Latin America Watch

A Green Transition in Latin America?

Project Director:
Elin Roberts

Editors:
Elin Roberts & Ana Sofia German Aramburo

Analysts:
Paulina Lainez Miccolo, Leonardo Brito, Lester Chavez, Maria Camila Lizarazo Gonzalez, Marcos Planchart, & Orlando Massari-Beniquez

June 2023

London Politica

About the Project Director and Editor

Elin Roberts

Elin is the director of the Latin America Watch at London Politica and currently works as an emerging risks analyst at AXA. She's a master student in International Governance and Diplomacy at Sciences Po Paris where she specialises in the Americas. Elin has previous experience of working at the FCDO, the UK Department for Business and Trade, Watura, and as a research fellow at the *Observatoire Politique de l'Amérique Latine et des Caraïbes*. Elin is fluent in Welsh, English, French, and Spanish, and is interested in all things related to Latin America: diplomacy, security, geopolitics, gender, and human rights.

Ana Sofia German Aramburo

Ana Sofia is a trade agreement specialist working on assisting the public and private sectors in international trade. Ana graduated from LSE with a master's degree in International Political Economy. She has previously worked at the Mexican Embassy in Spain and the Mexican Mission at the World Trade Organisation. Ana is also passionate about women's rights advocacy countering gender disparity within the field of trade.

About the Analysts

Paulina Lainez Miccolo

Paulina graduated from The George Washington University with a BA in Latin American and Hemispheric Studies with a concentration in Journalism and Mass Communications. Her experience includes working in a wide array of industries ranging from politics to multi-laterals, non-profits, PR agencies and software companies. She recently finished her MA at the University of Kent - Brussels School of International Studies, where she specialised in Political Strategy and Communication. Currently, she's a Public Affairs professional.

Leonardo Brito

Leonardo Brito is a Junior Analyst at Vector Relações Governamentais, where he writes a weekly newsletter keeping track of Latin American politics. He holds a Bachelor's degree in International Relations from the University of Brasília.

Lester Chavez

Lester Chavez lives and works in Washington, DC, supporting programs promoting the rule of law throughout Latin America. He previously lived in Managua, Nicaragua, where he conducted market research and trade promotion, and counseled international businesses on the country's economic and political climate. He has vast experience working in the non-profit space in Nicaragua, where he undertook extensive ethnographic and community-based research in rural communities. He holds a bachelor's degree in international relations from the College of William and Mary.

LONDON POLITICA

Maria Camila Lizaro Gonzalez

Camila is an international lawyer graduated from Universidad Externado of Colombia and holds a Master's in International Business Law from Pantheon-Assas University. Her experience focuses upon the private sector in customs, and foreign trade operations, hand in hand with the public sector in the creation of public trade policies. She is passionate about new cultures and global markets and hold many experiences in public relations and marketing. Camila is also fluent in Spanish, English, and French.

Marcos Planchart

Marcos is a Research Analyst at London Politica and holds a BSc in Politics and Economics from the University of Surrey. His academic research interests lie in public policy, development, trade, corruption, sustainability and innovation. Additionally, Marcos focuses on Latin America as his Venezuelan background provides him with a unique experience and knowledge of the region.

Orlando Massari-Beniquez

Orlando Massari-Beníquez is a recent graduate from the Geneva Graduate Institute with a Master's in International History and Politics, writing his thesis on Nostalgia as a political tool. He holds a Bachelor's in Political Science with a concentration in International and Regional Security and a minor in History from Hamline University. In the past, Orlando has worked in government agencies, with a local representative, and in a non-profit. Orlando is interested in cultural and economic identity alongside internet identity. He also enjoys understanding perceptions of power and power dynamics in Geopolitics.

LONDON POLITICA

Introduction..... 7
Colombia: Towards a full green transition?..... 8
Country overview.....8
What has been done by the Colombian government?..... 11
Colombia's new future.....14
Wind down fossil fuel production.....15
Labour force..... 16
On CO2 emission..... 17
The challenges of financing a green tradition.....18
Recommendations to implement a green transition.....20
The Return of Brazil's Green Transition Agenda?..... 22
Brazil and climate change..... 22
Brazil's economic profile.....24
Politics and the environmental agenda in Brazil.....29
Assessments and policy recommendations..... 42
Paraguay: An opportunity for a green transition?..... 45
Paraguay's geographic profile.....45
Society and demographics.....46
The country's economic activities.....48
Energy supplies in Paraguay.....51
The future of a green transition..... 54
Conclusion:.....57
Starting from scratch: an opportunity for Venezuela's green transition..... 59
Introduction.....59
Venezuela's Economic Profile..... 59
Venezuela and Climate Change.....64
The risks of climate change.....64
Policies for a green transition..... 67
Venezuela's path towards the Sustainable Development Goals (SDGs)..... 69
Challenges to achieving a green transition..... 72
Political - Venezuela's reputational dilemma..... 72
Economic - The funding problem:..... 72
Technological - The revolution's brain drain and ideological agenda:..... 73
Legal - In search of environmental rule of law:.....74
Environmental - The Green Paradox.....75
Policy Recommendations.....75
Institutional..... 76
Private Sector.....76
Civil Society.....77
Conclusion.....77
Ecuador: Towards a Green Transition.....78
Ecuador's Country Profile..... 78
Climate..... 78

Population..... 79
Economy..... 80
Main Sources of Energy..... 83
Main Sources of Electricity..... 85
Political Climate and Climate Change Policies.....87
Ecuador and the Effects of Climate Change..... 87
Ecuador's Policies to Combat Climate Change, the Environment, and Green Transition91
Funding Ecuador's Green Transition.....91
Recommendation to Achieve a Green Transition.....93
El Salvador's green transition..... 95
Introduction.....95
Background..... 95
Government.....96
Multilateral and International Initiatives..... 97
Banking Entities.....98
The Private Sector.....99
Challenges..... 100
Looking Ahead..... 100
Conclusion.....101
Conclusion: A green transition in Latin America?..... 102
Colombia..... 102
Brazil..... 102
Paraguay.....103
Venezuela.....103
Ecuador.....104
El Salvador.....104

*cover photo taken from the EU.

Introduction

Elin Roberts

As we currently live in a world full of polycrises[1], climate change is one of the biggest challenges facing our generation. In the past decade we have seen great changes in weather patterns such as increased floodings, higher levels of droughts, and increased numbers of wildfires, as well as growing levels of pollution and deforestation. These phenomenons are also seen in Latin America. According to the OECD[2], 13 of the 50 countries identified as being most at risk of climate change are located in Latin America.

With the recent wave of left-wing leaders in Latin America, most notably Gustavo Petro in Colombia and Luiz Inácio Lula da Silva in Brazil, climate change and a green transition are firmly back on the agenda in the region.

However, we question to which extent will a green transition be possible within the region. Hence, the main aim of this report is to provide an overview for policymakers and researchers on the green transition in Latin America, whilst identifying the wider barriers, opportunities, and benefits that this would bring to the region.

This report includes a detailed analysis of the potential of having a green transition within six countries[3] within the region, which include: Colombia, Brazil, Paraguay, Venezuela, Ecuador, and El Salvador. This report can be read in its entirety or can be read as individual chapters, if you are specifically interested in the green transition in certain countries. Each chapter analyses the context of each country whilst looking at how climate change is present within the given state. Furthermore, each section analyses the green transition within the specific country by looking at governmental policies and identifying challenges that could potentially impede a green transition. Every chapter concludes with policy recommendations on how to ensure a green transition within the specific state.

A variety of methodologies have been used throughout the report from data analysis to analyse the effects of climate change upon the region to the use of PESTLE analysis to define the challenges of implementing a green transition. Furthermore, the authors of this report have consulted literature by think tanks, international organisations, as well as by national governments.

[1] Within this report, polycrises will be defined as the state of living with multiple crises at the same time. For instance, the economic crisis of the COVID-19 pandemic was exasperated by the economic shocks of the ongoing war in Ukraine.

[2] https://www.oecd-ilibrary.org/docserver/3d5554fc-en.pdf?expires=1687185597&id=id&accname=guest&checksum=2F05EADA7F2FA32B148767AACCF643DC

[3] The countries within this report were selected based upon the interests of the authors.

Colombia: Towards a full green transition?

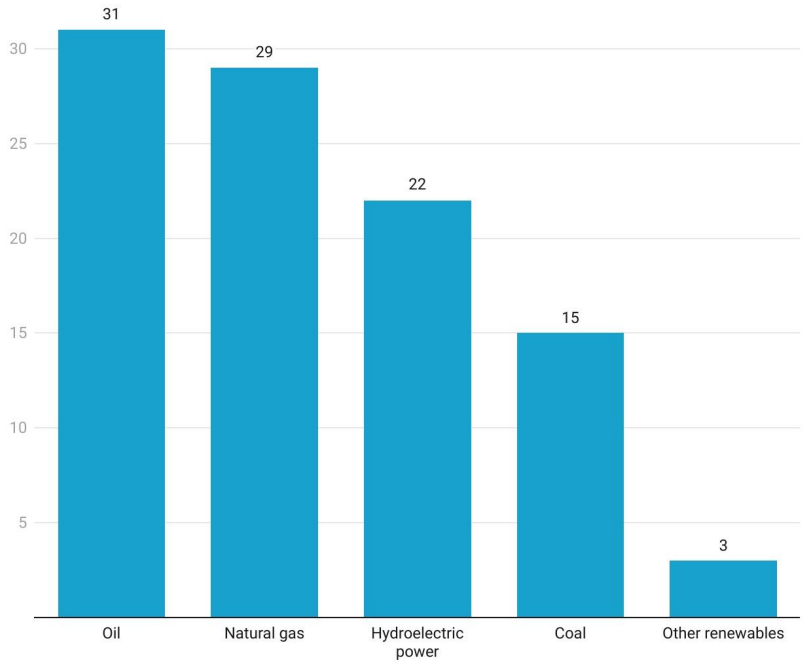
Maria Camila Lizarazo Gonzalez

Country overview

Colombia is the third most populous country in Latin America with around 49 million people[4], which boasts a mixture not only of race or gender but also of different cultures and major economic activities. Its varied temperatures, ranging from the Andes mountains to the Amazon, allows the country to develop strongly in real estate (8,43%), agriculture (7,43%), and mining (5,29%), among other major investments such as commerce (17,76%), and manufacture (11,52%) according to the Gross Domestic Product (GDP) distribution in 2021[5]. The country saw a GDP of over 300 billion[6] USD in the last 5 years, excluding 2020, which was marked by the COVID-19 pandemic.

All these activities require significant energy resources. It can be energy from coal, oil, gas, or renewables such as solar, wind, biofuels, hydroelectric, among others. Over the years, Colombia has used a combination of oil, coal, and gas[7], starting with some renewable in recent years on a marginal basis. In 2021, Colombia was the largest coal producer and second-largest petroleum producer in South America. As can also be seen in the graph below:

Primary energy consumption in Colombia by fuel type, 2020.

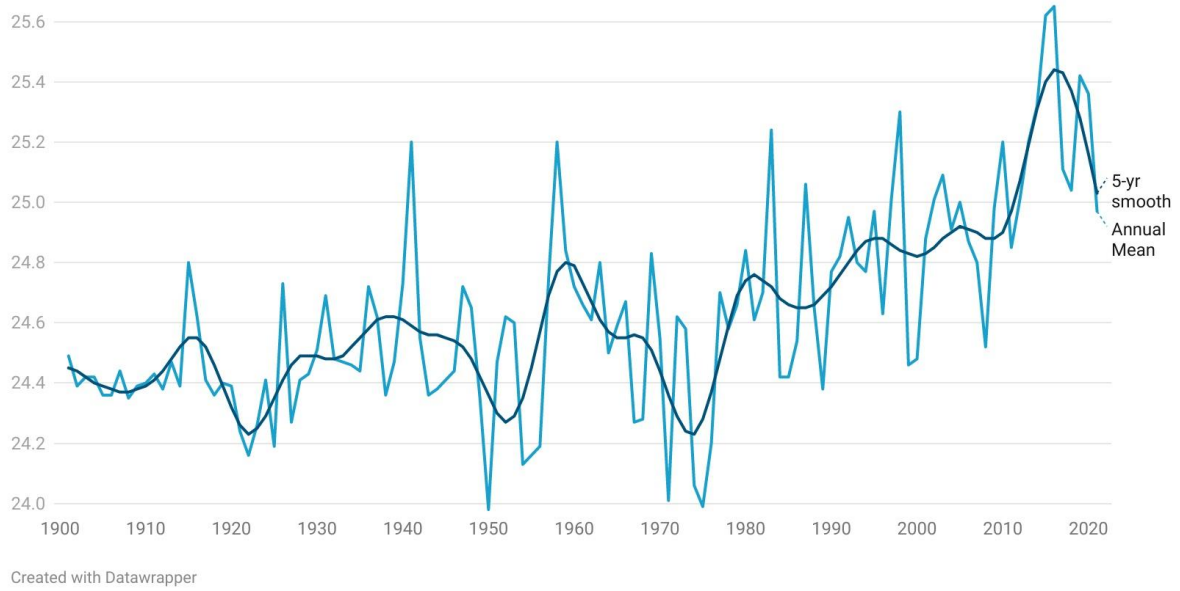


Source: Chart by U.S. Energy Information, based on the BP Statistical Review of World Energy, 2021.

[4] "¿Cuántos somos?", Departamento Nacional de Planeación, https://www.dane.gov.co/index.php/estadisticas-por-tema/demografia-y-poblacion/censo-nacional-de-poblacion-y-vivenda-2018/cuantos-somos.
[5] "Distribución del producto interno bruto (PIB) por actividad económica en Colombia en 2021" , Statista 2023, https://es.statista.com/estadisticas/1337044/distribucion-de-las-actividades-economicas-en-el-pib-de-colombia/.
[6] "GDP Current Colombia", TheWorld Bank, https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?end=2021&locations=CO&start=1960&view=chart
[7] "Colombia: Energy Country Profile", Our World in Data, https://ourworldindata.org/energy/country/colombia.

Awareness of climate change and the need to adapt has increased in recent years. During the past century, we have witnessed rising[8] temperatures that are becoming a growing risk in the country.

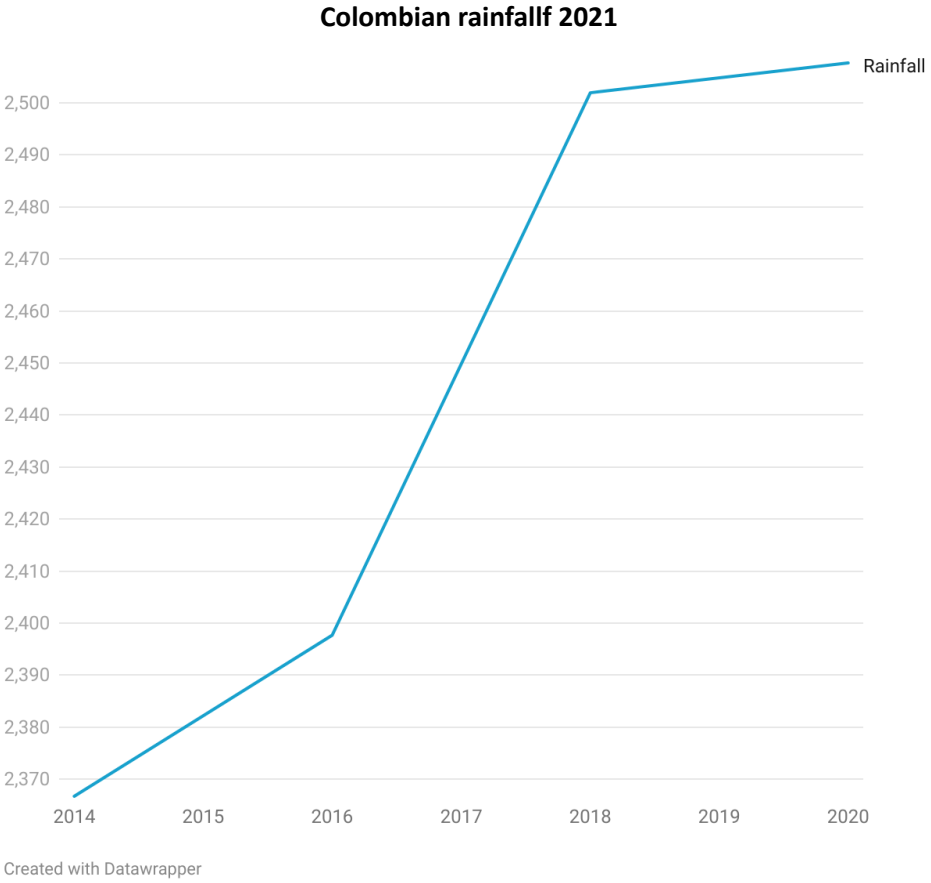
Observed Average Annual Mean-Temperature of Colombia for 1901-2021



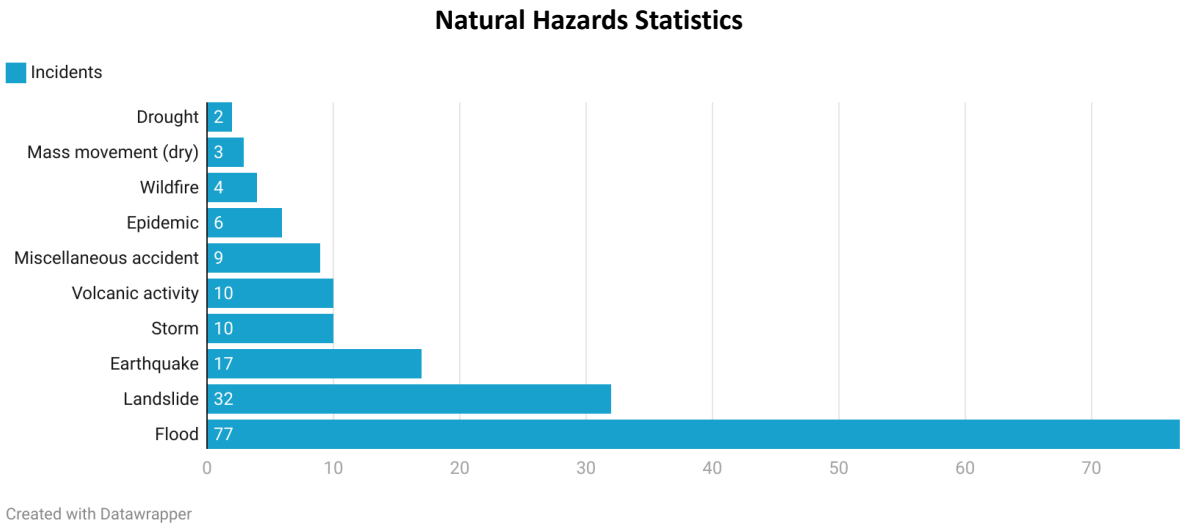
Source: Climate Change Knowledge Portal.

On the other hand, Colombia has been a country where inter-annual variability of rainfall has been mainly influenced by *El Niño* phenomenon, with droughts and warmer weather, and by *La Niña* phenomenon, associated with floods and colder weather between June and August. However, rapid population growth coupled with the effects of climate change has made Colombia more vulnerable and prone to natural disasters, mainly floods, and landslides[9]. As can be seen in the following graphs:

[8] "Colombia Climatology", Climate Change Knowledge Portal, https://climateknowledgeportal.worldbank.org/country/colombia/climate-data-historical.
[9] "Colombia Vulnerability, Climate Change Knowledge Portal, https://climateknowledgeportal.worldbank.org/country/colombia/vulnerability.



Source: Trading Economics



Source: Climate Change Knowledge portal.

According to the Global Climate Risk Index 2022[10]Colombia ranked 27th in the world among the countries most affected by the effects of climate change, dropping two places from the previous year .

Colombia is a middle-income[11] country where most of its population resides either in the Andes, where there are water shortages, droughts, and landslides, or in coastal areas, where sea level rise and floods affect communities and cities to a greater extent. Some of the most affected cities are:

Most populated cities (2020 population)	
Andean Region	**Caribbean Region**
Bogota: 8.380.801	Barranquilla: 1.239.804
Medellin: 2.569.007	Cartagena: 1.057.676
Cali: 2.496.346	Soledad: 700.970

Source: DANE.

Some of the most affected areas are; i) infrastructure; ii) water resources; iii) human health; iv) ecosystems, and v) agriculture. The latter is an important source of export revenues for Colombia. For instance, according to the World Bank Group, by 2050 climate change will affect 14% of Colombia's agriculture-related GDP and, if no preventive or corrective measures are taken, 80% of the country's crops could be affected[12].

What has been done by the Colombian government?

In 1979, the first World Climate Research Programme was established in Geneva as a result of the First World Climate Conference organised by the World Meteorological Organisation to raise awareness of the climate system and its changes. Later, in 1992, the United Nations Framework Convention on Climate Change[13] (hereinafter UNFCCC) was established and, through its conferences (COP), important decisions have been taken in this field.

[10] "The climate change performance INDEX 2022", New Climate Institute, https://newclimate.org/resources/publications/the-climate-change-performance-index-2022.
[11] "Climate RiskProfile Colombia", Climate Linksm https://www.climatelinks.org/resources/climate-risk-profile-colombia.
[12] "Profiles of adaptation: Colombia", World Resource Institute, https://www.wri.org/update/profiles-adaptation-colombia#:~:text=Colombia%20experiences%20high%20risks%20from,water%20scarcity%2C%20floods%20and%20landslides.
[13] "Convención marco de las naciones unidas sobre el cambio climático", Naciones Unidas, https://unfccc.int/resource/docs/convkp/convsp.pdf.

For instance, in 1997 the Kyoto protocol[14] (COP3) was approved to reduce the greenhouse gases (hereinafter GHG) and in 2015 the Paris Agreement (COP 21) was signed to reinforce countries' previous commitments, only in force until 4 November 2016. Regarding the previous context, Colombia adopted the National Climate Change Policy upon ratifying the UNFCC in 1992. However, Colombia had no specific GHG reduction obligations at that time (only for Annex I countries), and could even increase them if this was in line with its economic and social development.

Therefore, in 1997, Colombia ratified the Kyoto Protocol and began to benefit from the Clean Development Mechanism[15] (CDM, Kyoto protocol, art 12) in which developed countries can implement environmental projects in developing countries in order to meet their commitments. It also served as a way to finance Colombia's environmental projects.

In 2001, in its First National Communication[16], the Colombian government reported that although it was not the largest emitter of GHGs (only 0.2% of global carbon dioxide emissions), it was one of the most vulnerable countries regarding its social, economic, and environmental context. For this reason, they decided to increase their efforts to reduce GHGs. As a result, the Climate Change Policy Guidelines[17] were issued in 2002 and CONPES 3242[18] in 2003 as a strategy to reduce GHGs through the sale of environmental services. Within this framework, the National Environmental Council was created to evaluate CDM projects.

In 2009, the Second National Communication[19] was issued, making an inventory of GHG emissions between 2000-2004, highlighting all the risks for a country like Colombia (it has between 10% and 15% of the world's biodiversity).

Over the years, Colombia has adopted more robust policies to combat climate change. The National Plan for Adaptation to Climate Change (PNACC) was created during the government of Juan Manuel Santos (2010-2018), which outlined more concrete adaptation planning policies under a more solid scientific basis.

In 2015, climate change was already an item included in the multi-year investment plan. However, the country started to face funding problems to cover this expenditure, as mentioned in the Third

[14] "Que es el protocolo de Kyoto?, Naciones Unidas, https://unfccc.int/es/kyoto_protocol#:~:text=El%20Protocolo%20de%20Kyoto%20fue,16%20de%20febrero%20de%202005.
[15] The clean development mechanism, United Nations, https://docs.google.com/document/d/1Pwpc7Hv4RRVoB_UtYX0D39JscHTK6ZhxYq59-s3Ohgs/edit.
[16] "Primera Comunicación Nacional ante la Convención Marco de las Naciones Unidas sobre el Cambio Climático", Ideam, http://www.ideam.gov.co/documents/40860/219937/primera-comunicacion--nacional/b99663bb-9023-47d1-b54a-41f74cca0b1e.
[17] "Lineamientos de política de cambio climático", MInisterio de Medio Ambiente, https://www.preventionweb.net/files/21403_15719lineamientospoliticanacionalca.pdf.
[18] Documento CONPES 3242, Secretaria Distrital de Planeación, https://www.sdp.gov.co/sites/default/files/conpes_3242.pdf.
[19] "Segunda comunicación, Ministerio de ambiente, https://archivo.minambiente.gov.co/index.php/comunicaciones-nacionales-de-cambio-climatico/segunda-comunicacion.

National Communication[20]. Indeed, it was only in 2016 that a comprehensive plan to combat climate change was implemented within the framework of the National Climate Change System[21] (for its acronym in Spanish SISCLIMA), followed by the ratification of the Paris Agreement in 2017 (Law 1844 of 2017). At that time, regulations to combat climate change were scattered, making it necessary to adopt a guideline for climate change management. Indeed, Law 1931 of 2018 established the New National Climate Change Policy to integrate the fragmented legislation and articulate all the strategies to be implemented. Some of them are:

1. Climate resilient and low carbon rural development strategy.
2. Climate resilient and low carbon urban development strategy.
3. Low carbon and climate resilient mining and energy development strategy.
4. Low Carbon and Climate Resilient Strategic Infrastructure Development Strategy.
5. Strategy for the management and conservation of ecosystems and their ecosystem services for low-carbon, climate-resilient development.

Thus, the objective to progressively reduce GHG emissions by a minimum of 20% and an extreme of 30% of the emissions expected for 2030[22] was established. In 2018, the Green Growth Policy[23] (CONPES 3934 of 2018) was launched as a cross-sectoral plan to boost the country's productivity and competitiveness in a climate-compatible manner. Since then, different green regulations were promoted, such as the promotion of electric vehicles through tax exemptions and targeted subsidies (Law 1964 of 2019). In 2019, Colombia was the first country in Latin America to adopt a National Circular Economy Strategy.

The government of Ivan Duque (2018 to 2022) set new targets as part of the fulfilment of its commitments (Updated Nationally Determined Contribution (NDC))[24], improving the 2015 NDC, and increasing its ambition towards carbon neutrality by 2050. In this updated NDC, Colombia set out 30 goals to become a climate-resilient society and economy, i.e. carbon-neutral and with a high adaptive capacity in all its territories. It includes 148 GHG mitigation actions in the main relevant sectors (ANDI analysis[25]): 32 national actions and 3 specific black carbon measures led by ministries, 89 subnational actions led by local entities, and 24 measures led by private companies.

All these objectives are set to be implemented through three main channels:

[20] "Tercera comunicación", Cambio Climático, http://www.cambioclimatico.gov.co/3ra-comunicacion-cambio-climatico.
[21] "Sistema Nacional de Cambio Climático (SISCLIMA)", Ministerio de Ambiente, https://www.minambiente.gov.co/cambio-climatico-y-gestion-del-riesgo/sistema-nacional-de-cambio-climatico-sisclima/.
[22] Ley 1844 de 2017, Suin Juriscol, https://www.suin-juriscol.gov.co/viewDocument.asp?ruta=Leyes/30032607.
[23] Política de crecimiento verde Documento CONPES 3934 DE 2018, Departamento Nacional de Planeación, https://www.dnp.gov.co/Crecimiento-Verde/Documents/Pol%C3%ADtica%20CONPES%203934/Resumen%20Pol%C3%ADtica%20de%20Crecimiento%20Verde%20-%20diagramaci%C3%B3n%20FINAL.pdf.
[24] Actualización de la Contribución Determinada a Nivel Nacional de Colombia (NDC), UNFCC , https://unfccc.int/sites/default/files/NDC/2022-06/NDC%20actualizada%20de%20Colombia.pdf.
[25] Actualización NDC en Colombia, ANDI, https://www.andi.com.co/Uploads/Presentaci%C3%B3n%20NDC%20Actualizada%20y%20Plan%20de%20Implementaci%C3%B3n_637877025628675099.pdf.

1. Financing route: Cost analysis, management of national and cooperation funds.
2. Management route: Action Plans and Reporting with sectors, territories, and companies.
3. Institutional route: Regulation of the NDC, and harmonisation with Sectoral and Territorial Climate Change Management Plans.

This goes hand in hand with the fulfilment of the 2030 Agenda for Sustainable Development (SDGs)[26], adopted by all UN Member States in 2015. At the beginning of 2022, the National Planning Department (DNP) published an official annual Follow-up Compliance Report[27]. Indeed, more than 72% of the SDGs and 54.83% of the 2030 targets were achieved.

It is also important to highlight the participation of the private sector for these purposes. According to the SDG Corporate Tracker (SDGs)[28], which reports the contribution of the business sector to the SDGs, there are more than 672 registered companies and 493 active companies on the platform. Colombia is acting on other regional and international fronts, as it is an active member of the Pacific Alliance, the Amazonian Cooperation Treaty Organization, the Escazu Regional Agreement[29], among others**.**

Colombia's new future

Since last year with the coming to power of President Gustavo Petro, there has been some tension over the measures to be taken to address climate change. To a large extent, Colombia will continue to push towards a green transition and some of their main strategies are:

1. Accelerating the reduction of emissions from deforestation and forest degradation (REDD+).
2. Combating deforestation in the Amazon.
3. Improving carbon market regulation and standardising fair prices.
4. Focusing on the transition to renewable energy.

Likewise, the National Development Plan (PND) 2022-26, "Colombia, a world power of life" has been issued on the 6th of February of 2023, in which Gustavo Petro asks to order the territory "around water and environmental justice". It focuses precisely on environmental protection, emphasising the country's misguided energy and economic dependence on fossil fuels.

[26] Los 17 objetivos, Naciones Unidas, https://sdgs.un.org/es/goals.
[27] Informe ODS 2020, Departamento Nacional de Planeación, https://assets.ctfassets.net/27p7ivvbl4bs/7myPrzLxNgtrIV0ZZ9PLS6/4fcaa686e86371ab12de75c69f382571/2021-12-29_Informe_final_2021.pdf.
[28] SDG Corporate Tracker Colombia (SDG CT), United Nations, https://sdgs.un.org/partnerships/sdg-corporate-tracker-colombia-sdg-ct.
[29] La Ley que da vida al Acuerdo de Escazú es una realidad, Ministerio de Ambiente y desarrollo sostenible, https://www.minambiente.gov.co/acuerdo-de-escazu/la-ley-que-da-vida-al-acuerdo-de-escazu-es-una-realidad/#:~:text=El%20Acuerdo%20Regional%20sobre%20el,ya%20es%20ley%20en%20Colombia.

It also promotes the reindustrialization of the country through the development of science, technology, and knowledge, in order to become less dependent on hydrocarbons. Furthermore, it encourages citizen and community participation as can be read in article 41 of the plan:

> ***Article 41:*** *"CONCESSIONS FOR FOREST AND BIODIVERSITY USE IN RESERVE ZONES OF LAW 2 OF 1959 AND NATIONAL WASTELANDS. The Ministry of Environment and Sustainable Development (...) , may sign concessions with peasant organisations and peasant families for up to thirty (30) renewable years. for up to thirty (30) years renewable, with the purpose of controlling deforestation, the degradation of natural ecosystems and promoting the development of activities of restoration and restoration and rehabilitation (...)."*

The above represents a radical change in terms of environmental policies, regarding the prior National Development Plan 2019 - 2022, which favoured a militaristic approach to protecting ecosystems. Indeed, the goals set by President Duque were also ambitious at the time. For instance, it set the goal of reducing Colombia's GHG emissions by 51% in the next ten years, within the framework of the Paris Agreement, whereas President Santos had set a target reduction of 20%.

However, he was criticised for not having strong policies against deforestation, and for not proposing mitigation strategies. The same happened with the water management in the agricultural sector, as one of the main sources of greenhouse gas emissions in the country. As for mining, the previous PND proposed to increase hydrocarbon exploration, coal extraction and exploratory oil wells, which is very much in contrast to what is proposed by the current president, who has taken a much more radical position on this matter.

Wind down fossil fuel production

One of the most drastic and controversial changes is the government's plan to abandon fossil fuel extraction. This, rather than a transition, has been seen as a radical change. Colombia must overcome many challenges for this to become a reality, such as replacing half of its exports (Colombia is highly dependent economically on fossil fuels: between 40 and 50% of its world exports are coal and oil) and switching to renewable energies and electrifying industry. These changes could have a major impact on the Colombian economy and jeopardise its stability.

It is true that the previous government (Ivan Duque) had promoted the regulation of renewable markets and designed a general energy transition policy, but it did not work to reduce other non-renewable energy sources. Indeed, it cannot be ignored that Colombia relies heavily on fossil fuel exports and consumption to cover its energy needs.

On the contrary, Gustavo Petro has made announcements that, rather than bringing relief to the population, generate uncertainty about the country's energy future with his ambitious plans to eradicate oil and gas industry his words at the United Nations Framework Convention on Climate

Change in Egypt (COP 27)[30]: *"the world needs an immediate withdrawal from the oil and gas industry".*

This uncertainty is one of the main factors of the peso devaluation, along with the proposed health care reform and tax reform. which proposes that companies in the mining and energy sector contribute 57% of the tax collection. The Colombian peso falls sharply against the dollar at USD 5.061 for the first week of November 2022[31].

Indeed, his plan to diversify the economy and expand the country's renewable energy capacity is an assertive strategy, but there is still uncertainty on how the administration plans to achieve these goals.

Labour force

A complete green transition also implies labour challenges that need to be addressed to ensure a fair evolution. According to figures from the Ministry of Environment and Sustainable Development, there are currently 2,581 green businesses in Colombia, which have generated 30,661 jobs nationwide[32].

Certainly, the implementation of public policies for the mitigation of GHG emissions will generate disruptions, especially in the economic sectors that generate more emissions, without prejudice to the fact that the green economy sectors have a positive impact on the creation of new jobs. Some examples are shown in the table below:

Brown sectors **Generate more than 80% of GHG emissions.**	**Green sector**
Coal and oil derivatives.	Construction
Electricity, gas, steam and AC	Agriculture
Food, beverages and tobacco.	Land transport
Water and maritime transport	Trade and commerce
Paper and paper products.	Other manufacturing
Air transport	Professional, scientific and technical activities

[30] "El discurso del presidente Gustavo Petro en la COP 27, en Egipto", Portafolio, https://www.portafolio.co/economia/gobierno/gustavo-petro-discurso-del-presidente-en-la-cop-27-573720.
[31] "En 2023, primará incógnita con el dólar y su comportamiento", Portafolio, https://www.portafolio.co/economia/finanzas/en-2023-primara-incognita-con-el-dolar-y-su-comportamiento-575806.
[32] "Empleos verdes: nueva oportunidad laboral hacia la sostenibilidad", Portafolio, https://www.portafolio.co/economia/empleo/empleos-verdes-nueva-oportunidad-laboral-hacia-la-sostenibilidad-575203.

Land and pipeline transport	Public administration
Mining and quarrying	Human health and social work activities
Other non-metallic minerals	Other service activities
Warehousing and logistics	Information and communication activities

Source: OCDE, Green transition and labour formalisation in Colombia, 2023.

Similarly, other sectors such as forestry, energy, water and waste management, and the bio-economy are among those leading the list of green job opportunities. For this reason, the national government is required to adopt measures to gradually decrease the share of brown jobs in the economy, and promote new employment opportunities, especially in the sectors with the greatest green potential.

It is also important to focus on capacity development to enable a successful transition to these new sectors and to take measures to facilitate professional retraining by ensuring "*that workers have access to social protection, acquire the right skill sets and that economies have the capacity to make the transition between traditional and greener industries*", as was stated by the International Labour Organisation (ILO) Regional Director[33].

On CO2 emission

Since 2012, the Colombian Low Carbon Development Strategy[34] has been the challenge taken up by the Colombian government to put the country on the path to low GHG emission economic development.In 2016, the Carbon Tax Law 1819 was created to discourage the use of fossil fuels and promote technological improvements leading to their efficient use.

In 2018, two international cooperation projects were added to this initiative. The first one, "*Capacity Building for National Contribution*", is funded by the Spanish Cooperation Agency (by its acronym in Spanish AECID), the European Union, and the German Government. The second, implemented by Fondo Acción, called "*Moving Colombia's Low Carbon Development Strategy into Action*" as an initiative of the Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) of the Federal Republic of Germany.

At the same time, some measures have been taken to increase private sector action and link it more strongly to the government's plan to combat climate change and there is a Reform Proposal[35] underway to increase it by including coal consumption gradually until 2028. As a result, Law 2169 of

[33] La economía verde puede generar millones de empleos en América Latina y el Caribe , Organización Internacional del Trabajo, https://www.ilo.org/americas/sala-de-prensa/WCMS_629917/lang--es/index.htm.

[34] "Estrategia Colombiana de Desarrollo Bajo en Carbono (ECDBC)", Ministerio de Ambiente y Desarrollo Sostenible", https://www.minambiente.gov.co/cambio-climatico-y-gestion-del-riesgo/estrategia-colombiana-de-desarrollo-bajo-en-carbono-ecdbc/.

[35] "Impuesto al carbono", la Republica, https://www.larepublica.co/analisis/simon-gaviria-munoz-401830/impuesto-al-carbono-3440710#:~:text=Con%20la%20propuesta%20de%20reforma,22%2C2%25%20de%20las%20emisiones.

2021 was recently issued, which seeks to boost the country's low-carbon development through the establishment of minimum targets and measures on carbon neutrality and climate resilience. For instance, it sets a target that by 2030 at least 10% of companies in the industrial, commercial, and tourism sectors implement strategies or actions to adapt to climate change.

The challenges of financing a green tradition

Similarly, another major climate change concern is financing. In the last 10 years, 72% of climate action funding has come from public sources, which has generated significant shortfalls in state coffers. The Paris Agreement calls for a progressive increase in the mobilisation of finance for mitigation and climate change mitigation and adaptation.

In general, the green transition is not only driven by the public sector but also by private companies and by international organisations, especially in these issues that are totally cross-cutting for all of humanity and that the Latin American region has a large part of the green reserve. For instance, the MRV framework design[36] was mostly financed by the Green Climate Fund (GCF).

According to the National Climate Finance Strategy[37]national public investment averaged $ 1.26 trillion in annual investments between 2011 and 2016 (0.15% of GDP in 2016), distributed in risk management, environment and natural resources, agriculture and livestock, waste, energy, industry, and others.

Besides that, 1.5 trillion in loans and 528 billion in other banking products were received from the financial sector, 213 billion from the productive sector, 0.13 trillion from international sources, and 0.36 billion annually from private non-reimbursable sources. In sum, there was a demand for mitigation of $3.1 billion per year with a supply of $0.78 billion per year. Consequently, there is a gap in the mitigation component of around $2.3 billion annually.

In response to this, the director of the National Planning Department (by its acronym in Spanish DNP) together with the Climate Finance Committee[38] launched the National Climate Finance Strategy (by its acronym in Spanish SISCILMA) to guarantee the flow of resources required to meet the goals set.

To this end, two main strategies were established:

1. **Development of economic and financial instruments:** Focused on promoting private sector participation through economic instruments that internalise the negative

[36] "Tracking the financing of climate action: how Colombia developed and implemented a comprehensive national MRV framework for climate finance", Transparency partnership, https://transparency-partnership.net/system/files/document/200114_GPD_Colombia_RZ.pdf.
[37] "Estrategia de Financiamiento Climático", Observatorio ambiental de Bogotá, https://oab.ambientebogota.gov.co/?post_type=dlm_download&p=21676.
[38] "Colombian Climate Finance Committee", Departamento Nacional de Planeacion, https://unfccc.int/sites/default/files/resource/Session%206_BOG%201_Edgar%20Cruz%20Martinez.pdf.

externalities of climate change and integrate it as a component into investment decision-making.

2. **Management and access to sources of financing:** Facilitating management and access to economic resources through public financial planning instruments, international public sources, promotion of private investment in the financing of mitigation and adaptation initiatives, and structuring projects for access to these sources.

In addition, Colombia's government has developed a wide-ranging Monitoring, Reporting, and Verification (MRV) framework to track the flow of climate finance by using an online platform[39]. This makes it easier to identify investment gaps and how sectors and territories are working on NDC implementation and compliance.

In this sense, Colombia must face several challenges to achieve an ecological transition, among which are:

1. **Political**: One of the biggest challenges on the political side is the new beginning of a left-wing government. Indeed, Colombia is not only going through a green transition, but it is also going through a period of political changes since it is the first time that a left-wing government is elected. This represents difficulties in the approval of bills in different themes and therefore climate efforts can fade into oblivion.

2. **Economical:** Having financial planning and a consolidated and accurate budget to achieve environmental plans will be another challenge. Therefore, the destination of public resources must be well attributed to the action plans designed and cannot be diverted to other items, since this will prevent the transition from reaching its objective. Hence the importance and challenge of encouraging the financial participation of other interested parties, such as international organisations and the private sector.

3. **Social:** Involving communities and citizens in most cases is key to an effective transition. Although climate change is a global problem that should concern everyone, it has raised multiple points of view from the most diverse interests. Therefore, the challenge will be to engage all stakeholders in trying to find a path of evolution and transition that is beneficial in the short and long term for all.

4. **Technological:** The Colombian technological challenge, in terms of the green transition, is enormous because there is a lot of potential, but still requires substantial work. This can be seen in two ways:

   i) The challenge of boosting the technology sector and developing new technologies and making them available for a greener and more sustainable world.
   ii) The challenge of ensuring these new technologies do not generate alternative forms of environmental pollution. In the end, these efforts must revolve around the same purpose: an effective transition.

[39] "Portal MRV", Departamento Nacional de Planeación", https://mrv.dnp.gov.co/Paginas/inicio.aspx.

5. **Legal:** In the regulatory aspect, the challenge will be to ensure that all the agreements reached by the government are clearly written down, thus avoiding the existence of legal loopholes. Likewise, the task will be to support the environmental legislative projects that are proposed both by the initiative of the public and private sectors to have a successful outcome and not let them fall due to formal errors or excess in the procedures.

6. **Environmental:** Regarding the environmental challenge, it is to refer to this writing with an emphasis on the financing of the plans to combat climate change and the great leaps that the current government is taking in order to land it on more concrete, achievable, and measurable action plans.

   In addition, environmentally speaking, the country will face:

   a. Change in weather patterns: Climate change is causing alterations in weather patterns in Colombia, which can result in more intense droughts, floods and extreme weather events.

   b. Loss of Biodiversity: Colombia is one of the most biodiverse countries in the world, but it faces accelerating loss of species due to climate change, deforestation, and habitat degradation.
   c. Vulnerability of rural communities: Rural communities in Colombia depend directly on natural resources for their subsistence. Climate change can affect the availability of water, crops and food security, which increases the vulnerability of these communities.

   d. Adaptation and mitigation: Colombia has implemented measures to address climate change, such as the promotion of renewable energy, the conservation of ecosystems, and the adoption of sustainable agricultural practices. However, there are still challenges in the effective implementation of these strategies throughout the country.

Indeed, the current government seems optimistic and it looks eager to succeed in all its commitments[40]. Only in this way, Colombia will be on the path to achieving a green transition, but it is the government's duty to prioritise it and, beyond setting unattainable goals, to start implementing actions for change with its immediate alternative option so that the transition does not generate greater harm to society than the change itself.

Recommendations to implement a green transition

Regarding the above, in this adaptation process towards a green transition, it would be recommendable for the government to focus on three main aspects; i) financing diversification; ii) mainstreaming environmental issues, and iii) technology innovation and new economic models.

[40] "Cambio Climático", Ministerio de Relaciones Exteriores, https://www.cancilleria.gov.co/cambio-climatico-0.

The amount of finance required to meet renewable energy targets and the amount of funds required to decarbonize "brown" industries is huge. Therefore, more public investment incentives should be promoted. Indeed, it would be necessary to have a strong commitment from investors to invest in companies that have implemented decarbonisation plans and ESG (environmental, social, and governance) strategies.

In fact, if the world is to meet its climate change-related targets, it will need to close a $4.1 trillion funding gap in nature by 2050[41], which also means a balance between real investment supply and demand. Something along these lines was established by the European Union Sustainable Finance Disclosure Regulation (SFDR), which came into force on March 10, 2021, designed to introduce more transparency and essentially categorise investment products into sustainable and non-sustainable.

For the second aspect, it is important to mainstream the ecological transition public policy. Therefore, the importance of environmental education is to raise public awareness of the ecological transition and the articulation of public, private, and civil society environmental initiatives around national objectives. For instance, an initiative was taken in Ecuador to promote accessibility to environmental data and create spaces for citizen participation and science-policy integration, to standardise and ensure the quality of information[42].

Finally, it is advisable to issue public policies aimed at incorporating technological innovation in the different productive sectors, promoting the generation of new inclusive economic models based on the bioeconomy, circular economy, knowledge management, renewable energies, among others.

In addition, as mentioned, it should not be forgotten that Colombia is a developing country, which is why international aid continues to be one of the main axes and should be one of the strongest aids, remembering that the world belongs to everyone and Colombia is home to a large part of the natural reserves.

---

[41] "Cómo los inversores pueden ayudar a financiar una recuperación ecológica", EY, https://www.ey.com/es_py/assurance/how-investors-can-help-finance-a-green-recovery

[42] "Compromiso de Gobierno Abierto impulsa la accesibilidad a datos ambientales y del recurso hídrico en el Ecuador", Gobierno abierto Ecuador, https://www.gobiernoabierto.ec/compromiso-de-gobierno-abierto-impulsa-la-accesibilidad-a-datos-ambientales-y-del-recurso-hidrico-en-el-ecuador/

The Return of Brazil's Green Transition Agenda?

Leonardo Brito

Brazil and climate change

In terms of territory, population, and GDP, Brazil ranks first in Latin America. It spans over 8.5 million sq km[43], is estimated to have a population of nearly 210 million[44], and, in 2021, registered about 1.6 billion USD in GDP. Notably, the country encompasses a number of different biomes, including the Amazon rainforest and Atlantic forest, the savanna-like Cerrado, the tropical wetlands of the Pantanal, the semiarid desert Caatinga, and plenty more, which, all together, also put Brazil at the top of worldwide rankings in biodiversity[4546].

Not unlike other countries around the globe, Brazil has increasingly experienced the effects of climate change and extreme weather events that pose a threat to its rich biodiversity as well as the lives and livelihoods of its people. The country's National Meteorological Institute, for instance, has registered a 1.3 °C increase in mean national annual temperature between its climatological normals of 22.3°C in the period between 1961 and 1990, and those of 23.6°C between 1991 and 2020[47]. Although imprecise, the data is significant in pointing out an overall warming trend that is akin to global reports on climate change[48]. In turn, the World Bank's Climate Change Knowledge Portal reports a 0.67°C increase in the country's Observed Average Annual Mean-Temperature between 1901 and 2021, and an increase of over 1°C between 1901 and the record hot year of 2015[49].

---

[43] "Brazil", The World Factbook, CIA, accessed 4 February 2023, https://www.cia.gov/the-world-factbook/countries/brazil/#geography

[44] Thais Carrança, "Censo do IBGE: a polêmica sobre tamanho da população que pode tirar dinheiro de municípios", *BBC*, 5 January 2023, https://www.bbc.com/portuguese/brasil-64170957#:~:text=No%20apagar%20das%20luzes%20de,207%2C8%20milh%C3%B5es%20de%20habitantes

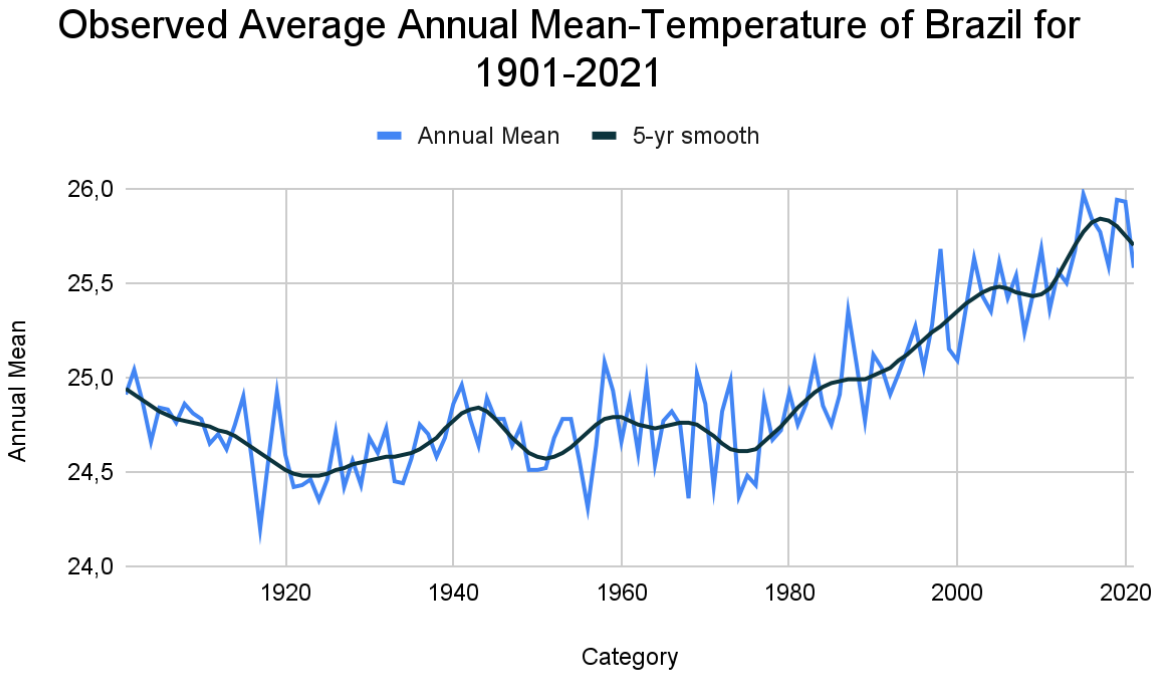
[45] Matthew Nash, "Global Biodiversity Ranked: Which Country Has the Most Flora and Fauna?", Greenroofs, accessed 4 February 2023, http://www.greenroofs.com/2022/10/24/global-biodiversity-ranked-which-country-has-the-most-flora-and-fauna/

[46] Matthew Nash, "The 201 Most (& Least) Biodiverse Countries in 2022", The Swiftest, accessed 4 February 2023, https://theswiftest.com/biodiversity-index/

[47] "Normais Climatológicas do Brasil", Instituto Nacional de Meteorologia, Ministério da Agricultura, Pecuária e Abastecimento, accessed 12 February 2023, https://portal.inmet.gov.br/normais

[48] World Meteorological Organisation, "WMO Provisional State of the Global Climate 2022", ReliefWeb, accessed 12 February 2023, https://reliefweb.int/report/world/wmo-provisional-state-global-climate-2022#:~:text=The%20global%20mean%20temperature%20in,be%20fifth%20or%20sixth%20warmest.

[49] "Brazil", Country Profiles, Climate Change Knowledge Portal, accessed 26 February 2023, https://climateknowledgeportal.worldbank.org/country/brazil/climate-data-historical



Source: World Bank's Climate Change Knowledge Portal

Moreover, in recent years, the country has experienced extreme weather events. For one, southern states, especially Rio Grande do Sul, is currently going through a La Niña-induced drought that is the worst in 70 years[50] and is estimated to have affected over 80% of the "agroproductive" area in the state[51]. This has led almost half of its municipal governments to declare a state of emergency[52]. On the other hand, just to name a few, deadly floods caused significant destruction in Bahia and Minas Gerais states in late 2021 (over 50 confirmed dead, some 90 thousand displaced)[53], in Pernambuco, Alagoas and Paraíba states in July 2022 (over 130 dead)[54] and in northern São Paulo state just last February

[50] Giovanna Galvani and Ludmila Candal, "'Seca do Rio Grande do Sul é a maior dos últimos 70 anos', diz agrometeorologista", *CNN Brasil*, 8 February 2023, https://www.cnnbrasil.com.br/business/seca-do-rio-grande-do-sul-e-a-maior-dos-ultimos-70-anos-diz-agrometeorologista/

[51] "Monitoramento de Secas e Impactos no Brasil – Janeiro/2023", Centro Nacional de Monitoramento e Alertas de Desastres Naturais, Ministério da Ciência, Tecnologia e Inovações, accessed 12 February 2023, https://www.gov.br/cemaden/pt-br/assuntos/monitoramento/monitoramento-de-seca-para-o-brasil/monitoramento-de-secas-e-impactos-no-brasil-2013-janeiro-2023

[52] Augustine Timm, "Estiagem: quase metade dos municípios do RS decretou situação de emergência; veja lista", *G1*, 5 February 2023, https://g1.globo.com/rs/rio-grande-do-sul/noticia/2023/02/05/estiagem-quase-metade-dos-municipios-do-rs-decretou-situacao-de-emergencia-veja-lista.ghtml

[53] "Bahia tem mais de 26 mil desabrigados, 61,5 mil desalojados e duas pessoas estão desaparecidas por causa da chuva", *G1*, 8 January 2022, https://g1.globo.com/ba/bahia/noticia/2022/01/08/bahia-tem-mais-de-26-mil-desabrigados-615-mil-desalojados-e-duas-pessoas-estao-desaparecidas-por-causa-da-chuva.ghtml

[54] Bruno Marinho, Vítor Oliveira and Danielle Fonseca, "Chuvas em Pernambuco: corpo de última desaparecida é encontrado e bombeiros encerram buscas; 128 pessoas morreram", *G1*, 3 June 2022, https://g1.globo.com/pe/pernambuco/noticia/2022/06/03/sobe-para-128-numero-de-mortos-apos-o-corpo-desaparecida-devido-as-chuvas-em-pernambuco-ser-encontrado.ghtml

2023 (over 50 confirmed dead)[55]. These are relatively common occurrences that are often attributed to specific meteorological events but whose intensity is exacerbated by global warming according to climatologists at Brazil's National Centre for Monitoring and Alerting on Natural Disasters[56].

At the same time, Brazil has a history of engagement and leadership in the international climate change agenda having hosted two major United Nations Conference on Environment and Development: Rio92[57], which followed up on the first-ever UN Conference on the matter that took place 20 years prior, and Rio+20[58], which took place 20 years afterwards and where the process to develop the Sustainable Development Goals (SDGs) was launched. Nevertheless, Brazil's Nationally Determined Contributions (NDCs) are deemed "insufficient" by the Climate Action Tracker (up from "highly insufficient" since 2022)[59], and the country ranks 38th (down from 33rd in 2022) in the New Climate Institute's Climate Change Performance Index[60]. Below, we seek to explore the country's economic and political profile to analyse the prospects of a Green Transition.

Brazil's economic profile

Brazil's economy is relatively diversified and industrialised as it ranks 47 out 127 countries in the Observatory of Economic Complexity's Economic Complexity Index[61]. In the 3rd quarter of 2022, Brazil's data agency (IBGE) estimated that about 6.3% of GDP came from the agricultural sector, 21.7% from the industrial sector and 58.4% from services and trade[62]. Nonetheless, the University of São Paulo's CEPEA (an applied economics think tank linked to the Luiz de Queiroz High College of Agriculture) estimates that the share of national GDP associated with the larger agribusiness sectors,

---

[55] "Sobe para 50 o n° de mortos vítimas do temporal no Litoral Norte de SP", *G1*, 22 February 2023, https://g1.globo.com/sp/vale-do-paraiba-regiao/noticia/2023/02/23/equipes-de-resgate-iniciam-5o-dia-de-buscas-por-vitimas-da-chuva-no-litoral-norte-de-sp.ghtml

[56] "Pesquisadores brasileiros fazem recomendações, analisando as repentinas inundações e deslizamentos de terra em Recife (PE), após fortes chuvas ocorridas em maio de 2022", Centro Nacional de Monitoramento e Alertas de Desastres Naturais, Ministério da Ciência, Tecnologia e Inovações, 31 January 2023, https://www.gov.br/cemaden/pt-br/assuntos/noticias-cemaden/pesquisadores-brasileiros-fazem-recomendacoes-analisando-as-repentinas-inundacoes-e-deslizamentos-de-terra-em-recife-pe-apos-fortes-chuvas-ocorridas-em-maio-de-2022

[57] "United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, 3-14 June 1992", Conferences, United Nations, accessed 12 February 2023, https://www.un.org/en/conferences/environment/rio1992

[58] "United Nations Conference on Sustainable Development", Conferences, United Nations, accessed 12 February 2023, https://www.un.org/en/conferences/environment/rio2012

[59] "Brazil", Countries, Climate Action Tracker, accessed 12 February 2023, https://climateactiontracker.org/countries/brazil/

[60] "Brazil", Climate Change Performance Index, accessed 26 February 2023, https://ccpi.org/country/bra/

[61] "Brazil", Country Profiles,Observatory of Economic Complexity, accessed 4 February 2023, https://oec.world/en/profile/country/bra

[62] "Tabela 1846: Valores a preços correntes", Contas Nacionais Trimestrais, SIDRA, Instituto Brasileiro de Geografia e Estatísticas, accessed 4 February 2023, https://sidra.ibge.gov.br/tabela/1846#/n1/all/v/all/p/-1/c11255/90687,90691,90696,90705,90706,90707,93404,93405,93406,93407,93408,102880/l/v,,c11255+t+p/resultado

which includes agriculture and livestock-related activities in industry and services[63], has hovered above 25% for the past couple of years[64].

The agricultural sector is especially important in Brazil's export portfolio. In 2022, it represented at least 40% of the FOB[65] value total of Brazilian exports[66]. Another key sector for exports is mining, which, in 2022, made up about 27% of the FOB value total of Brazilian exports[67]. In both cases, major export destinations are, in order, China, the European Union, and the United States of America[68]. In 2022, China was the destination of about 33,8% of Brazilian agricultural exports and 40% of mineral exports[69]. In the same year, the EU imported almost 16% and a bit over 17,5% for each set of exports respectively, and the US, 4% and 8%. Other Asian countries also figured highly as export destinations for agricultural (notably Iran, Japan, Thailand, South Korea, and India) and mineral (notably Singapore, Malaysia, South Korea, India, and Bahrein) products.

[63] Nicole Rennó Castro, "Afinal, quanto o agronegócio representa no PIB brasileiro?", Centro de Estudos Avançados em Economia Aplicada (Cepea), Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo, accessed 4 February 2023, https://www.cepea.esalq.usp.br/br/opiniao-cepea/afinal-quanto-o-agronegocio-representa-no-pib-brasileiro.aspx

[64] "PIB do agronegócio brasileiro", Centro de Estudos Avançados em Economia Aplicada (Cepea), Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo, accessed 4 February 2023, https://www.cepea.esalq.usp.br/br/pib-do-agronegocio-brasileiro.aspx

[65] FOB is a shipment code (incoterm) that, in this context, refers to the value of exports up until their final domestic shipping point.

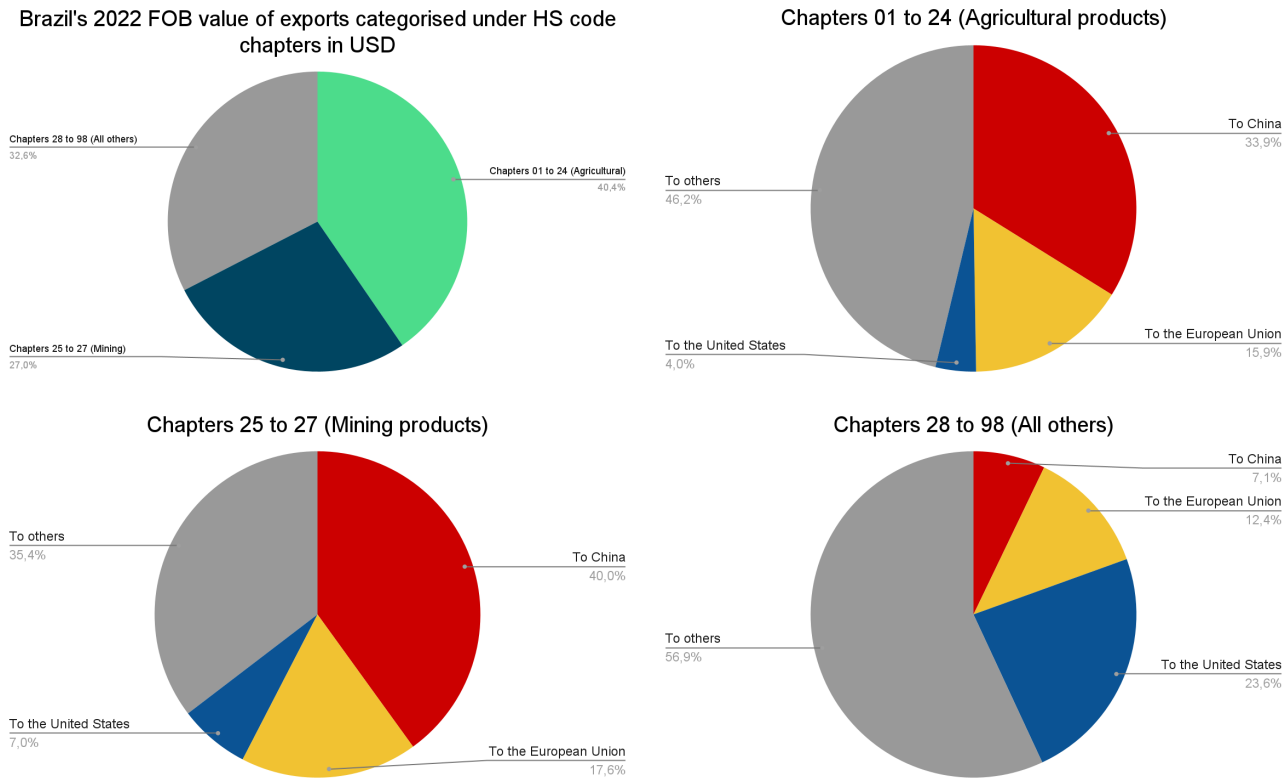
[66] Considering the FOB value of exports categorised under chapters 01 ("Live animals") to 24 ("Tobacco and manufactured tobacco substitutes") of the Hamornised System code according to the Brazilian Ministry of Industry and Trade's ComexStat database

[67] Considering the FOB value of exports categorised under chapters 25 ("Salt; sulphur, earths and stones; plastering materials, lime and cement") to 27 ("Mineral Fuels, Mineral Oils And Products Of Their Distillation; Bituminous Substances; Mineral Waxes") of the Hamornised System code according to the Brazilian Ministry of Industry and Trade's ComexStat database

[68] "Exportações e Importações Geral", ComexStat, Ministério do Desenvolvimento, Indústria e Comércio Exterior, accessed 4 February 2023, http://comexstat.mdic.gov.br/pt/home

[69] Considering the broad categories selected by HS code as stated above.

Composition of Brazil's 2022 FOB exports per group of HS code chapters in USD

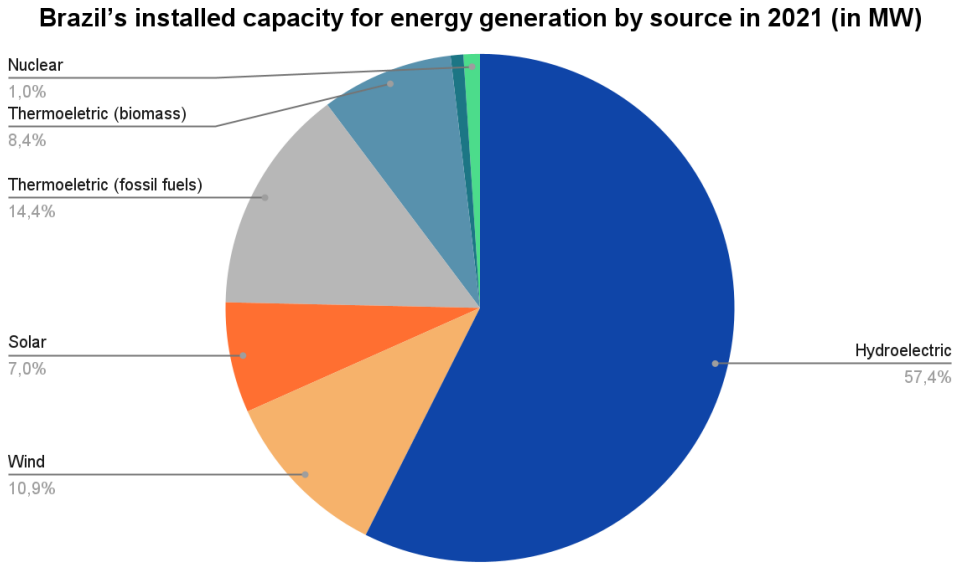


Source: Own construction based on data from Brazil's Ministry of Industry and Trade's ComexStat database

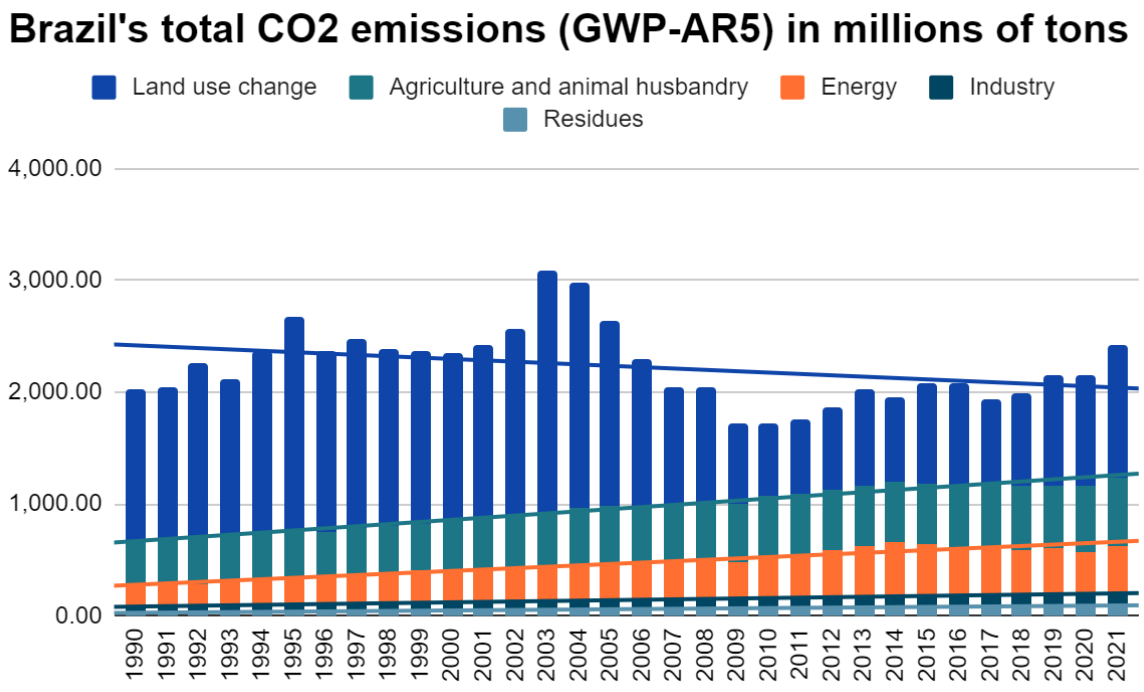
Most of the electricity consumed in Brazil is generated from renewable sources. In 2021, over 57% of the country's installed capacity for energy generation was derived from hydroelectric sources, followed by almost 11% of wind and 7% of solar sources. Thermoelectric generation encompassed 23.6% of Brazil's installed capacity, 61% of which relied on fossil fuels and 35.5% on biomass. Nuclear power sources corresponded to about 1% of installed capacity. Brazil also imported about 23 thousand GWh of electricity, almost 75% of which came from Paraguay, with which Brazil co-owns the Itaipu Dam, currently the second largest hydroelectric dam in the world in terms of power generation capacity[70] and, by the end of 2020, the energy plant that generated the most accumulated electricity in world history[71].

[70] "Largest hydroelectric dams worldwide as of 2021, based on power generation capacity(in gigawatts)", Statista, accessed 12 February 2023, https://www.statista.com/statistics/474526/largest-hydro-power-facilities-in-the-world-by-generating-capacity/

[71] "Itaipu and Three Gorges Set Two Historic Records", Itaipu Binacional, 1 January 2021, https://www.itaipu.gov.br/en/press-office/news/itaipu-and-three-gorges-set-two-historic-records



Source: Brazil's Ministry of Mines and Energy's sieBrasil[72]



Source: Observatório do clima's SEEG (System of Estimates of Emissions and Removals of Greenhouse Gases)[73]

[72] "Capacidade Instalada de Geração Elétrica", sieBrasil, Ministério de Minas e Energia, accessed 4 February 2023, https://www.mme.gov.br/SIEBRASIL/consultas/reporte-dato42-jerarquizado.aspx?oc=30181&or=30182&ss=2&v=1

[73] "Emissões Totais", SEEG, Observatório do Clima, accessed 15 April 2023, https://plataforma.seeg.eco.br/total_emission

When it comes to annual CO_2 emissions, the biggest component in Brazil's output has consistently been "land use change"[74], which mostly means deforestation in the Amazon Rainforest[75]. It has accounted for more than 50% of the country's emissions - as estimated by Brazilian NGO Observatório do Clima - for 19 of the last 30 years. It is, nonetheless, the only major category of CO_2 emissions source to have seen a downward trend in this period, having dropped below 50% of total output, as well as the 1 billion tons mark, in 2009 from a record of over 70% and 2,1 billion tons in 2003. More recently, however, there have been significant setbacks in this trend with its absolute figures going back over the 1 billion tons mark in 2020 and in 2021, when it accounted for 49% of total Brazilian emissions.

Although all categories displayed in the graph above have seen growth in their total annual emissions between 2011 and 2021[76], "land use change" has seen the largest rate, of over 80%. The second steepest growth, of 26%, was registered by the "residues'' category, which is mostly related to solid waste disposal and domestic wastewater treatment[77], and has also seen the steepest growth rate, of over 200%, in the 1990-2021 period. Meanwhile, growth in total emissions related to productive sectors has been milder, with the industrial sector recording 8% growth in the period; the agricultural sector, almost 11%; and the energy sector, a bit over 12.5%. Rather, according to data from Our World in Data[78], when it comes to annual CO_2 emissions from fossil fuels and industry (land use change not included), Brazil peaked in 2014 at 557.90 million tons and experienced a more or less consistent 20,7% decline in its emissions until 2020's 443.31 million tons, which was its lowest since 2010.

This period largely coincides with a period of economic malaise that saw either negative (2014, 2015, 2016, 2020) or very mild (2017, 2018, 2019) economic growth per capita[79]. In 2021, in the context of a post-pandemic recovery, the country registered 488.88 million tons of CO_2 emissions from fossil fuels and industry (land use change not included), or about a 10.5% increase in relation to the previous year[80]. That same year, its per capita emissions ranked it 128 in a list of 219 countries and

---

[74] "Emissões Totais", SEEG, Observatório do Clima, accessed 15 April 2023, https://plataforma.seeg.eco.br/total_emission

[75] Tasso Azevedo et al., "Análise das emissões brasileiras de Gases do Efeito Estufa e suas implicações para as metas climáticas do Brasil 1970 – 2020" (SEEG), 29, https://seeg.eco.br/2023/03/21/seeg-9-1990-2020/#

[76] "Emissões Totais", SEEG, Observatório do Clima, accessed 15 April 2023, https://plataforma.seeg.eco.br/total_emission

[77] Tasso Azevedo et al., "Análise das emissões brasileiras de Gases do Efeito Estufa e suas implicações para as metas climáticas do Brasil 1970 – 2020" (SEEG), 26, https://seeg.eco.br/2023/03/21/seeg-9-1990-2020/#

[78] "Annual CO_2 emissions", Our World In Data, accessed 13 February 2023, https://ourworldindata.org/grapher/annual-co2-emissions-per-country?time=2009..latest&country=~BRA

[79] "Annual growth of GDP per capita, 2013 to 2020", Our World In Data, accessed 13 February 2023, https://ourworldindata.org/grapher/gdp-per-capita-growth?tab=chart&time=2013..latest&country=~BRA

[80] "Change in annual CO_2 emissions", Our World In Data, accessed 13 February 2023, https://ourworldindata.org/grapher/annual-co2-emissions-per-country?stackMode=relative&time=2020..latest&country=~BRA

territories at 2.28 tons, a 16,8% decrease in relation to its 2014 peak, but an almost 10% increase in relation to the previous year[81].

Politics and the environmental agenda in Brazil

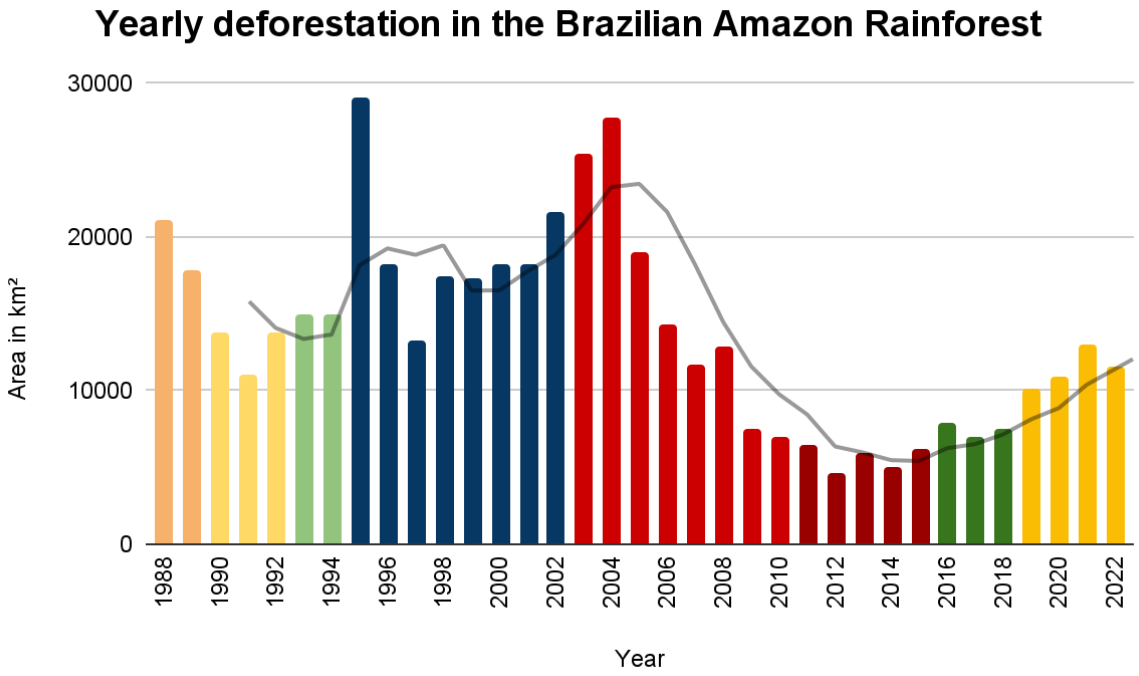
Brazil is a presidential Federative Republic, in which different decision-making capabilities are allocated to (or shared between) three different branches - Executive, Legislative and Judiciary - in three different levels of government - the Union, the 26 states and the Federal District, and over 5.5 thousand municipalities -. When it comes to the prospect of a green transition, the Union's Executive branch, the federal government, is especially significant as it encompasses the most prominent actors in setting the country's foreign, economic and environmental policy, which is why it will be the main focus of this section. Nonetheless, subnational, parliamentary and judiciary actors are increasingly engaged in environmental agendas and can act as significant players, especially but not exclusively, during policy implementation.

In late 2022, Brazil held general elections for the Executive and Legislative branches of its federal and state levels of government. Former president Luis Inácio Lula da Silva (from the centre-left Workers' Party) narrowly won the second round of the presidential election last 30 October against the then-incumbent president Jair Bolsonaro (from the right-wing Liberal Party). During that election cycle, environmental issues were considerably prominent as the Bolsonaro administration was often accused of being negligent or outright detrimental in its environmental policy, especially in relation to illegal logging, mining, and overall deforestation in the Amazon Rainforest[82].

To illustrate this, in the graph below, the Bolsonaro administration's record is highlighted in dark yellow (2019-2022), whereas Lula's previous governments' are in light red (2003-2010) and his anointed successor Dilma Rousseff's are in dark red (2011-2015). Whereas Lula's first two terms in office saw a yearly average of 10.72% decrease in deforestation, Bolsonaro's four years registered a 12.6% increase. Moreover, while Lula's last year in office (2010) represented an over 67% decrease in deforestation when compared to his predecessor's last year in power, Bolsonaro's last year recorded a 53.5% increase in relation to his predecessor's.

[81] "Change in per capita CO_2 emissions", Our World In Data, accessed 13 February 2023, https://ourworldindata.org/grapher/co-emissions-per-capita?tab=chart&stackMode=relative&time=2020..latest&country=OWID_WRL~BRA

[82] Goivanna Galvani, "Amazônia no debate da Globo: veja dados dos governos de Lula e Bolsonaro", *UOL*, 29 October 2022, https://noticias.uol.com.br/eleicoes/2022/10/29/desmatamento-na-amazonia-lula-e-bolsonaro-debate.htm



Source: Brazil's National Institute of Space Research's TerraBrasilis database[83]

The new Lula administration was inaugurated on the 1st of January 2023. In his inaugural address to the National Congress, the president referenced environmental commitments such as "zero deforestation in the Amazon" and a "zero greenhouse gas emissions energy grid"[84]. He later assigned a 2030 deadline for the zero deforestation goal[85] and, in the first month of the administration, reestablishing law enforcement and environmental protection in indigenous lands in the Amazon quickly took a major role[8687]. Although the net zero greenhouse gas emissions goal has not been as prominent in government communications, in 2021 Brazil updated its Nationally Determined Contributions (NDCs) to the Paris Agreement and committed to net zero emissions by 2050 and a 50% decrease by 2030 in relation to its 2005 emission levels.

[83] "Taxas de desmatamento - Amazônia Legal - Estados", TerraBrasilis, Instituto Nacional de Pesquisas Espaciais, accessed 6 March 2023, http://terrabrasilis.dpi.inpe.br/app/dashboard/deforestation/biomes/legal_amazon/rates
[84] "Leia na íntegra os discursos de Lula na posse", *UOL*, 1 January 2023, https://noticias.uol.com.br/politica/ultimas-noticias/2023/01/01/posse-lula-discursos-congressso-planalto-integra.htm
[85] "Lula diz ter compromisso com desmatamento zero na Amazônia até 2030", *G1*, 18 January 2023, https://g1.globo.com/politica/noticia/2023/01/18/lula-diz-ter-compromisso-com-desmatamento-zero-na-amazonia-ate-2030.ghtml
[86] "Ibama e Funai iniciam retomada do território Yanomami", *Ibama*, 8 February 2023, https://www.gov.br/ibama/pt-br/assuntos/noticias/2023/ibama-e-funai-iniciam-retomada-do-territorio-yanomami
[87] Valéria Oliveira, "Ibama queima avião, helicóptero e maquinários de garimpeiros ilegais na Terra Yanomami", *G1*, 11 February 2023, https://g1.globo.com/rr/roraima/noticia/2023/02/11/ibama-queima-aviao-helicoptero-e-maquinarios-de-garimpeiros-ilegais-na-terra-yanomami-videos.ghtml

In his address to Congress[88]President Lula also promised to "start an ecological and energy transition towards sustainable mining, agriculture and animal husbandry, stronger family farming and greener manufacturing". He argued that in incentivising the "recovery of degraded pastures" Brazil could keep and expand its agricultural frontier "without cutting down a single tree" and that indigenous Brazilians would play a central role in this process as "each demarcated piece of [indigenous] land is a new area for environmental protection". Lastly, he declared that, "with sovereignty and responsibility" and "never with subordination", Brazil would share its environmental assets with "humanity" and that "the world waits for Brazil to return to being a leader in facing the climate crises".

Lula's speech is relevant because it outlines an agenda for a green transition encompassing multiple sectors of the economy and of his own incoming administration, identifying environmental policy as a transgovernmental priority. It ties these commitments to the forefront of the country's foreign, economic, and justice policy and demands action on the matter to almost all incoming decision-makers. For instance, it is noteworthy that, since the promulgation of Decree 11.417[89] in February 2023, all Ministries - besides every branch of the Armed Forces, every state government and a number of representantives from municipal governments (8 seats), organised labour and civil society (22 seats) and business entities (8 seats) - will now hold a seat in the revamped National Environmental Council, chaired by the Environment and Climate Change minister. As such, it is worth analysing how some of Lula's key ministers have taken on the task over these first months of government and to what extent the president's remarks are setting the agenda in Brazil's federal bureaucracy.

When it comes to environmental policy, the new government's most notable actor is Marina Silva, a world-renowned environmental activist and senior Brazilian politician who served as Environment minister in Lula's previous terms between 2003 and 2008. As the head of the now renamed "Ministry of the Environment and Climate Change", Silva is a key indicator of where the attention of the current government lies when it comes to the environment.

During her first month back in power, Silva has been dedicated to restructuring key environmental protection agencies which she argues were weakened and whose agents had been "persecuted", "abused" and "dismissed" in the previous administration[90]. She has also worked to restructure her Ministry by reintegrating policy areas (such as water management) and agencies (such as the Forest Service) that had been relocated to other Ministries during the last presidential term. In updating the Ministry's bureaucracy, she has promised to present to Congress by April a proposal to create a National Climate Security Authority. The new agency would be tasked with producing data and

[88] "Leia na íntegra os discursos de Lula na posse", *UOL*, 1 January 2023, https://noticias.uol.com.br/politica/ultimas-noticias/2023/01/01/posse-lula-discursos-congressso-planalto-integra.htm

[89] "Decreto nº 11.417, de 16 de Fevereiro de 2023", Presidência da República, accessed 25 March 2023, http://www.planalto.gov.br/ccivil_03/_ato2023-2026/2023/decreto/D11417.htm

[90] "Discurso da ministra do Meio Ambiente e Mudança do Clima, Marina Silva", *Governo Federal*, 4 January 2023, https://www.gov.br/pt-br/noticias/meio-ambiente-e-clima/2023/01/discurso-da-ministra-do-meio-ambiente-e-mudanca-do-clima-marina-silva

monitoring the implementation of the National Climate Policy and with overseeing sectoral plans and goals related to mitigation, adaptation, and resilience promotion to climate change[91].

As she settles into the job, deforestation has clearly topped Silva's agenda, especially as the government embarked on a wholesale intervention in the Yanomami Indigenous Land (TIY) to provide healthcare and food aid to the Yanomami indigenous communities which were found to be in critical conditions. This intervention has seen a coordinated effort by environmental agencies, the Federal Police, the Armed Forces and the indigenous affairs agency to disrupt and evade hundreds of illegal miners and loggers that had invaded the TIY[92]. For her part, Silva has proposed a new "structured" (rather than seasonal) strategy to repel these activities that would see permanent bases being set up in the territory by these agencies.

As pointed out by President Lula in his speech, this crisis helps illustrate the deep connection between indigenous and environmental policy, especially in northern Brazil. With that in mind, it is noteworthy that, for the first time, the Brazilian federal government has a Ministry of Indigenous Peoples. The new portfolio is headed by internationally recognised indigenous rights activist and recently elected congresswoman Sonia Guajajara[93] and encompasses a National Secretariat of Indigenous Territorial and Environmental Management and the Department for Climate Justice. For now, it is mostly focused on assessing the needs of different communities and implementing more immediate urgent action, as well as on setting up its own bureaucratic structure.

On the 9th of February 2023, Silva also took part in the first meeting of the re-assembled Permanent Interministerial Committee on the Prevention and Control of Deforestation and Fires, in which her Ministry acts as General Secretariat. The group was set up by one of Lula's first decrees as a revamped version of a previous interministerial committee that had been terminated in the early months of the Bolsonaro administration and to which Silva attributed an 83% drop in deforestation in the Amazon between 2004 and 2012[94]. The new body encompasses 19 Ministries. It is chaired by the president's chief of staff, Rui Costa - which signals its transgovernmental approach and priority status -, and will produce plans to halt deforestation in all Brazilian biomes by August 2023 in cooperation with civil societies groups and state governments.[95]

---

[91] "Com Marina Silva à frente, conheça a nova estrutura e as principais figuras do meio ambiente no governo Lula", Frente Parlamentar Ambientalista, accessed 12 February 2023, https://www.frenteambientalista.com/com-marina-silva-a-frente-conheca-a-nova-estrutura-e-as-principais-figuras-do-meio-ambiente-no-governo-lula/

[92] Tom Phillips, "Brazil launches operation to drive illegal miners from Yanomami lands", *The Guardian*, 8 February 2023, https://www.theguardian.com/world/2023/feb/08/brazil-illegal-mining-indigenous-lula

[93] Laís Modelli, "Como funcionará o inédito Ministério dos Povos Indígenas", *DW*, 3 January 2023, https://www.dw.com/pt-br/como-funcionar%C3%A1-o-in%C3%A9dito-minist%C3%A9rio-dos-povos-ind%C3%ADgenas/a-64269096

[94] "Nova estratégia de combate ao desmatamento reúne 19 ministérios", *Ministério do Meio Ambiente*, 9 February 2023, https://www.gov.br/mma/pt-br/assuntos/noticias/nova-estrategia-de-combate-ao-desmatamento-reune-19-ministerios

[95] Heloisa Cristaldo, "Governo instala comissão para zerar desmatamento no Brasil até 2030", *AgênciaBrasil*, 8 February 2023, https://agenciabrasil.ebc.com.br/politica/noticia/2023-02/governo-instala-comissao-para-zerar-desmatamento-no-brasil-ate-2030

The Committee will oversee a program structured around 4 guidelines: (1) promoting sustainable productive activities, (2) environmental monitoring and controls, (3) territorial planning and land regularisation, and (4) normative and economic instruments[96]. Over guidelines 2 and 3, Marina Silva's Environment Ministry and Sonia Guajajara's Indigenous Peoples Ministry will most likely play the central roles in cooperation with security agencies, the Armed Forces, and the Rural Development Ministry's land management agency[97]. When it comes to the first guideline, the promotion of sustainable productive activities is linked to the broader agenda of a green transition in that it should entail the sustainable exploration of public forests, but also incentives to the development of "bioeconomy" activities, "low-carbon agriculture" and "green infrastructure". These should mobilise more economy-oriented portfolios that also hold seats in the Interministerial Committee such as the Agriculture, Science and Technology, Regional Development, Mines and Energy, Rural Development, Fisheries, Labour, Industry and Trade, and Transportation Ministries.

On the latter guideline, it should be noted that the government has recently reactivated the Amazon Fund, a key economic instrument through which it receives foreign donations to fund reforestation and forest protection projects. The fund is operated by Brazil's National Social and Economic Development Bank (BNDES) and used to receive donations from the German and Norwegian governments until they were frozen in the first year of the Bolsonaro administration[98]. Since Lula's inauguration, both countries have announced they will resume donations[99][100] and, during president Lula's trip to Washington DC on the 10th of February 2023, US president Joe Biden pledged to also contribute to the Fund[101], which is expected to help attract more donors. In a trip to Brazil on the 1st of March, US Climate Envoy John Kerry was not able to set a figure for their contribuition but pointed out that there were proposals being negotiated in the US Congress ranging from USD 4 to 9 billion[102].

Furthermore, the Amazon Fund is significant because it points to the centrality of foreign policy in the new administration's environmental policy, and vice versa. For one, Lula has expressed the notion that environmental responsibility is a key avenue through which Brazil will (re)build its international reputation and Marina Silva has shared her expectation that foreign actors (state and non-state[103])

---

[96] "Decreto nº 11.367, de 1º de Janeiro de 2023", *Diário Oficial da União*, 2 January 2023, https://www.in.gov.br/en/web/dou/-/decreto-n-11.367-de-1-de-janeiro-de-2023-455351826

[97] "O Incra", Ministério do Desenvolvimento Agrário, accessed 12 February 2023, https://www.gov.br/incra/pt-br/acesso-a-informacao/institucional/o-incra

[98] "O Fundo Amazônia é reativado", *Embaixada Real da Noruega no Brasil*, 2 January 2023, https://www.norway.no/pt/brasil/noruega-brasil/noticias-eventos/brasil/amazon-fund.-press-release.-2023/

[99] "O Fundo Amazônia é reativado", *Embaixada Real da Noruega no Brasil*, 2 January 2023, https://www.norway.no/pt/brasil/noruega-brasil/noticias-eventos/brasil/amazon-fund.-press-release.-2023/

[100] "Alemanha anuncia envio de € 35 milhões para Fundo Amazônia", *Poder360*, 2 January 2023, https://www.poder360.com.br/internacional/alemanha-anuncia-envio-de-35-milhoes-de-euros-para-fundo-amazonia/

[101] Mariana Haubert, "EUA oferecem US$ 50 milhões para Fundo Amazônia", *Poder360*, 10 February 2023, https://www.poder360.com.br/internacional/eua-oferecem-us-50-milhoes-para-fundo-amazonia/

[102] Leandro Prazeres, "É preciso investir no combate à crise climática como fazemos na guerra da Ucrânia, diz John Kerry", *BBC*, 1 March 2023, https://www.bbc.com/portuguese/articles/cxe31p3e3v4o

[103] Jamil Chade, "Bezos e DiCaprio fecham operação emergencial na Amazônia com Marina Silva", *UOL*, 11 February 2023, https://noticias.uol.com.br/colunas/jamil-chade/2023/02/11/bezos-e-di-caprio-fecham-operacao-emergencial-na-amazonia-com-marina-silva.htm

will play a key role in financing environmental action[104] and in promoting the sustainable development needed to disincentivise predatory economic activities. In a similar sense, even in previous administrations, the country has directed plenty of diplomatic energy into the international carbon credit market project[105], and, at the 2023 World Economic Forum in Davos, Silva indicated this will continue to be a key foreign policy goal for the country[106].

As such, it is relevant to note that the new Ministry of Foreign Affairs - headed by Mauro Vieira, an experienced career diplomat who previously held the role between 2015 and 2016 - has reinstated its positions of secretary of Climate, Environment and Energy and of extraordinary ambassador for Climate Change. The latter will be held by former Foreign minister Luiz Alberto Figueiredo, who was Brazil's chief negotiator at the United Nations' Climate Change Conference (UNFCCC)'s COP15 and executive secretary of Rio+20[107][108], and the former by former ambassador to India André Correa do Lago, who was Brazil's chief negotiator at Rio+20[109]. Both will be instrumental in pursuing multilateral goals set out by President Lula such as holding an Amazon Summit with the leaders of Amazonian countries (including France's Emmanuel Macron[110]), strengthening a recently-forged alliance with other rainforest countries such as the DR Congo and Indonesia[111], and hosting the UNFCCC's 2025 COP 30 in the Amazonian city of Belém[112].

New environmental commitments also seem to be one of the key factors in ongoing negotiations for a Free Trade Agreement between the European Union and Mercosur, the South American trade bloc formed by Brazil, Argentina, Paraguay, Uruguay, and, although currently suspended, Venezuela. The deal was signed in mid-2019 but has not been ratified yet. Since then, opposition to it in the EU,

---

[104] {Updating}
[105] Raphael Veleda, "Salles reabre campanha para cobrar créditos de carbono de países ricos", *Metrópoles*, 22 February 2021, https://www.metropoles.com/brasil/salles-reabre-campanha-para-cobrar-creditos-de-carbono-de-paises-ricos
[106] Kellen Severo, "Marina Silva quer regular o mercado de carbono; entenda como o agro será afetado", *Jovem Pan*, 18 January 2023, https://jovempan.com.br/opiniao-jovem-pan/comentaristas/kellen-severo/marina-silva-quer-regular-o-mercado-de-carbono-entenda-como-o-agro-sera-afetado.html
[107] Catarina Alencastro and Eliane Oliveira, "Luiz Alberto Figueiredo, um diplomata sem firula que busca consensos", *O Globo*, 14 September 2013, https://oglobo.globo.com/politica/luiz-alberto-figueiredo-um-diplomata-sem-firula-que-busca-consensos-9965141
[108] It is also noteworthy that, while Figueiredo's position is akin to John Kerry's post as US Climate Envoy, they were also counterparts as Foreign ministers between 2013 and 2015
[109] "André Corrêa do Lago", International Advisory Board, CEBRI, accessed 12 February 2023, https://www.cebri.org/en/especialista/84/andre-correa-do-lago
[110] Geovana Melo, "Presidente da França, Macron pode vir ao Brasil ainda neste semestre para Cúpula da Amazônia", *G1*, 8 February 2023, https://g1.globo.com/politica/noticia/2023/02/08/presidente-da-franca-macron-pode-vir-ao-brasil-ainda-neste-semestre-para-cupula-da-amazonia.ghtml
[111] "Brasil, Indonésia e República Democrática do Congo anunciam aliança dos países detentores das maiores florestas tropicais do mundo", *Ministério do Meio Ambiente*, 10 November 2022, https://www.gov.br/mma/pt-br/brasil-indonesia-e-republica-democratica-do-congo-anunciam-alianca-dos-paises-detentores-das-maiores-florestas-tropicais-do-mundo
[112] "Candidatura brasileira para sediar a COP 30", *Ministério das Relações Exteriores*, 12 January 2023, https://www.gov.br/mre/pt-br/canais_atendimento/imprensa/notas-a-imprensa/candidatura-brasileira-para-sediar-a-cop-30

especially from member-states like France, Austria, and the Netherlands[113], has focused on disparities in environmental protection requirements. On the 8th of March, chief negotiators met in Buenos Aires and agreed on a semester-long schedule of reenergised negotiations[114] following President Lula's calls to prioritise the deal in meetings with his Argentinian[115], Uruguayan[116], German[117], and French[118] counterparts. As of March, a "supplementary instrument" focused on sustainability and without reference to sanctions is expected by the end of July[119].

At the Deforestation Committee meeting in February, the vice-president and current minister of Industry and Trade, Geraldo Alckmin, pointed out that "to reduce carbon emissions is to combat deforestation. A hectare of cut-down and burnt forest produces 300 tons of carbon [emissions]. It is the most urgent task and the one with the best results"[120]. This quote reveals an approach that fundamentally ties the zero deforestation and the zero greenhouse gas emission goals, which in turn calls attention to the relative immaturity of other strategies. Out of these, on the 9th of March 2023, Minister Marina Silva promised to prioritise regulation that would make the domestic carbon credit market accessible to small businesses[121]. The issue requires congressional approval and there are two key bills being considered simultaneously by the House[122] and the Senate[123]. Neither one has fully cleared the committee stage yet.

---

[113] Assis Moreira, "EU, Mercosur set timeline to finalize agreement by July", *Valor International*, 8 March 2023, https://valorinternational.globo.com/economy/news/2023/03/08/eu-mercosur-set-timeline-to-finalize-agreement-by-july.ghtml

[114] "Comunicado Conjunto emitido por ocasião de reunião de negociadores-chefes MERCOSUL-União Europeia", *Ministério das Relações Exteriores*, 8 March 2023, https://www.gov.br/mre/pt-br/canais_atendimento/imprensa/notas-a-imprensa/comunicado-conjunto-emitido-por-ocasiao-de-reuniao-de-negociadores-chefes-mercosul-uniao-europeia

[115] Janaína Figuereido, "'A bola está do lado dos europeus', diz chanceler argentino sobre acordo com Mercosul", *O Globo*, 14 February 2023, https://oglobo.globo.com/mundo/noticia/2023/02/a-bola-esta-do-lado-dos-europeus-diz-chanceler-argentino-sobre-acordo-com-mercosul.ghtml

[116] Mariana Haubert and Natália Veloso, "Acordo Mercosul-União Europeia 1º, depois China, diz Lula", *Poder360*, 25 January 2023, https://www.poder360.com.br/governo/acordo-mercosul-uniao-europeia-1o-depois-china-diz-lula/

[117] Nathalia Garcia and Marianna Holanda, "Lula promete concluir acordo entre União Europeia e Mercosul, mas diz que texto precisa mudar", *Folha de São Paulo*, 30 January 2023, https://www1.folha.uol.com.br/mercado/2023/01/lula-promete-concluir-acordo-entre-uniao-europeia-e-mercosul-mas-diz-que-texto-precisa-mudar.shtml

[118] "Lula e Macron conversam sobre clima e acordo UE-Mercosul", *DW*, 27 January 2023, https://www.dw.com/pt-br/lula-e-macron-conversam-sobre-clima-e-acordo-ue-mercosul/a-64530882

[119] Assis Moreira, "EU, Mercosur set timeline to finalize agreement by July", *Valor International*, 8 March 2023, https://valorinternational.globo.com/economy/news/2023/03/08/eu-mercosur-set-timeline-to-finalize-agreement-by-july.ghtml

[120] "Ação transversal do Governo Federal sela compromisso de prevenção e controle do desmatamento", *Secretaria de Comunicação Social*, 9 February 2023, https://www.gov.br/secom/pt-br/assuntos/noticias/2023/02/acao-transversal-do-governo-federal-sela-compromisso-de-prevencao-e-controle-do-desmatamento

[121] "Marina Silva sinaliza prioridade a mercado de carbono acessível a pequenos comerciantes", *Folha de S. Paulo*, 9 March 2023, https://www1.folha.uol.com.br/colunas/painel/2023/03/marina-silva-sinaliza-prioridade-a-mercado-de-carbono-acessivel-a-pequenos-comerciantes.shtml

[122] "PL 2148/2015", Propostas Legislativas, Câmara dos Deputados, accessed 12 March 2023, https://www.camara.leg.br/propostas-legislativas/1548579

[123] "Projeto de Lei n° 412, de 2022", Atividade Legislativa, Senado Federal, accessed 12 March 2023, https://www25.senado.leg.br/web/atividade/materias/-/materia/151967

The carbon credit market should also be significant in the agenda of vice-president Alckmin's Ministry of Industry and Trade, which has been setting up a novel Secretariat of Green Economy, Decarbonisation and Bioindustry. The portfolio is held by former Federal District governor Rodrigo Rollemberg and, in the context of the National Council of Industrial Development, is supposed to play an active role in coming up with a "Green and Technological Industrial Strategy"[124]. The document will be a 10-year plan[125] detailing the vision of reindustrialisation put forth by the Lula-Alckmin ticket during the 2022 campaign and which was heavily emphasized in Alckmin's inaugural address in his ministerial role[126].

Meanwhile, Alckmin has also pushed for more immediate action, such as increasing the country's mandatory blend of biodiesel in diesel, which was shrunk from 13% to 10% during the Bolsonaro administration[127]. The issue will be addressed at a 17th of March meeting of the National Council of Energy Policy and is significant because it relies on input by other decision-makers such as the traditionally more business-focused Mines and Energy, and Agriculture Ministries. The final decision should be an early sign of the government's commitment to a relatively bolder environmental agenda - the new biodiesel blend requirement is expected to be of at least 15%[128] -, as well as its ability to set rules affecting multiple sectors of the economy while coordinating the decision-making process across portfolios held by actors from different political backgrounds.

Unlike the stakeholders previously mentioned[129], Alexandre Silveira, the Mines and Energy minister, and Carlos Fávaro, the Agriculture minister, are not affiliated with centre-left parties. Like the ministers of Transportation, Planning and Budget, Cities, Fisheries, Tourism, Regional Development and Communications, Silveira and Fávaro represent centre-right parties that joined Lula's coalition after his election. These Ministries have also seen bureaucratic changes to accommodate the transgovernmental aspect of the administration's environmental agenda, but they deserve special attention because, while having significant regulatory and agenda-setting powers, their leaders can be even more sensitive to private sector interests and, to different degrees, less bounded to Lula's campaign promises.

---

[124] "MDIC inicia elaboração de proposta de nova política industrial para os próximos 10 anos", *Ministério do Desenvolvimento, Indústria e Comércio Exterior*,16 February 2023, https://www.gov.br/mdic/pt-br/assuntos/noticias/2023/fevereiro/mdic-inicia-elaboracao-de-proposta-de-nova-politica-industrial-para-os-proximos-10-anos

[125] "MDIC inicia elaboração de proposta de nova política industrial para os próximos 10 anos", *Ministério do Desenvolvimento, Indústria e Comércio Exterior*,16 February 2023, https://www.gov.br/mdic/pt-br/assuntos/noticias/2023/fevereiro/mdic-inicia-elaboracao-de-proposta-de-nova-politica-industrial-para-os-proximos-10-anos

[126] "Discurso do vice-presidente Geraldo Alckmin", *Governo Federal*, 4 January 2023, https://www.gov.br/pt-br/noticias/comunicacao/2023/01/discurso-do-vice-presidente-geraldo-alckmin

[127] Roberto Samora; Editing by Kirsten Donovan and Will Dunham, "Brazil to decide biodiesel mandate in March meeting, ministry says", *Reuters*, 24 February 2023, https://www.reuters.com/business/energy/brazil-decide-biodiesel-mandate-march-meeting-says-ministry-2023-02-24/

[128] Roberto Samora, "Reunião do CNPE que pode decidir mistura de biodiesel marcada para dia 17", *BiodieselBR*, 7 March 2023, https://www.biodieselbr.com/noticias/regulacao/politica/reuniao-do-cnpe-que-pode-decidir-mistura-de-biodiesel-marcada-para-dia-17-070323

[129] A significant caveat should be noted about vice-president Geraldo Alckmin, who is now affiliated to the centre-left Brazilian Socialist Party (PSB) and was Lula's 2022 running mate, but spent the vast majority of his political career in the centre-right PSDB and ran against Lula's 2006 reelection bid.

In his inaugural address, Agriculture Minister Fávaro attempted to dispel precisely that perception when he assured that those who had anticipated "conflict between Minister Carlos Fávaro and the Environment and Rural Development ministers" will be "surprised because we are all on the same side. We want and will have the world's most sustainable agricultural production"[130]. Despite the pledge, Fávaro's agenda has been relatively light on specifics, but he co-authored a couple of 2022 campaign documents outlining proposals for the agricultural sector which included regulating the domestic carbon credit market to compensate farmers and land-owners for "environmental assets", as well as a national program to fund the transformation of degraded pastures in low-carbon soy and corn crops[131].

Notably, Fávaro's Ministry has inherited from the last administration the 2020-2030 ABC+ Plan for Low-Carbon Agriculture[132], which intends to reduce the sector's greenhouse gas emissions in line with the country's UNFCCC NDCs.The plan is under the umbrella of the Agriculture Ministry's Secretariat of Innovation, Sustainable Development, Irrigation and Cooperativism, led by career civil servant Renata Miranda[133]. Currently, in its second 10-year run, it sets out to promote sustainable production systems and the use of animal waste to produce biogas and organic compost, curb deforestation, and prepare and apply techniques to adapt agricultural production and rural communities to the effects of climate change.

In its first 10-year edition, the ABC Plan was credited with amassing almost BRL 21 billion in financing and leading to the recovery of over 26 million hectares of degraded pastures[134]. This next edition includes targets such as another 30 million hectares of recovered degraded pastures, 26 million hectares of expanded sustainable production systems (like planted forest and direct planting systems), and a 13 million hectares expansion of biological nitrogen fixation adoption as opposed to nitrogen fertilisers[135].

In turn, Silveira's Ministry has seen the former Energy Development and Planning Secretariat be transformed into the Energy Transition and Planning Secretariat. The new body will be led by Thiago

---

[130] André Borges, "Carlos Fávaro assume Agricultura prometendo 'reconstruir pontes' e pacificar relações com governo", *Estadão*, 02 January 2023, https://www.estadao.com.br/economia/carlos-favaro-assume-agricultura-prometendo-reconstruir-pontes-e-pacificar-relacoes-com-governo/

[131] Mateus Maia and Guilherme Waltenberg, "'Minha missão é pacificar o agronegócio', diz Fávaro", *Poder360*, 2 January 2023, https://www.poder360.com.br/governo/minha-missao-e-pacificar-o-agronegocio-diz-favaro/

[132] "Portaria MAPA nº 471, de 10 de Agosto de 2022", *Diário Oficial da União*, 11 August 2022, https://www.in.gov.br/en/web/dou/-/portaria-mapa-n-471-de-10-de-agosto-de-2022-421902518

[133] "Secretaria de Inovação, Desenvolvimento Sustentável, Irrigação e Cooperativismo - SDI", Ministério da Agricultura e Pecuária, accessed 13 March 2023, https://www.gov.br/agricultura/pt-br/acesso-a-informacao/institucional/quem-e-quem-novo/sdi

[134] "Governo Federal institui sistema para monitorar Plano ABC 2021/2030", *Ministério da Agricultura e Pecuária*, 25 January 2021, https://www.gov.br/agricultura/pt-br/assuntos/noticias/governo-federal-institui-sistema-para-monitorar-plano-abc-2021-2030

[135] "Plano ABC+ entra em vigor em setembro e vai reduzir emissão de carbono", *AgênciaBrasil*, 11 August 2022, https://agenciabrasil.ebc.com.br/economia/noticia/2022-08/plano-abc-entra-em-vigor-em-setembro-e-vai-reduzir-emissao-de-carbono

Barral, a career civil servant, who was tasked by the minister, in his inaugural address, with putting together policies to orient the future of Brazil's energy generation towards "innovation and the expansion of renewable sources"[136]. He especially highlighted the role of natural gas and biomass fuels, as well as the prospect of incorporating low-carbon hydrogen storage technologies into the Brazilian energy matrix.

According to the World Economic Forum, these new hydrogen-based technologies are "one of the leading options for storing energy from renewables" and hold the potential of enabling its transportation over long distances[137]. Since 2021, the Mines and Energy Ministry has been developing a National Hydrogen Program (PNH2), whose Triennial Work Plan (2023-2025) was under public consultation until the 28th of February 2023[138]. The outline of its first draft[139], as proposed by the last administration, focused on incentivising the development of scientific, technological, and human resources capabilities, as well as structuring the legal, regulatory, financial, and commercial requirements to prop up the Brazilian hydrogen market.

Also expected to play a major role in the Brazilian energy transition is Petrobras, the majority state-owned multinational oil company of the country. Its new CEO, former Workers' Party senator and oil sector executive Jean Paul Prates, pledged to pursue the "lucrative diversification" of operations towards renewable sources while also furthering its exploration of oil and gas "in a responsible manner"[140]. In his first public address as head of the company, he highlighted plans to work with hydrogen, offshore wind, and "new generation" biofuels[141]. The company's investment capabilities were traditionally leveraged as an economic policy tool in previous Workers' Party's governments, but its share in national investment figures dropped from 7.6% in 2014 (the last year of the first Rousseff administration) to 3% in 2022[142]. Lula has been critical of the choice to direct its

---

[136] Alexandre Silveira, "Alexandre Silveira: discurso de posse como ministro de Minas e Energia", filmed 2 January 2023 at Ministério de Minas e Energia, Brasília, video, 8:47, https://www.youtube.com/watch?v=1Gtnr8zPlKs

[137] Abhinav Chugh and Emanuele Taibi, "What is green hydrogen and why do we need it? An expert explains", *World Economic Forum*, 21 December 2021, https://www.weforum.org/agenda/2021/12/what-is-green-hydrogen-expert-explains-benefits/

[138] "MME prorroga consulta pública do Plano Trienal do Programa Nacional do Hidrogênio", *Ministério de Minas e Energia*, 31 January 2023, https://www.gov.br/mme/pt-br/assuntos/noticias/mme-prorroga-consulta-publica-do-plano-trienal-do-programa-nacional-do-hidrogenio

[139] Ministério de Minas e Energia, *Plano de Trabalho Trienal (2023-2025*), Comitê Gestor do Programa Nacional de Hidrogênio. Brasília: MME, 2022, https://bit.ly/3K1MSq5 (accessed 12 March 2023).

[140] "Jean Paul defende Petrobras na liderança da transição energética", *Poder360*, 27 January 2023, https://www.poder360.com.br/energia/jean-paul-defende-petrobras-na-lideranca-da-transicao-energetica/

[141] "Petrobras vai manter protagonismo enquanto se prepara para o futuro, diz Prates", *Mercado & Consumo*, 2 March 2023, https://mercadoeconsumo.com.br/02/03/2023/economia/petrobras-vai-manter-protagonismo-enquanto-se-prepara-para-o-futuro-diz-prates/

[142] "Bolsonaro reduz papel da Petrobras no PIB; governo Lula quer recuperação com investimento", *CartaCapital*, 24 December 2022, https://www.cartacapital.com.br/economia/bolsonaro-reduz-papel-da-petrobras-no-pib-governo-lula-quer-recuperacao-com-investimento/

profits to pay dividends at the expense of investment projects[143], to which Prates attributes that drop[144].

During the last administration, in November 2022, the company published a 5-year strategic plan that set out 83% of its USD 78 billion investment budget for oil and gas exploration and only USD 4.4 billion for energy transition projects[145]. Prates was part of the working group that oversaw energy policy during the post-election government transition in late 2022 and which had suggested a revision of Petrobras' investment plan[146][147]. As such, it would be expected to see an increase in those figures as long as Prates manages to secure the nomination of closer associates to the company's Board, a process that has taken longer than originally expected[148] and which should include the appointment of Rio de Janeiro Federal University professor and former national secretary for Climate Change[149], Suzana Khan[150].

If truly revised, a refurbished Petrobras investment plan would be a significant addition to the capacity of the Brazilian government to fund the green transition, but these projects will still have to compete with Prates' goal to expand oil refinery capacity[151] and President Lula's ambition to spur a new Brazilian shipbuilding industry[152]. Apart from that, budgetary government funding will most certainly be central to the prospects of a green transition in Brazil, which is why it is worth paying heed to the agenda and specific sustainability-oriented commitments of Finance Minister Fernando Haddad, a senior Workers' Party politician who previously served as Lula and Rousseff's Education

[143] Marcos Mortari, "Lula critica dividendo recorde da Petrobras e diz que empresas brasileiras têm que 'pensar primeiro no país'", *Infomoney*, 2 March 2023, https://www.infomoney.com.br/politica/lula-critica-dividendo-recorde-da-petrobras-e-diz-que-empresas-brasileiras-tem-que-pensar-primeiro-no-pais/
[144] "Bolsonaro reduz papel da Petrobras no PIB; governo Lula quer recuperação com investimento", *CartaCapital*, 24 December 2022, https://www.cartacapital.com.br/economia/bolsonaro-reduz-papel-da-petrobras-no-pib-governo-lula-quer-recuperacao-com-investimento/
[145] Lais Carregosa, "Petrobras vai investir US$ 78 bilhões nos próximos 5 anos", *Poder360*, 30 November 2022, https://www.poder360.com.br/energia/petrobras-vai-investir-us-78-bilhoes-nos-proximos-5-anos/
[146] "Jean Paul defende Petrobras na liderança da transição energética", *Poder360*, 27 January 2023, https://www.poder360.com.br/energia/jean-paul-defende-petrobras-na-lideranca-da-transicao-energetica/
[147] Lais Carregosa, "Relatório da transição sugere rever plano estratégico da Petrobras", *Poder360*, 4 Junary 2022, https://www.poder360.com.br/governo/relatorio-da-transicao-sugere-rever-plano-estrategico-da-petrobras/
[148] Vinicius Konchinski, "Governo demora a indicar conselheiros, atrasa mudanças na Petrobras e gera críticas", *Brasil de Fato*, 21 February 2023, https://www.brasildefato.com.br/2023/02/21/governo-demora-a-indicar-conselheiros-atrasa-mudancas-na-petrobras-e-gera-criticas
[149] "Suzana Kahn Ribeiro", Membros, Câmara Brasileira de Resolução de Conflitos em Energia e Mineração, accessed 13 March 2023, https://cbme.com.br/membro/suzana-kahn-ribeiro/
[150] "Efrain Cruz vai para Conselho de Administração da Petrobras", *Poder360*, 8 March 2023, https://www.poder360.com.br/energia/efrain-cruz-vai-para-conselho-de-administracao-da-petrobras/
[151] "Prates defende Petrobras como impulsionadora da transição energética no país", *EPBR*, 27 January 2023, https://epbr.com.br/prates-defende-petrobras-como-impulsionadora-da-transicao-energetica-no-pais/
[152] Rayanderson Guerra, "Lula anuncia retomada de investimentos na indústria naval no Rio de Janeiro", *Estadão*, 6 February 2023, https://www.estadao.com.br/economia/lula-anuncia-retomada-investimentos-industria-naval-rio-de-janeiro/

minister, as mayor of São Paulo City (Brazil's richest municipality), and as the Party's ultimately unsuccessful 2018 presidential candidate.

On the 13th of March 2023, Haddad took part in a press conference hosted by the National Confederation of Commerce and Services[153], in which he updated journalists on his Ministry's two biggest priorities: the so-called 'new fiscal anchor' and the tax reform. Both are expected to be introduced to Congress within the next semester and are major goals in the new government's legislative agenda. The new fiscal anchor is supposed to replace the 'expenditure ceiling' fiscal rule that froze government spending in 2017 (but which had not been in full effect since at least 2019[154]). The tax reform is supposed to simplify Brazil's notoriously complex tax system by creating a unified Value-Added Tax and to make taxation more progressive by eventually relying more on taxing income than consumption.

While there is still little settled about either proposal and it is even unclear to what extent the government commands a stable enough majority in the National Congress to push them through, in the press conference, Haddad pointed out some relevant commitments that tie his agenda to a green transition push. One of them would be that the tax reform will include a 'selectivity mechanism' that will allow it to discount tax rates for activities associated with 'positive externalities', for which he specifically mentioned "environmental matters" and cited "wind power, solar, and green hydrogen"[155]. Haddad has also pledged to work with Environment Minister Marina Silva to update the regulation of the country's gold market, which he associated with loopholes that facilitate money-laundering but also with predatory illegal mining and environmental degradation[156][157].

Regardless, and even if Haddad has promised that the tax reform will not expand the country's overall fiscal basis, these priorities will be consequential in determining the public sector's lee-way in financing big transformational projects, as, for instance, noted in the National Hydrogen Program Work Plan[158]. Moreover, it is also worth noting that Haddad stressed that mild growth rates were not

---

[153] Fernando Haddad, "Fernando Haddad e a reforma tributária | E AGORA, BRASIL?", filmed 13 March 2023 at O Globo and Valor Econômico's E AGORA, BRASIL? Seminar, 5:30 and 37:00, https://www.youtube.com/watch?v=BnpBOfwGlqI

[154] Célio Yano, "Quantas vezes o teto de gastos já foi furado e qual é o tamanho do buraco", *Gazeta do Povo*, 24 November 2022 https://www.gazetadopovo.com.br/economia/quantas-vezes-o-teto-de-gastos-ja-foi-furado-e-qual-o-tamanho-do-buraco/

[155] Fernando Haddad, "Fernando Haddad e a reforma tributária | E AGORA, BRASIL?", filmed 13 March 2023 at O Globo and Valor Econômico's E AGORA, BRASIL? Seminar, 1:05:35, https://www.youtube.com/watch?v=BnpBOfwGlqI

[156] Fernando Haddad, "Fernando Haddad e a reforma tributária | E AGORA, BRASIL?", filmed 13 March 2023 at O Globo and Valor Econômico's E AGORA, BRASIL? Seminar, 1:07:25, https://www.youtube.com/watch?v=BnpBOfwGlqI

[157] "Receita Federal institui obrigatoriedade de nota fiscal eletrônica do ouro", *Ministério da Fazenda*, 30 March 2023, https://www.gov.br/fazenda/pt-br/assuntos/noticias/2023/marco/receita-federal-institui-obrigatoriedade-de-nota-fiscal-eletronica-do-ouro

[158] Ministério de Minas e Energia, *Plano de Trabalho Trienal (2023-2025*), Comitê Gestor do Programa Nacional de Hidrogênio. Brasília: MME, 2022, https://bit.ly/3K1MSq5 (accessed 12 March 2023).

adequate for Brazil[159], which rules out any so-called 'degrowth'[160] approaches to a green transition in the Brazilian context. As such it is notable that Haddad's Ministry has also incorporated 'sustainable development' themes into its structure. Its Economic Policy Secretariat is composed of a Sustainable Economic Development Subsecretariat, held by Cristina Reis, a federal university professor of Internacional Economics[161], and its International Affairs Secretariat counts on a Sustainable Development Financing Subsecretariat, held by Ivan Oliveira, a former research fellow of the federal government's applied economics think tank IPEA[162].

Moreover, other green transition initiatives can and should be expected from other government bodies like the Science and Technology Ministry, which recently saw solar panels added to one of its tax break programs[163], and public works-focused portfolios, like the Transportation, Regional Development, or Cities Ministries. With the latter, the question to keep in mind is to what extent they will be able to absorb and prioritise green transition goals in their agendas. These three Ministries, in particular, are led by ministers associated with more centrist forces in President Lula's coalition and in whose inaugural addresses environmental concerns were present albeit very lightly, usually kept to a single or a couple of mentions[164][165][166]. Nonetheless, they are assigned with key policy areas, such as promoting sustainable development in the Amazon and other regional biomes, building infrastructure resilient to extreme weather events and responding to extreme weather crises, furthering urban sanitation and urban transportation in line with sustainability concerns, etc.

Their commitment to the green transition agenda probably needs to be clarified further as, based on Transportation and Regional Development work plans for the administration's first 100 days, they still lack depth. Transportation's document, for instance, only mentions 19 unspecified "environmental actions'' (ranging from compensatory planting to public hearings)[167]. Regional Development's work plan mentions specific but still rather incipient measures such as starting public consultations on a

---

[159] Fernando Haddad, "Fernando Haddad e a reforma tributária | E AGORA, BRASIL?", filmed 13 March 2023 at O Globo and Valor Econômico's E AGORA, BRASIL? Seminar, 1:11:35, https://www.youtube.com/watch?v=BnpBOfwGlqI

[160] "Degrowth – what's behind the economic theory and why does it matter right now?", *World Economic Forum*, 15 June 2022, https://www.weforum.org/agenda/2022/06/what-is-degrowth-economics-climate-change/#:~:text=What%20is%20degrowth%3F,put%20wellbeing%20ahead%20of%20profit.

[161] "Cristina Fróes de Borja Reis", Quem é quem, Ministério da Fazenda, acessed 2 April 2023, https://www.gov.br/fazenda/pt-br/composicao/secretaria-de-politica-economica/subsecretaria-de-desenvolvimento-economico-sustentavel/cristina-froes-de-borja-reis

[162] "Ivan Tiago Machado Oliveira", Quem é quem, Ministério da Fazenda, acessed 2 April 2023, https://www.gov.br/fazenda/pt-br/composicao/secretaria-de-assuntos-internacionais/subsecretaria-de-financiamento-ao-desenvolvimento-sustentavel/ivan-tiago-machado-oliveira

[163] "Decreto inclui insumos fotovoltaicos no Padis, que valerá até 2026", *Ministério da Ciência, Tecnologia e Inovação*, 29 March 2023, https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/noticias/2023/03/decreto-inclui-insumos-fotovoltaicos-no-padis-que-valera-ate-2026

[164] Renan Filho, "Renan Filho: discurso de posse como ministro dos Transportes", filmed 3 January 2023 at Ministério dos Transportes, 36:00, https://www.youtube.com/watch?v=_AO0ntIg838

[165] Waldez Góes, "Waldez Góes: discurso de posse como ministro do Desenvolvimento Regional", filmed 3 January 2023 at Ministério da Integração e do Desenvolvimento Regional, 11:40, https://www.youtube.com/watch?v=gjV2nr45fNg

[166] Jader Filho, "Cerimônia de Posse do Ministro Jader Filho - Ministério das Cidades", filmed 3 January 2023 at Ministério das Cidades, 56:33, https://www.youtube.com/watch?v=8kNGtNV8tHY

[167] Ministério dos Transportes, *Plano de 100 dias: Ações prioritárias*. Brasília: MT, 2023, https://bit.ly/3K2t06s (accessed 2 April 2023).

first draft of the 'Bioeconomy for Development' Program, moving past the legal review step on the process to establish the Sustainable Regional Infrastructure Development Fund, and launching an online platform to map and keep track of "vulnerability to extreme weather events caused by climate change"[168].

Similarly, the Transportation Ministry inherited from the last government a 2023-2026 Sustainability Agenda[169], which was built in collaboration with the German cooperation agency GIZ and sets out 29 'lines of action' that include "internalizing the climate change theme, ensuring its integration into policy", "developing standardized mechanisms to identify and assess climate risks" and "qualify projects to access resources to promote mitigation and adaptation to climate change"[170]. Although it is certainly positive that the Ministry has taken steps to incorporate climate change concerns into its strategic documents, these tend to take the form of incipient commitments, which points to the relative immaturity of the green transition agenda in this sector of government. The fact that the document was inherited from a previous government also raises the question of how much centrality it will hold in the new staff's priority list, which would currently be nearly impossible to answer as, in this Ministry, this agenda is the primary concern of a Sustainability Subsecretariat that has not gotten a titular head yet[171].

Assessments and policy recommendations

In the previous sections of this article, we were able to paint an overall picture of the context in which lies the quest of pushing Brazil through a green transition. As we can visualise in the list below, this context points to multifaceted challenges but also opportunities that the country will have to overcome and mobilise in order to be successful in this endeavour.

1. **Political**: Brazil has seen the environmental agenda jump to the forefront of its political agenda both domestically and internationally. This is an opportunity in that it has produced a strong mandate for the federal government to pursue an 'all-out', transgovernmental approach, and that, given its particular geographic endowments, it can attract foreign partners to help fund its development trajectory. At the same time, the bar has been raised as, domestically, environmental issues are more politically sensitive, and, internationally, there will be higher expectations of quick, positive outcomes. Under tougher oversight, the federal government must show that it is capable of delivering concrete results across multiple policy areas, but especially in regards to curbing deforestation of the Amazon Rainforest.

---

[168] Ministério da Integração e do Desenvolvimento Regional, *Plano de 100 dias*. Brasília: MIDR, 2023, https://bit.ly/40LtLaG (accessed 2 April 2023).
[169] Ministério da Infraestrutura, *Agenda de Sustentabilidade do Ministério da Infraestrutura 2023-2026*. Brasília: MINFRA, 2022, https://bit.ly/3MeRjAC (accessed 2 April 2023).
[170] Ministério da Infraestrutura, *Agenda de Sustentabilidade do Ministério da Infraestrutura 2023-2026*. Brasília: MINFRA, 2022, https://bit.ly/3MeRjAC (accessed 2 April 2023).
[171] "Subsecretaria de Sustentabilidade", Quem é quem, Ministério da Infraestrutura, accessed 2 April 2023, https://www.gov.br/infraestrutura/pt-br/acesso-a-informacao/quem-e-quem/subsecretaria-de-sustentabilidade-sust

2. **Economical:** Brazil's economy relies on a largely renewable energy source matrix and its export portfolio does not majorly rely on the extraction of fossil fuels, which are significant facilitators for the energy component of the green transition. Moreover, some of its key export sectors - notably agribusiness - have proven sensitive to external pressures on environmental matters, which has contributed to advanced government action in coming up with plans towards sectoral decarbonisation. Similarly, mature efforts are yet to be seen in more inward-focused sectors like industry or transportation.

3. **Social:** Although environmental concerns rarely top the results of opinion polls that question Brazilians on the country's major problems, recent polls have suggested support for the federal government's more assertive action against illegal economic activities in the Amazon[172][173]. At the same time, concerns about poverty and economic growth are often very high on the minds of those assessed by opinion polls[174], so there is an opportunity to connect these demands to a green transition project focused on sustainable development.

4. **Technological:** When it comes to the technological innovations at the forefront of the green transition vision, Brazil has signaled its interest in living up to the challenges and opportunities represented by setting up a bioeconomy and green hydrogen industries. Both would require significant investments to scale up to the point of competitiveness but seem compatible with the country's potential. Especially in the case of green hydrogen, the country's Energy minister has kickstarted early talks with Germany to set up a "contractual investment" partnership that would provide the "predictable demand" needed to build industrial capacity[175].

5. **Legal:** Brazil has a significant backlog of norms it needs to formally establish to give traction to its green transition push. That is most notably the case of the regularisation of its domestic carbon credit market, but also of the tax reform, which if approved by Congress as anticipated by Finance Minister Haddad, could provide Brazil with the tools to reward green transition-oriented economic activities to the expense of climate change-inducing ones.

6. **Environmental:** Brazil's rich biodiversity offers plenty of economic opportunities but demands attention, especially under the ever more strained conditions of the changing climate. The growing

[172] "Pesquisa mostra que 81% são favoráveis a atendimento emergencial a Yanomamis", *Valor Econômico*, 1 February 2023, https://valor.globo.com/brasil/noticia/2023/02/01/pesquisa-mostra-que-81percent-sao-favoraveis-a-atendimento-emergencial-a-yanomamis.ghtml

[173] Nicolas Iory, "Pesquisa Quaest: 92% defendem mais fiscalização na Amazônia e 75% querem menos armas nas ruas", *O Globo*, 15 February 2023, https://oglobo.globo.com/blogs/pulso/post/2023/02/pesquisa-quaest-92percent-defendem-mais-fiscalizacao-na-amazonia-e-75percent-querem-menos-armas-nas-ruas.ghtml

[174] "Pesquisa mostra que 81% são favoráveis a atendimento emergencial a Yanomamis", *Valor Econômico*, 1 February 2023, https://valor.globo.com/brasil/noticia/2023/02/01/pesquisa-mostra-que-81percent-sao-favoraveis-a-atendimento-emergencial-a-yanomamis.ghtml

[175] Hanrrikson de Andrade, "Ministro de Minas e Energia propõe acordo comercial para venda de hidrogênio para Alemanha", *EPBR*, 13 March 2023, https://epbr.com.br/ministro-de-minas-e-energia-propoe-acordo-comercial-para-venda-de-hidrogenio-para-alemanha/

frequency of extreme weather events also poses a challenge that requires effective and prompt measures of mitigation and adaptation, which, if ignored, may represent an increasing cost in human lives and livelihoods.

All throughout, Brazil should seize the favourable political circumstances to harness its natural and geographic potentialities towards a full-scale green transition of its economy and society. To do so, engaging with foreign partners should be strategic in that it can offer much needed funds and help 'lock-in' policy decisions by adding international reputational costs in case future political actors attempt to revert them. This strategy seems especially opportune as there seems to be a positive disposition (albeit at different levels) amongst Brazil's main trade partners in the EU[176][177], China[178], and the US[179].

Domestically, the prospect of a green transition needs to be tied to Brazilian citizens' legitimate demands for development. To do so, more immediate policy options include setting up an accessible domestic carbon credit market and a decarbonisation-inducing tax system. Another option that could greatly contribute to the prospects of a Brazilian green transition and help manage potential conflicts would be the renewal of the regional Economic-Ecological Zoning Plan[180] and the production of a nation-wide plan tasked with offering predictability over which parts of the country's biomes need to be preserved, which can accommodate economic activities and which types of economic activities should be accommodated in which contexts.

---

[176] "Lula e Macron conversam sobre clima e acordo UE-Mercosul", *DW*, 27 January 2023, https://www.dw.com/pt-br/lula-e-macron-conversam-sobre-clima-e-acordo-ue-mercosul/a-64530882
[177] Hanrrikson de Andrade, "Ministro de Minas e Energia propõe acordo comercial para venda de hidrogênio para Alemanha", *EPBR*, 13 March 2023, https://epbr.com.br/ministro-de-minas-e-energia-propoe-acordo-comercial-para-venda-de-hidrogenio-para-alemanha/
[178] "Brasil e China negociam fundo bilateral de investimento verde", *Infomoney*, 24 March 2023, https://www.infomoney.com.br/politica/brasil-e-china-negociam-fundo-bilateral-de-investimento-verde/
[179] Mariana Haubert, "EUA oferecem US$ 50 milhões para Fundo Amazônia", Poder360, 10 February 2023, https://www.poder360.com.br/internacional/eua-oferecem-us-50-milhoes-para-fundo-amazonia/
[180] "Zoneamento Econômico Ecológico", *Ministério do Meio Ambiente*, accessed 2 April 2023, https://antigo.mma.gov.br/gestao-territorial/zoneamento-territorial.html

Paraguay: An opportunity for a green transition?

Orlando Massari-Beniquez

Paraguay is situated in the South American continent, landlocked between Brazil and Bolivia to the north and Argentina to the south. Historically Paraguay has had a troubled history with its neighbors, fighting a series of wars that devastated the country and made it more militarised. The military and the Colorado Party have dominated Paraguayan politics for decades and, at times, instituted a one-party rule in the country. The end of the 35-year rule by President Alfredo Stroessner in 1989 ushered in a tacit transition to democracy in the country. After a series of elected presidents from the main Colorado Party in 2008, their 61-year winning streak ended with the election of former Bishop Fernando Lugo. Since then the Colorado Party has managed to return to power and hold power since. Yet the country has managed to build relationships with international organizations, and partners both foreign and domestic.

With these relationships Paraguay is heading into the future with the aim of becoming more self-sufficient and adopting strategies to be able to withstand climate change unpredictability. The government has aimed to reduce the importation of petroleum and other fuels, it aims to become more reliant and efficient on the energy the people consume. The government in Asuncion also aims to improve and increase the output of its agricultural sector by conserving land and implementing better practices. The country is also betting on major infrastructure projects to better connect the country with the outside world while at the same time improving the lives of its citizens. Sufficient to say that Paraguay is a nascent democracy, and itis worth analysing how the country is positioning itself for the future, more specifically when it comes to the challenges of climate change and the adoption of greener policies.

Paraguay's geographic profile

To understand Paraguay better, it is important to understand its geographical location. Paraguay is at the center of South America, making it landlocked and surrounded by Brazil on the northeast and Bolivia to the northwest, while Argentina borders it to the south[181]. Paraguay is divided into two main

[181] GISGeography. "Map of Paraguay - GIS Geography." GIS Geography, July 18, 2021. https://gisgeography.com/paraguay-map/.

regions, the eastern part, where most of the population is located and the western side also known as the Chaco region.

The eastern portion of the country is where the capital Asunción and most of the major cities are located. Two rivers traverse through the eastern side of Paraguay, the Parana and the Paraguay River. These rivers provide Paraguay with commercial access from the outside, fertile land for agriculture, and its main energy source.

On the western side of the country is the Chaco region. This region is more arid and has less access to water since the area receives very little rain and no major rivers pass through it. Because of this, the area has a low population density with about 3% of the country living in the Chaco.

Society and demographics

According to the Instituto Nacional de Estadística[182]Paraguay's population is 7.3 million. The country's population is quite young and diverse, with a median age of 26 years old and a life expectancy of 71. The demographics of Paraguay are quite similar to the ones of their neighbors[183]. It's important to know that the population of Paraguay suffered massive casualties from the War of the Triple Alliance (1864 to 1870)[184]. This war decimated the Paraguayan population, including the Guarani. Because of this, many of the population are descendants of European colonizers and migrants, Spanish, Italians, and some German colonies. Yet the majority of the population is mixed between Guarani and white. Paraguay has two official languages, Spanish and Guarani. According to the government, 33.4% of the population speaks Guarani, 34.7% are fluent in Guarani and Spanish, and 26.6% speak Spanish.

According to the United Nations Population Fund (UNPF), "Paraguay is a middle-income country, ranking high in the human development index. Despite recent economic growth (average 4.4 per cent between 2003 and 2018), poverty affected almost 1 in 4 people (24.2 per cent) in 2018, while 4.8 per cent of the population live in extreme poverty…"[185]. The World Bank reports that the annual

[182] Ine.gov.py, 2017. https://www.ine.gov.py/news/news-contenido.php?cod-news=989.
[183] Embapar.de. "Población – Embajada de La República de Paraguay En Alemania," 2023. https://embapar.de/paraguay-turistico/poblacion/.
[184] Bethell, Leslie. "The Paraguayan War (1864–70)." In *Brazil: Essays on History and Politics*, 93–112. University of London Press, 2018. http://www.jstor.org/stable/j.ctv51309x.7.
[185] Fpa, Dp, and Cpd. "United Nations Executive Board of the United Nations Development Programme, the United Nations Population Fund and the United Nations Office for Project Services *1922684*." Accessed February 12, 2023. https://www.unfpa.org/sites/default/files/portal-document/DP.FPA_.CPD_.PRY_.8.ENG_.pdf.

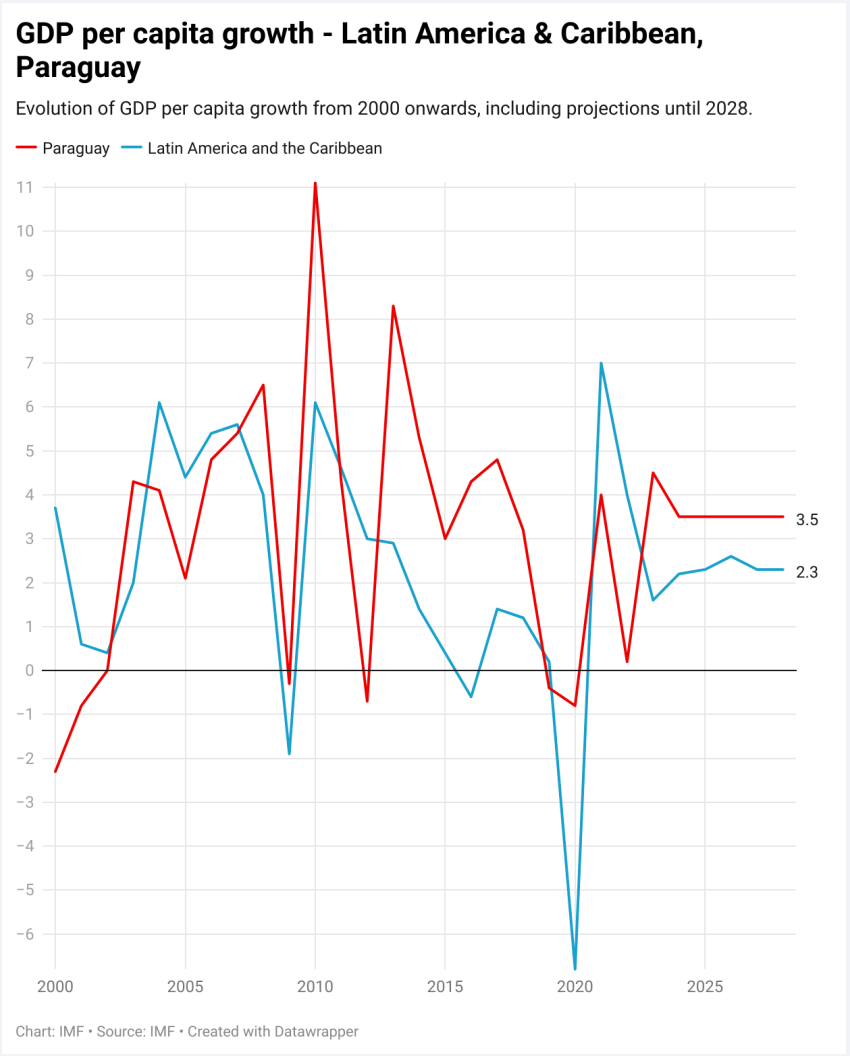
population growth is about 1.3%[186], which is similar to the regional average. Paraguay is considered a rural country and this brings further challenges to the country.

According to the World Bank, Paraguay was doing quite well economically. It mentions that Paraguay had been growing economically for the last two decades, making the country more prosperous and reducing poverty. The World Bank writes, "Poverty (USD 6.85 a day per capita, PPA 2017) was reduced from 40.2% to 19.7% while inequality was reduced from 54 to 46 Gini points during the same period"[187]. But like many things, the Covid-19 pandemic has stopped all of these advances. Unfortunately, Paraguay is not out of the woods yet, with the World Bank writing that poverty would rise by 21.5% in 2022. They explain that this rise is a consequence of the Covid pandemic, high inflation, drought, and the war in Ukraine.

The government in Asuncion has been taking several steps in reducing poverty and improving life expectancy in the country. Part of this plan is to reduce emissions in the country. Although Paraguay's electricity comes from a renewable source being the Itaipu Dam the people consume a lot of biomass and petrol for their day to day.

[186] Worldbank.org. "Population Growth (Annual %) - Paraguay, Argentina, Brazil, Bolivia, Chile, Ecuador, Peru, Colombia, Venezuela, RB, Uruguay | Data," 2022. https://data.worldbank.org/indicator/SP.POP.GROW?locations=PY-AR-BR-BO-CL-EC-PE-CO-VE-UY.

[187] World Bank. "Paraguay: Panorama General," 2019. https://www.bancomundial.org/es/country/paraguay/overview#:~:text=Con%20la%20recesi%C3%B3n%20y%20la,21%2C5%25%20en%202022.



The country's economic activities

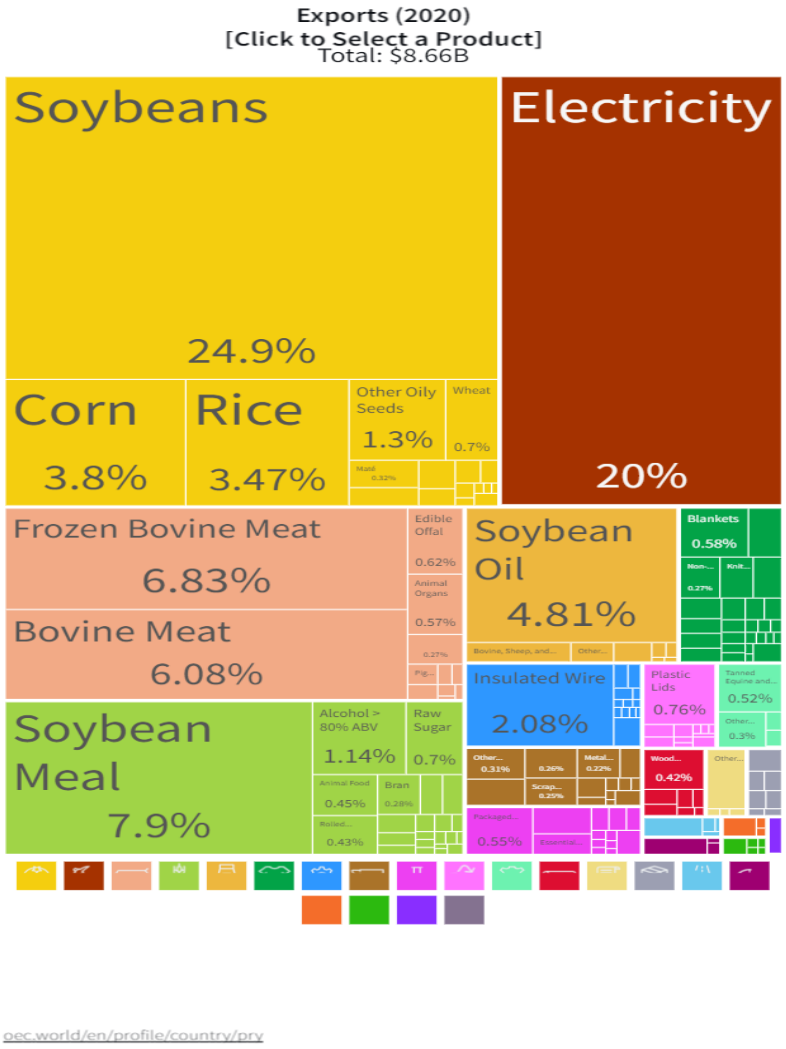
The economy of Paraguay is mainly focused on agricultural products such as soybean, corn, wheat, livestock, and rice, alongside cassava, sesame, cotton, sugar cane, and vegetables[188]. According to the International Fund for Agricultural Development (IFIDA), cattle and agriculture compose about 17% of the GDP[189]. In its 2030[190] plan, the Paraguayan government wants to make the agricultural sector

[188] *Análisis de riesgo del sector agropecuario en Paraguay : identificación y priorización de los riesgos agropecuarios (Spanish).* Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/105821468332711721/Análisis-de-riesgo-del-sector-agropecuario-en-Paraguay-identificación-y-priorización-de-los-riesgos-agropecuarios

[189] IFAD. "Paraguay," 2016. https://www.ifad.org/es/web/operations/w/pa%C3%ADs/paraguay#:~:text=Los%20sectores%20de%20la%20agricultura,60%20%25%20en%20la%20pobreza%20extrema..

[190] https://www.stp.gov.py/pnd/

more productive and resilient[191]. Knowing that the country has a strong agricultural base, they analise that the best way forward is to provide better technology to farmers and further strengthen the agriculture sector with more sustainable methods such as replenishment of soils and better crops. All of this is in the hope to fight against climate change and its repercussions. The Observatory of Economic Complexity mentions that Brazil is Paraguay's main economic partner. Paraguay's main agricultural exports are Soybeans ($252M), and Corn ($187M). During the last 25 years, the exports of Paraguay to Brazil have increased at an annualized rate of 7.93%, from $449M in 1995 to $3.02B in 2020"[192]. Yet Paraguay's largest export is electricity. As the Observatory of Economic Complexity writes the main products that Paraguay exported to Brazil are Electricity ($1.44B)[193].



Source: Observatory of Economic Complexity

[191] Ibid Page 105-107
[192] OEC - The Observatory of Economic Complexity. "Paraguay (PRY) and Brazil (BRA) Trade | OEC," 2020. https://oec.world/en/profile/bilateral-country/pry/partner/bra.
[193] Ibid

Paraguay's most important relationship is Brazil[194]. It is their main export and import, and the most important part of this relationship is centred around the Itaipu Dam. Paraguay sells most of the electricity to Brazil because of a lack of demand within Paraguay. Paraguay uses the other 15% of total generation which is about 90% of the electricity in Paraguay. Paraguay has a treaty agreement with Brazil which requires Paraguay to sell the energy it does not consume. According to The Global Infrastructure Hub[195]Brazil consumes about 15% of Itaipu this translates to about 85% of the generation of the Dam. The Global Infrastructure Hub points out that "The Treaty, when originally signed, required Paraguay to sell its unused electricity to Brazil for USD124 million a year until 2023. In July 2009, the two countries signed a deal under which Brazil agreed to triple its payments to Paraguay''[196]. Paraguay is reliant on this Dam multiple when it comes to its foreign policy, and its economy.

Yet with the unforseen effects of a warming planet puts two of Paraguay's main economic activities in jeopardy. For example drought has affected the production of electricity in Itaipu and has reduced how much electricity the dam produces. Drought has also affected Paraguay's agricultural sector most specifically its main crop, soybeans. Joana Colussi, Nick Paulson, and Gary Schnitkey write that La Niña phenomenon has affected South America's ability to cultivate soybeans affecting exports and their economies. They mention how "Paraguay is expected to produce 367 million bushels, more than double the output of the last crop season. This estimate represents a recovery from the previous cycle when Paraguay's soybean harvest fell almost 60% to 147 million bushels, the lowest level in the last decade. Paraguay exports more than half of the soybeans it produces, and its economy depends heavily on those exports''[197]. In comparison Argentina's soy production fell[198] and will have to import soybeans from Brazil and Paraguay to keep supplying the global market.

Paraguay has an interest in improving its methods when it comes to better agriculture practices and energy production. Because of this they are positioning themselves to improve their own self

[194] Worldbank.org. "Paraguay Trade Balance, Exports, Imports by Country 2017 | WITS Data," 2017. https://wits.worldbank.org/CountryProfile/en/Country/PRY/Year/2017/TradeFlow/EXPIMP/Partner/by-country.
[195] Gihub.org. "Itaipu Hydroelectric Dam," 2020. https://www.gihub.org/connectivity-across-borders/case-studies/itaipu-hydroelectric-dam/.
[196]Ibid
[197] Colussi, Joana, Paulson, Nick, Schnitkey, Gary "Record in Brazil, Drop in Argentina: Contrasting Soybean Harvests in South America." Farmdoc Daily 13, no. 59 (April 2023). https://farmdocdaily.illinois.edu/2023/03/record-in-brazil-drop-in-argentina-contrasting-soybean-harvests-in-south-america.html.
[198] Ibid

sufficiency in energy and agriculture. Another side of Paraguay's economic base comes from the transportation sector. Because Paraguay is a landlocked country they rely on shipping products through land. The government states that in 2018 about $9 billion worth of goods passed through the country. Paraguay wants to increase its transport economy in the future especially with the Bioceanic corridor. In the anticipation of a growing transportation sector the government wants to reduce oil importation and find alternatives to fossil fuels such as hydrogen fuel. Many of these projects are in their early stages and early days of proving fully beneficial to the country. Yet the government[199] is betting that it could shape the energy market and become a leader in hydrogen.

Energy supplies in Paraguay

The International Renewable Energy Agency (IRENA) writes that "the energy supply in Paraguay is dominated mainly by hydrologic and biomass resources, which represented 41.0% and 36.8%, respectively, of energy use in 2019"[200]. Paraguay also imports 90%[201] of its petrol and diesel fuel. The country is implementing a variety of development plans to reduce the use of biomass sources in a push to reduce its CO2 emissions and be more efficient.

Paraguay is a country that usually flows below the radar, yet its importance in South America has been growing recently. Paraguay's geographical location makes it an important gatekeeper of hydroelectric energy[202] for Brazil and Argentina. This position has made Paraguay quite important in the green energy transition by providing renewable energy to the country and to its neighbors. It is important to note that 99% of the population has access to electricity in part thanks to the Itaipu Dam[203] which was completed in collaboration with Brazil in 1984. This is an impressive feat of engineering and what makes it more remarkable is the amount of energy it produces.

The Itaipu Dam is the third largest in the world, according to the Itaipu Binacional website. They also report that the dam produces 90% of Paraguay's total energy consumption and 10.8% of Brazil's total energy consumption[204]. The Dam has been described as one of the modern wonders of the world.

---

[199] https://www.ssme.gov.py/vmme/pdf/H2/H2%20Marco_Conceptual_DIGITAL.pdf
[200] Irena.org. "Renewables Readiness Assessment: Paraguay," September 20, 2021. https://www.irena.org/publications/2021/Sep/Renewables-Readiness-Assessment-Paraguay. Page 20.
[201] Ibid
[202] Gihub.org. "Itaipu Hydroelectric Dam," 2020. https://www.gihub.org/connectivity-across-borders/case-studies/itaipu-hydroelectric-dam/.
[203] Ibid
[204] admin.via. "Itaipu Binacional | Integration That Generates Energy." ITAIPU BINACIONAL | Integration that generates energy and development, January 27, 2022.

Not only because of its size and energy output but because of the conservation efforts in the region. The Itaipu administration has planted millions[205] of trees in the area. Technically, if Paraguay did not use any other energy source such as oil, gas or the burning of biomass, the country would be carbon neutral. The dam is essentially Paraguay's main source of energy and it happens to be green and renewable.

Although the Itaipu Dam supplies Paraguay with the vast majority of its energy consumption, the river has been affected by drought. Although the droughts have not yet crossed the threshold of becoming catastrophic, it is worth pointing out the damage this might cause in the future. Paraguay faces a major threat to its economy and livelihood because the Parana River faces a series of droughts. The Parana River has suffered from drought and reduced rainfall for several years. This is an existential crisis for Paraguay because of how much they depend on the river system.As mentioned before, the Itaipu Dam is a major energy source for Paraguay not only because they use the majority of the energy the dam produces but also because they sell the surplus energy to Brazil and Argentina. With the waters of the Parana River decreasing, it has a knock-on effect of reducing the energy the dam produces, making the project uncertain. For example, 2021 has been one of the driest years the river has experienced[206], so much so that the Itaipu Binacional[207] has reported that in 2021 the dam produced 66,369 GWh compared to 2016, which produced 103 098GWh. This is quite a drop in a short amount of time and can put Paraguay's financial and energetic position in jeopardy.

Yet, the World Bank points out that the country still emits 1.3 metric tons as of 2019[208]. Why does Paraguay still emit so much CO2 emissions? The answer would come from its land use, agriculture, waste, and transport[209]. Yet the country is looking to further transition into a more sustainable country when it comes to better agricultural practices and reducing its dependence on importing oil and gas.

---

https://itaipu.energy/#:~:text=Itaipu%20provides%20around%2090%25%20of,the%20world%20for%2045%20days..

[205] The Resilience Shift. "Itaipú Dam Case Study - the Resilience Shift," October 27, 2020. https://www.resilienceshift.org/case-study/itaipu-dam/.

[206] Ibid

[207] Itaipu.gov.br. "ENERGY | ITAIPU BINACIONAL," 2021. https://www.itaipu.gov.br/en/energy/energy.

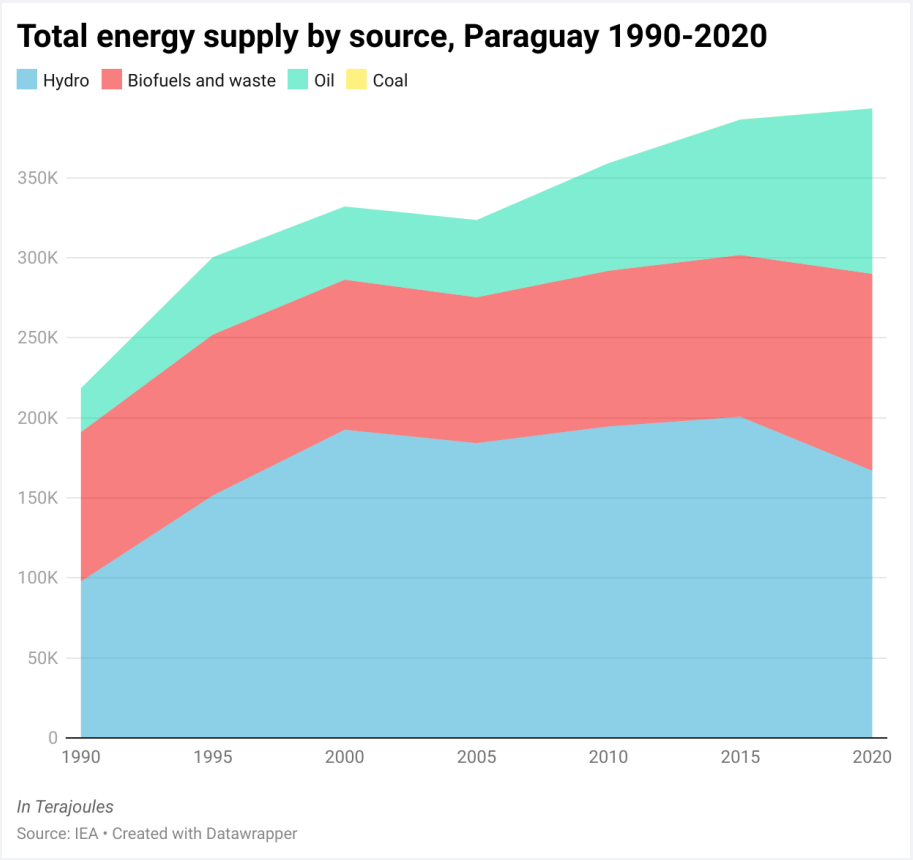
[208] Worldbank.org. "CO2 Emissions (Metric Tons per Capita) - Paraguay | Data," 2020. https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?locations=PY.

[209] Ritchie, Hannah, Max Roser, and Pablo Rosado. "CO2 and Greenhouse Gas Emissions." Our World in Data, May 11, 2020. https://ourworldindata.org/co2/country/paraguay.

The Ministry of Public Works[210] developed a conceptual framework on how Paraguay can furher increase its renewable energy market while becoming self-sufficient. The country is betting on further developing hydrogen projects for a variety of reasons such as being energy independent and increasing its renewable energy capacity. Although the Itaipu Dam supplies most of Paraguay's electricity it still has to import petroleum for its vehicles and transportation industry. The government aims that by 2030[211] the country will be able to increase its consumption of renewable energy to 60% while reducing petroleum consumption by 20%. The International Energy Agency shows that as of 2019[212] renewables accounted for 60.1% of energy consumed. Yet the plan to keep increasing this number and the way to do it has been by investing in hydrogen energy for its transport industry. Because of Paraguays landlocked status the country is dependent on vehicle transportation for imports and export. The government points out that "As an economic sector, it is responsible for 4% of the country's GDP" while also pointing out that "In 2018 it was responsible for the movement of goods for export worth USD 9 billion (mainly soybeans and their derivatives as well as meat products, in that order), and imported goods worth USD 13 billion (petroleum, electronic equipment, cars, fertilizers and pesticides in that order)"[213].

Paraguay is an interesting conundrum because by most metrics its energy sector is essentially renewable and clean, but if it wants to benefit from further expanding the economy it has to expand its transportation capabilities which in part makes the country more reliant on petroleum imports. Paraguay is also reaping the benefits of broader consumption of hydrogen as a energy source worldwide. Hydrogen as a renewable energy resource is expected to grow especially if it can be used for transportation such as vehicles. Regionally this is important because of the reliance on vehicles to transport goods all over South America. For example the Bioceanic Corridor project aims to connect the Atlantic Ocean via the Brazilian coast to the Pacific Ocean and ble able to move goods easier. Paraguay is an integral part of this plan and its landlockens make it even more important to shape the future of transportation and renewable energy. '

[210]"Towards the Green Hydrogen Roadmap in Paraguay" Conceptual Framework https://www.ssme.gov.py/vmme/pdf/H2/DIGITAL_ENG_H2_Marco_Conceptual.pdf
[211] Climate-laws.org. "Decree 2,794: National Development Plan 2030 - Climate Change Laws of the World," 2023. https://www.climate-laws.org/documents/decree-2794-national-development-plan-2030_a3b1.
[212] Paraguay - Countries & Regions - IEA. "Paraguay - Countries & Regions - IEA." IEA, 2014. https://www.iea.org/countries/paraguay.
[213] "Towards the Green Hydrogen Roadmap in Paraguay" Page 15.



The future of a green transition

Paraguay has taken steps to further expand its agricultural sector and improve the lives of farmers and indigenous people. Like many other countries, Paraguay has an ambitious plan for a greener future. The government in Asusncion has implemented multiple plans with foreign and local partners to better improve Paraguay's society and economy. These multiple projects have been implemented by having multiple stakeholders and inverstmets. One such project is the "*Proyecto Green Chaco*", the aim of the project is to improve Paraguay's agricultural region which is one of the poorest regions of the country. The mission is to enhance meat production byt improving how cattle is raised in the region. According to the projects website about 5.700 people[214] in the region of el Chaco. These projects have been implemented across the country in the hopes of improving people's lives while recognizing the adverse impacts climate change will have on people.

[214] Proyecto Green Chaco. "Se Presentaron Resultados Del Proyecto Green Chaco - Proyecto Green Chaco," December 2, 2021. https://greencommoditiesparaguay.org/proyectogreenchaco/2021/12/02/se-presentaron-resultados-del-proyecto-green-chaco/.

In Paraguay's *Plan Nacional de Desarrollo* 2030[215] shows the country's ambitions to upgrade the country's infrastructure and make it more resilient to the climate crisis and make it better prepared for the future. Within this development plan, there is the PROEZA[216] plan which focuses on making a more sustainable and resilient community, especially in poorer areas. PROEZA is a collaboration between the Paraguayan government, the Green Climate Fund and the Food and Agriculture Organization, to make poorer areas more resilient against climate change. This plan was adopted in 2018[217] and it's supposed to last 5 years, ending in 2023. The total cost of this project would be about $90.3 million[218]. The goal the government is trying to achieve is for marginalized and indigenous communities to be able to plant a significant amount of trees and teach conservation strategies that would offset CO2 emissions in the future. Another goal is to improve 7,500 kitchens that are more sustainable and emit fewer emissions into the environment and the population. The Paraguayan government expresses that the way to sustain this project is by providing credits to investors that more investments are done that further develop the area.

In the 2030 development plan, the Paraguayan government points out the difficulties the society has been facing with water and floods. According to the government, massive flooding was a once-a-decade problem, yet since 2014[219] these floods happen every year. The government proposes to strengthen the systems that are in place and for better drainage[220] in residential homes. The government's desire is to control the floods and make the infrastructure as strong as possible and for the local governments to better coordinate with themselves. If there is a throughline that can be observed through Paraguay's development plans are efficient, resilient all through infrastructure projects. One such project is the Bioceanic Corridor.

Paraguay is trying to position itself as a transport hub in South America. The Bioceanic Corridor[221] is a massive infrastructure project in South America that aims to connect the Atlantic Ocean to the Pacific Ocean. The goal is to create a series of roads, canals, and ports that would make the transportation of goods easier to move. The hope is to connect the region through these infrastructure projects and

[215] https://www.stp.gov.py/pnd/
[216] Stp.gov.py. "Pobreza, Reforestación, Energía Y Cambio Climático (PROEZA)," 2023. https://proeza.stp.gov.py/proeza-proyecto.
[217] Green Climate Fund. "GCF/B.19/22/Add.04 : Funding Proposal Package for FP062." Green Climate Fund, February 6, 2018. https://www.greenclimate.fund/document/gcf-b19-22-add04.
[218] Ibid page 8
[219] https://www.stp.gov.py/pnd/ Page 91-94.
[220] Ibid
[221] Corredorbioceanico.org. "Corredor Bioceánico - Sitio Web Del Corredor Bioceánico Vial de Sudamérica | about the Corridor," 2015. https://corredorbioceanico.org/en/conoce-el-corredor/.

further integrate the South American economies. It is estimated that the total cost of this project will be US $ 2,368,159,000[222]. This massive infrastructure would further integrate the country with itself by building new roads and revitalizing thousands of kilometers of already build roads and train tracks[223]. The roads that would be built and the area that is being developed is the Chaco region of the country. João Carlos Parkinson de Castro[224] writes that the integration of the region via these networks of roads would bring economic benefits and improvements to agriculture and water projects.

Although small, Paraguay has the potential to become a major hub for distribution. Paraguay promotes these massive infrastructure projects as a new Panama Canal[225] but inland. This project would increase emissions, but there are plans to make the energy consumption in the country more efficient and cleanerthrough hydrogen projects. Although nascent, many companies have seen the potential in investing in hydrogen projects because of the Itaipu Dam and Paraguay's water resources. For example, the Administración Nacional de Electricidad (ANDE) government signed a deal with the Canadian company Neogreen Hydrogen Corporation[226] to develop a more efficient energy resource. According to Hydrogen Central, this deal would over time create thousands of jobs. They write that "The construction of the different plants will generate, at its peak, between 2,500 and 3,000 sources of work, this includes specialized welders, assemblers, instrumentalists, electricians, painters, insulators, civil works, masons, among others necessary for the operation of the plant. In addition, around 7,500 indirect jobs related to the project will be generated, including transportation, food, manufacturing of metal structures, tanks and containers, concrete and civil construction materials, roofing, painting, architectural finishes, security personnel, commercial

222 https://www.un.org/ohrlls/sites/www.un.org.ohrlls/files/paraguay-mongolia-presentacion-ingles-3s.pdf Page 3

223 "PARAGUAY."https://scioteca.caf.com/bitstream/handle/123456789/1537/Paraguay_Analisis_de_Inversiones_en_el_Sector_de_Transporte_Interurbano_Terrestre_Latinoamericano_al_2040.pdf?sequence=17&isAllowed=y.

224 Parkinson de Castro, João Carlos. 2021. "Estudos analíticos Sobre O Corredor Bioceânico". *Interações (Campo Grande)* 22 (4):1061-76. https://doi.org/10.20435/inter.v22i4.3484.

225 The Economist. "A New Motorway in Paraguay Could Eventually Rival the Panama Canal." The Economist. The Economist, April 30, 2022. https://www.economist.com/the-americas/2022/04/30/a-new-motorway-in-paraguay-could-eventually-rival-the-panama-canal.

226 Ferreira, Noelia. "ANDE Y Empresa Canadiense Estudiarán Condiciones Para Instalar Una Planta Industrial de Hidrógeno - .::Agencia IP::."::Agencia IP::., November 17, 2021. https://www.ip.gov.py/ip/ande-y-empresa-canadiense-estudiaran-condiciones-para-instalar-una-planta-industrial-de-hidrogeno/.

sector, logistics, among others"[227]. Paraguay hopes that by investing in hydrogen energy they can become self-sufficient while improving the transportation sector.

Conclusion:

When looking into what Paraguay is moving towards the most simple summary would be infrastructure. Paraguay is aiming to improve all of its infrastructure be it energy, transportation, and households. Paraguay has a lot of room for improvement especially when it comes to reducing its CO2 emissions. Thanks to the Itaipu Dam, the country is already halfway to its goals. Yet Paraguay has a couple of challenges ahead. The usual challenge is that of missed opportunities. Covid-19 put a pause on Paraguay's economic growth and regression of poverty levels the country had managed to achieve. It is hard to say when the country will get back on track especially since 2019 the state of global politics has been unstable. Just like many other countries, Paraguay has been at the mercy of geopolitics and uncertainty in the global economy.

Paraguay has the potential to grow and prosper if the plans they have drawn out work out. For example, the government's push to reduce the people's consumption of biomass in the hopes of reducing CO2 emissions is the correct way to go. For example reducing contamination people are exposed to while improving the quality of air in Paraguay's cities

A major challenge Paraguay faces comes from its near abroad. First, its neighbours' policies have an outsise effect on the country. For example, Paraguay is engaging in these massive infrastructure projects thinking the Bioceanic Corridor will be implemented. Although good policies from the government to improve its roads and train lines, they are assuming that Brazil, Bolivia, and Argentina will also do the same and connect with them. Although some projects have already begun to be constructed, what many observers point out is that this is a years-long commitment from all sides. To make it feasible all the countries need to be in a long-term agreement of continuity. As of right now,

[227] redactoramexico. "Paraguay - Ande and Canada Based Company Neogreen Hydrogen Corporation Sign a Service Provision Contract for 75 Mw - Hydrogen Central." Hydrogen Central, February 6, 2023. https://hydrogen-central.com/paraguay-ande-canada-based-company-neogreen-hydrogen-corporation-sign-service-provision-contract-for-75-mw/.

the region has many other priorities that are constantly being undermined by local politics. The problem of course is investors, either local or foreign that might lose patience with the region and with Paraguay. For example, if Brazil is not fully committed to connecting its Atlantic coast to the Pacific via Paraguay then Paraguay's infrastructure falters.

The government in Paraguay has set goals that although ambitious, are doable if planned accordingly. In part, because the country knows it is at the mercy of its neighboyrs, the Paraguayan state is focusing onimproving the living conditions of its citizens and positioning itself to be able to withstand climate change. This comes in the form of improving housing and drainage systems in the face of floods and improving how people use biomass to cook and reducing the import of these fuels.

Now for the Parana River, as we have seen in this section the river has been a blessing for the country. Essentially most of the economy and the country revolves around the river. For example, selling and consuming electricity comes from the Itaiou dam. They also use the water for transportation and irrigation. Yet, in recent years, the river has become less powerful affecting the energy production of the country and a valuable source of income. The reason for the fall in water is due to the lack of rain in Brazil, which at the same time increases fires that affect agriculture. For the country to be able to keep being energy independent and keep renewables, they need to build more wind farms, solar farms, and better capacity to store the energy. It would be a shame that after decades of using a renewable source such as hydroelectric, they could be forced to use more petrol and gas, which would make them dependent on imports.

These efforts are easier said than done. This would take billions of dollars and long-term investments that might be feasible now, especially after the Covid-19 pandemic and the geopolitics of who controls the new energy sources. Yet the Paraguayan state is looking into investments and projects when it comes to hydrogen production. This would be a boon for the country since it can use the river system as a source of energy plus with the building of new infrastructure and the expectation of better cars the country could benefit from this new technology.

It seems that Paraguay is heading towards the future with realistic expectations. Understanding that they cannot over-promise but can improve the livelihood of its citizens in practical but beneficial ways. If there is a word to encapsulate Paraguay's move into the future it would be self-reliance.

Starting from scratch: an opportunity for Venezuela's green transition

Marcos Planchart

Introduction

Thinking about a green transition in Venezuela seems far-fetched given the current political and economic crisis the country is facing which has depleted living standards for the population and caused the largest migration crisis Latin America has ever experienced. Nonetheless, as climate change and global warming have become a major discussion point in the global agenda, countries regardless of their status in the global stage have had to adhere to the international consensus and agreements which will increasingly have more influence in foreign investments and partnerships. Hence, conceptualising a plan for a future in which Venezuela is part of the global effort against climate change becomes more of a certain yet distant reality.

As it is commonly said "in every crisis there is an opportunity" and this is the cornerstone for the argument for a green transition in Venezuela. To understand the path towards Venezuela's green transition it's important to comprehend the current political and economic climate of the country. Given the current scenario which has exacerbated the climate related risks in the country, policy officials have an opportunity to redirect current policies and tackle the country's challenges while embedding environmental policy and sustainability into its economic and political systems. Hence, as Venezuela will experience great changes in the coming years whether they are economic or political these can be driven by sustainability.

Venezuela's Economic Profile

Endowed with the largest oil reserves in the world, Venezuela is largely dependent on fluctuations in oil prices. The country had a 5% decline in GDP in 2021 due to the lingering impacts of the pandemic, and it has been in a deep recession since 2013. The International Monetary Fund (IMF) estimated a GDP contraction of 75% from 2013 to 2021[228]. Moreover, GDP per capita nearly halved between 2019 and 2021, going from USD 2,299 to USD 1,627, and should continue down the same trajectory in the short term. Thus, the economic situation in Venezuela is still very harsh. Nonetheless, it should improve slightly in the coming years, with the IMF predicting negative growth of 3% for 2022 and 0% for 2023, which indicates a slight recovery in the economy with doubts on whether it can be maintained or even leveraged to start the green transition.[229]

[228] Arena, Marco, Emilio Fernandez Corugedo, Jaime Guajardo, and Juan Francisco Yepez. 2022. "Venezuela's Migrants Bring Economic Opportunity to Latin America." International Monetary Fund, December 7, 2022. https://www.imf.org/en/News/Articles/2022/12/06/cf-venezuelas-migrants-bring-economic-opportunity-to-latin-america.

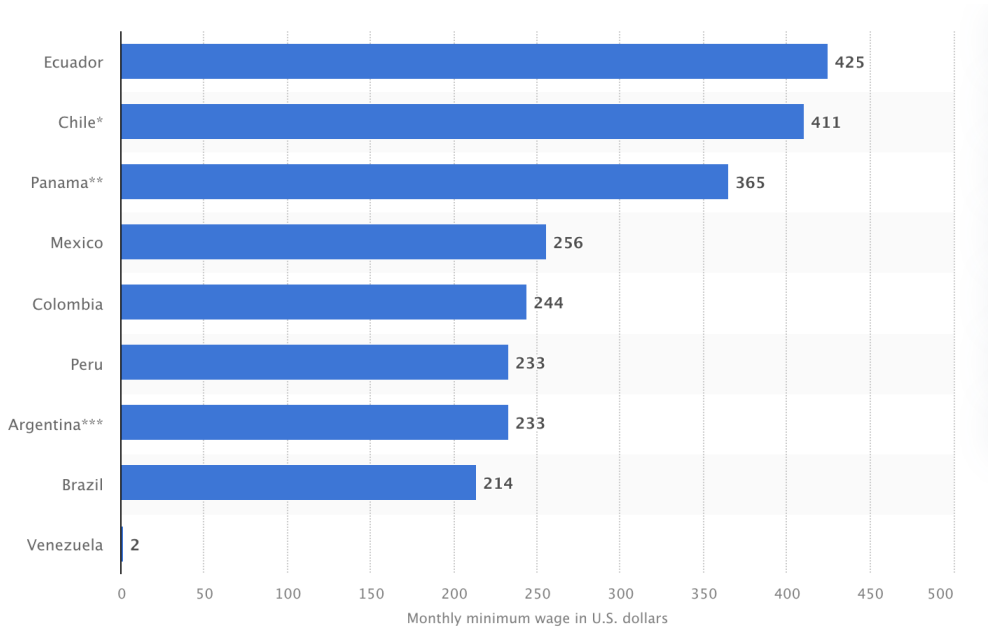
[229] Crédite Agricole Groupe. 2022. "Economic and Political Overview in Venezuela." Groupecreditagricole.com. 2022. https://international.groupecreditagricole.com/en/international-support/venezuela/economic-overview?url_de_la_page=%2Fen%2Finternational-support%2Fvenezuela%2Feconomic-overview&.

Inadequate diversification and difficulties importing intermediate products continue to plague the industrial sector. The IMF reports that during the hyperinflationary period, inflation skyrocketed from 254.9% in 2016 reaching a peak of 65,390% in 2018 to a harsh decrease to 1,590% in 2021[230]. The Central Bank of Venezuela, on the other hand, reports that the country's hyperinflation has decreased from 2,959.8% in 2020 to 686.4% in 2021. Regardless of the source of information, the figures demonstrate a deceleration of consumer price growth due to inflation control measures that the government was forced to put in place to rescue a demolished economy given by hyperinflationary climate. This was created by several years of monetising the public deficit, a free-falling currency that makes imports more expensive, a strong depreciation of the currency in both the official and black markets, and dramatic shortages of basic goods. Thus, the recent central bank's policy of reducing the money supply is not expected to help reduce hyperinflation sustainably, as it does not address the economy's key issues, and the fear of a second coming of a hyperinflationary period in the country is lingering.

Despite multiple minimum wage increases decided by the government, real wages have been continuously decreasing. During 2020, the government increased the wage three times resulting in a cumulative increase of 700% and even with this increase the real minimum wage contracted by 73.1%[231]. Moreover, in 2022 Venezuela had the lowest minimum wage in the region, situated at a mere $2 a month (refer to the graph below)[232]. However, household income and consumption are highly dependent on remittances from expatriates. Thus, even though remittances have decreased by more than half from $3.5 billion to $1.5 billion amid the COVID-19 crisis[233], growth in the host countries of Venezuelan expatriates, such as Colombia, Spain, and the United States, should increase remittance flows in 2022, supporting some recovery in household consumption.

[230] International Monetary Fund. 2023. "Venezuela Bolivarian Republic and the IMF," April. https://www.imf.org/en/Countries/VEN.
[231] Economic Commission for Latin America and the Caribbean. 2021. "Economic Survey of Latin America and the Caribbean 2021: Bolivarian Republic of Venezuela." ECLAC. https://repositorio.cepal.org/bitstream/handle/11362/47193/90/EI2021_Venezuela_en.pdf.
[232] Statista. 2022. "Minimum Monthly Wage in Latin America by Country 2022." Statista, January. https://www.statista.com/statistics/953880/latin-america-minimum-monthly-wages/.
[233] Wallace, Anthony J. 2020. "Massive Fall in Remittances Hits Hard in Venezuela." The New Humanitarian, June 23, 2020. https://www.thenewhumanitarian.org/news-feature/2020/06/23/Venezuela-coronavirus-COVID-19-remittances-economy-Panama.

Graph: Monthly minimum wage in Latin America 2022 (US dollars)



Source: Statista, 2022

In Venezuela, as explained above, even though the minimum wage has been increased numerous times over the past few years, these increases have not followed inflation. Therefore, purchasing power is weak and has greatly decreased in recent years. The unemployment rate has been rising for years, and the IMF estimated that, in 2020, almost half of the Venezuelan workforce was unemployed, reaching 47.9%[234]. Furthermore, the country also faces a rise in insecurity, with the second-highest homicide rate in Latin America and the Caribbean with 40.4 homicides per 100,000 inhabitants[235]. Because of the country's current economic situation, there are severe shortages of basic goods, such as food and medicine, with Venezuela being among the countries with the highest rates of food insecurity in the region. The Global Hunger Index positions Venezuela in the 85th position being the highest ranked and most food insecure country in the Latin American region[236] while the UN reports that nearly one in three Venezuelans was food insecure by 2020[237]. As such, neighbouring countries have been receiving a large number of Venezuelan migrants and refugees in recent years. Estimates suggest that over 7 million people have left the country so far, surpassing migration crises such as the ones occurring in Syria (refer to graph below)[238].

---

[234] Biller, David, and Patricia Laya. 2019. "Venezuela Unemployment Nears that of War-Ruined Bosnia, IMF Says." Bloomberg.com, April 9, 2019. https://www.bloomberg.com/news/articles/2019-04-09/venezuela-unemployment-nears-that-of-war-ruined-bosnia-imf-says#xj4y7vzkg.

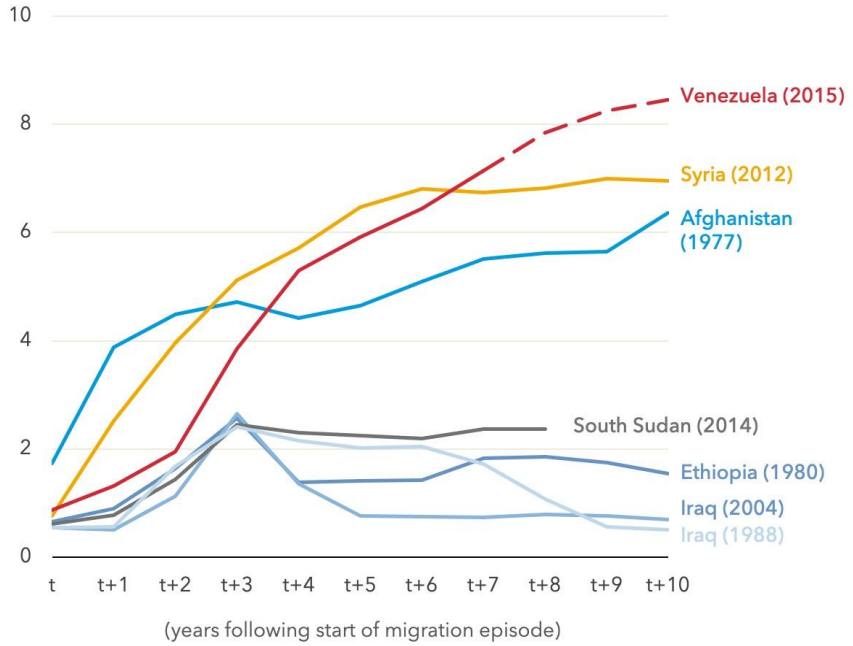
[235] ———. 2023. "Homicide Rate in Latin America by Country." Statista. https://www.statista.com/statistics/947781/homicide-rates-latin-america-caribbean-country/.

[236] Global Hunger Index. 2022. "Global Hunger Index Scores by 2022 GHI Rank." Global Hunger Index (GHI) - Peer-Reviewed Annual Publication Designed to Comprehensively Measure and Track Hunger at the Global, Regional, and Country Levels. https://www.globalhungerindex.org/ranking.html.

[237] Otis, John. 2022. "Why the Kids of Venezuela Aren't Getting Enough to Eat." NPR, January 11, 2022. https://www.npr.org/sections/goatsandsoda/2022/01/11/1071485460/why-the-kids-of-venezuela-arent-getting-enough-to-eat.

[238] Arena, Marco, Emilio Fernandez Corugedo, Jaime Guajardo, and Juan Francisco Yepez. 2022. "Venezuela's Migrants Bring Economic Opportunity to Latin America." International Monetary Fund, December 7, 2022.

Graph: Historic episode of migration, millions of Venezuelans have fled the country (2015-2025)



.

Source: International Monetary Fund, 2022

Compared to other Latin nations, agriculture makes a smaller contribution to Venezuela's economy. The agricultural sector represents 5% of the Venezuelan GDP and employs 7.8% of the active population[239]. The main agricultural products of the country are corn, soy, sugar cane, rice, cotton, bananas, vegetables, coffee, cocoa, beef and pork meat, milk, eggs, and fish. However, Venezuela enjoys important natural resources, such as petroleum (their main natural resource), gas, gold and silver mines, bauxite, and diamonds. According to OPEC, the country's proven resources in petroleum reached 303,468 million barrels, which puts it in first place in the world ahead of Saudi Arabia[240]. Despite a decline in petroleum production since 2019[241] (refer to graph below), Venezuela remains largely dependent on revenue from its vast petroleum reserves, which accounts for nearly all of its earnings from exportation and for almost half of the government's revenue[242]. In 2021, the country

https://www.imf.org/en/News/Articles/2022/12/06/cf-venezuelas-migrants-bring-economic-opportunity-to-latin-america.

[239] Lloyds Bank. 2022. "The Economic Context of Venezuela - International Trade Portal." Lloydsbanktrade.com. 2022. https://www.lloydsbanktrade.com/en/market-potential/venezuela/economical-context.

[240] Organisations of the Petroleum Exporting Countries. 2021. "OPEC: Venezuela." Opec.org. 2021. https://www.opec.org/opec_web/en/about_us/171.htm.

[241] Trading Economics. 2019. "Venezuela Crude Oil Production." Tradingeconomics.com. Trading Economics. May 3, 2019. https://tradingeconomics.com/venezuela/crude-oil-production.

[242] ———. 2023. "Foreign Trade Figures of Venezuela - Economic and Political Overview - International Trade Portal International Trade Portal." www.lloydsbank trade.com. June 2023. https://www.lloydsbanktrade.com/en/market-potential/venezuela/trade-profile.

experienced food shortages due to a lack of diesel, as more than 90% of producers were unable to prepare land for cultivation[243].

Graph: Oil Production in Venezuela (thousand of barrels per day) 2019 - 2023

Source: Trading Economics, 2019

The industrial sector represents 37.2% of the GDP and employs 15.3% of the active population. The main industrial activities revolve around the petroleum sector, which is controlled by the state company PDVSA. Additionally, other important industries are construction equipment, food, textiles, iron, steel, aluminium, and engine part assembly[244]. However, due to state control over the country's currency and prices, local industries have encountered immense difficulties acquiring the necessary goods to maintain operations or sell goods with a profit on the local market. Although these difficulties were aggravated by the pandemic, particularly in the oil industry, the sector showed a significant recovery in 2021. Despite its steep decline after 2019, Venezuela revamped its oil output in the last quarter of 2021, mainly thanks to a deal struck between the state-owned Petroleos de Venezuela and the National Iranian Oil Company to pump and process more extra-heavy crude into exportable grades[245].

According to the US Energy Information Administration (EIA), in 2020, petroleum and other liquids accounted for 94% of Venezuela's total primary energy consumption, while natural gas accounted for the remaining 6%. The country has significant reserves of both oil and natural gas, with proven reserves estimated at 303 billion barrels and 198 trillion cubic feet, respectively, as of 2021. Venezuela also has some hydropower resources, primarily in the form of large dams on the Caroní

[243] HumVenezuela. 2022. "Agricultores Denuncian 90% de Caída En La Producción de Papa | Vía: La Nación | HumVenezuela." HumVenezuela. January 21, 2022. https://humvenezuela.com/agricultores-denuncian-90-de-caida-en-la-produccion-de-papa-via-la-nacion/.
[244] Lloyds Bank. 2022. "The Economic Context of Venezuela - International Trade Portal." Lloydsbanktrade.com. 2022. https://www.lloydsbanktrade.com/en/market-potential/venezuela/economical-context.
[245] Parraga, Marianna. 2021. "How Venezuela Pulled Its Oil Production out of a Tailspin." Reuters, December 27, 2021, sec. Commodities. https://www.reuters.com/markets/commodities/how-venezuela-pulled-its-oil-production-out-tailspin-2021-12-27/.

River, but the contribution of hydropower to the country's energy mix has been relatively small in recent years due to mismanagement and a lack of maintenance. It's important to add that Venezuela's energy sector has faced significant challenges in recent years due to political and economic instability, declining oil production, and a lack of investment in new energy infrastructure. These factors have contributed to major power outages, which persist today, and other disruptions in the country's energy supply.[246]

The service sector represents 51.6% of the GDP and employs 76.1% of the active population, making it a major source of revenue and jobs[247]. The sector includes banking and finance, real estate, education, medicine, governmental agencies, hotels and restaurants, as well as entertainment. Together, these activities represent more than two-thirds of total employment in Venezuela. Although the COVID-19 crisis negatively impacted the Venezuelan economy as a whole, the services sector was hit the hardest, and it's still feeling the impacts of the pandemic.

Venezuela and Climate Change

The risks of climate change

a) Extreme weather events

Extreme weather events in Venezuela have become more frequent and intense in recent years. According to the National Institute of Meteorology and Hydrology (INAMEH) in the first half of 2022 over 9,000 families in only three states (Capital District, Sucre and Aragua) were affected by these events while over 1,000 houses were lost only in the state of Zulia[248]. The majority of these disasters were related to heavy rainfall, floods, and landslides, which have caused significant damage to infrastructure and homes, and have led to displacement of people. In 2020, for example, heavy rainfall caused flooding and landslides in several states, affecting more than 30,000 people.

The frequency and intensity of extreme weather events in Venezuela have increased over the past few decades. In 1999 as Venezuela was struck by one of the worst natural disasters in its history, the Vargas landslides, nearly 550,000 were affected. Twenty two years later, in 2021, 1.43 million Venezuelans were affected by multiple natural disasters around the country[249]. The majority of these disasters were related to heavy rainfall, floods, and landslides and correlated to the lack of investment by the government in mitigation and adaptation strategies against climate change.

---

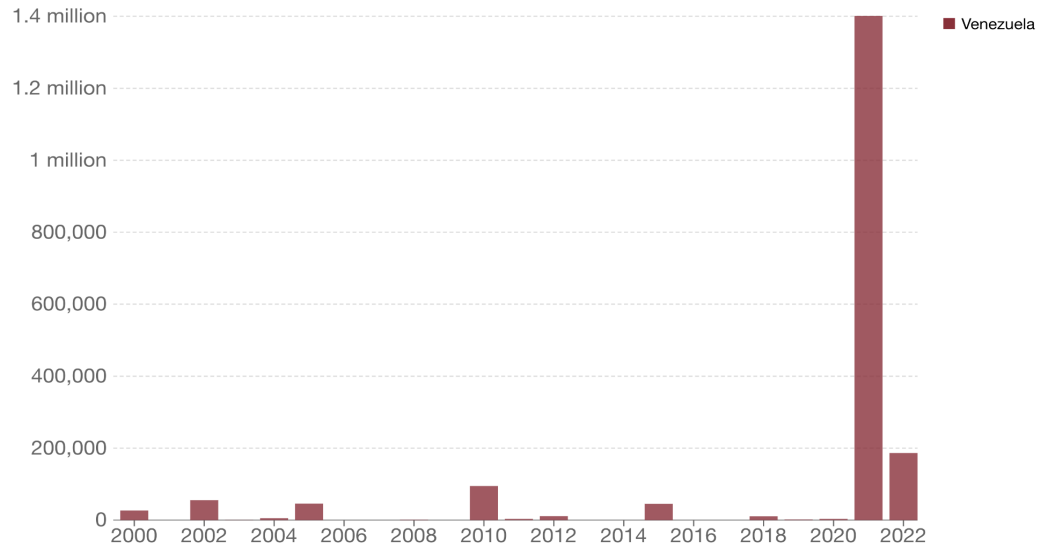
[246] US Energy Information Administrations. 2023. “International - U.S. Energy Information Administration (EIA).” Eia.gov. 2023. https://www.eia.gov/international/overview/country/ven.

[247] Lloyds Bank. 2022. “The Economic Context of Venezuela - International Trade Portal.” Lloydsbanktrade.com. 2022. https://www.lloydsbanktrade.com/en/market-potential/venezuela/economical-context.

[248] United Nations Office for the Coordination of Humanitarian Affairs. 2022. “Venezuela - Severe Weather (INAMEH, Media) (ECHO Daily Flash of 26 October 2022) - Venezuela (Bolivarian Republic Of) | ReliefWeb.” Reliefweb.int. October 26, 2022. https://reliefweb.int/report/venezuela-bolivarian-republic/venezuela-severe-weather-inameh-media-echo-daily-flash-26-october-2022.

[249] Ritchie, Hannah, Max Roser, and Pablo Rosado. 2022. “Natural Disasters.” Our World in Data. 2022. https://ourworldindata.org/natural-disasters.

Graph: Total Venezuelans affected by natural disasters 2000 - 2022



Source: Our World in Data, 2022

b) Deforestation

Venezuela's forests are being lost at an alarming rate. According to data from Global Forest Watch, in Venezuela from 2001 to 2021, 33% of tree cover loss occurred in areas where the dominant driver of loss was deforestation[250]. Much of this deforestation is due to illegal activities, such as mining and logging, which are driven by high demand for minerals and timber. Deforestation contributes to climate change by reducing the amount of carbon that forests can sequester, as well as by releasing carbon dioxide into the atmosphere.

Deforestation in Venezuela has been a significant problem for several decades. Between 1990 and 2000, Venezuela lost an average of 137,000 hectares of forest per year, whereas, between 2000 and 2010, the annual average increased to 272,000 hectares. While the rate of deforestation slowed down slightly in the 2010s, the country is still losing significant areas of forest each year, with an annual average of 223,000 hectares lost between 2010 and 2019[251].

c) Loss of biodiversity

Climate change is having significant impacts on Venezuela's ecosystems and biodiversity. According to the International Union for Conservation of Nature (IUCN), Venezuela has one of the highest numbers of threatened species in the world, with over 600 species listed as either critically endangered, endangered, or vulnerable[252]. Climate change is exacerbating the threats to these species, by altering their habitats and ecosystems. For example, rising temperatures are causing coral

[250] Global Forest Watch. 2021. "Venezuela Dashboard." Globalforestwatch.org. 2021. https://www.globalforestwatch.org/dashboards/country/VEN/

[251] Global Forest Watch. 2021. "Venezuela Dashboard." Globalforestwatch.org. 2021. https://www.globalforestwatch.org/dashboards/country/VEN/

[252] Statista. 2022a. "Venezuela: Number of Threatened Animal Species 2022." Statista. 2022. https://www.statista.com/statistics/977817/venezuela-threatened-animal-species-category/.

bleaching in Venezuela's coral reefs, which is impacting the fish and other marine species that depend on the reefs for their survival[253].

Venezuela has long been recognized as one of the world's most biodiverse countries, with rich ecosystems and a diverse range of species. However, climate change is having a significant impact on this biodiversity. Climate change is exacerbating the threats facing biodiversity, by altering ecosystems and habitats and making it more difficult for species to adapt.

d) Rising sea levels

Venezuela's coastal areas are vulnerable to sea level rise, which is caused by the warming of the oceans and the melting of ice caps and glaciers. According to the Intergovernmental Panel on Climate Change (IPCC), global sea levels are projected to rise by between 0.43 and 0.84 metres by the end of the century[254]. This could have significant impacts on Venezuela's coastal communities, many of which are densely populated. In addition to flooding and erosion, rising sea levels can also lead to saltwater intrusion, which can contaminate freshwater resources and harm crops.

e) Agriculture

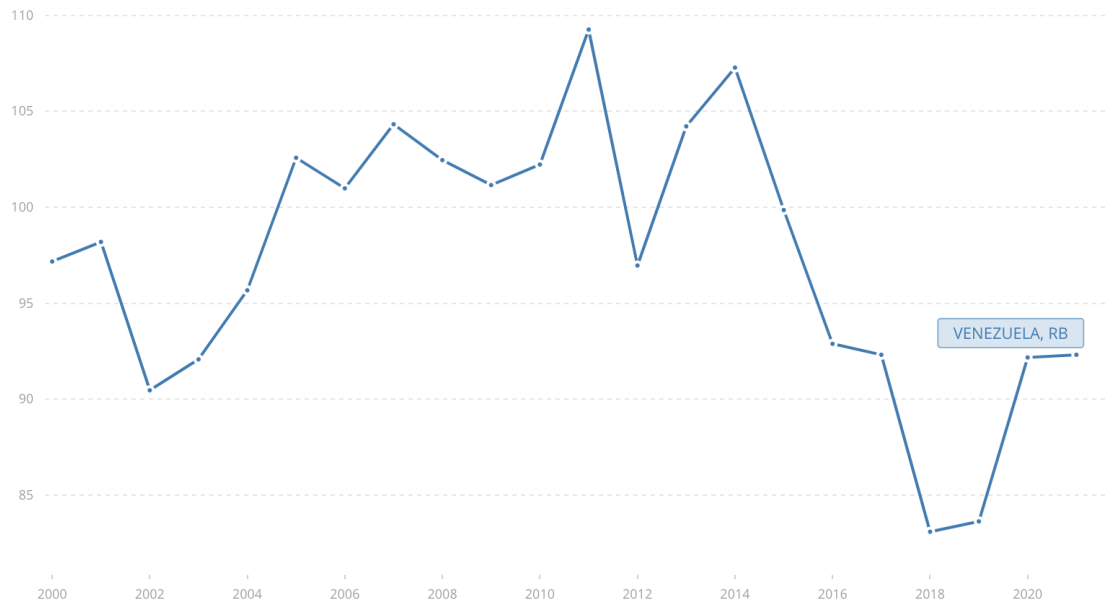
Climate change is already impacting Venezuela's agricultural sector, which is already facing challenges due to economic instability and food shortages. According to a report by the Food and Agriculture Organization (FAO), between 2014 and 2016, Venezuela's agricultural production decreased significantly as shown in the graph below where the country has dropped its Crop Production Index from an all time high of 109 in 2011 to an 83 in 2019[255]. Changes in rainfall patterns and increased temperatures are affecting crop yields, and are contributing to food insecurity in the country. In addition, extreme weather events, such as floods and droughts, are causing further damage to crops and infrastructure, and are exacerbating the challenges faced by farmers and rural communities.

[253] Aarón Israel Muñiz-Castillo, Andrea Rivera-Sosa, Iliana Chollett, C. Mark Eakin, Leopoldo Andrade-Gómez, Melanie McField, and Jesús Ernesto Arias-González. 2019. "Three Decades of Heat Stress Exposure in Caribbean Coral Reefs: A New Regional Delineation to Enhance Conservation." *Scientific Reports* 9 (1). https://doi.org/10.1038/s41598-019-47307-0.

[254] IPCC. 2015. "Chapter 4: Sea Level Rise and Implications for Low-Lying Islands, Coasts and Communities — Special Report on the Ocean and Cryosphere in a Changing Climate." Ipcc.ch. IPCC. 2015. https://www.ipcc.ch/srocc/chapter/chapter-4-sea-level-rise-and-implications-for-low-lying-islands-coasts-and-communities/.

[255] World Bank. 2021. "World Bank Open Data." World Bank Open Data. 2021. https://data.worldbank.org/indicator/AG.PRD.CROP.XD?end=2021&locations=VE&start=1966.

Graph: Crop Production Index (CPI) Venezuela 2000 - 2020



Source: World Bank, 2021 CPI

Policies for a green transition

On paper Venezuela seems to have a robust and extensive legal and structural framework to address climate change and protect the environment. Through an ecosocialist model, the government has extended the number of ministries, institutions, laws and decrees dedicated to protect the environment while creating three different national plans since 2009 to address climate change and subscribing to every major international climate agreement[256]. However, this ecosocialist model put in place by Chavez and followed by Maduro appears to have little to no positive impacts on the environment and the population given the rise of challenges such as illegal mining and the increase in natural disasters such as floods. The following analyses of key policies of this model demonstrate and showcase the reasons why the many actions taken have fallen short of their objectives and why the government is blamed to use climate change as a topic to attempt to clean its reputation.

a) The National Climate Change Programme

The National Climate Change Programme was first implemented by the country's government in 2009 seeked to pivot the course of climate change in Venezuela through mitigation and adaptation legislation and economic development[257]. However, after its implementation in 2009, total

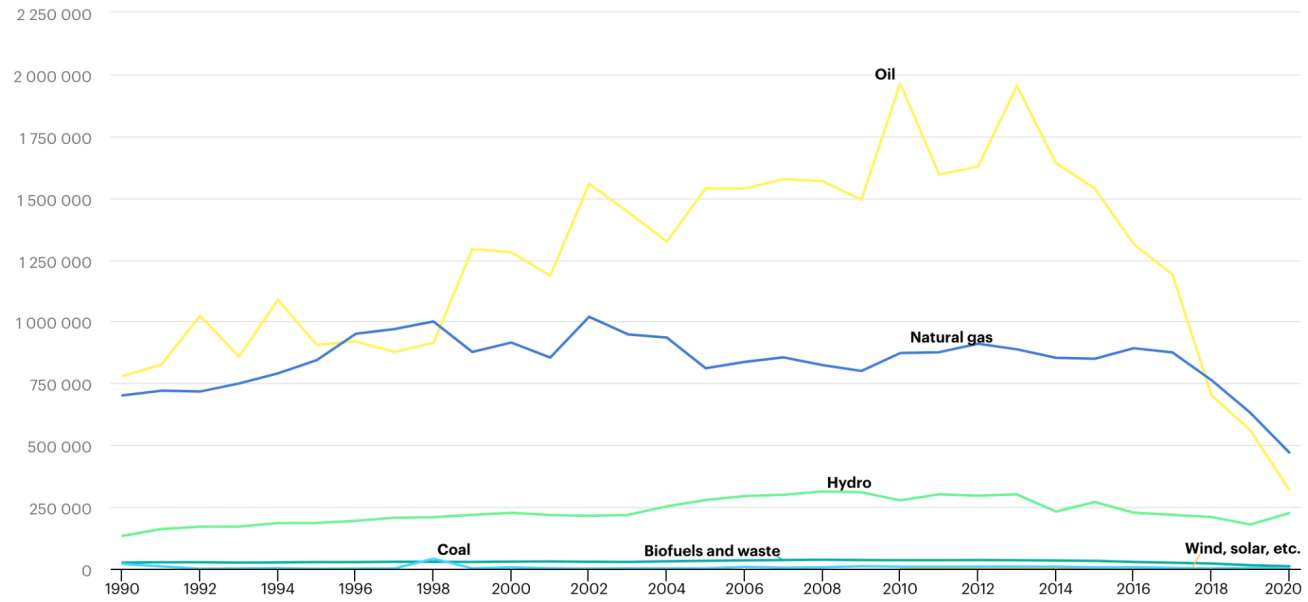
[256] Benitez, Sandra. 2020. "Digital Technologies to Mitigate Climate Change in Venezuela." Giswatch.org. Latin American School of Networks Foundation. https://giswatch.org/node/6264#_ftn6.
[257] Nachmany, Michal, Sam Fankhauser, Jana Davidová, Nick Kingsmill, Tucker Landesman, Hitomi Roppongi, Philip Schleifer, et al. 2015. "Climate Change Legislation in Venezuela." https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/VENEZUELA.pdf.

greenhouse gas emissions in Venezuela started to increase exponentially until 2015[258]. After, after 2015 total greenhouse gas emissions started to decline, this turnaround of events has been attributed to the economic and social crisis in the country which has depleted all industrial and possibly polluting activities in the country. Regardless, in 2021 the government published its Nationally Determined Contributions in order to keep following the Paris Agreement, mainly vowing to reduce its emissions by 20% in 2030 through more legislation and social programs[259].

b) Renewable energy incentives

Despite having significant renewable energy potential, Venezuela has made relatively little progress in developing its renewable energy sector. According to data from the International Energy Agency, Venezuela's energy mix strongly relies on oil and natural gas while hydro and biofuels account for a relatively small contribution to the energy mix[260]. Critics argue that the government has failed to provide sufficient financial incentives for renewable energy development, and that the country's reliance on fossil fuels remains a major barrier to progress. Moreover the lack of maintenance of renewable energy sources such as the Guri Dam have been a symbol of the government's indifference towards renewable energy[261].

Graph: Total Energy Supply by source Venezuela 1990 - 2020



Source: International Energy Agency, 2015

[258] _____. 2022. "World Bank Open Data." World Bank Open Data. 2022. https://data.worldbank.org/indicator/EN.ATM.GHGT.KT.CE?locations=VE.

[259] República Bolivariana de Venezuela. 2021. "Actualización de La Contribución Nacionalmente Determinada de La República Bolivariana de Venezuela Para La Lucha Contra El Cambio Climático Y Sus Efectos." https://unfccc.int/sites/default/files/NDC/2022-06/Actualizacion%20NDC%20Venezuela.pdf.

[260] International Energy Agency. 2015. "Venezuela - Countries & Regions - IEA." IEA. 2015. https://www.iea.org/countries/venezuela.

[261] Gutierrez, Jeanfreddy. 2020. "Venezuela's Electricity Emergency Swallows up Tens of Millions of Dollars." Dialogo Chino. January 15, 2020. https://dialogochino.net/en/climate-energy/32577-venezuelas-electricity-emergency-swallows-up-tens-of-millions-of-dollars/.

c) Forest conservation programmes

Venezuela's forests are under threat from a range of factors, including logging, mining, and agricultural expansion. According to data from the Global Forest Watch, the country lost more than 700,000 hectares of tree cover between 2002 and 2019[262]. While the government through a new General Direction of Forest Heritage seeks to implement a number of programmes aimed at conserving these forests, including the establishment of protected areas and the promotion of sustainable forestry practices, critics argue that these efforts have been hampered by corruption and a lack of political will. The policies set out to be implemented focus primarily on CO2 emission capture and reforestation, however, projects such as the Orinoco Mining Arch which were supposed to be bring sustainable economic growth have turned into a security and environmental crisis for the country[263]

d) International cooperation

Venezuela has participated in a number of international initiatives aimed at combating climate change, including the United Nations Framework Convention on Climate Change and the Bolivarian Alliance for the Peoples of Our America. However, the country's political and economic situation has limited its ability to participate fully in these initiatives. The government's focus on domestic issues and its strained relationship with other countries have prevented it from playing a more active role in the global effort to address climate change.

Overall, while Venezuela has implemented a range of policies aimed at combating climate change, the country has struggled to make significant progress in reducing its greenhouse gas emissions and promoting sustainable development. The government's response has been criticised for being insufficient and ineffective, as well as for using climate change efforts as a facade to try and improve its image with the international community which has simply resulted in weakened environmental institutions and a negative climate footprint[264].

Venezuela's path towards the Sustainable Development Goals (SDGs)

The SDGs have been for the past decade an international consensus to identify and quantify global progress in the path towards the 2030 agenda. Nevertheless, in the case of Venezuela, progress has been severely hindered by political and economic instability, as well as social unrest and the impact of the COVID-19 pandemic. According to the 2022 SDG Index and Dashboards report, Venezuela's

[262] Global Forest Watch. 2021. "Venezuela Dashboard." Globalforestwatch.org. 2021. https://www.globalforestwatch.org/dashboards/country/VEN.

[263] Rendon, Moises, Linnea Sandin, and Claudia Fernandez. 2020. "Illegal Mining in Venezuela: Death and Devastation in the Amazonas and Orinoco Regions." Csis.org. 2020. https://www.csis.org/analysis/illegal-mining-venezuela-death-and-devastation-amazonas-and-orinoco-regions.

[264] Cristina Vollmer Burelli, and Claudia Fernandez. 2021. "Venezuela's Ecological Death Spiral: Formulating a Global Response." Csis.org. 2021. https://www.csis.org/analysis/venezuelas-ecological-death-spiral-formulating-global-response

overall SDG Index score was 60.3 out of 100, which places it in the "low" category of SDG performance ranking 120 out of 163 countries[265].

SDGs represent an important indicator for Venezuela's progress as the country also has the challenge to improve Venezuelans living conditions in all aspects. Hence, as Venezuela prepares for an economic recovery and a resolution of its political instability the green transition needs to be integrated into this process. If the green transition is being addressed while Venezuelans living conditions continue to deteriorate, any action towards sustainability would result in ineffectiveness.

The country's best-performing SDGs were SDG 7 (Affordable and Clean Energy), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).

- **SDG 7 Affordable and Clean Energy:** the report shows that overall Venezuela is on track of maintaining its SDG achievements for affordable and clean energy. Specifically, the reports refers to a good performance from Venezuela in the indicators referring to population with access to electricity, population with access to clean fuels and technology for cooking, CO2 emissions from fuel combustion per total electricity output. Nonetheless, the country still faces severe challenges in this area given that in March 2019 Venezuelans all over the territory experienced the worst power outage in the country's history[266]. Additionally, the country still has significant challenges to overcome in terms of its share of renewable energy in the total primary energy supply.

- **SDG 12 Responsible Consumption and Production:** refers to ensuring the sustainable consumption and production within the country. In the case of Venezuela, the report signals towards a good performance in the indicators referring to municipal waste, SO2 and nitrogen emissions. However, in terms of electronic waste the report shows that there are major challenges remaining for Venezuela. The results of this report are not surprising as it is safe to assume that the depletion of the Venezuelan economy in the past two decades have impacted the amount of consumption and production in the country allowing for a decrease in polluting activities.

- **SDG 13 Climate Action:** as explained previously, Venezuela has implemented an array of climate policies and programs which have been recently revised to successfully achieve the global 2030 agenda which the SDG Index confirms. However, it also acknowledges that there are still challenges to overcome in this area, specifically in C02 emissions from fossil fuel combustion and cement production.

Despite these achievements, Venezuela still faces significant challenges in achieving the SDGs, particularly in the areas of governance, economic stability, and environmental sustainability. The

[265] United Nations. 2022. "Sustainable Development Report 2022." Dashboards.sdgindex.org. 2022. https://dashboards.sdgindex.org/map.
[266] The Borgen Project. 2021. "Blackouts: The Issue of Electricity in Venezuela." The Borgen Project. February 5, 2021. https://borgenproject.org/electricity-in-venezuela/.

ongoing political and economic crisis in the country has offset the progress made towards the goals, and the COVID-19 pandemic has further exacerbated the situation.

Venezuela has experienced significant deterioration in several Sustainable Development Goals (SDGs) in recent years, especially in SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 16 (Peace, Justice and Strong Institutions) and SDG 17 (Partnerships for the Goals).

- **SDG 1 (No Poverty):** Venezuela's poverty scores decrease year on year and major challenges remain for the country to overcome this problem. In 2021, 76.6% of venezuelans lived on less than 1.90$ a day which is the international standard for extreme poverty, in 2014 it was only 13.1% of the population[267]. Hence, the living conditions for Venezuelans worsen by the day and this has significant spillover effects which can be seen in the migrations crisis overwhelming other Latin American countries.

- **SDG 2 (Zero Hunger):** The report entails that the situation regarding food poverty in venezuela is stagnating. However, it acknowledges that there are major challenges risking the situation to worsen in the upcoming years. Indicators such as the prevalence of undernourishment have worsen, Cáritas Venezuela indicates that nearly 57% of households in the country are food deprived[268].

- **SDG 16 (Peace, Justice and Strong Institutions):** the complex political situation in Venezuela has hindered the ability of judicial and environmental institutions to take action. As shown in the figures in this report Venezuela has performed poorly in the corruption perception index (CPI) as well as in the access to and affordability of justice. In 2022, Venezuela ranked 177 out of 180 countries evaluated in the CPI and 87% of people perceived corruption to increase throughout the year[269]. Hence with organisations and citizens willing to take action to make a positive change in the country, corruption is a major hurdle in the way towards a green transition in the country.

- **SDG 17 (Partnership for the Goals):** One of the main issues highlighted is the lack of spending from the government in health and education. Health infrastructure has been significantly affected by the situation. Until 2014 the government published regular morbidity and mortality reports, then after two years of no reports in 2016 new data revealed that indicators such as infant mortality had increased by 30% and maternal mortality by 65%[270].

---

[267] Green, Mark. 2021. "Venezuelan Poverty, Afghan Opium, and Russian Permafrost | Wilson Center." Www.wilsoncenter.org. October 18, 2021. https://www.wilsoncenter.org/blog-post/venezuelan-poverty-afghan-opium-and-russian-permafrost.

[268] Rodriguez Garcia, Janet J. 2021. "Food Security in Venezuela: From Policies to Facts." Frontierin.org. March 19, 2021. https://www.frontiersin.org/articles/10.3389/fsufs.2021.617907/full.

[269]Transparency International. 2022. "Venezuela." Transparency.org. 2022. https://www.transparency.org/en/countries/venezuela.

[270] Broner, Tamara. 2020. "Venezuela's Health Care Crisis Now Poses a Global Threat." Human Rights Watch. March 12, 2020. https://www.hrw.org/news/2020/03/12/venezuelas-health-care-crisis-now-poses-global-threat.

These are just a few examples of the SDGs that have deteriorated the most in Venezuela. Even though most are not directly climate related, as the basic needs of the population such as food and health are not able to be fulfilled, the fight against climate change will remain ineffective and the last issue in the Venezuelans day to day struggles.

Challenges to achieving a green transition

Political - Venezuela's reputational dilemma

There have been several instances of "greenwashing" in Venezuela, particularly in relation to the country's oil industry. One example is the government's promotion of the Orinoco Oil Belt, a large oil reserve located in the eastern part of the country also considered a reservoir for international biodiversity[271]. The government has claimed that the Orinoco Oil Belt is an environmentally responsible project, but environmental groups have criticised the project for its significant impact on the local ecosystem and indigenous communities. They argue that the project has resulted in deforestation, water pollution, and displacement of local communities[272].

The government has also been criticised for its promotion of renewable energy sources such as wind and solar power. In 2013, the government announced plans to build several wind and solar power plants, but these projects have been delayed or cancelled due to lack of funding, technical issues or as the government claimed "vandalism"[273]. It seems as if the government is using these projects to promote a positive image while continuing to rely on oil and gas production as the main source of energy.

Overall, while the government has made some efforts to promote sustainable practices and environmental protection, there are concerns that these efforts may be undermined by the country's continued reliance on oil and gas production. Moreover, the examples of "greenwashing" in Venezuela are a cause for concern and highlight the need for greater transparency and accountability in the country's environmental policies and practices which are extremely difficult to attain under the current political context[274].

Economic - The funding problem:

Funding a green transition in Venezuela is a complex issue that involves a number of economic and political factors. On the one hand, the country has significant potential for renewable energy

[271] Dialogo Chino. 2022. "Orinoco Belt: Venezuela Waiting on Oil Investment in Biodiverse Region." Dialogo Chino. October 7, 2022. https://dialogochino.net/en/extractive-industries/59034-orinoco-belt-venezuela-oil-investment-in-biodiverse-region/.

[272] Egaña, Carlos. 2016. "Venezuela's Orinoco Mining Belt: The Economy, Environment and Violence." Venezuelanalysis.com. September 8, 2016. https://venezuelanalysis.com/analysis/12417.

[273] REVE. 2023. "Wind Energy in Venezuela, a Frustrated Attempt." REVE. April 18, 2023. https://www.evwind.es/2023/04/18/wind-energy-in-venezuela-a-frustrated-attempt/91356.

[274] Villamizar, Alicia, and Guy Edwards. 2014. "Venezuela Needs Low-Carbon Action - Not Greenwash." Thomson Reuters Foundation News. August 26, 2014. https://news.trust.org/item/20140826095421-gopl5.

development, particularly in the areas of wind and solar power. Regarding solar energy Venezuela has a potential generation of 5.35 kilowatt hours which situates the country theoretically amongst the highest in Latin America[275].

However, the country's economic situation has been a major barrier to investment in renewable energy. As discussed previously, the Venezuelan government has been struggling with a severe economic crisis since 2014, which has led to hyperinflation, a decline in oil production, and a shortage of foreign currency. The economic crisis has made it difficult for the government to finance new projects, including those related to renewable energy. In addition, political instability in the country has created a challenging environment for foreign investment. The government's past nationalisation of foreign-owned companies, as well as its current economic policies, have created a perception of risk among investors. This has made it difficult for Venezuela to attract the foreign investment needed to fund a green transition.

Additionally, there are concerns about how the government is investing the funds for the green transition. Given the country's economic crisis, there are questions about whether the government has the financial resources to invest in large-scale renewable energy projects. Moreover, corruption and mismanagement in the allocation of funds for environmental and renewable energy projects pose a great risk given the government's track record of starting and not finishing renewable projects. Nonetheless, despite these challenges the country has received funding for environmental and renewable energy projects from international organisations such as the United Nations Development Program (UNPD) and the Inter-American Development Bank (IDB). Thus, the funding problem relies not on the capacity of Venezuela to obtain funds or on the potential of the country's renewable energy sources but on the allocation and management of the resources from the current government.

Overall, while funding a green transition in Venezuela is challenging, there are opportunities for progress with the country having significant potential for renewable energy development. However, addressing the economic and political challenges facing the country will be critical for moving forward with a successful green transition. Moreover, the high amount of foreign and national funding and investment necessary for the country's economic recovery allows for an opportunity to start making the right investments and to make Venezuela's economic recovery a green recovery.

Technological - The revolution's brain drain and ideological agenda:

The lack of resources and investment in the country has negatively impacted innovation, research and development which is currently at its lowest point ever[276]. Nonetheless, the current state of innovation, research and development in Venezuela can also be attributed to two specific factors:

[275] Lopez, Margaret. 2023. "Could Solar Energy Help Venezuela Power Its Way out of Crisis?" Dialogo Chino. February 23, 2023. https://dialogochino.net/en/climate-energy/363525-could-solar-energy-help-venezuela-power-its-way-out-of-crisis/.

[276] Media Landscapes. 2018. "Media Landscapes." Media Landscapes. 2018. https://medialandscapes.org/country/venezuela/innovation/main-profiles.

1) **Diaspora:** Given the complex economic and political situation that Venezuela is immersed in, the country has suffered a massive brain drain given by the millions of Venezuelans that have seeked opportunities in other neighbouring countries. The prime example of the impacts of brain drain in Venezuela is the state owned oil company PDVSA which has lost 41% of its research staff since the 2002 protests led by its workers which paralysed the country and where later on condemned and penalised by former president Hugo Chavez. Moreover, in the last two decades the country's scientific community has nearly halved with basic sciences research public institutes losing 25% of its academic staff. Public autonomous universities have lost 18% of their academic staff and major universities such as Universidad Simon Bolivar have seen these numbers rise up to 34%.[277]

2) **Political Goals:** As part of the many changes Venezuela underwent with the 1999 Constitution introduced by Chavez, the scientific community faced a new organisational model for research and development. As part of this new model, a new Ministry of Science, Technology and Innovation was created to handle and centralise the planning, financing and management of research and development. This Ministry only deemed acceptable research that was socially pertinent for the administration which directly constraints freedom of thought, the scientific method and meritocracy. The Venezuelan Science Mission of 2006 stands as an early example of the true intentions of the government regarding research and development. Initially, the mission seeked to promote talent training in the country and to prevent brain drain. However, it resulted in a mismanagement of public funds and a promotion of ideological fidelity to the "socialist revolution" which was unveiled by the same leader of this mission as the mission was deemed a failure[278]. Thus, ideological fidelity has tampered with institution's ability to manage and distribute unbiased data and information which is key to monitor environmental behaviour and indicators[279].

Hence, lack of investment and resources for innovation and development are not the only obstacle facing Venezuela from a technical perspective. The deterioration of research and innovation in Venezuela can also be attributed to the economic context that has pushed the venezuelan scientific community outside of the country and the political context that has constrained free thought within the country.

Legal - In search of environmental rule of law:

Since Chavez won the election in 1998, major institutional changes have been driven forward in the name of the "socialist revolution", amongst these is the creation of the Ministry of Ecosocialism and the Ministry of Ecological Mining which replaced the longstanding Ministry for the Environment. On paper this Ministry said to undergo a mission to construct and consolidate ecosocialism in the country, for Venezuelans to benefit from the resources of their land in a sustainable and responsible

[277] Requena, Jaime. 2021. "Boom and Doom of Scientific Research in Venezuela." Interciencia 46 (12): 479–86. https://www.redalyc.org/journal/339/33969944006/html/.
[278] García, Rubén, Zoraira Silva, and Consuelo Ramos De Francisco. 2018. "Misión Ciencia En Venezuela. Un Proyecto Ilusorio, Extraviado, Fugaz Y Víctima de La Revolución Del Siglo XXI." Revista Venezolana de Análisis de Coyuntura XXIV (1): 179–294. https://www.redalyc.org/journal/364/36457129010/html/.
[279] Benitez, Sandra. 2020. "Digital Technologies to Mitigate Climate Change in Venezuela." Giswatch.org. Latin American School of Networks Foundation. https://giswatch.org/node/6264#_ftn6.

way. However, this cannot be farther from the truth as twenty years after its creation the country ranks 59th in the Yale Environmental Performance Index[280] is underperforming in the majority of the SDGs, greenwashing scandals have been the highlight of nearly every major green investment and illegal mining is on the rise in the Orinoco Oil Belt.

The Nationally Determined Contributions displayed by the government have set a foot in the right direction regarding a redefinition of the legal framework in an attempt to restore authority to the institutions to tackle major challenges such as illegal mining and to clear a path for a green transition in the country. However, the current institutions and public officials which are responsible for the execution of this legal framework, pose a threat for a green transition in Venezuela as their track record has been nothing short of a failure.

Environmental - The Green Paradox

The environmental risks and challenges that have been discussed are all aimed at long term problems that require long term solutions. Nonetheless, in the short term for Venezuela to address the issue of a green transition, the challenge of the green paradox needs to be considered. This is a theoretical argument which explains how environmental policy can have a counterproductive effect resulting in an increase of resource extraction for fossil fuel like oil which dominates the country's economy. The theory explains that as governments try to tackle environmental risks and challenges with instruments such as carbon taxes, renewable incentives or decreasing the demand for fossil fuels; this causes the prices to drop. As a consequence, producers liquidate their oil reserves in an attempt to anticipate further regulations and constraints. Hence, producers start to implement reckless and unsustainable extraction practices which further damage ecosystems and exacerbate any environmental threats.[281]

In the case of Venezuela demand for oil has decreased due to the deterioration of the oil production infrastructure which has encouraged the government to embrace reckless practices to extract as much oil as possible before the infrastructure collapses. The consequences can be seen all around the Orinoco Oil Belt, a reservoir of international biodiversity which is currently harbouring the expansion of illegal mining groups as well as mismanaged investments from the government with the intent to ramp up oil production.

Policy Recommendations

In terms of policy recommendation it is necessary to note that for any progress to occur towards a green transition in Venezuela, the political and economic crisis need to be resolved first. Given the current state of the country, environmental challenges are the last issue Venezuelans want to see addressed. Nonetheless, even amidst its worst economic and political crisis, the country has a golden

[280] BTI Tranformation Index. 2022. "BTI 2022 Venezuela Country Report." BTI 2022. 2022. https://bti-project.org/en/reports/country-report/VEN#pos15.
[281] Nagar, Sarosh. 2021. "Venezuela's Environmental Collapse: A Harbinger of Health and Environmental Harm." Harvard International Review. Harvard International Review. August 18, 2021. https://hir.harvard.edu/venezuelas-environmental-collapse-a-harbinger-of-health-and-environmental-harm/.

opportunity to consider environmental policy as a key component of its political and economic recovery. As a consequence environmental policy could potentially be embedded in Venezuelan law which would create a solid foundation for the country's path towards a green transition. This represents an opportunity few countries possess as most have had to adapt and bargain between conflicting interests while given the state of Venezuela everything is yet to be determined. Moreover, reflecting on the ongoing negotiations between the opposition and the government as well as the upcoming election where the opposition agreed to participate, environmental policy could become an interesting part of the discourse for parties to gain support from a population that has been politically inactive since 2015.

Institutional

Given the legal challenges facing the country, institutionally, Venezuela will need more than a new legal framework or the NDCs in order to restore authority to its environmental institutions. The government will need to develop an adaptation plan to address the short term challenges facing the country while conducting a long term restructure of environmental institutions with the objective to restore their authority and legitimacy to mitigate climate risks.

Despite the extensive environmental legal framework Venezuela seems to have on paper, the country still faces severe climate risks which impacts on the population have radically increased. Thus, in the short term, the first step is to reevaluate current policies and their effectiveness to assess which ones have had a positive impact. Secondly, the new adaptation plan has to be integrated into the country's plans for economic and political recovery and needs to be developed with the objective to be an effective mechanism to strengthen the country's climate resilience. Moreover, transparency and accountability need to be restored to provide credibility to new climate actions and to justify investments in areas such as renewable energies as the country seeks to take advantage of its energy potential to diversify its energy mix. Thus, current and future governments need to reassess the current position, reflect on past mistakes and develop a new short term strategy for climate adaptation which aligns with the economic and political recovery.

Meanwhile in the long term there is a need for a national consensus from the country's main political forces, the government and the opposition to reevaluate the ecosocialist model. The consensus should consider every aspect affecting the country's environment, from national policies to international agreements. Climate policy should be a common ground for both sides to reach agreements such as the amendment of current national policies to the assessment of international agreements with countries who reap the benefits of the country's resources. Thus, a platform for environmental national consensus could represent a cornerstone of agreements in the struggle for power between the government and the opposition.

Private Sector

Private and foreign investment in Venezuela has been severely hindered by the current economic situation, the government's reputation regarding the mismanagement of resources and years of restrictions and constraints from the government to private and foreign investment. Hence, for the private sector to be able to skew the balance in favour of the fight against climate change, the government's needs to allow, encourage and incentivise private and foreign investment aimed at

lending expertise and resources to build a healthier economy in Venezuela. As a consequence not only will the economic crisis improve but the government has the opportunity to shift the management of resources towards a more responsible private sector. However, for the private sector to gain this opportunity, companies need to establish transparent and accountable processes for the management of these resources which need to be directed to the development of platforms, systems and tools that support the adaptation and mitigation of climate change in the country.

Civil Society

Environmental awareness is crucial for the civil society to strive and urge for effective policies. Nonetheless, as the population addresses their day to day struggles such as food security, people are unaware of the environmental challenges facing the country extending from the increase in floods and droughts to illegal mining and the exploitation of natural resources at the expense of the environment. Hence, Non Governmental Organisations (NGO) need to strengthen individual and collective awareness about the environmental crisis while developing tools and mechanisms that allow the population to face the climate risks. Achieving individual and collective environmental awareness will allow civil society groups to rally pressure for the government to take effective actions and develop credible plans while maintaining public officials transparent and accountable.

Conclusion

The economic situation in Venezuela is dire, climate risks are on the rise, policies have been ineffective and the challenges seem insurmountable. However, there are still opportunities for the country to rectify its trajectory and open a path towards a green transition. As the struggle for power continues between the main political forces in Venezuela, climate change could pose an impartial common ground to reach agreements and provide economic progress for the population. As a result, in the fight against climate change the country would not only protect its diverse environment but could also open a way for sustainable political stability and economic recovery. Thus, as Venezuela seeks a new beginning of prosperity for its population, the green transition could play a crucial role in setting new foundations for the country.

Ecuador: Towards a Green Transition

Lester Chavez

Ecuador's Country Profile

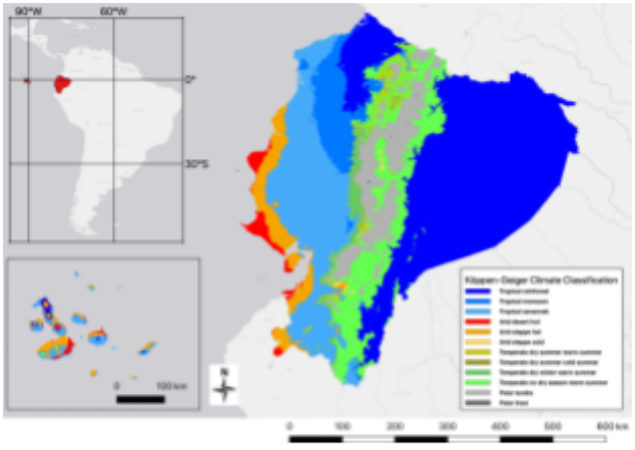
Ecuador is an Andean country located in the northwest of South America. It borders Colombia to the North, Peru to the South, and the Pacific Ocean to the West, which separates by 972 km continental Ecuador from the Galapagos Islands. Ecuador also shares maritime borders with Costa Rica and has a total land area of 276,841 square km[282]. The volcanic mountain range of the Andes runs north-south dividing the country into three distinct topographical regions: the coast on the east, the Andes, and the Amazon on the western flank.[283]

According to official government sources, Ecuador is one of the countries with the highest concentration of rivers in square km in the world. It is also one of the first nations to engrain the Rights of Nature in its constitution in 2008[284]. About 30% of the country's land is used for agriculture, while close to 40% is rainforest.[285]

Ecuador - Country Summary
Government: Presidential Republic
Population: 18,236,684 (Feb. 2023)
Population growth rate: 1.13% (2022 est.)
Land Area: 276,841 square km
Real GDP (PPP): $189.88 billion (2021 est.)
Real GDP per capita: $10,700 (2021 est.)
Basic Basket of Goods: $764.71 (Jan. 2023)
Poverty (Wages): 25.2% (Dec. 2022)
Poverty (Multi-sectorial): 38.1% (Dec. 2022)
Electricity Access: 98.8% (2020)

Source: National Institute of Statistics and Censuses (INEC) of Ecuador, CIA World Facebook, World Bank.

Climate



Source: History of limnology in Ecuador: a foundation for a growing field in the country - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Map-of-Koeppen-climate-classifications-displaying-12-climate-zones-for-Ecuador-This_fig1_341951726 [accessed 20 Feb, 2023]

According to a UN report, Ecuador belongs to a group of 17 nations with "the highest levels of biodiversity and a high level of endemic species." In great part this is due to the varied climate, resulting from variations in altitude and terrain. Ecuador's coastal regions experience a humid subtropical climate, while the Andean valleys have a year-round temperate climate, with a rainforest climate in the Amazon lowlands. Two main seasons exist, the rainy and dry seasons. The average temperature is about 25°C to 26°C during the rainy season (December to May) and 21°C to

[282] "Country Summary." n.d. CIA.gov. Central Intelligence Agency. Accessed June 10, 2023. https://www.cia.gov/the-world-factbook/countries/ecuador/summaries/#people-and-society.
[283] "Ecuador." n.d. *Cancillería de Ecuador*. https://www.cancilleria.gob.ec/bolivia/wp-content/uploads/sites/22/2021/07/ECUADOR.pdf.
[284] Ibid.
[285] "Ecuador - the World Factbook." n.d. https://www.cia.gov/the-world-factbook/countries/ecuador/#environment.

22°C during the dry season (June to November).

The World Bank's Climate Change Knowledge Portal indicates that "the coast has a tropical climate and a rainy season that extends from the end of December to May; the thermal regime is characterised by a 2°C to 3°C variation between the hottest and coldest months. The inter-Andean valleys have a temperate climate and rainy season from October to May and a dry season from June to September; average monthly temperatures are about 14.5° C in the rainy season and 15° C in the dry season. The Amazon Region in the eastern part of the country experiences rainfall throughout the year; the average temperature is around 21° C during most months of the year. The Island region comprising the Galapagos Islands has a climate similar to that of the Coastal Region."[286]

The variation in climate is also closely linked with the El Niño Southern Oscillation (ENSO) leading to increased rainfall and floods in the coast and Western Andes, and droughts in the Northern and Eastern areas. These variations in rainfall are significant given Ecuador's great reliance on hydroelectric power as its main source of renewable energy.

Population

The most recent official estimates place the total population at 18.2 million[287], of which the World Bank estimates that 36% live in rural parts of the country in 2021.[288] Approximately half of the population resides in the interior of the Andean basins and valleys, with a significant concentration also located in the western coastal regions. The Amazon regions in the eastern country are sparsely populated.[289] Ecuador has made great strides with electrification, with 98.8% of the population having access to electricity and 97.7% in rural areas.[290]

However, despite these gains as of December 2022, 25.2% of those earning wages experienced poverty while the multi-dimensional poverty rate reached 38.1%.[291] Ecuador was particularly hard-hit by the impacts of the Covid-19 pandemic, with dire consequences for vulnerable populations (including Venezuelan migrants). The World Bank estimates that some estimated 1.5 million residents were pushed into poverty and conditions worsened for those who were already experiencing poverty.[292]

The country's high poverty and income inequality mostly impact indigenous, mixed-race, and rural populations. According to the 2010 National Census, indigenous people represented 7.03% of the total population, Afro-Ecuadorians 7.19%, and the Montubios (a nationally recognized mestizo ethnic

---

[286] "World Bank Climate Change Knowledge Portal." n.d. https://climateknowledgeportal.worldbank.org/country/ecuador/climate-data-historical.

[287] "Ecuador - Indicadores Básicos." 2021. INEC. 2021. https://www.ecuadorencifras.gob.ec/estadisticas/.

[288] "Población Rural (% de La Población Total) - Ecuador." n.d. World Bank Open Data. Accessed June 10, 2023. https://datos.bancomundial.org/indicator/SP.RUR.TOTL.ZS?locations=EC.

[289] "Ecuador - People and Society." n.d. CIA - the World Factbook. https://www.cia.gov/the-world-factbook/countries/ecuador/#people-and-society.

[290] "Access to Electricity (% of Population) - Ecuador ." n.d. World Bank Open Data. Accessed June 10, 2023. https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=EC.

[291] "Ecuador - Indicadores Básicos" (2021)
"Encuesta Nacional de Empleo, Desempleo Y Subempleo 2021 (ENEMDU)." 2021. *INEC*. https://www.ecuadorencifras.gob.ec/documentos/web-inec/POBREZA/2021/Diciembre-2021/202112_PobrezayDesigualdad.pdf.

[292] "Protecting the Vulnerable during the COVID-19 Crisis: Ecuador's Emergency Cash-Transfer Scheme and Increased Work Arrangement Flexibility." 2021. World Bank. April 9, 2021. https://www.worldbank.org/en/results/2021/04/09/protecting-the-vulnerable-during-the-covid-19-crisis-ecuador-s-emergency-cash-transfer-scheme-and-increased-work-arrange.

group) 7.39%.[293] There are 14 indigenous nationalities, each with its own distinct language and culture. The share of the indigenous population in 2020 that had an average per capita income below the poverty line reached nearly 60 percent.[294] Ecuador also has the second highest share of indigenous people living in extreme poverty (35.6%) in Latin America, after Colombia.[295] These socioeconomic and demographic dynamics have led to serious social and political tensions throughout the years that will play a key role in Ecuador's green transition.

Ecuador has a small but growing immigrant population and is Latin America's top recipient of refugees[296]; 97% are neighbouring Colombians fleeing violence in their country with a growing number of displaced Venezuelans.[297]

Economy

Ecuador experienced slow growth from 2017 through 2019, a contraction due to the Covid-19 pandemic in 2020, and a rebound in 2021. Inflation impacted the growth in 2022 but was offset by rising oil prices. The economy is heavily reliant on oil production and exports, with the commodity comprising more than half the country's export earnings and approximately 25 percent of public-sector revenues.[298] As a result, fluctuations in oil prices tend to significantly impact domestic macroeconomics. In general, the economy relies mainly on the mining, agriculture, and fishing sectors. Recently Ecuador has come to rely more on the export of cocoa, flowers, and bananas, of which Ecuador is the world's largest exporter[299]. Remittances also play an important role in the economy (3.87% of GDP). In South America, remittances represent a greater portion of Ecuador's economy than in any other country.[300]

---

[293] CONSEJO NACIONAL PARA LA IGUALDAD DE PUEBLOS Y NACIONALIDADES AGENDA PARA LA IGUALDAD DE DERECHOS DE LAS NACIONALIDADES Y PUEBLOS INDÍGENAS, PUEBLO AFROECUATORIANO Y PUEBLO. 2019. "AGENDA PARA LA IGUALDAD de DERECHOS de LAS NACIONALIDADES Y PUEBLOS INDÍGENAS, PUEBLO AFROECUATORIANO Y PUEBLO MONTUBIO 2019 - 2021." http://www.pueblosynacionalidades.gob.ec/wp-content/uploads/2020/02/Agenda-Nacional-para-la-Igualdad-de-Pueblos-y-Nacionalidades.pdf.

[294] Romero, Teresa. 2023. "Percentage of Indigenous People Living under the Poverty Line in Ecuador 2007-2021." Statista. March 6, 2023. https://www.statista.com/statistics/1289121/share-indigenous-population-living-poverty-ecuador/.

[295] Romero, Teresa. 2023a. "Percentage of Indigenous People Living in Extreme Poverty in Latin America 2021." Statista. March 3, 2023. https://www.statista.com/statistics/1288329/share-indigenous-population-living-extreme-poverty-latin-american-countries/.

[296] "Ecuador - People and Society" (n.d.)

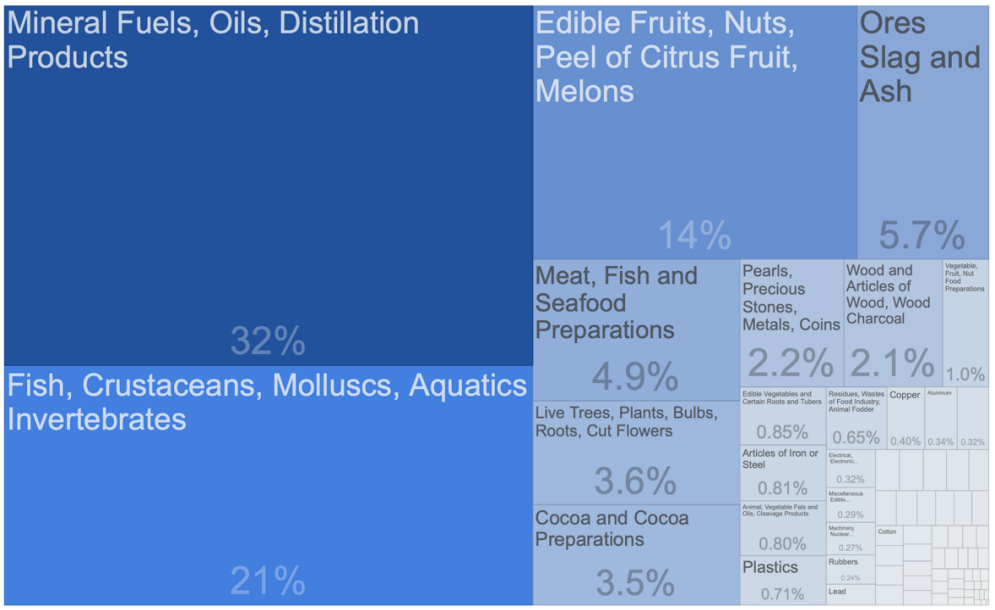
[297] Latuff, Jeffrey D. Pugh, Luis F. Jiménez, and Bettina. 2020. "Welcome Wears Thin for Colombians in Ecuador as Venezuelans Become More Visible." Migration Policy Institute. January 9, 2020. https://www.migrationpolicy.org/article/welcome-wears-thin-for-colombians-ecuador.

[298] "Ecuador - 2022 Index of Economic Freedom." 2022. *The Heritage Foundation*. https://www.heritage.org/index/pdf/2022/countries/2022_IndexofEconomicFreedom-Ecuador.pdf.

[299] "Ecuador Banana Industry Slips over War in Ukraine." 2022. France 24. April 5, 2022. https://www.france24.com/en/live-news/20220405-ecuador-banana-industry-slips-over-war-in-ukraine.

[300] "Ecuador, the Country Where Remittances Contribute the Most to the Economy." 2023. Ecuador Times. January 14, 2023. https://www.ecuadortimes.net/ecuador-the-country-where-remittances-contribute-the-most-to-the-economy/.

Ecuador's Exports By Sector (2021)



Source: United Nations COMTRADE database on international trade (2021).

Ecuador's 2022 economic freedom index score ranks it 25th among the 32 countries in the Americas, with a score below the regional and global averages. According to the report, the country's "property rights, government integrity, and investment freedom exhibit weaknesses."[301]

In 2000, Ecuador adopted full dollarisation in order to curb severe economic and financial crises. While the policy proved successful during the first decade, mainly due to high commodity and oil prices, some budgetary discipline, and a completive exchange rate the move was not without some downsides. The country's vulnerability to external shocks (namely petroleum price swings and financial crises) as nominal exchange rate adjustments and money creation were no longer possible options. This proved to be the case with the Covid-19 Pandemic, as the national authorities lacked the fiscal and monetary tools to absorb its impact.[302]

The pandemic had a profound impact on Ecuador's economy and led to a spike in unemployment, and poverty rates.[303] The economy experienced a real GDP contraction of 7.8%, in part the result of a reduction of oil production and exports due to the high volatility of international prices, and challenges with extraction and transportation. Consequently, more than 80% of economic sectors recorded a deceleration in 2020.[304] However, as the result of a successful vaccination campaign and

[301] "Ecuador - 2022 Index of Economic Freedom" (2022)

[302] Ozyurt, Selin, and Simon Cueva. 2020. "Twenty Years of Official Dollarization in Ecuador: A Blessing or a Curse?" Agence Française de Développement. July 2020. https://www.afd.fr/en/official-dollarization-ecuador.

[303] King, Katiuska, and Philipp Altmann. 2020. "Ecuador's Mishandled COVID-19 Health Crisis Has Also Had Serious Economic, Educational, and Emotional Impacts | LSE Latin America and Caribbean." LSE Latin America and Caribbean Blog. November 18, 2020. https://blogs.lse.ac.uk/latamcaribbean/2020/11/18/ecuadors-mishandled-covid-19-health-crisis-has-also-had-serious-economic-educational-and-emotional-impacts.

[304] "Ecuador - Economic Survey of Latin America and the Caribbean 2021." 2021. Economic Commission for Latin America and the Caribbean (ECLAC). 2021. https://repositorio.cepal.org/bitstream/handle/11362/47193/77/EI2021_Ecuador_en.pdf.

economic reforms under a new administration in 2021,[305] and an increase in oil production the country was slowly able to stabilise and end the recession.[306]

By 2022, as global inflation rose in part due to Russia's invasion of Ukraine, local fuel and food prices took a toll on average citizens. Year-on-year inflation had reached 4.23 % by June 2022,[307] which would ultimately serve as the catalyst for nationwide protests and strikes led by indigenous groups impacted by the rising cost of living to break out that month. Among the protesters' demands were greater social support including fuel price cuts and the halting of further expansion of Ecuador's oil and mining industry.[308] The social uprising paralysed the economy for 18 days (see Box below).[309] Similar strikes had previously taken place in 2019. However, despite the economic decline caused by the unrest, at the end of the third quarter of 2022, the economy was reflecting a recovery of productive activities.[310] In January 2023, Ecuador signed a free trade deal with China, which seeks to boost exports and growth following a debt-restructuring agreement in 2022.[311]

[305] "Ecuador, the Country That Vanquished the Nightmare Pandemic in 100 Days." 2021. World Bank. October 18, 2021. https://www.worldbank.org/en/news/feature/2021/10/18/ecuador-the-country-that-vanquished-the-nightmare-pandemic-in-100-days.

[306] "The Ecuadorian Economy Grew 4.2% in 2021, Exceeding the Most Recent Growth Forecasts - Central Bank of Ecuador." 2021. Central Bank of Ecuador (BCE). March 31, 2021. https://www.bce.fin.ec/en/press-release/the-ecuadorian-economy-grew-4-2-in-2021-exceeding-the-most-recent-growth-forecasts.

[307] "Why Does the Price of Premium Gasoline Skyrocket in Ecuador?" 2022. Ecuador Times. July 13, 2022. https://www.ecuadortimes.net/why-does-the-price-of-premium-gasoline-skyrocket-in-ecuador/.

[308] Valencia, Alexandra. 2022. "Thousands of Ecuador Indigenous Protesters March on Capital." *Reuters*, June 21, 2022, sec. Americas. https://www.reuters.com/world/americas/thousands-ecuador-indigenous-protesters-march-capital-2022-06-21/.

[309] "The Ecuadorian Economy Slowed down due to the Strikes of June 2022 - Central Bank of Ecuador." 2022. Central Bank of Ecuador (BCE). September 30, 2022. https://www.bce.fin.ec/en/press-release/the-ecuadorian-economy-slowed-down-due-to-the-strikes-of-june-2022.

[310] "Ecuador's Economy Grew by 3.2% in the Third Quarter of 2022 - Central Bank of Ecuador." 2022. Central Bank of Ecuador (BCE). January 3, 2022. https://www.bce.fin.ec/en/press-release/ecuador-s-economy-grew-by-3-2-in-the-third-quarter-of-2022.

[311] *Reuters*. 2023. "Ecuador Reaches Trade Deal with China, Aims to Increase Exports, Lasso Says," January 3, 2023, sec. Markets. https://www.reuters.com/markets/ecuador-reaches-trade-deal-with-china-aims-increase-exports-lasso-says-2023-01-03/.

Economic Impact of June 2022 Strikes

In September of 2022, the Central Bank of Ecuador (with technical assistance from the World Bank) estimated the economic losses caused by the June 2022 strikes. According to the analysis:

- The economic losses and damages caused by the strikes of June 2022 amounted to USD 1.115 billion, of which USD 330 million correspond to losses and damages in the oil sector and USD 785 million to the non-oil sector.
- Out of the total amount of damages and losses, USD 281.6 million occurred in the public sector and USD 833.8 million affected the private sector.
- The five sectors most affected by the strikes were energy and hydrocarbons with USD 330 million; trade with USD 318 million; industry with USD 227 million; agriculture with USD 80 million; and tourism with USD 56 million.
- As a consequence of the events of June and other factors that affect economic growth, the Central Bank of Ecuador lowered its growth forecast for the year 2022 to 2.7%, which represents a reduction of 0.1% from the previous forecast of 2.8%.

Source: Central Bank of Ecuador (BCE)

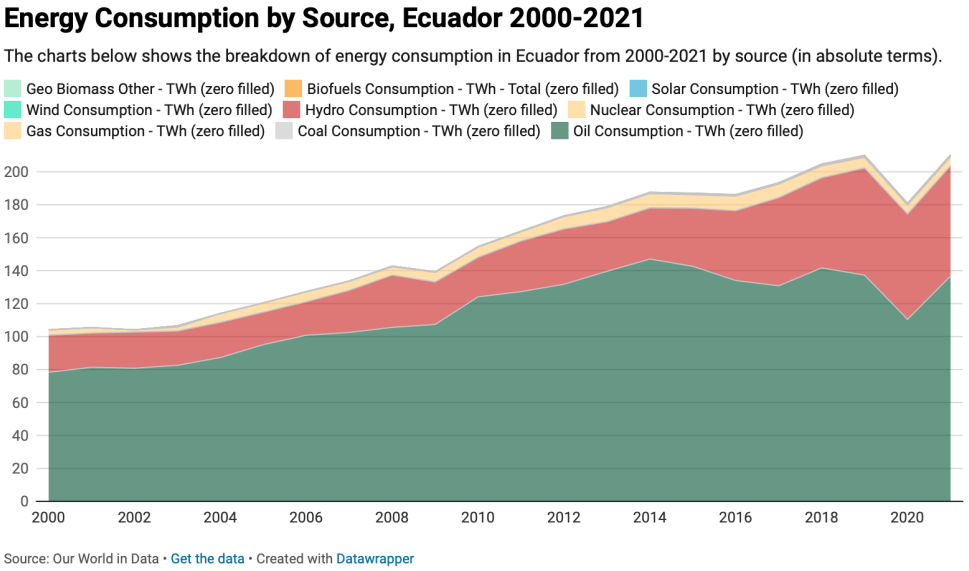
The Economist Intelligence Unit (EIU) predicts an economic return to pre-pandemic levels in 2023, however, with slower GDP growth (1.4%) when compared to 2022 (2.7%). The EIU's economic forecasting for 2024-2027 shows the economy struggling to regain its 2022 growth rate, growing by an estimated annual average of 2.2%. Risks to the forecast include "another spike in oil prices [which] would have a net positive effect on growth, although it would also raise the potential for damaging protests over elevated living costs that would hit investment and activity. The biggest downside risks are internal political instability and a deteriorating global economic outlook."[312]

Main Sources of Energy

According to the U.S. Energy Information Administration (EIA), Ecuador was the fifth-largest oil producer in 2020 in South America behind Brazil, Colombia, Argentina, and Venezuela. And as of January 2021, it held the third-largest oil reserves in Latin America. Most of the oil reserves are located in the eastern Amazon region of the country, in the Oriente Basin.

The EIA estimates that petroleum and other liquids represented 62% of Ecuador's total energy consumption in 2020. Hydroelectric power was the second-largest energy source at 34%. Natural gas and other renewable fuels account for the remainder of Ecuador's energy mix at 3% each.[313] Ecuador's national oil company, Petroecuador, controls almost 75% of oil production. The EIU estimates that oil consumption increased by 1.5% in 2022, and forecasts average annual growth of 1.2% from 2023-2032, mainly due to growth in the transportation sector and car ownership.[314]

[312] https://viewpoint.eiu.com/analysis/article/1772748160
[313] https://www.eia.gov/international/content/analysis/countries_long/Ecuador/ecuador.pdf
[314] https://viewpoint.eiu.com/analysis/article/1852741568



The Latin American Energy Organization (OLADE) estimates that in 2021 the transportation sector accounted for 55% of the end-use energy consumption, followed by the industrial sector at 16%, the residential sector at 14%, and the commercial sector at 6%.[315]

Given the transportation sector's major share of energy consumption (namely petrol), the transition to hybrid and electric vehicles (HEV and EV) will play a significant role in Ecuador's green transition. According to an analysis by Global Fleet, an industry research group, in 2021 EVs sold in Ecuador rose by 225% year-on-year. Meanwhile, sales of HEVs were ten times higher than those of EVs (4,225 units and 345 units respectively).[316] By May 2022, EVs and HEVs represented 5.27% of the market share, while in 2020 EV sales were in the single digits.[317]

Since March 2019, Guayaquil, the most populous city in Ecuador, has relied on a fleet of 20 BYD electric buses to transport some 10,500 users daily.[318] Ecuador has set a non-legal binding target that all public transportation vehicles must be electric starting in 2025.[319]

---

[315] "Ecuador - Panorama Energético de América Latina Y El Caribe 2022." 2022. Organización Latinoamericana de Energía (OLADE). December 2022. https://www.olade.org/wp-content/uploads/2023/01/Panorama-ALC-13-12-2022.pdf.

[316] Bland, Daniel. 2022. "Electric Vehicles Sales in Latin America, 2021 and Beyond." Global Fleet. January 18, 2022. https://www.globalfleet.com/en/safety-environment/latin-america/analysis/electric-vehicles-sales-latin-america-2021-and-beyond?a=DBL10&t.

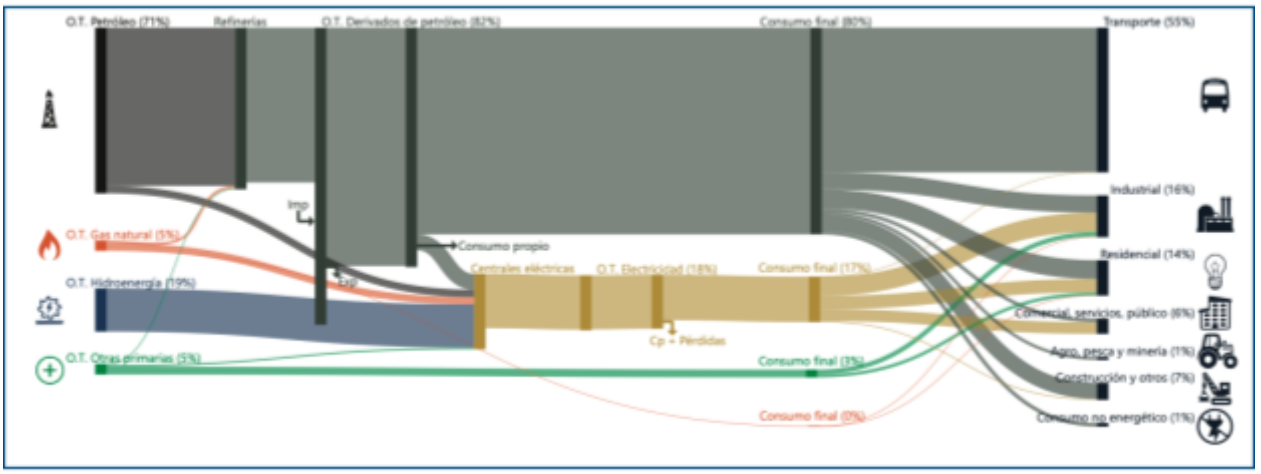
[317] Celemín Mojica, Juan Diego. 2022. "South American Plugin Vehicle Markets, a Brief Overview — Part 1: Argentina, Peru, & Ecuador." CleanTechnica. August 23, 2022. https://cleantechnica.com/2022/08/23/south-america-plugin-vehicle-markets-a-brief-overview-part-1-argentina-peru-ecuador/.

[318] "Electric Buses and Charging Infrastructures in the World." 2021. IES-Synergy. March 4, 2021. https://www.ies-synergy.com/en/electric-buses-where-are-we/.

Field, Kyle. 2018. "One Ecuadorian City Is Converting Its Entire Bus Fleet to Electric by March 2019." CleanTechnica. November 14, 2018. https://cleantechnica.com/2018/11/14/one-ecuadorian-city-is-converting-its-entire-bus-fleet-to-electric-by-march-2019/.

[319] Kohli, Sumati, Tanzila Khan, Zifei Yang, and Josh Miller. 2022. "Zero-Emission Vehicle Deployment: Latin America." *INTERNATIONAL COUNCIL on CLEAN TRANSPORTATION*. https://theicct.org/wp-content/uploads/2022/04/EMDE-Latin-America-briefing-A4-v2.pdf.

Ecuador: Energy Balance Summary 2021



Source: OLADE. Panorama energético de América Latina y el Caribe 2022

Main Sources of Electricity

Electricity makes up only one of the three components of total energy consumption (the others being transportation and heating). Ecuador's electric power system has an estimated capacity of nearly 8,730 MW.[320] When looking at electricity production, EIA estimates that in 2020, 79% of the country's electricity generation came from hydroelectric power, 19% of the generation came from fossil fuels, and the remaining 2% came from non-hydro renewables.

Ecuador's Over-reliance on Hydropower

While over 80% of Ecuador's electricity is generated from renewable sources, EIA warns that:

> *"Ecuador's high use of hydropower for electricity generation leaves the country's electric power sector vulnerable to droughts and low water levels during the dry season, which spans from October to March. To offset this, Ecuador currently relies on oil-fired plants for non-hydroelectric power supply."*

Additionally, while hydropower is technically considered a renewable energy source[321], some experts question this due to their impact on the environment, climate, and greenhouse emission. According to the MIT Climate Portal:

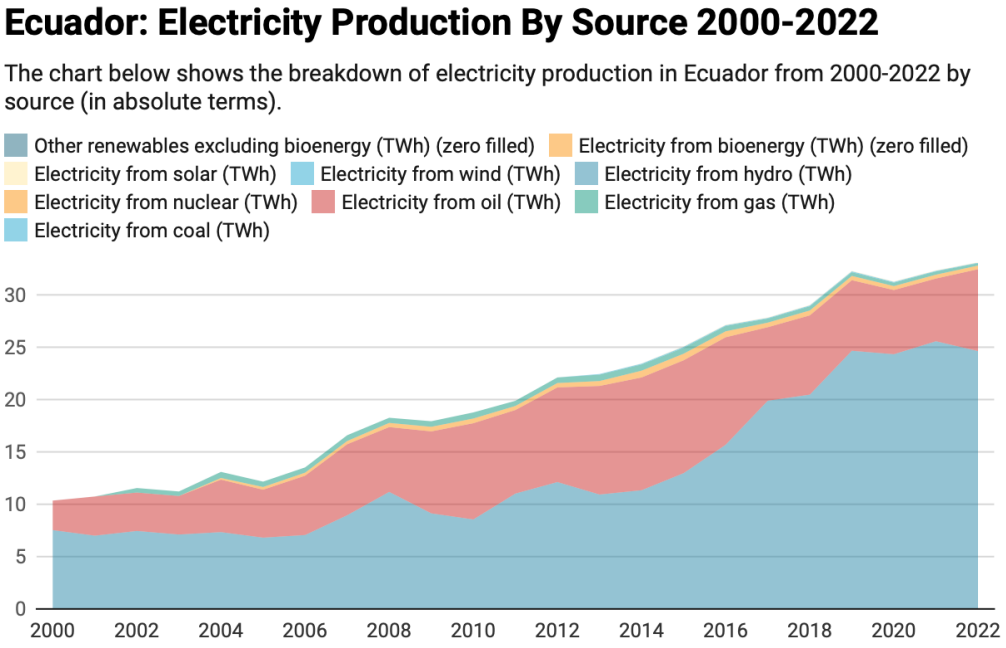
> "Hydropower can also cause environmental and social problems. Reservoirs drastically change the landscape and rivers they are built on. Dams and reservoirs can reduce river flows, raise water temperature, degrade water quality and cause sediment to build up. This has negative impacts on fish, birds and other wildlife."[322]

[320] "Ecuador - Panorama Energético de America Latina Y El Caribe 2022" (2022)
[321] Water Science School. 2018. "Hydroelectric Power: Advantages of Production and Usage | U.S. Geological Survey." United States Geological Survey. June 6, 2018. https://www.usgs.gov/special-topics/water-science-school/science/hydroelectric-power-advantages-production-and-usage#:~:text=1.
[322] Fendt, Lindsay. 2021. "Why Aren't We Looking at More Hydropower?" MIT Climate Portal. March 2, 2021. https://climate.mit.edu/ask-mit/why-arent-we-looking-more-hydropower.

According to a 2016 study in BioScience, dams and reservoirs contribute to global warming 25% more than previously estimated.[323] A study using hydrology-electricity modeling to assess the impacts of climate change on Ecuador's hydropower resources from 2071 to 2100, underlines the need to diversify and increase the non-hydro renewable sources of energy generation.

> "The analysis shows that hydropower generation in Ecuador is highly uncertain and sensitive to climate change since variations in inflow to hydropower stations would directly result in changes in the expected hydropower potential. Annual hydroelectric power production in Ecuador is found to vary between − 55% and + 39% of the mean historical output."[324]

Source: U.S. Energy Information Administration, *International Energy Statistics, MIT Climate Portal*



[323] Deemer, Bridget R., John A. Harrison, Siyue Li, Jake J. Beaulieu, Tonya DelSontro, Nathan Barros, José F. Bezerra-Neto, Stephen M. Powers, Marco A. dos Santos, and J. Arie Vonk. 2016. "Greenhouse Gas Emissions from Reservoir Water Surfaces: A New Global Synthesis." *BioScience* 66 (11): 949–64. https://doi.org/10.1093/biosci/biw117.

[324] Carvajal, Pablo E., Gabrial Anandarajah, Yacob Mulugetta, and Olivier Dessens. 2017. "Assessing Uncertainty of Climate Change Impacts on Long-Term Hydropower Generation Using the CMIP5 Ensemble—the Case of Ecuador." *Climatic Change* 144 (4): 611–24. https://doi.org/10.1007/s10584-017-2055-4.

Political Climate and Climate Change Policies

In an attempt to increase oil production and revenue, Ecuador withdrew its membership to the Organisation of the Petroleum Exporting Countries (OPEC), so as not to be constrained by the output quotas. This measure was part of the government's plan to reduce public spending and generate new income through the implementation of market-friendly policies which included layoffs of workers at state-owned companies and cuts to gasoline subsidies.[325]

Ecuador is party to the UN Convention on Climate Change and has subsequently developed its national strategy on climate change (2021-2025). The strategy provides for concerted and coordinated actions to adapt and mitigate climate change. The country will seek to reduce emissions by at least 20 percent by 2030. According to the UNDP Climate Change Adaptation Portal, Ecuador was identified as one of the 10 countries making the most significant progress on climate action in 2022, with the country having "taken a leading role in promoting climate action in Latin America." Major policy advances celebrated by the UNDP report include the inclusive gender considerations of Ecuador's strategy, and the incorporation of tools to monitor and identify climate change financing needs in 2022. These tools will provide the government with a framework to access the impact of interventions on the broader economy and will lead to data-informed decisions. Specific initiatives in the national strategy that have seen success are the focus on private sector investment, encouraging private companies to voluntarily monitor their carbon footprint, and deforestation-free certificates to help preserve the Amazon forest.[326]

Also in 2020, Ecuador gained membership into the Extractive Industries Transparency Initiative (EITI) with the aim of improving transparency in the oil and mining sectors. According to EITI, transparency and accountability are critical to guarantee that the country's resources are managed responsibly. Furthermore, a high level of transparency and efficiency will be necessary for the government to attract new and larger investments.[327] If Ecuador is able to build on these advances to decrease corruption opportunities in the energy sector it will be much more effective in attracting private sector and direct foreign investment, as well as other international funding opportunities.

Ecuador and the Effects of Climate Change

Climate variation in Ecuador is closely related to the El Niño (ENSO) weather phenomenon, which leads to increased rainfall and floods in the coast and Western Andes, and droughts in the Northern and Eastern areas. The World Bank projects that "In the medium- to long-term, climate change trends in Ecuador are expected to result in major impacts for the country. These include the intensification of extreme climatic events (e.g. ENSO); sea level rise; increased retreat of glaciers; decrease in annual runoff and increased vulnerability of water resources; increased vulnerability to floods and prolonged droughts; increased transmission of dengue and other tropical diseases; the

[325] Valencia, Alexandra. 2019. "Ecuador to Quit OPEC in 2020 in Search of Bigger Export Revenue." *Reuters*, October 1, 2019. https://www.reuters.com/article/us-ecuador-opec/ecuador-to-quit-opec-in-2020-in-search-of-bigger-export-revenue-idUSKBN1WG4KB.

[326] UNDP Climate. 2022. "10 Countries Making Progress on Climate Action in 2022 by UNDP Climate on Exposure." UNDP Climate Change Adaptation Portal. December 21, 2022. https://undp-climate.exposure.co/10-countries-making-progress-on-climate-action-in-2022?source=share-undp-climate.

[327] "Ecuador Joins the EITI." 2020. EITI. October 15, 2020. https://eiti.org/news/ecuador-joins-eiti.

expansion of invasive species populations in the Galapagos and other sensitive ecosystems of continental Ecuador; and the extinction of certain species."[328]

Ecuador's Ministry of the Environment presented some projections in the 2017 Third National Communication on Climate Change. An increase in temperatures is expected, ranging from 0.9°C to 1.7°C by mid-century and from 0.9°C and 2.8°C for the 2071-2100 period. Melting of glaciers, rising temperatures, and an increase in extreme rainfall are trends that have already been observed in Ecuador.[329] According to the UN Country Common Assessment (CCA), the situation related to climate change in Ecuador is concerning. The country is very vulnerable to the effects of climate variation and climate change. And while climate change affects all segments of the population, those living in poverty and extreme poverty will be disproportionately impacted.[330]

A 2018 report by the UNDP-UN Environment National Adaptation Plan Global Support Programme (NAP-GSP) estimated that losses from extreme weather events in Ecuador would amount to approximately US$5.6 billion by 2025.[331] Some of the impacts on key sectors of society and the economy are outlined in below:

Climate Change Impacts on Key Sectors	
Agriculture	Projections suggest that by 2050, climate change in Ecuador will impact 14% of the GDP corresponding to agriculture, and that without adaptation, 80% of the country's crops could be impacted in more than 60% of their current areas of cultivation, especially high value perennial and export crops.
Water	Impacts related to excess precipitation and extreme rainfall are expected to be most impactful in the coastal and the Andean region, mainly in the central and southern areas. In the short-term, river basins could experience an increase in frequency, intensity and occurrence of intense rainfall, resulting in flood events. In between these heavy rainfall events, a reduction in precipitation is expected, increasing aridity and may lead to drought conditions. Glacier retreat and thawing processes will accelerate even more in the coming decades.
Energy	Uncertainty around the impacts of climate change, investment cost overruns, and restrictions to untapped resources may challenge the future deployment of hydropower and consequently impact decarbonisation efforts for Ecuador's power sector.

[328] "Ecuador - Climatology." n.d. World Bank Climate Change Knowledge Portal. https://climateknowledgeportal.worldbank.org/country/ecuador/climate-data-historical.
[329] Ministerio del Ambiente (MAE). 2017. "Tercera Comunicación Nacional Del Ecuador a La Convención Marco de Las Naciones Unidas Sobre El Cambio Climático." Ministerio Del Ambiente Del Ecuador. May 2017. https://unfccc.int/sites/default/files/resource/TERCERA.
[330] UNHCR. n.d. "UNHCR Ecuador - Climate Change Plan of Action (2023-2025)." UNHCR Operational Data Portal (ODP). Accessed June 10, 2023. https://data.unhcr.org/en/documents/details/96168.
[331] UNDP-UN Environment National Adaptation Plan Global Support Programme (NAP-GSP). 2018. "National Adaptation Plans in Focus: Lessons from Ecuador." UNDP. September 2018. https://www.adaptation-undp.org/sites/default/files/resources/nap_in_focus_lessons_from_ecuador_english.pdf

Health	Changing weather patterns and projected climate trends are expected to impact the dynamics of some diseases. Such as, an increase in heat stress; the altered range, seasonality and distribution of vector-borne diseases including malaria, zika, chikungunya; air pollution and associated respiratory illnesses; as well as water-borne illnesses such as cholera and diarrheal disease.

Source: World Bank's Climate Risk Country Profile: Ecuador 2020[332]

In addition to the effects of climate change, Ecuador is struggling with some of the environmental and ecological impacts of human extractive and expansive economic (and more often than not, illicit) activities. The table below outlines some of the activities and their impacts:

Extractive Industries Threatening the Environment in Ecuador	
Oil Spills[333]	Oil extraction in the Amazon region has proved harmful to the environment and indigenous local communities. Between 2005 to 2015, the government officially reported more than 1169 oil spills in the country, of which 81% (952) occurred in the Amazon region. In April 2020, Ecuador experienced the second largest oil spill in 15 years, after heavy rainfall caused a landslide that resulted in the rupture of three pipelines in the Coca river. More than 118, 000 indigenous people were directly and indirectly affected by the spill of 15,800 barrels of oil which polluted 360 km of the river. In January 2022, another spill took place. This time nearly 3,600 barrels of crude oil flowed into Coca and Napo rivers. It is reported that this spill polluted about 2 hectares in the Cayambe-Coca national reserve (estimates differ from 16,913 to almost 21,000 square metres).
Illegal Mining[334]	According to the environment ministry, as many as 7,000 hectares have been destroyed by illegal mining in Napo province, with much destruction felt in the Yutzupino area. Analysis of water samples from areas of the Napo river have confirmed that levels of heavy metals such as copper, iron, lead, aluminium and manganese exceed the limits for the preservation of aquatic life and wildlife. The evidence of pollution was so alarming that in early 2022 the Minister of Energy and Non-Renewable Natural Resources announced a temporary ban on all mining in Napo province.

[332] Zermoglio, Fernanda, and MacKenzie Dove. 2021. "ECUADOR CLIMATE RISK COUNTRY PROFILE." The World Bank Group. https://climateknowledgeportal.worldbank.org/sites/default/files/country-profiles/15988-WB_Ecuador%20Country%20Profile-WEB.pdf.

[333] Borotkanych, Natalia. 2022. "EOS Data Analytics Studies Oil Spills in Ecuador's Amazon." EOS Data Analytics. July 19, 2022. https://eos.com/blog/oil-spills-in-the-amazon-a-never-ending-tragedy/.

[334] Moore, Patrick. 2022. "Illegal Gold Mining 'Mafias' Threaten Life in an Ecuadorian River." Dialogo Chino. November 8, 2022. https://dialogochino.net/en/extractive-industries/60366-ecuador-illegal-mining-gold-mafias-threaten-river/.

Illegal Fishing	Illegal, unreported and unregulated (IUU) fishing is threatening the biodiversity of and the ecology of the Galapagos.[335] IUU is also responsible for growing inland contamination, with the Galapagos National Park (GNP) reporting having collected 74,206 plastic bottles between 2018 and 2021 as part of their clean up efforts. Researchers estimate that 30% of the garbage originated from Chinese fishing fleets.[336] In June 2022, the Ecuadorian Navy detected some 180 Chinese vessels near the islands' Exclusive Economic Zone (EEZ).[337] Between 2020-2022, the authorities issued at least 44 alerts of unauthorised industrial fishing in the region.[338] This is particularly concerning given that the Galápagos Islands and the surrounding Marine Reserve are recognized as a UNESCO World Heritage site[339], and are home to more than 2,900 marine species, of which 25 percent only found within this protected area.[340]
Deforestation	Between 2014 and 2016, however, deforestation levels in Ecuador amounted to approximately 94,000 hectares (ha) per year. Although deforestation rates are slowing down, this number remains significantly high. 99 percent of the deforested land was transformed into agricultural areas, and this change meant the second largest greenhouse gas (GHG) emission at the national level.[341] For its size, Ecuador has the highest annual deforestation rate of any country in the Western Hemisphere.[342] A 2020 scientific study found that in Ecuador deforestation will result in the loss of more dry forests than what is predicted to be lost by climate change damage.[343] This is especially concerning, since forests are a natural solution to climate change by absorbing carbon dioxide.

[335] Bello, Maximiliano. 2021. "Ecuador on the Frontier of a Changing Ocean: Understanding the Impacts of Illegal, Unreported, and Unregulated Fishing on Ecuador's International Economic Relations." *Wilson Center*. https://www.wilsoncenter.org/sites/default/files/media/uploads/documents/Ecuador%20on%20the%20Frontier%20of%20a%20Changing%20Ocean%20by%20Max%20Bello_0.pdf.

[336] Alarcon, Isabel, and Ana Cristina Alvarado Proaño. 2022. "Garbage with Asian Labels Contaminates Galapagos Islands." Earth Journalism Network. March 20, 2022. https://earthjournalism.net/stories/garbage-with-asian-labels-contaminates-galapagos-islands.

[337] Dialogo. 2022. "Ecuador Combats Chinese Fleet's Illegal Fishing with Canadian Satellite Technology." Diálogo Américas. July 26, 2022. https://dialogo-americas.com/articles/ecuador-combats-chinese-fleets-illegal-fishing-with-canadian-satellite-technology/#.Y_cM_i-B1hE.

[338] Gorder, Gabrielle. 2022. "Ecuador Illegal Fishermen Target Sardines, Anchovies amid Fishmeal Boom." InSight Crime. October 27, 2022. https://insightcrime.org/news/illegal-fishing-ecuador-targets-sardines-anchovies-fishmeal/.

[339] UNESCO World Heritage Centre. 2018. "Galápagos Islands." UNESCO. 2018. https://whc.unesco.org/en/list/1/.

[340] "Ecuador - Promoting Ocean Transparency Together." n.d. Global Fishing Watch. Accessed June 10, 2023. https://globalfishingwatch.org/transparency-program-ecuador/.

[341] Serrano, Patricia. 2022. "How Ecuador Is Protecting the Amazon Forest." UNDP Climate Promise. April 21, 2022. https://climatepromise.undp.org/news-and-stories/how-ecuador-protecting-amazon-forest.

[342] Paz Cardona, Antonio José. 2020. "For Ecuador, a Litany of Environmental Challenges Awaits in 2020." Mongabay Environmental News. February 5, 2020. https://news.mongabay.com/2020/02/for-ecuador-a-litany-of-environmental-challenges-awaits-in-2020/.

[343] Technical University Munich. 2018. "Ecuador: Deforestation Destroys More Dry Forest than Climate Change." Phys.org. February 5, 2018. https://phys.org/news/2018-02-ecuador-deforestation-forest-climate.html.

Ecuador's Policies to Combat Climate Change, the Environment, and Green Transition

According to BloomberNEF's Climatescope 2022 Index, which evaluates the relative readiness of individual nations to put energy transition investment to work effectively, Ecuador received a score of 1.32 and ranks number 71 among emerging markets and number 100 in the global ranking. The report identifies the following main barriers:

> *Ecuador faces barriers to the deployment of more renewable generation due to characteristics of its power market. A combination of very low electricity tariffs, fossil fuel subsidies for electricity generation and low power demand growth creates a challenging environment for project developers. There is a history of protests and roadblocks whenever fuel subsidies are diminished.*[344]

Nationally Determined Contributions (NDC)

In 2019, Ecuador submitted its Nationally Determined Contribution (NDC), which is a country's plan to help achieve the goals of the Paris Agreement. The NDC has a target of a 9% reduction in emissions by 2030 from the business-as-usual (BAU) scenario. With international financial and technological support, Ecuador says it could lower its emissions further – by 20.9% by 2030 compared with a BAU scenario. The mitigation sectors are energy, waste, industrial processes, agriculture and land use.[345]

According to a report from The United Nations High Commissioner for Refugees (UNHCR) "Ecuador is currently in the process of developing a national plan for adaptation to climate change that will allow for territorial planning as well as reduction of climate vulnerabilities in six prioritised areas; many of them are relevant to PoCs such as: health, human settlements (housing), productive and strategic sectors, food security, agriculture, cattle industry, and fishery. According to the source, the populations which will be mostly affected by climate change are those located in the coast, the Amazon area as well as those in the Andean region where most people of concern are located."[346]

Funding Ecuador's Green Transition

Ecuador's Green Financing	
Private Investment	According to the objectives laid out in the 2031 Electricity Master Plan, which targets new projects for hydro, wind and solar, the total private investment required is projected to reach US$13 billion over the next 10 years. The government started by offering tenders totaling just over $1.8 billion in 2022.[347]

[344] BloombergNEF. n.d. "Climatescope 2022 | Ecuador." Climatescope. Accessed June 10, 2023. https://global-climatescope.org/markets/ec/.
[345] Ibid.
[346] UNHCR. 2022. "UNHCR Ecuador Climate Change Plan of Action (2023-2025) - Ecuador | ReliefWeb." Reliefweb.int. 2022. https://reliefweb.int/report/ecuador/unhcr-ecuador-climate-change-plan-action-2023-2025.
[347] Soutar, Robert. 2022. "Ecuador's Energy Investment Drive Targets Renewables – and Fossil Fuels." Dialogo Chino. June 13, 2022. https://dialogochino.net/en/climate-energy/54913-ecuadors-energy-investment-drive-targets-renewables-and-fossil-fuels/.

Climate Investment Fund (CIF)	Projects: 2; Funding: $24.85 million; Co-financing: $10 million CIF's investment in Ecuador is through its Forest Investment Program (FIP). In line with the country's Reducing Emissions from Deforestation and Forest Degradation (REDD+) action plan, its $24 million FIP investment plan aims to contribute to reducing (1) deforestation and forest degradation through conservation, sustainable forest management, and the optimization of other land uses, and (2) greenhouse gas emissions.[348]
Green Climate Fund (GCF)	Projects: 12; Financing: 245.4 million The GCF, which is a fund established within the United Nations Framework Convention on Climate Change (UNFCCC), supports various cross cutting and mitigation projects. One such project seeks to support Ecuador in mobilising International Climate Financing and Private Investments. In 2022, GCF announced a project in the Galapagos that would "assist [in] the establishment of the Conolophus local power plant and de-risk investments for decentralised renewable energy sources" and "strengthen local communities through the rehabilitation of ecosystems and the promotion of climate-smart agriculture and tourism practices."[349]
World Bank	In 2022, the World Bank approved a $700 million loan for Ecuador, to help finance efforts to mitigate the impact of the COVID-19 crisis and foster growth, inclusion, job creation and climate resilience. "The second pillar will support actions to encourage private sector participation in the financing of non-conventional renewable energies, facilitating renewable distributed generation, an institutional framework to prioritise investments in energy efficiency, decarbonization of the transport sector, measurement and reporting of greenhouse gases, mitigation initiatives and development of voluntary carbon markets." The financing is a variable rate loan with a maturity period of 16.5 years, including a 5-year grace period. The World Bank has indicated that this loan is the first of three that seeks in part to "strengthen low-carbon development and fulfil the country's commitment to carbon neutrality by 2050."[350]
Green Bonds	"Ecuador's sustainable finance market is relatively recent with the first green bond issued in December 2019 by Banco Pichincha, the largest bank in the country, at the Quito Stock Exchange. The USD150m deal will finance renewable energy, low carbon buildings, low carbon transportation, waste and industry. The International Finance Corporation (IFC), IDB Invest, and Proparco (French development agency), were investors, with a participation of USD50m each."[351]
China	"China's debt exposure in Ecuador amounts to USD 18.37 billion, which equals 17.1% of Ecuador's GDP. If China agrees to swap this debt for climate action, Ecuador could reduce CO2 emissions by 39 million tonnes per year, which would otherwise cost USD

[348] Climate Investment Funds (CIF). n.d. "CIF Countries | Ecuador." Www.cif.org. Accessed June 10, 2023. https://www.cif.org/country/ecuador.

[349] Green Climate Fund. 2020. "Ecuador." Green Climate Fund. April 2, 2020. https://www.greenclimate.fund/countries/ecuador.

[350] World Bank. 2022. "The World Bank Approves a US$ 700 Million Loan to Promote Ecuador's Green, Resilient Economic Recovery." World Bank. February 1, 2022. https://www.worldbank.org/en/news/press-release/2022/02/01/the-world-bank-approves-a-us-700-million-loan-to-promote-ecuador-s-green-resilient-economic-recovery.

[351] Climate Bonds Initiative. 2021. "Latin America & Caribbean: Sustainable Finance State of the Market 2021." Climate Bonds Initiative. June 30, 2021. https://www.climatebonds.net/files/reports/cbi_lac_2020_04e.pdf.

	12.65 billion, or 11.78 % of Ecuador's GDP. These figures add to Ecuador's debt swap potential. One proposal is for China to forgive USD 440 million of Ecuador's debt in exchange for 200,000 hectares of Amazon rainforest conservation, which would avoid 117 million tCO2 emissions. A less ambitious plan suggests repurposing USD 19.2 million in debt to support university research and expand the Colonso Chalupas Biological Reserve."[352]

Recommendation to Achieve a Green Transition

In recent years, Ecuador has made various strides towards transitioning towards a greener economy, however, much work remains to be done. While policies such as striving to double oil output[353] can help to provide the world with cleaner sources of petroleum in the short term, Ecuador needs ambitious goals of sorts for renewables. Wind and solar energy remain vastly untapped resources[354]. A 2022 meta-analysis of Ecuador's barrier to renewable energy expansion in the journal of Energy Strategy Reviews found that among the main barriers that exits are:

Ecuador's Barriers to Renewable Energy Expansion	
Economic	• Financing • High Investment Costs • Fuel Subsidies • Lack of guarantees in the sale of energy in the electricity sector • Uncertainty from entrepreneurs • Long payback period
Technical	• Problems with permissions to access and connect to the power grid • Limited access to efficient technologies for electricity generation • Lack of specialized training for designers, professionals, installers, and maintainers • High hydroelectric potential is prioritized at the expense of wind and solar • Delays and withdrawals in construction permits • Lowe capacity factor among renewable resources than conventional energy generation • Shortage of renewable resources necessary for electricity generation
Social	• Lack of information or incomplete information • Local opposition to the development of nonconventional renewable projects (wind and solar energy) • Lack of environmental awareness • Energy illiteracy • Low involvement of key stakeholders

[352] Tang, Sisi. 2022. "Can China Contribute to Climate Action in Latin America?" International Institute for Sustainable Development. September 6, 2022. https://www.iisd.org/articles/policy-analysis/china-climate-action-latin-america.
[353] Reuters. 2022a. "Ecuador's State Oil Company Looks to Double Output in Five Years." *Reuters*, March 11, 2022, sec. Energy. https://www.reuters.com/business/energy/ecuadors-state-oil-company-looks-double-output-five-years-2022-03-11/.
[354] Soutar (2022).

Policies and Regulations	• Ephemeral, revoked, or unclear regulations for wind and solar • Lack of a stable national energy efficiency policy • Lack of government support • Lack of institutional consolidation

Source: Energy Strategy Reviews (2022). Barriers to renewable energy expansion: Ecuador as a case study. [355]

In order for Ecuador to continue and progress in its efforts towards a Green Transition and combat the looming devastating effects of climate change, it must make a concentrated effort to tackle the economic, technical, social and regulatory barriers previously identified. Beyond lowering its reliance on fossil fuels (and hydropower) and replacing it with a more diversified gambit of renewable energy sources, Ecuador must also prepare to mitigate the impacts of climate change, and combat the various extractive and illicit activities that are currently speeding up the process. This requires a whole-of-government, private sector, civil society coordinated approach. Full-hearted and long-term commitments must extend beyond governments, independent of what end of the political spectrum they belong to.

---

[355] Barragán-Escandón, Antonio, Darwin Jara-Nieves, Israel Romero-Fajardo, Esteban F. Zalamea-Leon, and Xavier Serrano-Guerrero. 2022. "Barriers to Renewable Energy Expansion: Ecuador as a Case Study." *Energy Strategy Reviews* 43 (September): 100903. https://doi.org/10.1016/j.esr.2022.100903.

El Salvador's green transition

Paulina Lainez Miccolo

Introduction

Nested in between mountains and valleys, El Salvador is full of natural resources that have sustained its people for thousands of years. However, as a nation that relies heavily on agriculture, changes in rainfall, flooding and other nature-related phenomena have long-standing effects on vulnerable populations, to the extent that reduced crop yields are becoming a major driver for migration[356]. Moreover, coastal erosion is putting communities and infrastructure along El Salvador's coast at risk. This is particularly concerning given that a significant portion of the population lives near the coast. Loss of biodiversity is equally harmful given that climate change is reducing the ability of ecosystems to provide important services such as clean water and air, as well as food and materials for human use, thus causing a strain in the population.

According to the Inter-American Development Bank, in the last thirty years, climate change has cost the Salvadoran economy more than $2.2 billion[357]. As a result, the government, private companies, multilaterals and banks are betting on greener technologies and projects in order to combat and mitigate the effects of climate change. Said transition onto a more sustainable future requires investments, public-private partnerships and innovation. There is no doubt that the country is working towards a forward-looking green agenda, yet it is still behind compared to other neighbours in the region.

Background

Historically, El Salvador had been a large importer of fossil fuels due to the lack of domestic oil, gas and coal. Yet, ever since the 1990s, it began to work towards greater independence through renewables, with hydroelectric power leading the sector of clean energy. It wasn't until 1996 that El Salvador began creating a legal framework towards the energy sector. The law, which liberalised the energy market, "regulate[d] the generation, transmission, distribution and commercialisation of energy activities aiming for the rational and efficient use of resources."[358] This allowed the private sector to begin work, thus spurring innovation and competitiveness in the clean energy business. Yet, it would then take them almost ten years to pass another law that concerned renewable energy[359] , which most likely indicates a lack of consensus and interest during the hiatus. The 2007 Law of Fiscal

[356] Ana María Ibáñez et al., "Responses to Temperature Shocks: Labor Markets and Migration Decisions in El Salvador," *IDB Working Paper Series*, May 2022, https://doi.org/10.18235/0004237.
[357] Oscar Samayoa and Inter-American Development Bank, "Climate Change in the Northern Triangle: Challenges and Oportunities," Slide show, Wilson Center, n.d., https://www.wilsoncenter.org/sites/default/files/media/uploads/documents/Climate%20change%20impacts%20in%20HO%20GU%20and%20ES_Omar%20Samayoa%20%28005%29.pdf.
[358] "General Electricity Law – Policies," IEA, n.d., https://www.iea.org/policies/6140-general-electricity-law.
[359] "National Energy Commission Law – Policies," IEA, n.d., https://www.iea.org/policies/6139-national-energy-commission-law.

Incentives for the Promotion of Renewable Energy for Electricity Generation hoped to stimulate the sector for greater engagement. It also encouraged the usage of alternative energies and provided an attractiveness for financiers. In the same year, the country created the *Consejo Nacional de Energia* (CNE), with the aim of addressing energy challenges and to create awareness regarding the climate change situation. Moreover, the CNE was to be in charge of spearheading strategies and policies for the whole country, which includes but is not limited to renewable energy auctions. During this process, companies participate in a call of tender, where they present their proposals. After the winners are announced in the auction, projects are awarded. The CNE is presided by the Economy Ministry and has as part of its members, representatives of the Ministry of Finance, the Environment, Public Works and the *Defensoria del Consumidor*.

Government

The government's focus on renewable energy is a relatively recent development, with President Nayib Bukele announcing the launch of El Salvador's Sustainable Energy Plan in 2020. Said plan aims to generate 100% of the country's energy from renewable sources by 2050. The plan includes several goals and targets, such as the installation of 600 MW of new renewable capacity by 2024. [360]

According to the International Renewable Energy Agency (IRENA), renewable energy accounted for 25% of the country's electricity generation in 2019, up from 20% in 2015. Moreover, El Salvador's total renewable energy capacity was 599 MW in 2020, representing about 28% of the country's installed power capacity. A 2021 IRENA report also stated that the country has the potential to further develop its renewable energy resources, particularly in solar and wind power.[361]

To this end, the Ministry of Foreign Affairs alongside IRENA signed an agreement in January, 2022 in which they planned to work "towards [the] implementation of recommendations put forward under the recently published Renewable Readiness Assessment (RRA) and the energy component of the updated Nationally Determined Contributions presented at COP26"[362] . Additionally, "IRENA and El Salvador will also collaborate within the framework of the Energy Transition Accelerator Financing (ETAF) Platform to identify national projects suitable for financing as the country works towards the achievement of its goals."[363] These types of international agreements provide a roadway and steps in order to ensure the country has a clear path and objectives when establishing their energy policies, hence, it is important to highlight its role.

---

360 El Salvador's Sustainable Energy Plan 2020-2024:

Ministry of Economy. El Salvador's Sustainable Energy Plan 2020-2024. Gobierno de El Salvador, 2020. https://energia.gob.sv/wp-content/uploads/2020/11/PES-2020-2024-Eng.pdf.

361 International Renewable Energy Agency (IRENA) report on El Salvador:

International Renewable Energy Agency. "Renewable Energy Statistics 2021." IRENA, June 2021.

https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Jun/IRENA_Renewable_Energy_Statistics_2021.pdf.

362 International Renewable Energy Agency, "El Salvador Eyes Major Renewables Push Under New Partnership with IRENA," Press release, January 16, 2022, https://www.irena.org/News/pressreleases/2022/Jan/El-Salvador-Eyes-Major-Renewables-Push-Under-New-Partnership-with-IRENA.

363 Ibid.

On another note, in 2021, President Bukele announced the creation of Bitcoin city, a place completely funded by cryptocurrency and powered by geothermal energy. The president's plan consists of using the energy of the Conchagua volcano for Bitcoin mining, which is known to consume large amounts of energy. However, there is little to no information on the timeframe nor the status of the ambitious project.[364] It must be noted, the above project is different from Volcano Energy's mining farm. The public-private partnership has the support of the government but it's a separate venture that will be discussed below.

Without a doubt, El Salvador's government has been implementing policies and measures to promote the green transition, such as tax incentives for renewable energy investments and regulations to reduce greenhouse gas emissions. These efforts have attracted the attention of international organisations and investors, which has been mentioned previously, which could provide further support for the country's renewable energy development.

Overall, the green transition in El Salvador is likely to continue to progress in the next five years, driven by the government's plans and efforts, as well as the increasing interest in renewable energy among investors and international organisations.

Multilateral and International Initiatives

Multilateral organisations and international entities have invested in several areas in El Salvador in regards to the green transition. Some of these areas include renewable energy, energy efficiency, climate adaptation, and sustainable agriculture, for example:

1. Renewable Energy: The Inter-American Development Bank (IDB) has provided financing for several renewable energy projects in El Salvador, including a 100 MW solar power plant in the department of La Paz.[365] The World Bank has also supported the development of a geothermal energy project in the country. [366]

2. Energy Efficiency: The Global Environment Facility (GEF) has funded a project to improve energy efficiency in the industrial sector in El Salvador, which aims to reduce greenhouse gas emissions and save energy costs for businesses.[367]

3. Climate Adaptation: The United Nations Development Programme (UNDP) has worked with the Salvadoran government to develop a National Climate Change Strategy, which includes measures to improve climate resilience in sectors such as agriculture, water, and forestry.[368]

---

[364] BBC News, "El Salvador Bitcoin City Planned at Base of Conchagua Volcano," *BBC News*, November 21, 2021, https://www.bbc.com/news/world-latin-america-59368483.
[365] Inter-American Development Bank (IDB) - El Salvador: 100 MW Solar Project
Inter-American Development Bank. "El Salvador: 100 MW Solar Project." IDB, n.d.
https://www.iadb.org/en/projects/el-salvador-100-mw-solar-project.
[366] World Bank - Geothermal Energy Development Project
World Bank. "Geothermal Energy Development Project." World Bank, n.d.
https://projects.worldbank.org/en/projects-operations/project-detail/P157226.
[367] Global Environment Facility. "El Salvador." GEF, n.d.
https://www.thegef.org/projects-operations/country-profiles/el-salvador.
[368] United Nations Development Programme (UNDP) - El Salvador: National Climate Change Strategy

4. Sustainable Agriculture: The International Fund for Agricultural Development (IFAD) has supported sustainable agriculture and agroforestry projects in El Salvador, which aim to promote food security, reduce deforestation, and increase incomes for rural communities.[369]

The country is also part of the *Mesa redonda sobre el financiamiento climático y la transición energética en América Latina y el Caribe,* a UN-backed roundtable organised through the United Nations Economic Commission for Latin America and the Caribbean (CEPAL), that focuses on the financing of the sectors involved in climate resilient projects. Said projects include the electrification of public transport, electric vehicles for public institutions, among others.[370] In the same realm, the European Union also created a program titled EUROCLIMA+, which consists of supporting public policies centred on climate change. Most recently, they're working on a project focused on energy efficiency in the country.[371] As evidenced, the above actors are crucial in the implementation and the funding of the green transition.

Banking Entities

Banks are also key actors in ensuring climate resilient projects become realities. In El Salvador, Banco Davivienda has been a leader in the sector. The bank has a sustainability policy in which they highlight their commitment to developing and incentivising business models that solve social and climate issues.[372] Besides working to reduce their carbon footprint, Davivienda also provides financial incentives or added values to projects that are climate-friendly and/or have any other societal benefit, thus effectively promoting an environment of green investments.

Similarly, *BANDESAL*, the development bank of El Salvador, alongside the Ministry of the Environment and Natural Resources, the *Banco Hipotecario de El Salvador* and the *Banco de Fomento Agropecuario* reiterated their commitment in 2022 to the "*Protocolo Verde del Sistema Financiero de El Salvador",* a protocol that has as its main objective to offer financial services that guarantee care for the environment.[373] As a result, given the support of financiers, green projects become attractive to investors.

United Nations Development Programme. "El Salvador: National Climate Change Strategy." UNDP, n.d. https://www.adaptation-undp.org/projects/el-salvador-national-climate-change-strategy.

[369] International Fund for Agricultural Development (IFAD) - El Salvador
International Fund for Agricultural Development. "El Salvador." IFAD, n.d. https://www.ifad.org/en/web/operations/country/id/el-salvador.

[370] "Mesa redonda sobre el financiamiento climático y la transición energética en América Latina y el Caribe | Comisión Económica para América Latina y el Caribe," n.d., https://www.cepal.org/es/accion-climatica.

[371]Unión Europea en El Salvador, "Comunicado de prensa: La Unión Europea y El Salvador firman un nuevo Programa Indicativo Nacional (PIN) por un monto de € 60 millones para apoyar el desarrollo económico y la inclusión social en el país. #UEenElSalvador #CooperaciónUE," Twitter, February 3, 2023, 3:15 PM, https://twitter.com/UEenElSalvador/status/1621618320859430913

[372] Sostenibilidad, "Sostenibilidad | Davivienda," Davivienda | Otro Sitio Realizado Con WordPress, February 7, 2023, https://sostenibilidad.davivienda.com/.

[373] Bandesal, "ACTUALIZACIÓN DE LA FIRMA DEL CONVENIO 'PROTOCOLO VERDE DEL SISTEMA FINANCIERO DE EL SALVADOR,'" August 31, 2022, https://www.bandesal.gob.sv/actualizacion-de-la-firma-del-convenio-protocolo-verde-del-sistema-financiero-de-el-salvador/.

The Private Sector

The private sector is also playing a crucial role in El Salvador's green transition by investing in renewable energy projects, implementing sustainable practices, and promoting environmental awareness.

Per the Global Environment Facility (GEF), the private sector in El Salvador has already made significant investments in renewable energy, including wind and solar energy projects. The GEF has also partnered with the private entities to implement a project aimed at promoting renewable energy, improving energy efficiency, and reducing greenhouse gas emissions.[374] The country also houses one of the few electricity generation plants that captures biogas from a landfill, which in return, counters the greenhouse effect.[375] The AES Nejapa plant uses a process that captures the methane released during the decomposition of the organic waste, thus creating a source of energy. Even though it doesn't account for much of the renewable energy produced in the country, processes like the one described above is an example of a model that can be replicated in other nations.

Another leader in the sector is the French company Neoen. The renewable energy giant decided to expand its footprint in the Central American nation with the opening of a new photovoltaic park with the hopes of "fortifying the stability and security of the electric power grid of the country."[376] Moreover, it has worked alongside multilaterals in their green energy projects, thus solidifying their commitment to the sector.

Bitcoin is also driving the rise between sustainable private-public partnerships after Nayib Bukele announced the cryptocurrency as a legal tender. Recently, the Volcano Energy group announced that it had received the initial $250M of a $1B investment for a power generation park that will use solar and wind energy that will eventually power a bitcoin mining farm.[377] Per the startup, "by providing renewable energy solutions for mining, [they're] paving the way for a more distributed and resilient network." [378]

Without a doubt, the private sector is a major player in the green energy transition. Overall, it is expected to continue to play a key role in the country's green transition, as the government and international organisations continue to promote sustainable practices and incentivize private sector investment in renewable energy and other environmentally-friendly initiatives.

---

[374] Global Environment Facility. "El Salvador: Promoting Renewable Energy with the Private Sector." GEF, n.d. https://www.thegef.org/project/el-salvador-promoting-renewable-energy-private-sector.
[375] "Planta Nejapa | AES El Salvador," n.d., https://www.aes-elsalvador.com/es/planta-nejapa.
[376] Christophe Morvant, "Neoen consolida su operación en El Salvador con un segundo y emblemático parque fotovoltaico," Neoen, December 3, 2020, https://neoen.com/es/noticias/2020/neoen-consolida-su-operacion-en-el-salvador-con-un-segundo-y-emblematico-parque-fotovoltaico/.
[377] Reuters. "El Salvador in Partnership to Build $1 Billion Bitcoin Mining Farm." Reuters, 5 June 2023, www.reuters.com/technology/el-salvador-partnership-build-1-billion-bitcoin-mining-farm-2023-06-05/
[378] Volcano Energy [@Volcano_Energy]. "Exciting news! We have just launched our innovative geothermal power plant, harnessing the power of volcanoes for clean and sustainable energy. 🌋💡 #RenewableEnergy #GeothermalPower" Twitter, 15 May 2023, 2:30 p.m., twitter.com/Volcano_Energy/status/1667743783436406786?cxt=HHwWhMC-wdGIgqUuAAAA

Challenges

Even though El Salvador has made some steady advancements towards becoming a more sustainable nation, there are still factors that hinder its eventual success. To start off, there is a lack of political will to create significant policy changes to achieve energy goals. According to an IRENA report, there's a need for a more supportive legal framework, clearer targets and an increase in investments. [379] A significant change won't be cheap given that the green transition requires substantial financing, which the country may not be able to afford. According to a report by the World Bank, El Salvador needs an investment of around $9.7 billion to achieve its renewable energy targets by 2030. The report also notes that the country needs to attract even more private investment to finance said transition.[380]

In sociological terms, moving towards alternative energy sources may lead to job losses in the traditional sector, which in turn could lead to social unrest. Additionally, the transition could lead to an increase in energy prices, which may disproportionately affect low-income households. Moreover, the country still is devoid of the necessary infrastructure to support wind and solar power. Plus, the expertise needed in order to develop and maintain these types of businesses is still lacking.

Environmentally speaking, given that El Salvador has a fragile ecosystem that is highly susceptible to climate change, the green transition may lead to land use changes and increased pressure on natural resources, thus causing environmental degradation.

Lastly, bureaucratic hurdles, such as administrative procedures and permits, are 'decentralised' and thus cause unnecessary issues. Per the Renewable Readiness Assessment of El Salvador, one of the ways to combat it is to create "a unified national office (or "single-window agency") [and] it should be established to handle all applicable licences and permits for renewable energy projects, reducing project delays and development costs." [381] If the above is implemented, a smoother transition into a climate-friendly future is set to become a reality.

Looking Ahead

It will take years for El Salvador to be in a position of leadership in terms of the green transition. In the meantime, the government should keep creating and enforcing policies that support a forward-looking agenda, including implementing subsidies, tax incentives, and regulations that encourage the use of renewable energy sources. The private sector plays a key role in the development of the industry and as such, the government should ensure they work alongside them and in conjunction with civil society and non-profits to implement sustainable waste management policies and promote practices such as recycling, composting, and reducing waste generation.

[379] International Renewable Energy Agency (IRENA). "Renewable Energy Roadmap: El Salvador." https://www.irena.org/publications/2019/Sep/Renewable-energy-roadmap-El-Salvador.
[380] World Bank. "El Salvador: Investment Needs Assessment for a Renewable Energy Transition." https://openknowledge.worldbank.org/handle/10986/32305.
[381] IRENA, "Renewable Readiness Assesment El Salvador" (IRENA, December 2020), http://energiasrenovables.cne.gob.sv/wp-content/uploads/2021/02/IRENA_RRA_El_Salvador_2020.pdf.

Awareness should also be raised by civil society, non-profits, and the private sector about the importance of transitioning to a green economy. This can include public education campaigns, social media outreach, and working with local communities to promote sustainable practices. Overall, a green transition requires a coordinated effort from all sectors of society to reduce greenhouse gas emissions, promote sustainable practices, and create a more resilient and sustainable future for El Salvador.

Conclusion

This is by no means an exhaustive analysis of the green transition in the Central American nation, yet it provides a condensed and succinct outlook on the state of the above-mentioned transition and the major players. Even though El Salvador has made major advancements in the last few years, there is still a long way to go in order to become a regional leader. Through public-private partnerships, the support of the government and international entities, the nation is paving its way towards a more sustainable and eco-friendlier future.

Conclusion: A green transition in Latin America?

Elin Roberts

Through the use of six case studies, this report highlights that there is a strong appetite in the region for a green transition within Latin America. For instance, suggestions are being made to reduce CO2 emissions throughout the region and measures are being implemented to increase the use of renewable energies. Furthermore, steps are being taken to protect the biodiversity of the region, such as policies to reduce deforestation of the Amazon. Despite this, many challenges face the full implementation of a green transition in the area. The main challenge is the lack of sources and funding to invest in a long-term sustainable green transition. To conclude, we shall summarise the opportunities and challenges explored in each country.

Colombia

Gustavo Petro came to power on a mandate to protect the environment and to implement a green transition. The National Development Plan 2022-2026, the first under the government of Petro, sets a strong vision to protect the country's water and bio resources as well as to ensure environmental justice - a plan that has been commended by environmental activists. However, one of the biggest challenges that Petro's government faces when it comes to implementing a green transition is his policy to decrease its use and production of fossil fuels. Implementing radical decreases in Colombia's fossil fuel will have a negative impact on its economic stability as between 40-50% of its world exports are coal and oil. For instance, the Colombian peso has often decreased against the US dollar following Petro's speeches about decreasing production of fossil fuels. Another major challenge to ensure Colombia's green transition is access to finance to fully implement such a transition. A green transition is possible in Colombia, however, to fully implement it, the government will need to consider:

- **Financial diversification**: Use public investment incentives to decarbonise the economy and create plans to promote investment in decarbonised sectors. Also, measures should be taken to support companies to implement a plan of decarbonisation and ESG goals.
- **Mainstreaming environmental issues:** Implementation of environmental education to raise awareness of the public about the importance of an ecological transition. This is also an opportunity to create long-term public and private collaborations with civil society to implement a green transition.
- **Economic and technological innovation:** Promotion of a new inclusive economic model that's primarily based upon the bioeconomy, circular economy, knowledge management, renewable energies.

Brazil

The government of Jair Bolsonaro witnessed drastic increases in the Amazon's deforestation rate, highlighting the back seat that environmental issues took during his government. The return of Lula as president signifies a great shift in Brazil's stance on the environment as environmental issues are now a transgovernmental priority where the government engages with the private sector to promote a green transition. The Brazilian economy heavily relies upon renewable energies which will further

facilitate a green transition within the country. In addition to this, the government intends to expand the bioeconomy and green hydrogen industry. This would be a great opportunity for Brazil to become a regional leader in renewable energy, yet such large advances would require further technological investments. However, challenges can be seen in implementing a green transition within the private sector - such as in the agribusiness and mining sectors. One of the major challenges when it comes to protecting the environment, specifically the Amazon, is tackling the illegal economy that is active within the rainforest. To further assist a green transition in Brazil, an accessible domestic carbon credit market and a decarbonisation-inducing tax system should be used as tools to implement a green transition. Furthermore, a production of a nation-wide plan tasked with offering predictability over which parts of the country's biomes need to be preserved would allow better prioritisation of resources and support for specific regions.

Paraguay

Paraguay has strong ambitions for a greener future, especially when it comes to building resilience against climate change. For example, the country's 2030 National Development Plan highlights Paraguay's intentions to improve infrastructure throughout the nation to mitigate the infrastructural damage caused by climate change. Furthermore, we are seeing that plans for a greener future are being connected with policy intentions to decrease poverty. For instance, the PROEZA plan is collaboration between the Paraguayan government, the Green Climate Fund, and the Food and Agriculture Organization to make the poorest areas of the country more resilient against climate change. Paraguay holds an important position when speaking about renewable energy. The Itaipu Dam produces 90% of Paraguay's total energy consumption - highlighting that most of the country's energy usage is renewable as it is hydroelectric. One of the biggest risks facing the dam today is the increased number of droughts caused by climate change. Despite the fact that Paraguay's energy production is nearly carbon neutral, the country produces high levels of CO2 emissions as a result of its agricultural and transportation sectors. More environmentally friendly measures will need to be implemented within these two sectors to further expand Paraguay's green transition.

Venezuela

Venezuela has great potential when it comes to the renewable energy market, however, the country has made relatively little progress in developing this sector. The country strongly relies on oil and natural gas while hydro and biofuels account for a relatively small contribution to the energy mix. The lack of financial incentives by the government to further develop the production of renewable energy as well as the country's heavy reliance on fossil fuels poses a great barrier to Venezuela's green transition. Moreover, the lack of preservation of natural sites highlights a risk to a green transition within the country. For instance, over 700,000 hectares of trees have been destroyed between 2002 and 2019. To implement a green transition within the country, the political and economic crisis must firstly be resolved. If this is resolved, implementing a green transition could potentially bring the country together whilst improving the country's economic prospects by engaging in private-public partnerships alongside contributions from the civil society.

Ecuador

To ensure a green transition in Ecuador, the country must decrease its reliance on fossil fuels and further diversify its use of renewable energy. For instance, in 2020 Ecuador was the fifth largest producer of oil in South America. One of the main impediments to Ecuador's green transition is the ability to finance a green transition and further invest in the necessary infrastructure and technology. Furthermore, other social and regulatory barriers are also identified. When it comes to climate change, Ecuador needs to further mitigate its effects as well as combat the various extractive and illicit activities that heavily contribute to climate change. Implementing a full green transition requires a coordinated approach that includes the government, the private sector and the civil society. Furthermore, long-term strategies need to be implemented - strategies independent of political ideology.

El Salvador

Recent efforts have begun in El Salvador to implement a green transition. For instance, the current President, Nayib Bukele, announced the launch of El Salvador's Sustainable Energy plan in 2020 to expand the country's use and production of renewable energy. Furthermore, the government has implemented measures such as tax incentives for renewable energy investments and regulations to reduce greenhouse gas emissions to further facilitate a green transition. Despite a good beginning to the country's green transition history, we noted a few challenges. For instance, there is a lack of political will to create significant policy changes to achieve goals related to renewable energy. For instance, according to a report by the World Bank, El Salvador needs an investment of around $9.7 billion to achieve its renewable energy targets by 2030. Furthermore, the decentralised administrative system of the country makes it difficult for companies to have licences and permits for renewable energy projects across the country which lead to project delays. Despite the challenges, El Salvador has begun its green transition journey. Public-private partnerships will be key to sustaining a long-term transition as well as ensuring governmental support and funding.