



Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 25-Nov-2024 | Report No: PIDDC01102



BASIC INFORMATION

A. Basic Project Data

Project Beneficiary(ies) Brazil	Operation ID P507629	Operation Name Brazil: Decarbonization of Energy and Industrial Value Chains Project	
Region LATIN AMERICA AND CARIBBEAN	Estimated Appraisal Date 16-Apr-2025	Estimated Approval Date 04-Aug-2025	Practice Area (Lead) Energy & Extractives
Financing Instrument Investment Project Financing (IPF)	Borrower(s) Banco Nacional de Desenvolvimento Economico e Social (BNDES)	Implementing Agency Banco Nacional de Desenvolvimento Econômico e Social (BNDES)	

Proposed Development Objective(s)

To catalyze investments in decarbonization of energy and industrial value chains in Brazil.

PROJECT FINANCING DATA (US\$, Millions)

Maximizing Finance for Development

Is this an MFD-Enabling Project (MFD-EP)? Yes

Is this project Private Capital Enabling (PCE)? Yes

SUMMARY

Total Operation Cost	1,060.00
Total Financing	1,060.00
of which IBRD/IDA	1,000.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	1,000.00
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Non-World Bank Group Financing

Trust Funds	60.00
Clean Technology Fund	60.00

Environmental and Social Risk Classification

Concept Review Decision

High

Other Decision (as needed)

B. Introduction and Context

Country Context

1. **Brazil is the largest economy in the Latin American and Caribbean (LAC) region, and it aspires to become an OECD country as well as a global leader in the energy transition.** Brazil’s gross domestic product (GDP) per capita of US\$10,044 in 2023 (in purchasing power parity terms), ranking fifth in the region and 79th globally. Brazil plays an important role on the international stage, including for climate change mitigation and adaptation; it is hosting the G20 in Brazil in 2024, COP-29 in 2025, and has an updated NDC committing the country to reach economy-wide net zero emissions by mid-century. In 2022, Brazil initiated its accession process to join the OECD and has already adhered to more than one third of OECD instruments¹. This high-profile position creates an ideal moment for the country to accelerate its leadership to transform the global economy towards low-carbon development.

2. **The country has many of the conditions in place to achieve its development objectives, but low productivity and a cumbersome business environment create headwinds.** Brazil’s favorable conditions include a broadly stable political and fiscal environment, a clean power system, abundant renewable energy, and a renewed focus on safeguarding the country’s ecological resources. On the other hand, the country faces headwinds including increased investment in extractive industries, high taxes, a complex business environment, inadequate infrastructure investments, limited integration in global markets, and a rapidly increasing extractives sector - the extractive industry (i.e., oil, gas, and mining) has grown by 87.9 percent in Brazil since 2000, making up 13 percent of the gross domestic product (GDP) in 2021. These factors curb innovation and competitiveness. With the exception of the agricultural sector, productivity growth has stalled for the past two decades, particularly in the manufacturing and services sectors, and total factor productivity fell by 0.8 percent over 2014 to 2022. To meet its development and climate change objectives, Brazil needs to focus on fostering strong trade relationships, supporting a robust industrial sector, and use its comparative advantage in clean energy to capture share in new markets for decarbonized products, thereby increasing competitiveness and driving a new age of economic growth and neo-industrialization.

¹ [https://one.oecd.org/document/C/MIN\(2022\)21/FINAL/en/pdf](https://one.oecd.org/document/C/MIN(2022)21/FINAL/en/pdf)



3. **Brazil has set out an ambitious agenda to revive its energy and industrial value chains as an engine of sustainable economic growth.** In 2024, Brazil launched its New Industrial Program (*‘Programa Nova Indústria Brasil, “NIB”*), structured around six Missions aimed at fostering technological innovation, increasing productivity, and promoting green job. Mission 5 *‘Bioeconomy, decarbonization, energy transition and energy security’* sets out the Government’s objective of reducing the GHG intensity of industrial GDP by 30 percent by 2033 and increasing the share of biofuels in the transport energy matrix by 50 percent. Brazil has also launched its National Hydrogen Plan (PNH2), which envisages a huge potential for industrial decarbonization through clean hydrogen development, including links to new e-fuels (ammonia, methanol and other synthetic liquid hydrocarbons), promising alternatives for decarbonizing the aviation and shipping sectors. The Brazilian Government recently approved the Brazil Hydrogen Bill (2308/2023) which provides the regulatory framework and contains fiscal incentives (up to R\$ 20 billion), a fundamental step and clear signal to investors, but falls short of the required financing needed to give an impulse to industry. Forecasts indicate that these policies will facilitate economic growth in the country by increasing GDP through industrial activities while advancing the decarbonization of industrial processes, such as refining, biofuels, iron ore and steel, and chemical production.

Sectoral and Institutional Context

4. **Brazil is rich in energy resources – both renewable and non-renewable – and it boasts the lowest share of fossil fuels in its energy sector among the G-20 economies; however, the country has maintained the share of oil, gas and coal throughout the last decade.** In 2022, renewables comprised 47.4 percent of the total primary energy supply (TES), with sugarcane biomass, hydropower and variable renewables (wind and solar) representing 15.4, 12.5, and 3.3 percent, respectively. Among non-renewables, oil and natural gas represent the largest shares of the TES, with 35.7 and 10.5 percent, respectively. Notably, Brazil is the second largest biofuels producer in the world and ethanol supply is set increase seven-fold between 2020 and 2026 (from 90 to 660 kb/d in 2026)², and the country aims to establish itself as global leader in advanced or second-generation biofuels, including Sustainable Aviation Fuels³. Brazil’s power system also is amongst the greenest in the world, with unique characteristics⁴ that have enabled more than 80 percent of the electricity mix produced through renewable energy. These conditions can enable Brazil to decarbonize of other sectors of the economy at a relatively low cost compared to many of Brazil’s competitor countries⁵. However, Brazil plans to increase its oil production from its large offshore oil reserves (Pre-salt) by an additional 80 percent over the next two decades. While these fossil resources will serve as an important revenue base for the country, they could also lead to uneconomic uses of these resources domestically, which would increase emissions and generate large opportunity costs⁶.

² IEA, <https://www.iea.org/countries/brazil>

³ Second generation biofuels are defined as produced from waste, residues and non-food energy crops without increasing land use. Sustainable Aviation Fuels are defined as renewable or waste-derived aviation fuels that meets sustainability criteria defined by Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) at <https://www.icao.int/environmental-protection/Pages/SAF.aspx>.

⁴ These unique characteristics include: (1) a nationwide, interconnected and efficiently operated grid system; (2) abundant existing and significant expansion potential of variable renewable energy, with high-capacity factors (e.g., exceeding 50 percent for wind in some regions); and (3) abundant existing hydropower resources to provide clean baseload power and storage.

⁵ World Bank Group. 2023. Brazil Country Climate and Development Report. CCDR Series. © World Bank Group, Washington DC. <http://hdl.handle.net/10986/39782> License: CC BY-NC 3.0 IGO.

⁶ <https://openknowledge.worldbank.org/server/api/core/bitstreams/fd36997e-3890-456b-b6f0-d0cee5fc191e/content>



5. **On the demand side, Brazil is among the top ten world's largest energy consumers, mainly driven by the transport and industry sectors.** In 2022, the transport and industrial sectors represented 71 percent of the country's total final energy consumption (TFC), and these sectors have seen rapid growth over the past two decades⁷. Within the transport sector, oil products (75.3 percent) and biofuels and waste (21.3 percent) represent the largest sources of energy, while for the industrial sector, the largest ones are biofuels and waste (45 percent) and electricity (23 percent)⁸. Brazil's 'hard to abate'⁹ industries such as chemicals, steel, and cement, made up 65 percent of the country total industry energy demand. In 2022, Brazil's industrial sector accounted for 6.3 percent of the country's total emissions¹⁰. While energy-intensive industries pose challenges to achieve net-zero commitments, they are also critical to provide materials and components that are necessary to produce sustainable technologies and infrastructure (e.g., steel and cement for wind farms). Brazil has an opportunity increase productivity and competitiveness by utilizing its clean energy resources and accelerating innovation to transform its manufacturing and industrial sectors into an engine of sustainable economic growth.

6. **Public support has been strong in developed economies to support DCEI, creating a new source of demand for green products; however, due to fiscal constraints, developing countries like Brazil will require additional support.** Many large, developed economies are pursuing aggressive domestic green industrialization policies as well as *greenshoring*, the practice of locating industrial production in areas that offer clean, safe, and cheap energy. For example, the U.S. Inflation Reduction Act offers US\$369 billion in Energy Security and Climate Change programs over the next ten years, including incentives for green hydrogen and biofuels production, and the EU's Green Deal offers US\$245 billion of loans and US\$20 billion of grants for the greening of industry, including offering tax breaks to businesses investing in net-zero technologies. Germany, for example, has been particularly aggressive in their support for greening their industrial sector, providing €4.6 billion for subsidies for green hydrogen¹¹. Many of the projects benefiting from these incentives are located in developing countries with clean and cheaper renewable power. However, Brazil – like other developing countries - does not have the fiscal means to provide this level of support to decarbonize their domestic energy and industrial value chain, creating the need for concessional financing. At the same time, Brazil's heavy industries need to respond to the market signals from the EU's Carbon Border Adjustment Mechanism (CBAM), which will come into full effect in 2026; based on 2022 export figures, USD 3 billion of Brazilian exports would be affected by the mechanism, with iron, steel, and aluminum sectors accounting for the largest share¹². Brazil is also preparing legislation for a carbon market, but the impact on the industrial sector is not yet clear.

7. **Large amounts of funding must be leveraged to finance the energy transition and industrial decarbonization in Brazil, including from the private sector, yet challenges remain to attracting commercial financing for these investments.** It is estimated that the required investment to achieve Brazil's climate transition by 2030 amounts to approximately US\$200 billion (BRL 1 trillion)¹³. In this context, the country's energy transition specifically demands a

⁷ Between 2000 and 2022, the TFC of Brazil's transport industry grew by 96 percent, while the TFC of the industrial sector increased about 46 percent. <https://www.iea.org/countries/brazil/energy-mix>

⁸ <https://www.iea.org/countries/brazil/efficiency-demand>

⁹ These sectors are considered 'hard-to-abate' due to their reliance on high heat processes that cannot easily be electrified and/or their reliance on fossil fuels during processing that cannot easily be substituted.

¹⁰ Industrial sector emissions are attributed to a combination of sources, including: (i) fuel-related emissions, (ii) electricity generation emissions, (iii) industrial process emissions, and (iv) manufactured product life cycle emissions.

¹¹ <https://www.h2-view.com/story/germany-backs-23-hydrogen-production-storage-and-transport-projects-with-e4-6bn/2112377.article/>

¹² <https://www.iisd.org/system/files/2024-07/border-carbon-adjustments-brazil.pdf>

¹³ <https://www.weforum.org/publications/finding-pathways-financing-innovation-tackling-the-brazilian-transition-challenge/>



reallocation of capital and resources from traditional fossil fuel assets, such as oil refineries, thermal power plants, and natural gas pipelines, to cleaner alternatives. Furthermore, Brazil requires major enabling infrastructure to connect renewable energy loads and manage renewable variability; to modernize supply chains, specially of critical minerals and metals; to transport new commodities such as clean hydrogen, carbon dioxide, or advanced biofuels; and to expand energy efficiency.

8. Under the NIB, Brazil's National Bank for Economic and Social Development (*Banco Nacional de Desenvolvimento Econômico e Social, BNDES*) is set to kick-start investments that aim to result in the decarbonization of industrial processes and boost the deployment of renewable energy sources. NIB establishes that BNDES, in collaboration with the Brazil's Innovation Agency, (*Financiadora de Estudos e Projetos – Finep*), will utilize grants and concessional loans to support the achievement of energy transition and decarbonization. Particularly, NIB determines that BNDES can provide grants to (i) develop technological solutions to replace fossil fuels with renewables, reduce industrial CO₂ emissions, including carbon capture, utilization and storage (CCUS) technologies and BECCS (bioenergy energy with carbon capture and storage), and develop second generation biofuels; (ii) develop components and equipment for generating renewable energy, with a particular focus on wind, solar, and low-carbon hydrogen; (iii) promote sustainable technologies for the exploration and production of strategic minerals, along with their conversion processes and solutions for energy storage, utilization, and transportation; (iv) advance technologies for ultra-high voltage energy transmission, power compensators, and other solutions to improve the safety and resilience of the National Interconnected System and its subsystems; (v) innovate the production of chemicals, bioproducts, and bio inputs derived from renewable sources. NIB also mandates BNDES to offer concessional credit lines for the development of (i) bioproducts and bio inputs derived from the forest-based socio-bioeconomy, (ii) technology to generate and process biomass into biofuels and bioproducts, (iii) CCUS technology, (iv) green diesel, synthetic fuels, and Sustainable Aviation Fuels (SAFs), and (iv) advancement of low-carbon hydrogen technologies, encompassing the manufacturing of equipment, as well as the production, storage, transportation, and utilization of hydrogen as a clean energy source.

9. Prior experiences, including the deployment of non-conventional renewables, demonstrate that the participation of BNDES in energy transition and decarbonization projects can play a pivotal role in mobilizing private investors and accelerate the ramp-up from pilot initiatives to industrial scale. BNDES has historically supported the development of clean energy investments, specifically, between 2000 and 2020, the institution disbursed USD 24.4 billion (BRL 133.8 billion) for renewable energy projects, mainly for wind power generation projects, followed by biomass thermal plants and Small Hydro Power (SHP). Moreover, in the five-year period 2017-2021, BNDES approved projects that added 9.4 GW of renewable sources to the Brazilian energy grid, representing an increase of almost 29% in installed renewable capacity. Specific examples of successful programs implemented by BNDES include PROINFA (Incentive Program for Alternative Sources of Electric Energy) which was instrumental in the financing of wind energy projects and helped install 1.5 GW of wind generation capacity¹⁴. Another example can be found in the biofuels sector, where projects supported by BNDES have made it possible to increase the annual production of ethanol by about 10 billion liters (one third of Brazil's current production), enough to supply 200 million vehicle tanks, and more than 3,000 MW in electricity generation capacity. In addition, the institution supported in the same period the expansion of biofuel storage capacity by 40,000 m³.

10. A robust market sounding demonstrates that the main barriers to securing commercial financing for industrial decarbonization in Brazil include, include high upfront capital costs associated with adopting low-carbon

¹⁴ <https://www.iea.org/policies/4019-programme-of-incentives-for-alternative-electricity-sources-programa-de-incentivo-a-fontes-alternativas-de-energia-eletrica-proinfa>



technologies, lack of financial instruments tailored to support large-scale decarbonization, and perceived risks associated with long-term investments in innovative green projects. Additionally, some industrial sectors in Brazil face uncertainties around regulatory frameworks that secure demand and the absence of clear incentives for transitioning to greener operations, further hindering the mobilization of private capital. These challenges are compounded by limited access to climate and concessional finance, along with inadequate risk mitigation mechanisms, which make decarbonization projects less attractive to private investors. Moreover, these barriers are even more pronounced for local industrial players, due to their limited capacity to absorb high financial risks or navigate complex financial structures.

11. The proposed lending operation with BNDES as a Financing Intermediary (FI), can catalyze substantial investments to decarbonize the Northeast's energy sector and ramp-up green industrial value chains. This lending operation has the potential to leverage BNDES's deep understanding of Brazil's economic landscape and proven ability to mobilize private capital, alongside the World Bank (WB)'s technical expertise and financial resources, to accelerate the country's transition toward a low-carbon economy. This project is expected to mobilize approximately US\$4 billion in private capital by 2030. By leveraging WB's funds, BNDES can maximize private capital mobilization by offering blended financing options and risk mitigation instruments, thereby attracting further private sector investments. This approach supports Brazil's decarbonization goals and strengthens its position as a global leader in sustainable industrial exports.

Relationship to CPF

12. The proposed operation is aligned with Brazil Country Partnership Framework (CPF) for FY24-28, as it will finance infrastructure that enables electrical grid expansion, as part of industrial electrification projects, and it will boost greater renewable energy integration. This project will specifically contribute to the achievement of two high-level objectives (HLOs) "Greater productivity and employment" and "Greener economy with reduced vulnerability to climate shocks," as it focuses on realizing Brazil's full potential as a more sustainable economy, while also supporting mitigation and adaptation actions in response to the impact of climate change on Brazil's energy infrastructure. Specifically, this intervention contributes to the achievement of specific goal "expand clean energy matrix," which will uphold the adoption of new green technologies and greater renewable energy integration (e.g., in green hydrogen, green ammonia, biofuels, solar and wind energy). Notably, the project will reinforce the commitment to ramp-up Brazil's clean hydrogen economy, as the CPF recognized that clean hydrogen is an important vector for decarbonizing sectors that cannot achieve carbon neutrality using electricity and therefore this new fuel is a critical enabler of Brazil's ecological transformation. In addition, the Project is in line with the private capital mobilization (PCM) approach, as it aims to address binding constraints to leverage private sector financing to a nascent industry.

13. The proposed Project is aligned with the Global Challenge Program Energy Access and Transition (GCP-E) because it will support the acceleration of energy efficiency improvements in the industrial sector and will enable the development of sustainable financing programs that can attract both public and private resources. The operation will support the efforts of the Government of Brazil to deploy innovative technologies that accelerate energy efficiency in high-energy consuming industries, such as steel, aluminum, cement and chemical production. In addition, the project will ramp-up the market development for energy efficiency processes that can substantially reduce GHG emissions, by providing concessional finance through BNDES and will mobilize private investments, based on the experience of renewable energy projects.

14. The Project is aligned with Brazil's Country Climate and Development Report (CCDR), which identifies that Brazil has the potential to achieve a "deep decarbonization" based on the country's existing low-carbon energy matrix and the deployment of clean hydrogen. The CCDR recognizes that in a scenario with increased electrification and the use



of green hydrogen for transport, industry and export¹⁵. Thus, this intervention will leverage on Brazil's existing electricity mix by supporting the electrification of industrial processes, integrating clean hydrogen solutions, and strengthening the enabling power infrastructure that are critical to achieve the country's deep decarbonization. Moreover, the project encompasses the financing of potential developments of clean hydrogen and boosting the electrification of industrial processes, which are critical to secure Brazil's net zero commitments.

15. **The operation aligns with Brazil's Multi-Year Plan (*O Plano Plurianual, PPA*) for 2024-27**, approved by Congress in late 2023, which places a strong emphasis on climate action outlines key programs aimed at facilitating Brazil's green transition, including the *Ecological Transformation Plan (ETP)* and its focus on renewable energy. IT also aligns with the *Growth Acceleration Program (Programa de Aceleração do Crescimento, PAC)* with an investment commitment of US\$350 billion in infrastructure-related projects; and the *New Industrial Program (Nova Indústria Brasil, NIB)*, which will provide US\$60 billion of financing until 2026 to support Brazil's industrial modernization and sustainability efforts.

C. Proposed Development Objective(s)

To catalyze investments in decarbonization of energy and industrial value chains in Brazil.

Key Results (From PCN)

The proposed PDO-level indicators are as follows:

- Carbon dioxide (CO₂) emissions from manufacturing industries per unit of manufacturing value added (kilograms of CO₂ per constant United States dollars);
- Private capital mobilized for energy and industrial decarbonization investments (\$ billion) (US\$);
- Projected lifetime fuel savings (MJ).

Potential intermediate results include:

- Lifetime greenhouse gas emissions avoided or reduced (tCO₂e);
- Renewable energy capacity enabled (GW);

D. Concept Description

16. **The proposed Project will support the creation of a credit line to be operationalized by BNDES, acting as Financial Intermediary, to finance sub-projects that decarbonize the energy mix and energy-intensive industrial value chains.** BNDES will on-lend directly to medium- and large-scale decarbonization projects over a 5-year period, blending the project's resources with their own funding. The proposed operation focuses on supporting technologies and processes that have the highest potential to generate an impact on reducing its GHG emissions for the energy and industrial sectors. In terms of leverage, BNDES requires at least 20 percent sponsor co-financing, which includes equity. In larger infrastructure projects, the final co-financing percentage is typically higher. The final terms and conditions of the credit line will also be agreed during project preparation. Moreover, this operation will support BNDES in offering long-term, low-interest loans to decarbonization projects, which will result in attracting private investors by lowering the overall cost of capital. This kind of financing is especially important for selected sub-projects that will require large-scale infrastructure investments, such as decarbonization/hydrogen production plants or large biofuels complexes.

¹⁵ <https://openknowledge.worldbank.org/entities/publication/a713713d-0b47-4eb3-a162-be9a383c341b>



17. The Project comprises a US\$1,060,000,000 credit line, including US\$1 billion IBRD and a potential for US\$60 million from the Clean Technology Fund¹⁶; to finance sub-projects that accelerate the decarbonization of Brazil’s energy sector and its energy-intensive industries. This operation will allocate the funds in two sub-components: Sub-component (1a) US\$700 million for the decarbonization of energy and industrial value chains (DCEI); Subcomponent (1b) US\$350 million for enabling shared infrastructure approximately. These amounts are indicative and will be discussed and confirmed during project preparation.

Legal Operational Policies

Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Area OP 7.60	No

Summary of Screening of Environmental and Social Risks and Impacts

18. The combined E&S risk of the project is high. BNDES would finance subprojects for public/private borrowers that meet the eligibility criteria of fostering energy transition (ET) and low-carbon industrial technologies and necessary support infrastructures. These subprojects are not known yet, but ET and decarbonization are often associated with positive effects on the economy and energy security; the environment and public health, job opportunities and livelihoods. They are also often associated with needs to: a) create decent jobs and provide skills retraining and upskilling to “brown workers to help them to manage skill, wage, and location mismatches; b) ensure that places with high concentrations of brown jobs do not lose their economic viability, sense of community, and identity, and can develop alternative economies and livelihoods; c) contribute to eradicate energy poverty and ensure universal access to clean and affordable energy; d) incorporate gender and generation views and to assure that ET benefits are distributed fairly and negative impacts did not fall disproportionately on vulnerable people; and, e) engage workers, unions, employers, vulnerable groups and local communities as active participants, decision-makers and beneficiaries. Considering the sectors and the typology of pre-selected subprojects, other areas of major concern refer to: health and safety of workers and communities involved in the increasingly needed extraction of lithium and rare earth minerals and exposed to the handling/use of dangerous chemical products; conflicts over land and water use right; and the impacts associated with the construction of enabling infrastructures related with land acquisition, physical/economic displacement, impacts on livelihoods of local and traditional communities, and temporary project induced labor influx in communities with low absorption capacity and weak law enforcement and its widely known consequences.

CONTACT POINT

¹⁶ The team has prepared a concept note for a US\$30 million concessional loan from the CTF Futures Window, which will be submitted for approval of the CTF Trust Fund Committee by November 2024. If the concept note is approved, a new Carta Consulta will be submitted.



World Bank

David Vilar Ferrenbach
Senior Energy Specialist, Program Leader

Megan Meyer
Senior Energy Specialist

Borrower/Client/Recipient

Banco Nacional de Desenvolvimento Economico e Social (BNDES)

Vivian Machado dos Santos Correa Pereira
Head of Funding Department
viviansantos@bndes.gov.br

Implementing Agencies

Banco Nacional de Desenvolvimento Econômico e Social (BNDES)

Vivian Machado dos Santos Correa Pereira
Head of Funding Department
viviansantos@bndes.gov.br

FOR MORE INFORMATION CONTACT

The World Bank
1818 H Street, NW
Washington, D.C. 20433
Telephone: (202) 473-1000
Web: <http://www.worldbank.org/projects>

APPROVAL

Task Team Leader(s):	David Vilar Ferrenbach, Megan Meyer
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Approved By

Practice Manager/Manager:	Gabriela Elizondo Azuela	14-Oct-2024
Country Director:	Sophie Naudeau	25-Nov-2024