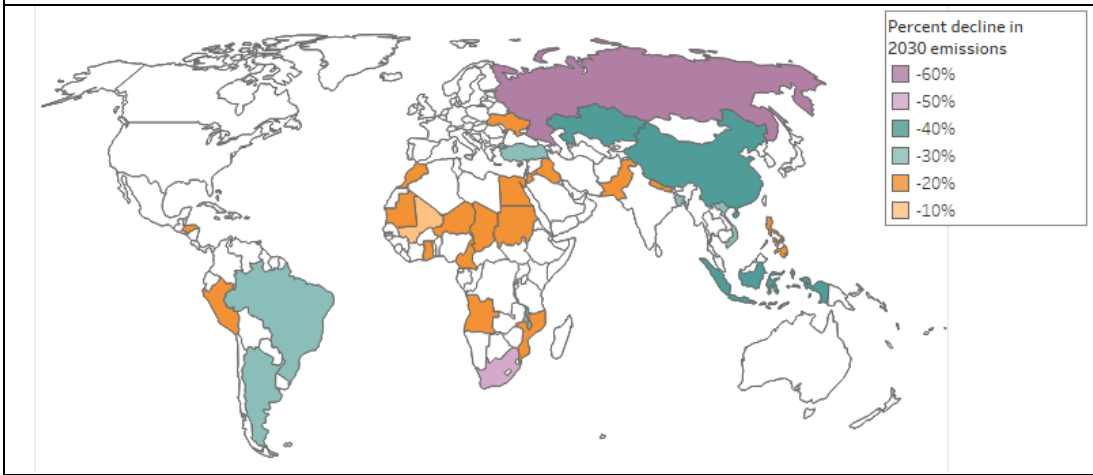
Source: Andres and Mealy (2023)

Policy design and implementation

No single policy can ensure an efficient and least-cost low-carbon transition. A package of measures will be required (Figure 6) that comprise: (1) steps to internalize externalities (e.g., tax reform, subsidy reform, carbon pricing); (2) sectoral supply-side policies (e.g., innovation policies, renewable energy feed-in tariffs, investment in electric vehicle (EV) charging stations); and (3) social and transition policies to facilitate the shift to low-carbon technologies and ensure a just transition (IMF, 2020, Chapter 3).

Carbon prices are needed to align economic incentives with decarbonization. Carbon taxes, subsidy reform, emissions trading systems, and carbon crediting mechanisms have emerged as the most common explicit carbon pricing instruments. However, carbon pricing is not a silver bullet. The World Bank estimates suggest that carbon prices alone would reduce emissions by less than 50% in most countries it has evaluated. Regulatory action and even industrial policy can speed up and amplify the transition.

Figure 6. Modeled emissions reduction by 2030 due to carbon taxes of between US$60 and US$100



Source: World Bank, Climate Policy Assessment Tool (CPAT) analysis of FY22 CCDRs

Non-market obstacles to emissions reductions must also be addressed. These range from the absence of low-carbon technologies (e.g., low-carbon cement), to a lack of infrastructure (e.g., EV charging) and electrical grids capable of absorbing renewable energy. Regulations, standards, and focused investments can complement pricing action. Forestry is another sector where sectoral policies are necessary to ensure, in particular, the enforcement of land-use regulations and to prevent illegal deforestation.

Ensuring a smooth transition requires a set of additional measures to ease the cost of the transition. Measures include depollution and waste management when shuttering coal plants, and the management of social impacts (workforce early retirement or retraining, investment in affected communities). Experience from Europe shows that a successful transition out of coal is more likely with investment in infrastructure and communities to attract alternative activities and jobs.

The just transition will affect much more than coal miners and plant workers. For instance, the shift to EVs will transform the automobile industry's global value chain, with winners and losers but an overall decline in the number of jobs (due to the simpler and more efficient design of EVs). In parallel, green activities, such as afforestation, can be major job creators, provided the work force has appropriate skills and mobility.

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