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Report No: PAD3475

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT
ON A
PROPOSED LOAN

IN THE AMOUNT OF US$38 MILLION

TO THE

FEDERATIVE REPUBLIC OF BRAZIL

FOR AN

ENERGY AND MINERAL SECTORS STRENGTHENING PROJECT II

March 3, 2020

Energy & Extractives Global Practice
Latin America and Caribbean Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective {January 31, 2020})

Currency Unit =	Brazilian Real (BRL)
BRL 4.28 =	US$1

BRL 1= US$ 0.23

FISCAL YEAR
July 1 - June 30

Regional Vice President:	J. Humberto Lopez (Acting)
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ABBREVIATIONS AND ACRONYMS

ACEEE	American Council for Energy Efficiency Economy
ACL	Free Contracting Environment *(Ambiente de Contratação Livre)*
ACR	Regulated Contracting Environment *(Ambiente de Contratação Regulada)*
AECI	Internal Control Office *(Assessoria Especial de Controle Interno)*
AEGP	Special Advisory of Project Management *(Assessoria Especial de Gestão de Projetos)*
AERO	Brazil Aerogeophysical Projects Database *(Base de Dados de Projetos Aerogeofísicos do Brasil)*
AESA	Environmental Issues Advisory Team *(Assessoria Especial de Meio Ambiente)*
AESS	Social and Environmental Team
AMI	Advance Metering Infrastructure
ANEEL	National Electricity Regulatory Agency (*Agência Nacional de Energia Elétrica*)
ANM	National Mining Agency (*Agência Nacional de Mineração*)
ANP	National Agency of Petroleum, Natural Gas and Biofuels (*Agência Nacional do Petróleo, Gás Natural e Biocombustíveis*)
ASM	Artisanal and Small-scale Mining
B40	Bottom 40 percent
CADE	Administrative Council of Economic Defense *(Conselho Administrativo de Defesa Econômica)*
CCC	Fuel Consumption Account
CCEE	Electricity Trading Chamber (*Câmara de Comercialização de Energia Elétrica*)
CDE	Energy Development Account
CEPEL	National Center for Research in Electricity (*Centro de Pesquisa em Energia Elétrica*)
CFEM	Financial Compensation for the Exploitation of Mineral Resources *(Compensação Financeira pela Exploração de Recursos Minerais)*
CFURH	Financial Compensation for the Use of Water Resources
CGOF	General-Coordination of Budget and Finance *(Coordenação-Geral de Orçamento e Finanças)*
CGU	Office of the Comptroller General (*Controladoria-Geral da União*)
CMGN	Committee for Monitoring the Opening of the Natural Gas Market *(Comitê de Monitoramento da Abertura do Mercado de Gás Natural)*
CMSE	Power Sector Monitoring Committee *(Comitê de Monitoramento do Setor Elétrico)*
CMU	Country Management Unit
CNPE	National Energy Policy Council (*Conselho Nacional de Política Energética*)
COFIN	Finance Coordination *(Coordenação Financeira)*
CONT	Accounting Coordination *(Coordenação de Contabilidade)*
CPF	Country Partnership Framework
CPRM	Brazilian Geological Survey (*Companhia de Pesquisa de Recursos Minerais - Serviço Geológico do Brasil*)
CSM	Climate Smart Mining
DER	Distributed Energy Resources
DA	Designated Account
DG	Distributed Generation

DGN	Natural Gas Directorate *(Departamento de Gás Natural)*
DISCOs	Distribution Companies
DNPM	National Department of Mineral Production (*Departamento Nacional de Produção Mineral*)
E&P	Exploration & Production
EHSGs	Environmental Health and Safety Guidelines
EPE	Energy Research Office (*Empresa de Pesquisa Energética*)
ERR	Economic Rate of Return
ESCP	Environmental and Social Commitment Plan (*Plano de Compromissos Sociais e Ambientais)*
ESF	Environmental and Social Framework
ESS	System Service Charges
ESTAL	Energy Sector Technical Assistance Project
EUST	Transmission System Use Charges
FDI	Foreign Direct Investment
FM	Financial Management
FMA	Financial Management Assessment
FRR	Financial Rate of Return
Gaspetro	Petrobras Gás S.A.
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoB	Government of Brazil
GRS	Grievance Redress Service
GT	Working Group (*Grupo de Trabalho*)
HPP	Hydropower Plant
ICB	International Competitive Bidding
ICMM	International Council on Mining and Metals
ICR	Implementation Completion and Results Report
IFR	Interim Financial Report
IPSAS	International Public Sector Accounting Standards
ISA	International Standards on Auditing
ISR	Implementation Status and Results Report
IT	Information Technology
LDO	Budget Guidance Law *(Lei de Diretrizes Orçamentárias)*
LEN	New Energy Auction *(Leilão de Energia Nova)*
LNG	Liquified Natural Gas
LOA	Annual Budget Law (*Lei Orçamentária Anual*)
LPG	Liquified Petroleum Gas
MAE	Wholesale Electric Energy Market *(Mercado Atacadista de Energia Elétrica)*
MCASP	Accounting Manual Applicable to the Public Sector *(Manual de Contabilidade Aplicada ao Setor Público)*
META	Mineral and Energy Technical Assistance Loan
M&E	Monitoring and Evaluation
MME	Ministry of Mines and Energy
MP	Provisional Measure *(Medida Provisória)*
MRE	Energy Reallocation Mechanism *(Mecanismo de Realocação de Energia)*

MoE	Ministry of Economy
NBC	Brazilian Accounting Standards *(Normas Brasileiras de Contabilidade)*
NBCASP	Brazilian Accounting Standards Applicable to the Public Sector *(Normas Brasileiras de Contabilidade Aplicadas ao Setor Público)*
NDC	Nationally Determined Contribution
NTS	National (Natural Gas) Transmission System
ONS	National Electrical System Operator (*Operador Nacional do Sistema Elétrico*)
OECD	Organisation for Economic Co-operation and Development
OM	Operational Manual (*Manual Operacional do Projeto – MOP)*
PDO	Project Development Objective
PEE	Energy Efficiency Program
PFE	State Finance Strengthening Program
PEF	Fiscal Balance Program *(Programa de Equilíbrio Fiscal)*
PIU	Project Implementation Unit
PLR	Performance and Learning Review
PNM	National Mining Plan (*Plano Nacional de Mineração*)
PPA	Power Purchase Agreement
PPSD	Project Procurement Strategy for Development (*Estratégia de Aquisições para Projetos de Desenvolvimento*)
PPT	Thermal Priority Program
PRI	Principles for Responsible Investment
PROCEL	National Electrical Energy Conservation Program *(Programa Nacional de Conservação de Energia Elétrica)*
PROINFA	Incentive Program for Alternative Sources (Programa de Incentivo às Fontes Alternativas de Energia Elétrica)
PRO-REG	Program for the Strengthening of Institutional Capacity for Regulatory Management
PSC	Project Steering Committee
PV	Photovoltaic
R&D	Research and Development
RCE	Regulated Contracting Environment
RIA	Regulatory Impact Assessment
RGR	Global Reserve of Reversal
SECAP	Secretariat of Evaluation, Planning, Energy and Lottery *(Secretaria de Avaliação de Políticas Públicas, Planejamento, Energia e Loteria)*
SEE	Secretariat for Electrical Energy *(Secretaria de Energia Elétrica)*
SGM	Secretariat for Geology, Mining, and Mineral Processing *(Secretaria de Geologia, Mineração e Transformação Mineral)*
SIAFI	Federal Government Integrated Administration System *(Sistema Integrado de Administração Financeira do Governo Federal)*
SICONV	System of Management of Agreements and Transfer Contracts *(Sistema de Gestão de Convênios e Contratos de Repasse do Governo Federal)*
SIN	National Integrated System (*Sistema Interligado Nacional*)
SINIEF	National Integrated Economic Information System Tax *(Sistema Nacional Integrado de Informações Econômico-Fiscais)*
SOEs	State-Owned Enterprises (Empresas Estatais)

SPE	Secretariat for Planning and Energy Development (*Secretaria de Planejamento e Desenvolvimento Energético*)
SPG	Secretariat for Petroleum, Natural Gas, and Biofuels (*Secretaria de Petróleo, Gás Natural e Biocombustíveis*)
SPOA	Secretariat for Planning, Budget and Administration (*Secretaria de Planejamento, Orçamento e Administração*)
STEP	Systematic Tracking of Exchanges in Procurement
STN	National Treasury Secretariat *(Secretaria do Tesouro Nacional)*
TA	Technical Assistance
TAG	Natural Gas Transport Company (*Transportadora Associada de Gás S.A.*)
TCU	Federal Court of Accounts *(Tribunal de Contas da União)*
TFSEE	Electric Power Services Monitoring Rate
ToR	Terms of Reference
TPA	Third-Party Access
TFP	Total Factor of Productivity
TPP	Thermal Power Plant
TSA	Treasury Single Account
VOLL	Value of Lost Load
VRE	Variable Renewable Energy
VTP	Virtual Trading Point
WA	Withdrawal Application
WBG	World Bank Group

TABLE OF CONTENTS

DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Brazil	Energy and Mineral Sectors Strengthening Project II	
Project ID	**Financing Instrument**	**Environmental and Social Risk Classification**
P170850	Investment Project Financing	Substantial

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[ ] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Disbursement-linked Indicators (DLIs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made Disaster
[ ] Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
24-Mar-2020	31-Dec-2025

Bank/IFC Collaboration

No

Proposed Development Objective(s)

To strengthen institutional capacity for market efficiency taking into consideration climate resilience in the energy and mining sectors in Brazil.

Components

Component Name	Cost (US$, millions)

Component 1 – Technical assistance to increase efficiency, long term infrastructure adequacy and climate resilience in the energy and mining sectors.	20.07
Component 2 – Institutional strengthening of energy and mining institutions to establish and implement strategies, policies and regulation	17.48
Component 3 – Implementation support, monitoring and evaluation, knowledge sharing and dissemination.	0.45

Organizations

Borrower:	Federative Republic of Brazil
Implementing Agency:	Ministério de Minas e Energia

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	38.00
Total Financing	38.00
of which IBRD/IDA	38.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	38.00

Expected Disbursements (in US$, Millions)

WB Fiscal Year	2020	2021	2022	2023	2024	2025	2026
Annual	2.24	2.40	7.31	7.56	8.61	9.88	0.00
Cumulative	2.24	4.64	11.95	19.51	28.12	38.00	38.00

INSTITUTIONAL DATA

Practice Area (Lead)	Contributing Practice Areas
Energy & Extractives	

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Substantial
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Moderate
6. Fiduciary	Moderate
7. Environment and Social	Substantial
8. Stakeholders	Moderate
9. Other	Low
10. Overall	Moderate

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
Assessment and Management of Environmental and Social Risks and Impacts	Relevant
Stakeholder Engagement and Information Disclosure	Relevant
Labor and Working Conditions	Relevant
Resource Efficiency and Pollution Prevention and Management	Relevant
Community Health and Safety	Relevant
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Relevant
Cultural Heritage	Relevant
Financial Intermediaries	Not Currently Relevant

NOTE: For further information regarding the World Bank's due diligence assessment of the Project's potential environmental and social risks and impacts, please refer to the Project's Appraisal Environmental and Social Review Summary (ESRS).

Legal Covenants

Sections and Description
Schedule 2 Section I A 1 and 2 (Institutional Arrangements)

1. The Borrower, through MME, shall operate and maintain, through the implementation of the Project:
(a) a project implementation unit (the "PIU") with functions, resources and staffing in numbers and with qualifications as set forth in the Operational Manual; and
(b) a Project Steering Committee (the "PSC"), to be responsible for overseeing Project implementation and coordination among the Participating Entities, and with structure and functions as set forth in the Operational Manual.

2. The Borrower, through MME, shall or shall cause, as applicable, all Participating Entities to operate and maintain, through the implementation of the Project, Project Co-executing units physically located in each of the Participating Entities (the "Project Co-executing Units") with functions, resources and staffing in numbers and with

qualifications as set forth in the Operational Manual.

Schedule 2 Section I B 1 and 2 (Operational Manual)

1. The Borrower, through MME, shall carry out the Project in accordance with the provisions of a manual (the Operational Manual) satisfactory to the Bank, containing, inter alia: (a) specific provisions on detailed arrangements for the carrying out of the Project; (b) the composition and responsibilities of the PIU, the PSC and the Project Co-executing Units; (c) the procurement, financial management and disbursement requirements thereof; (d) the performance indicators; and (e) the Anti-Corruption Guidelines.

2 The Borrower shall not amend or waive or fail to enforce any provision of the Operational Manual without the Bank's prior written approval. In case of any conflict between the terms of the Operational Manual and those of this Agreement, the terms of this Agreement shall prevail.

Schedule 2 Section I C 1 and 2 (Cooperation Agreements)

1. The Borrower, through MME, shall, prior to carrying out any Project activity under the administrative jurisdiction of a Participating Entity, enter into an agreement with said Participating Entity (the Cooperation Agreement), under terms and conditions approved by the Bank, which shall include, inter alia:
(a) MME's obligation to:
(i) transfer to the Participating Entities, when applicable, on a non-reimbursable basis, part of the Loan proceeds necessary to carry out the Project activities under their responsibility; and
(ii) comply with the pertinent obligations under this Agreement, as applicable to the pertinent Project activity; and

(b) the Participating Entities' obligation to, when applicable:
(i) procure the goods, consultants' services and Non-Consulting services under the Project in accordance with the provisions set forth in Section III of this Schedule; and
(ii) carry out the Project activities under their responsibility with due diligence and efficiency and to comply with the pertinent obligations under this Agreement, including with the provisions of the Anti-Corruption Guidelines, all as applicable to the corresponding Project activity.

2. The Borrower, through MME, shall exercise its rights and carry out its obligations under each Cooperation Agreement in such manner as to protect the interests of the Borrower and the Bank and to accomplish the purposes of the Loan. Except as the Bank shall otherwise agree, the Borrower shall not assign, amend, abrogate, terminate, waive or fail to enforce any Cooperation Agreement or any provision thereof.

Schedule 2 Section I D 1, 2, 3 and 4 (Environmental and Social Standards)

1. The Borrower shall, and shall cause the Project Entities to, ensure that the Project is carried out in accordance with the Environmental and Social Standards.

2. Without limitation upon paragraph 1 above, the Borrower shall, and shall cause the Project Entities to, ensure that the Project is implemented in accordance with the Environmental and Social Commitment Plan ("ESCP"), in a manner acceptable to the Bank. To this end, the Borrower shall, and shall cause the Project Entities

to, ensure that:
(a) the measures and actions specified in the ESCP are implemented with due diligence and efficiency, and as further specified in the ESCP;
(b) sufficient funds are available to cover the costs of implementing the ESCP;
(c) policies, procedures and qualified staff are maintained to enable it to implement the ESCP, as further specified in the ESCP; and
(d) the ESCP or any provision thereof, is not amended, revised or waived, except as the Bank shall otherwise agree in writing and the Borrower has, thereafter, disclosed the revised ESCP.

Conditions

Type	Description
Effectiveness	The Additional Conditions of Effectiveness consist of the following, namely that the Operational Manual has been adopted by the Borrower in a manner and with contents acceptable to the Bank (Article V. 5.01).

I. STRATEGIC CONTEXT

A. Country Context[1]

1. **After a decade of solid growth, Brazil's economy entered a deep recession in 2015 and 2016 from which it is slowly recovering.** The deterioration of both the external environment and domestic policies led to a slowdown, followed by two years of recession in 2015 and 2016. While external factors contributed to the recession, growing fiscal imbalances, structural bottlenecks and domestic political uncertainty affected investor and consumer confidence. Economic recovery remains weak with 1.3 percent real GDP growth recorded in 2017 and 2018, and 1.1 percent growth estimated in 2019 and 2.0 percent projected for 2020. Job creation is slowly improving with unemployment declining from a peak of 13.6 percent in March 2017 to 11.0 percent in 2019, but still above pre-crisis levels (6.8 percent in 2014). Most of the new jobs are created in the informal sector. As of 2018, 19.9 percent of the population lived on less than US$5.50 per day (2011 PPP), including 4.4 percent on less than US$1.90 per day (2011 PPP). Given the uneven recovery and continuing fiscal challenges limiting expansion of public support, poverty is expected to only gradually improve over the next few years.

2. **Inflation has been within the Central Bank target, allowing for accommodative monetary policy.** In 2018, consumer price index (CPI) inflation remained moderate at 3.7 percent and remained stable since then. Inflation ended 2019 at 4.31 percent (slightly above the 4.25 percent Central Bank's target). The benign inflation environment – combined with weakening activity and loosening of monetary policy abroad – compelled the Central Bank to cut the policy rate (SELIC) to a record low 4.25 percent in 2020.

3. **The Brazilian government continues to follow a fiscal consolidation path**. In light of the weak economy and rising mandatory expenditures, the general government deficit peaked at over 10.6 percent of GDP in 2015 and public debt rose quickly, reaching 79 percent of GDP in the same year. Since December 2016 fiscal consolidation at federal level has been anchored by a constitutional rule limiting the increase in primary expenditures. An ambitious pension reform and several other fiscal measures helped to meet the expenditure target. This also helped to reduce the fiscal deficit in 2019 to 6.2 percent of GDP. Further supported by one-off revenues, repayments and foreign exchange operations, gross public debt declined to 75.6 percent of GDP in 2019 from 76.5 percent in 2018. The recession and subsequent slow recovery have also affected subnational governments, which have seen their revenue base decline while they struggle to adjust fiscally given high expenditure rigidities. As a result, a growing number of state governments have faced liquidity and solvency crises since 2015, undermining critical service delivery. The stock of outstanding subnational debt represents about 12 percent of GDP, which poses a significant contingent liability for the Federal Government.

4. **The current account deficit has been moderate and fully financed by net FDI flows, while a flexible exchange rate and adequate international reserves provide buffers.** The floating exchange rate regime provides an effective first line of defense against external shocks. The level of the exchange rate has been broadly stable over the past two years, despite bouts of volatility (it has been relatively unaffected by the recent Argentina crisis). The current account deficit stood at 2.8 percent in 2019. Net FDI inflows has been larger at 3.1 percent of GDP in 2019, with other financial outflows accounting for most of the difference. Reserves accumulated to US$356.9 billion in 2019, enough to finance

[1] Sources: IBGE (Instituto Brasileiro de Geografia e Estatística), (Brazilian Statistics Agency), Ministry of Finance of Brazil, Central Bank of Brazil and World Bank.

16 months of imports or 2.0 times as large as the country's short-term external debt.

5. **Brazil needs to accelerate his productivity growth and infrastructure development to boost long-term growth.** The low total factor productivity (TFP) growth between 1996 and 2015 has made the per capita income of Brazilians to rise by just 0.7 percent per year since the mid-1990s. This corresponds to one tenth of the rate in China and only one half of the average in OECD countries. The TFP dynamics in Brazil is related to significant distortions caused by absence of conducive business environment, market fragmentation, multiple inefficient public programs directed to support selected private sectors, barriers to external trade and competition. Also, Brazil has one of the lowest investment levels in infrastructure (2.1 percent of GDP on average between 2000 and 2013) when compared to its peers, resulting in a deterioration of the infrastructure stock that creates acute bottlenecks for production. With limited fiscal space and a dwindling demographic bonus, accelerating productivity growth remains key to sustain long-term growth. To this end, reforms should focus on boosting market competition, open the economy to external trade that could reduce inputs' and technologies' prices and simplification of the tax system. Also, higher levels of investment in infrastructure are needed to ensure adequate stock of infrastructure capital, remove bottlenecks for production and expand access to social services. This calls for improving planning capacity at government level, improving the regulatory environment and leveraging private resources to finance investments.

6. **While Brazil has made progress on reducing gender inequality gaps in the past, continued efforts are needed, especially regarding women's economic participation and opportunities**. Brazil has experienced a significant reversal in progress towards gender parity in 2018, with overall gender gap standing at its widest point since 2011, largely driven by the country's Economic Participation and Opportunity sub-index (Brazil ranked 92 out of 149 countries).[2] Brazil's 2018 Gender Inequality Index score of 0.407 ranked 94 out of 160 countries. Female participation in the labor market in Brazil is 53.2 percent compared to 74.7 percent for men, slightly higher than the regional Latin America and the Caribbean average of 51.6 percent. Women's gross national income per capita in Brazil is substantially lower than men's: US$10,073 versus US$17,566, respectively.[3] While it is estimated that improving gender equality in Brazil could have a positive impact on GDP per capita growth, there are constraints that are preventing women from having more opportunities to participate in the economy and have access to better jobs.

B. Sectoral and Institutional Context

7. **The energy and mining sectors are some of the main drivers of the Brazilian economy.** The electricity, oil and gas and mining and mineral processing sectors represent almost 3 percent, 13 percent[4] and 4 percent of Brazil's GDP, respectively, and are fundamental to other important economic sectors. Additionally, in 2018, the mining and mineral processing sector was responsible for 25 percent of the country's commercial balance, while petroleum and fuel represented around 10 percent.[5] Brazil is the world's ninth-largest country and has rich reserves of important metals such as bauxite (aluminum), iron ore, niobium and nickel, and is also a leading producer of precious metals such as gold.

8. **The power, gas and mining sectors stand at different stages of institutional development.** While the power sector is one of the most sophisticated in Latin America, it is facing a number of challenges to increase its resiliency to

[2] World Economic Forum. *The Global Gender Gap Report 2018*. World Economic Forum. Geneva, Switzerland. 2019. This is the most recent Global Gender Gap Report in which Brazil participated.
[3] UNDP (United Nations Development Programme). 2019. *Human Development Indices and Indicators: 2018 Statistical Update - Briefing Notes for Countries on the 2018 Statistical Update, Brazil.*
[4] BN Americas, http://www.brasil.gov.br/economia-e-emprego/2014/06/setor-de-petroleo-e-gas-chega-a-13-do-pib-brasileiro
[5] https://wits.worldbank.org/CountryProfile/en/Country/BRA/Year/LTST/Summary

climate change; the gas sector development has lagged due to regulatory and governance issues; and the mining sector requires a comprehensive modernization anchored in sustainability. In particular, and given the substantial contribution of hydropower to the energy mix, observed and anticipated climate change impacts, including projected increase in temperature coupled with more severe and frequent droughts and changes in the precipitation patterns, are exacerbating already observed vulnerability of the power sector generation and quality of the supply. Likewise, the mining sector is a significant user of local water and energy resources, both of which are impacted by a changing climate. Furthermore, its operations and supply chains are exposed to extreme weather events, including cyclones, flooding and drought, all of which are expected to intensify with climate change.

9. **The modernization of Brazil's energy and mining sector is critical to accelerate economic growth and job creation in an environmentally sustainable way.** The sectors are in need of regulatory improvements to support increased productivity in Brazil. The gaps are described in detail in annexes 3, 4 and 5, and can be exemplified as follows: (i) **in the power sector** - climate volatility increasingly threatens energy security, due to the substantial contribution of hydropower to the energy mix and the lack of effective mechanisms to prevent electricity crises caused by draughts[6]. The diversification of the electricity matrix will contribute to increasing the power system resiliency. However, the inclusion of an anticipated 45 percent of variable renewable generation to the energy mix by 2040 will require a revision of market rules, dispatch, pricing, as well as specific contracting models to increase flexibility in the power system; While access to electricity is universal, the power sectors faces important challenges in terms of affordability. There is a need to rationalize the tariff structure that had led to high tariffs due to charges and levies (see annex 4); (ii) **in the natural gas sector** – the existing legal, regulatory and taxation frameworks do not offer adequate incentives for the emergence of a competitive natural gas market, contributing to the dominance of Petrobras in all gas market segments[7], underinvestment in infrastructure[8], concentration in offshore production with high reinjection rates[9] and, significantly high prices[10]; and (iii) **in the mining sector** - there is a need to strengthen the regulatory capacity and modernize the recently created National Mining Agency (*Agência Nacional de Mineração,* ANM) to bridge the significant institutional gap that exists for the efficient regulation and supervision of the sector. The National Mining Plan (PNM) must be revised in order to provide a strategy for the sector's sustainable development.

10. **In January 2019, the Ministry of Mines and Energy (MME) launched its program to reform the Energy and Mining Sectors**. The program for reform focuses on: (i) Adequate governance, including regarding the distribution competencies and responsibilities among institutions to optimize the management of the sector, and respect for the competencies of the policy maker (MME) and sectoral regulators; (ii) Stability and certainty in the judicial and regulatory front; and (iii) Predictability to help attract private investments, for example with prior disclosure of mining, gas, oil and electricity auctions. The program is continuing a number of reforms which were initiated under the previous administration. These included the approval of revised mining legislation in 2017, the launch of the New Gas Market ("Novo Mercado de Gás") program in June 2019, and the revision of the bill that emerged from the *Consulta*

[6] Past crisis had substantial impact in GDP, for example the crisis of 2001 led to rationing that impacted one percentual point of GDP.
[7] Petrobras is responsible for 77 percent of the national production, 100 percent of natural gas imports, 100 percent of the supply of natural gas in the integrated network, and 40 percent of total consumption. It also operates almost 100 percent of all essential infrastructure assets, owns most of the capacity of existing transport networks and has a stake in 20 of the 27 natural gas distributors.
[8] Brazil's current gas pipeline network is 9,400 km, which is small, considering the size of the country/market, and apparent when comparing with Argentina (52,000 km) and the US' (490,900 km) networks. No new km of gas pipelines has been built in Brazil since 2009.
[9] 81 percent of national gas production in Brazil was produced offshore. 1/3 of natural gas produced in Brazil is reinjected, with most reinjections occurring offshore and significantly expanding since 2014. The remaining 3% of associated natural gas is flared.
[10] Industry in Brazil pays almost US$14 per million BTU, while in Europe the price is US$7-US$8, and less than US$4 in the US.

Pública 33 (CP-33)[11] held from July to August 2018, which gathered feedback on proposed measures to improve the regulatory framework to ensure the long term sustainability of the power sector.

11. **Brazil has ambitious goals in terms of diversifying its energy matrix, including a large increase in the share of variable renewables (variable renewable energy [VRE], solar, and wind) in its energy matrix, from around 10 percent in 2018 now to 40 percent by 2040**. Reaching that goal would be key for Brazil to maintain clean energy matrix even as its reliance on hydropower falls over time. From the point of view of greenhouse gas (GHG) emissions, the counterfactual to the development of a strong renewables sector would be a scenario in which fossil fuels substitute for hydroelectricity. However, for Brazil to instead make a large leap in the share of variable renewables in a sustainable manner, Brazil will need to implement significant changes in the organization and regulation of its power market. In other words, for Brazil to ensure that power supply is able to accompany the growth acceleration for which Brazil is poised based on ongoing reforms in its fiscal and broader macro management, as well on its increasing openness to private investments in key infrastructure sectors, it needs to embark on a third wave of power sector reforms. These reforms are needed for the power system to have the flexibility needed to absorb the large increase in variable renewables that the country is targeting as a way of supporting its ambitious goals for the diversification of its energy matrix and to ensure that the reduction in the share of hydropower is not accompanied by a large increase in fossil fuel based energy generation.

12. **Rapid growth in renewables could become a significant source of skilled jobs and potentially have significant positive effects on the growth of the respective manufacturing industries**. In recent years, Brazilian wind energy has been growing on a fast trajectory, particularly in the Northeastern region. The International Renewable Energy Agency (IRENA) suggests that in Brazil approximately 33,700 people are engaged in the manufacturing of wind turbine components, in tower construction and in the installation, operation, and maintenance of wind farms. Brazil is looking at expanding, not only its on-shore wind industry, but also off-shore. Some recent studies suggest that wind energy not only increases employment in the industry, agriculture and construction, but also increases wages across all sectors in the economy including commerce and services. A rapid solar scale-up could also have a significant impact.[12]

13. **Similarly, Brazil has very large mineral resources and vast newly discovered reserves of oil and gas, but the** governance and regulatory reforms are needed to accelerate the development of the sector. Brazil has global leading-edge expertise in the ultra-deep waters offshore technologies necessaries to exploit these reserves. In addition to supporting growth and job creation directly, oil and gas can have significant backward and forward links (for example, engineering services, capital goods, petrochemicals, and so on). Realizing these opportunities also requires policy and regulatory reforms, including midstream and downstream.

14. **All the reforms mentioned in power, gas and mining are second or third generation reforms.** In other words, in many cases Brazil would be at the forefront of innovation in development policy. Lessons learned would most probably be of large interest to other developing countries with large potential in renewable generation, as well as to those with significant mineral and oil and gas resources. Those reforms would have to be accompanied by new methodologies, modernization of processes and new institutional framework in areas in which Brazil is still lagging, particularly in the mining sector.

15. **However, because of their complexity, the design of all these reforms will require substantial analytical**

[11] http://www.mme.gov.br/web/guest
[12] http://www.repec.eae.fea.usp.br/documentos/Goncalves_Rodrigues_Chagas_41WP.pdf

studies and investments in new methods and tools associated with capacity building activities. The World Bank has a long track record in supporting previous waves of reforms in EEX sectors, helping provide the analytical underpinnings for Brazil's previous waves of legal and institutional reforms, which has placed the country at the forefront of development policy innovation in some areas (auction design, hydrothermal operations, etc.). However, even in these areas, there is a need for a new generation of reforms to eliminate barriers to new technologies and to ensure long term adequacy in the power sector. Moreover, Brazil still lags considerably in other areas, such as climate resilience in the power sector or regulation to drive sustainable mining practices, and this creates an important constraint to the growth acceleration for which Brazil is poised, especially if this is to occur in a sustainable way.

16. **Governance. The regulatory policy agenda in Brazil has focused on strengthening institutional capacity with the regulators.** In 2007, the GoB established a Program for the Strengthening of Institutional Capacity for Regulatory Management (PRO-REG) coordinated by the Civil House of the Presidency. Since then, PRO-REG has sought to promote the use of good practices in regulatory governance[13] by training officials and strengthening the coordination between regulatory institutions. As a result of PRO-REG, and according to the OCDE iREG benchmarking exercise[14] conducted in 2016, Brazil has established an advanced regulatory system ranking well in methodology, systematic adoption, transparency and oversight (See Figure 1 a and 1b), but the country still lags behind many OCDE countries in some respects.

Figure 1a: iREG Bechmarking results 2016

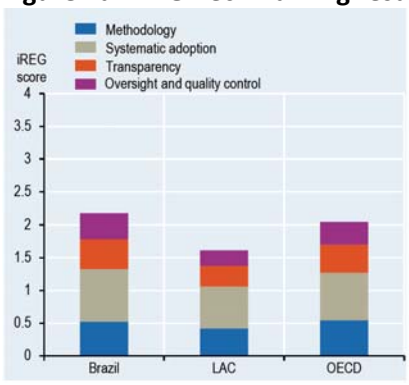
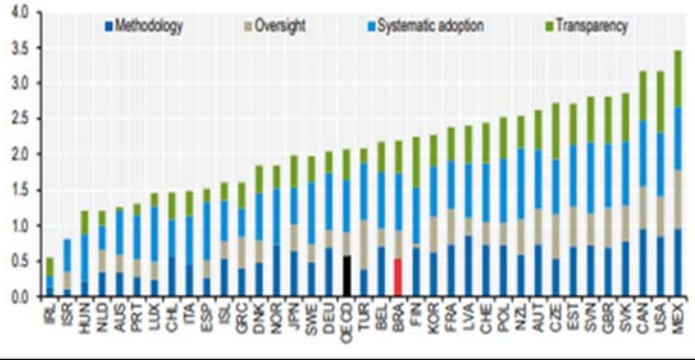


Figura 1b: Stakeholder engagement in developing subordinate regulation, score from 0 to 4 (best), 2015



Source: OECD

17. **There is need to broaden the scope of PRO-REG and the regulatory policy agenda in general from its focus on regulatory agencies to ensure an integrated government approach to regulatory quality.** The use of evidence-

[13] Brown et al (2006) defined regulatory governance as the institutional and legal design of the regulatory system resulting in the framework within which decisions are made. Regulatory governance is defined by the laws, processes, and procedures that determine: which enterprises, actions, and parameters are regulated; the government entities that make the regulatory decisions; and the resources and information that are available to support these decisions.

[14] INDICATORS OF REGULATORY POLICY AND GOVERNANCE (iREG): LATIN AMERICA 2016, OCDE. iREG evaluates the following pillars: (i)Systematic adoption records formal requirements and how often and at what stage in the rulemaking process these requirements are conducted in practice; (ii) Methodology gathers information on the methods used to engage with stakeholders, e.g. forms of consultation and documents to support them; (iii) Oversight and quality control records the role of oversight bodies and publically available evaluations of the consultation system. (iv)Transparency records information from the questions that relate to the principles of open government, e.g. whether consultations are open to the general public and if comments and responses by authorities are published.

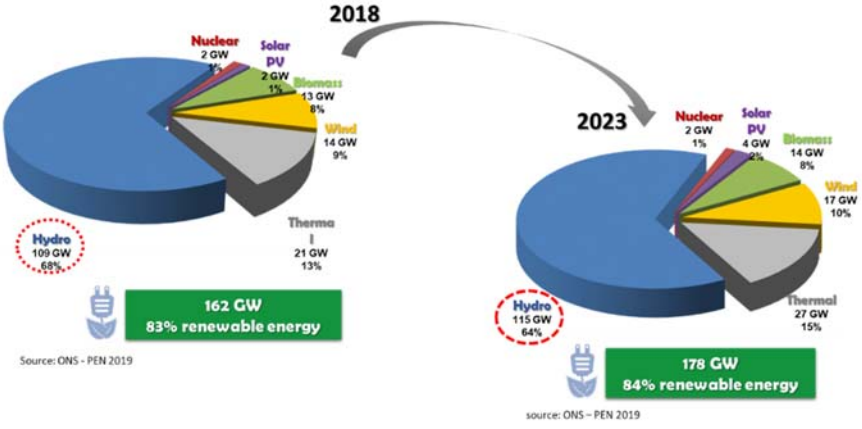
based *ex ante* Regulatory Impact Assessments (RIAs) has been adopted by several regulatory agencies, but is not a consistent practice across the whole administration yet. It would thus be important to harmonize the RIA methodology and expand its use with a focus on regulations with major impacts. Establishing independent quality control would support the effective implementation of RIA. Whilst some regulatory agencies have started investing in administrative simplification processes, a more systematic use of ex post evaluation could help allocate resources where they have the biggest impact and identify potential areas for reform in a more efficient manner.

18. **According to OECD policy outlook[15], Brazil would also benefit from strengthening the autonomy of regulators,** both from governmental political interference and from the interests of regulated firms. This includes further limiting the scope for political appointments since empirical research suggests that political appointments are associated with lower agency capacity. In addition, OECD recommends several measures in order to support Brazil's integration into global markets, including: (i) establishing a system to check international norms and standards in the process of definition or revision of existing regulations; (ii) considering screening laws and regulations to identify unnecessary regulatory barriers to competition; and (iii) participating actively in bilateral, regional and global fora for regulatory co-operation to work towards common policy approaches to challenges shared with foreign peers. In response to these recommendations, the GoB is currently carrying out an overall evaluation of all the regulatory work.

Electricity Sector: Institutional framework and reforms

19. **Brazil is one of the largest and most developed power markets in Latin America, with a total installed capacity of 168 GW in mid-2019, a relatively clean electricity matrix and significant commitments for further emissions reductions.** The hydropower system is one of the largest in the world, with an installed capacity of over 106 GW that provides between 60 percent and 80 percent of the country's electricity, while using only one third of its estimated potential. As a result, the carbon intensity of the Brazilian energy mix is half of the world average and one-sixth of the OECD average. Under its Nationally Determined Contributions (NDCs) pledged at COP-21, Brazil has committed to a reduction in national GHG emissions by 37 percent below 2005 levels in 2025, and 43 percent by 2030 and, in terms of energy efficiency, a 10 percent efficiency gain target was set for the energy sector, meaning approximately 105TWh should be saved by 2030. The electricity mix for 2023, based on contracts, will have a higher share of solar energy, but also a significant increase in thermal generation (from 13 percent to 15 percent). See Figure 2.

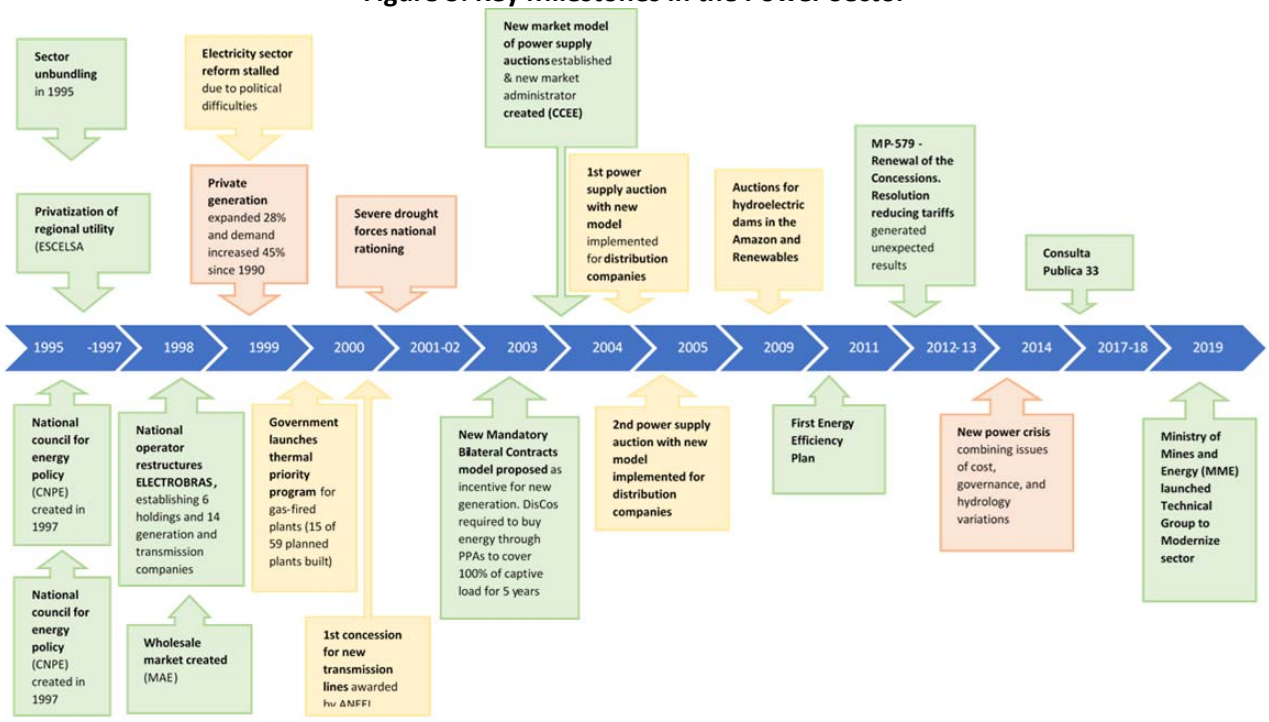
Figure 2: Electricity matrix in 2018 and expected matrix in 2023 (based on contracts)



[15] https://www.oecd.org/policy-briefs/Brazil-Regulatory-Reform-EN.pdf

20. **Brazil has implemented successful reforms to increase the efficiency of the power sector and to attract private capital, paving the way for competition and private sector participation.** A description of the different waves of reforms and their motivations is included in Annex 2. Figure 3 summarizes the key milestones. The first wave of reforms in the 90s was focused on the liberalization of the sector. The key changes introduced included: (i) the establishment of independent regulators for the electricity (ANEEL – National Electricity Regulatory Agency (Brazil)) and oil, gas and biofuels' (ANP – National Agency of Petroleum, Natural Gas and Biofuels (Brazil)) sectors; (ii) the unbundling of the formerly vertically integrated of power industry; (iii) the introduction of wholesale and retail competition; (iv) the establishment of new commercial agreements and a wholesale electricity market; (v) new tariff regimes; and (vi) the consolidation of an independent National Electrical System Operator (ONS). The second wave of reforms launched in 2004 focused on ensuring long term supply-demand adequacy and a suitable co-existence of private and state-owned companies (the so-called "new model"). A public energy planning entity (Empresa de Pesquisa Energética, EPE), was created and assigned the responsibility for energy planning nationwide. The "new model" focused on: (i) Reducing the role of the short-term "spot" market as provider of signals for system expansion; (ii) Emphasis on the forward contract market to induce capacity additions; (iii) Strengthening of regulatory agencies; (iv) Prohibition on cross-ownership and self-dealing[16]; (v) Requirement of participation in mandatory energy auctions for distribution companies to cover 100 percent of load. These reforms managed to attract significant investments and partially address adequacy issues, but the energy sector still needs to overcome various challenges to better contribute to improved living standards and economic growth.

Figure 3: Key Milestones in the Power Sector

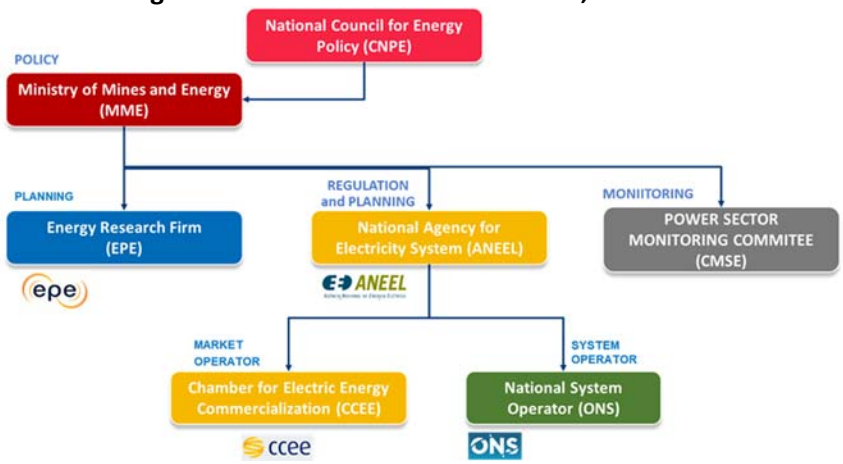


[16] Cross-ownership refers to the same company participating in different segments of the market, and self-dealing when a company favors affiliate companies. Self-dealing may be viewed as abusive if it is both inefficient and deliberate. One form of abusive self-dealing is when transfer pricing occurs, if a utility affiliate is able to charge above-market prices for its goods and services knowing that these increased prices will be passed through to ratepayers.

Source: Adapted from Vagliasindi and Besant-Jones (2013)

21. **The current power sector based on the "new model" is unbundled and competition features across the value chain with the generation subsector being driven by a highly intricate multifaceted auctioning system** (coordinating activities of 176 generation companies, 31 trading companies and 49 distribution companies). Key stakeholders include the regulator *Agência Nacional de Energia Elétrica* (ANEEL), the electrical system operator *Operador Nacional do Sistema Elétrico* (ONS), *Empresa de Pesquisa Energética* (EPE) – responsible for developing energy planning nationwide and a market operator *Câmara de Comercialização de Energia Elétrica* (CCEE). An institutional assessment of the electricity sector is included in Annex 3.

Figure 4: INSTITUTIONAL STRUCTURE, ELECTRICITY



Source: EPE and MME

22. **However, the limitations of the "new model" have become evident after recent hydrological crises and have been exacerbated by the economic crisis.** Climate volatility increasingly threatens power generation predictability and the quality of supply in times of crisis, due to the substantial contribution of hydropower to the energy mix. Since 2012 severe droughts have periodically affected the areas of the country that represent 86 percent of the hydro stored capacity. This has led in the short run to a considerable increase of the use of costly thermal energy, and hence a spike in the cost of electricity. A provisional measure introduced in 2012 to try to control the tariff spike led to a series of negative unintended consequences and would need to be reconsidered. There is a need for a comprehensive strategy to drive the adequate investments to move from a hydrothermal system to a more diverse and climate resilient electricity matrix. Climate change parameters need to be integrated in the planning methodologies used by EPE.

23. **The dispatching algorithms used by ONS and the market rules need to be optimized to address the role of hydropower, ensure supply-demand adequacy and provide adequate remuneration of ancillary services**. Brazil's dispatch is centrally planned by ONS, which is responsible for operation of the National Integrated System (*Sistema Interligado Nacional,* SIN). The current dispatch model prioritizes hydropower and is founded on a weekly granularity which deviates significantly from e.g. hourly models better suited to renewable generation. The pricing model underpinning the dispatch currently sends mixed signals to generators, and has required the introduction of additional charges, passed through to the electricity consumers, which have led to substantial tariff increases. Both pricing and dispatching approaches thus require a substantial revision. With an energy mix anticipated to consist of 32 percent

solar and 12 percent wind by 2040[17], it is even more necessary to revise market rules, dispatch, pricing, as well as specific contracting models to increase flexibility options and ensure its remuneration in the power system minimizing the impact on the tariff.

24. **To address some of these sector challenges a new reform plan for the power sector was launched by the GoB in 2017**. Following the Consulta Pública CP-33 (public consultation), the MME presented a draft bill (PL) that aimed to restructure and modernize the model of the Brazilian power sector[18]. Furthermore, between April and October 2019 a multi-organizational group (GT)[19], headed by the MME, was formed to propose recommendations for the modernization of the Brazilian power sector. The GT recommended the following pillars to the modernization process: (i) Proper allocation of payment for electrical system safety; (ii) Opening of the electricity consumer market in an orderly manner; (iii) Efficient allocation of costs and risks of the electrical system; (iv) Improving of price formation in the Short-Term Market; (v) Modifying system expansion contracting to ensure necessary reliability and security requirements; (vi) Preparing the distribution segment for the market opening; and (vii) Adapting the regulatory framework for neutrality in the insertion of new technologies. As a result, more sophisticated regulation, planning, risk assessments, technologies, and institutional capacities will be needed.

25. **Increasing the share of Variable Renewable Energy (VRE) generation, in the form of solar and wind brings complexity to the management of the national grid system**. The projected growth represents doubling the solar production from 1.78 GW in 2018 to 3.87 GW in 2023, and wind increasing by 3.2 GW from 2018 levels to 17.5 GW in 2023. However, the power sector planning in Brazil is based on a hydro-thermal generation grid. In order to achieve the growth in VRE: (i) planning and auction models and methodologies need to be modified to include a higher share of VRE[20]; (ii) regulatory adjustments are required so that the cost for accurately managing VRE is reflected in both determining the order of energy dispatch and in the final tariff price; (iii) accuracy of PV forecasting has to be improved to include 24h/intra-day weather forecasting models (which also affect other RE sources, such as wind and hydro), so as to allow for greater efficiency in the energy dispatch, and improved energy exchanges between the energy regions[21]; and (iv) regulatory adjustments and guidelines (including legal, tariff setting, financial incentives, etc.) are needed to expand the use of Distributed Generation (DG).

26. **Regarding electricity prices and tariffs, there is a need to make pricing methodologies more transparent, and rationalize subsidies, taxes and levies.** This is particularly important given the government plans to further liberalize the distribution market, and allow consumers consuming over 500 kW/month[22] to purchase electricity from the free market by 2022. Generation is driven by a complex auctioning process, and prices are regulated for retail customers, with cross-subsidies across: (i) consumer groups (the Regulated Contracting Environment, ACR); and (ii) free spot prices set in power market auctions for bulk consumers (the Free Contracting Environment, ACL). The pricing structure is characterized by significant distortions due to cross-subsidies and specific sector levies, leading to high

[17] Source: ONS
[18] The MME's objectives to restructure and modernize the Brazilian power sector are: (i) encourage efficiency in business decisions, guaranteeing low tariffs, security of supply and socio-environmental sustainability; (ii) appropriately allocate the risks among agents that operate in the market, in order to allow their individual management; (iii) remove barriers to market entry.
[19] The group included MME, ONS, EPE, CCEE and ANEEL.
[20] Current planning models estimate 5-6 years for new generation plants to become operational, and 5 years for new transmission lines. VRE, on the other hand, can take as little as 1-2 years to be commissioned, however transmission lines construction still requires 5 years.
[21] The characteristics of the Brazilian transmission system is that it is divided into mainly 4 regions (North, North-East, South-East/Mid-West and South), and there are large energy exchanges between these regions vis-à-vis the production capacity and demand.
[22] The average consumer in Brazil uses approximately 200 kW/month. 500 kW level consumers thus represent small businesses and large homes. ANEEL and CCEE are scheduled to conclude a study, by December 2022, looking into opening the free market to consumers with <500 kW consumption.

and non-transparent end-consumer prices.

27. **Even though the country virtually achieved universal access to electricity, there is still a need to reduce energy poverty levels and close the access gap in remote areas**. The system is still plagued by high tariffs, high non-technical losses and low quality of supply (particularly in the Amazon Region). Additionally, remote areas in the Amazon region are mostly served by fossil fuels (diesel). Sustainable solutions may be pursued through innovation and Distributed Energy Resources (DER). To achieve this, the regulatory framework should be adapted to enable grid-edge technology (mini/microgrids) investments.

28. **In order to address the changes which have been affecting the power sector, the current government established a working group in April 2019,** comprised of MME, ANEEL, CCEE, EPE and ONS, to develop an action plan for the modernization of the Electricity Sector. Following a sequence of conferences, seminars and meetings with the various stakeholders from the public and private sector, the working group presented their findings and recommendations in October 2019, and through the Portaria n^{o} 403, the MME instituted a committee to implement the recommendations for the modernization of the sector. The Action Plan covers 88 actions in 15 areas: (i) Price formation; (ii) Supply criteria; (iii) Transition measures; (iv) Generation and energy production (including a contractual separation of capacity from energy); (v) Auction processes; (vi) "Red tape" reduction and process improvement; (vii) Governance; (viii) New technologies; (ix) further liberalization of the market; (x) Rationalization of charges and subsidies; (xi) Distribution sector sustainability; (xii) Energy Reallocation Mechanism (MRE)[23]; (xiii) Contracting processes; (xiv) Transmission sustainability; and (xv) Integrating gas into electricity. The proposed project aims at informing the definition and implementation of those actions, with particular focus on the areas where the World Bank can add value by sharing international experiences and recommendations based on lessons learned from other countries. In particular, the project will focus on topics linked to climate resilience, dispatching rules, market design (ancillary services and separation of energy and capacity), VRE integration, gas integration and price formation, that are key to reduce the overall electricity costs, and ensure long term sustainability preventing a new energy crisis.

Hydrocarbons Sector: Institutional framework and reforms

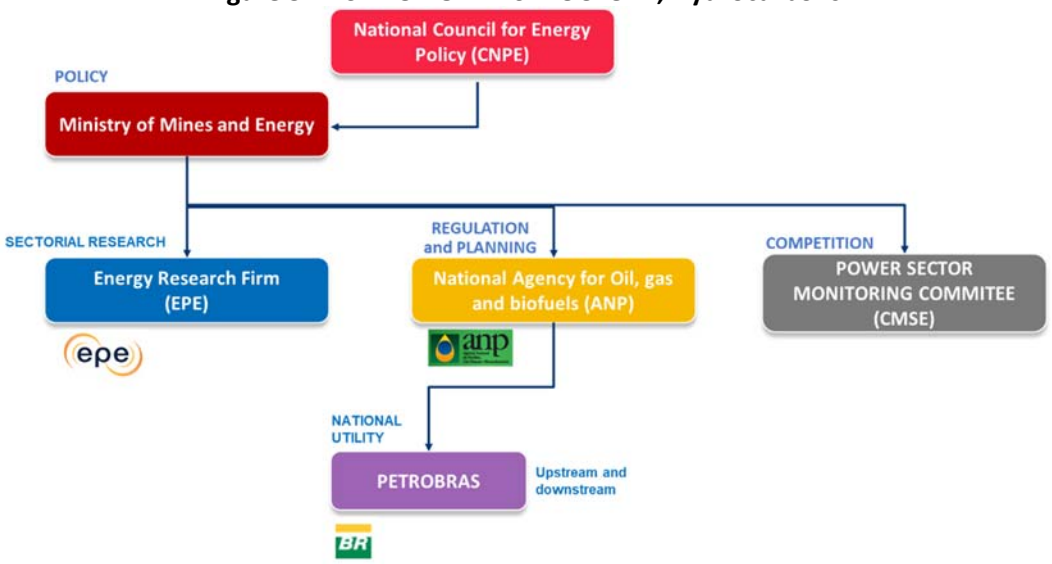
29. **Brazil's hydrocarbons sector growth has lagged due to governance and regulatory issues.** Brazil has the world's 15th largest proven oil reserves and was the world's 9th largest oil producer in 2018, with about 3 percent of all production, primarily coming from offshore. Brazil has seen its exports of crude grow from 734,000 barrels per day (bdp) in 2015 to 1.3 million bpd in Q1 of 2019. While Brazil revoked Petrobras' monopoly on key segments of the supply chain and established an independent regulatory agency, ANP, in the mid-90s, the national oil company (NOC) still plays a dominant role in the sector. Brazil's government intends to drive upstream investment in order to monetize its pre-salt oil and natural gas resources, attract midstream investment, and achieve more affordable domestic energy, which it believes will in turn drive downstream industry development. It has done so, among others, by settling a longstanding dispute with Petrobras on the transfer of rights (TOR) blocks[24] and by organizing bid rounds in October and November 2019, opening up significant new areas onshore and offshore for exploration. The rounds were however not as successful as anticipated due in part to high prices and the persistent dominant role of Petrobras;

[23] The Energy Reallocation Mechanism (MRE) is a financial mechanism aimed at sharing the hydrological risks that affect generation agents, seeking to ensure the optimization of hydroelectric resources of the National Interconnected System (SIN).

[24] The TOR area is a roughly 2,800-square-km zone off the coast of southeastern Brazil, demarcated in a 2010 deal between the government and Petrobras. In order to maintain control of the company, the government granted Petrobras the rights to extract 5 billion barrels of oil in this area in return for new shares. ANP now believes there are 11-20 billion barrels of oil in the TOR and wanted to offer the new oil for auction, but Petrobras resisted. In April 2019, the government and Petrobras reached an agreement, whereby the government would pay US$9 billion to Petrobras to offer the oil.

highlighting the need for additional legal, regulatory and governance reforms.

Figure 5: INSTITUTIONAL STRUCTURE, Hydrocarbons

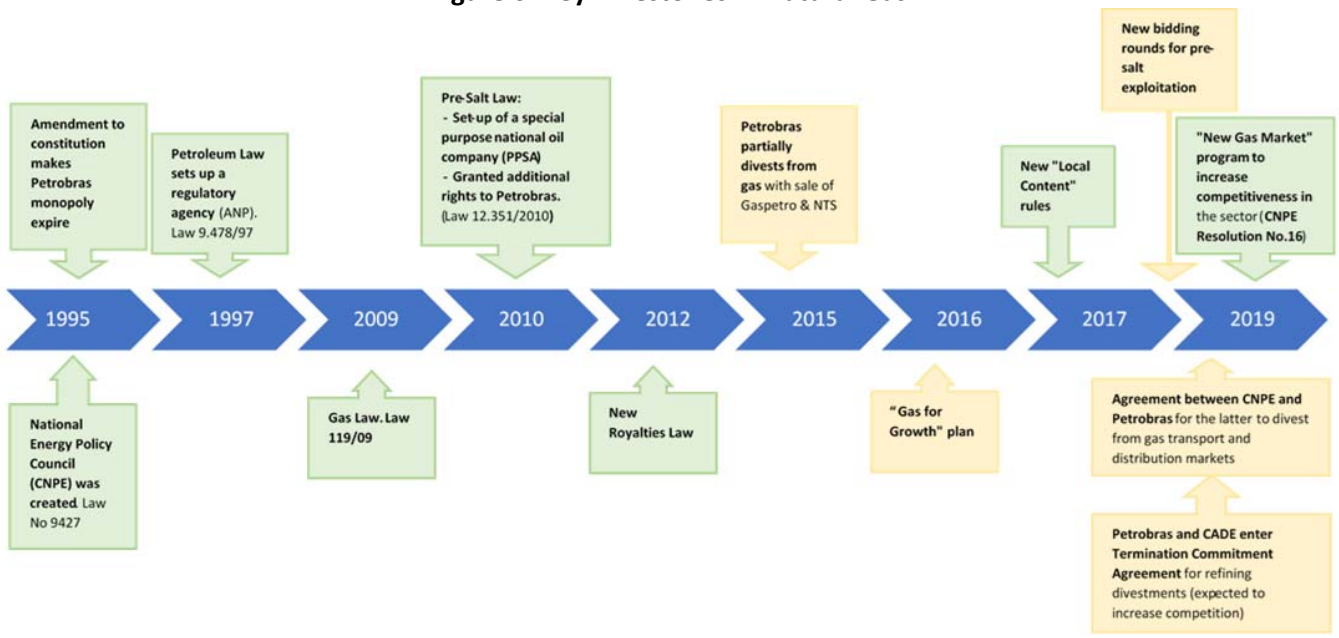


Source: EPE and MME

30. **Brazil's natural gas market has been relatively stagnant in recent decades**. At present, despite increased levels of natural gas production[25], it represents about 13 percent of Brazil's primary energy supply, fueling industry and power generation. Gas demand for power generation varies considerably from one year to the next in Brazil because gas is used to balance the annual availability of large-scale hydropower.[26] This means that natural gas producers – mostly offshore - do not have a relatively constant source of demand to justify building additional and costly offshore-to-onshore pipeline capacity to bring gas onshore. Significant storage capacity could potentially provide such a constant source of demand as well as contribute to security of supply, to smooth out intertemporal/seasonal variations in demand, supply, or prices; but justifying these investments requires access to markets. Industry may provide the relatively constant year-round demand, but industrial gas prices are currently unattractive. Natural gas demand is at present met with a combination of domestic production, liquified natural gas (LNG) imports, and piped gas from Bolivia. [27] Gas demand is forecasted to increase in the coming decades, where according to EPE, the natural gas market supply in Brazil will grow from 57 million cubic meters a day in 2016 to 95 million m^3in 2026.

[25] As per the World Energy Outlook (WEO) (2019), natural gas production increased from 7 billion cubic meters (bcm) in 2000 to 26 bcm in 2018. Associated gas accounts for around 10% of total output of the pre-salt fields in energy terms.
[26] Gas demand for power over the last decade has varied from as little as 3 bcm to nearly 20 bcm, according to WEO (2019).
[27] National production accounted for 66 percent, Bolivian imports for 26 percent and LNG imports for 8 percent of total natural gas consumption in 2018.

Figure 6: Key Milestones in Natural Gas



Source: World Bank, 2020

31. **Almost ten years since regulatory reforms failed to kickstart greater natural gas market competition, Brazil launched the New Gas Market ("Novo Mercado de Gás") program**, which builds upon the Gas for Growth Initiative ("Iniciativa Gás para Crescer"), and aims to establish an open, dynamic and competitive natural gas market, cut the domestic price of gas by 40 percent and attract greater investment into the sector. The main pillars of the New Gas Market program are: (i) competition promotion; (ii) harmonization of the state and federal regulations; (iii) integration of the natural gas sector with the power and industrial sectors; and (iv) removal of tax barriers. After the failed attempts in 2016 and 2018 to change the natural gas law, the GoB has opted to promote change through: (i) approval of Resolution No.16 by the National Energy Policy Council (CNPE) in June 2019 that provides guidelines for the sector to promote a competitive natural gas market; (ii) the Agreement on the Commitment to Terminate ("Termo de Compromisso de Cessação"), which was reached between Petrobras and the Administrative Council of Economic Defense (CADE) in July 2019, whereby Petrobras committed to sell-off several assets and get out of non-core sectors; (iii) new regulations by ANP; (iv) state regulations, incentivized through programs such as Fiscal Balance Program (PEF); (v) submission of legal amendments to the National Congress; and (vi) tax adjustments such as the National Integrated Economic Information System Tax (SINIEF). The reform momentum is currently strong, but its ultimate success will hinge upon diligent oversight at both the federal and, critically, at the state level, as well as identifying the right incentives/ clear harmonized rules to attract new entrants while ensuring security of supply. Considering the complexity of the new market model, oversight will be challenging, requiring strengthening of capacity at ANP and state regulators, which thus far had not played a major role in the sector and as a result have limited experience and resources dedicated to natural gas.

32. **Natural gas presents a key opportunity to support Brazil's energy transition**. The anticipated increase in VRE in the generation mix will call for further flexibility in the power system, which natural gas-fired power plants can contribute towards. Similarly, the industry sector could benefit from switching from more polluting fossil fuels to natural gas for their processes. Finally, natural gas could also support a clean transition in the transport sector, with

opportunities in the trucking and shipping sector.

Mineral Sector: Institutional framework and reforms

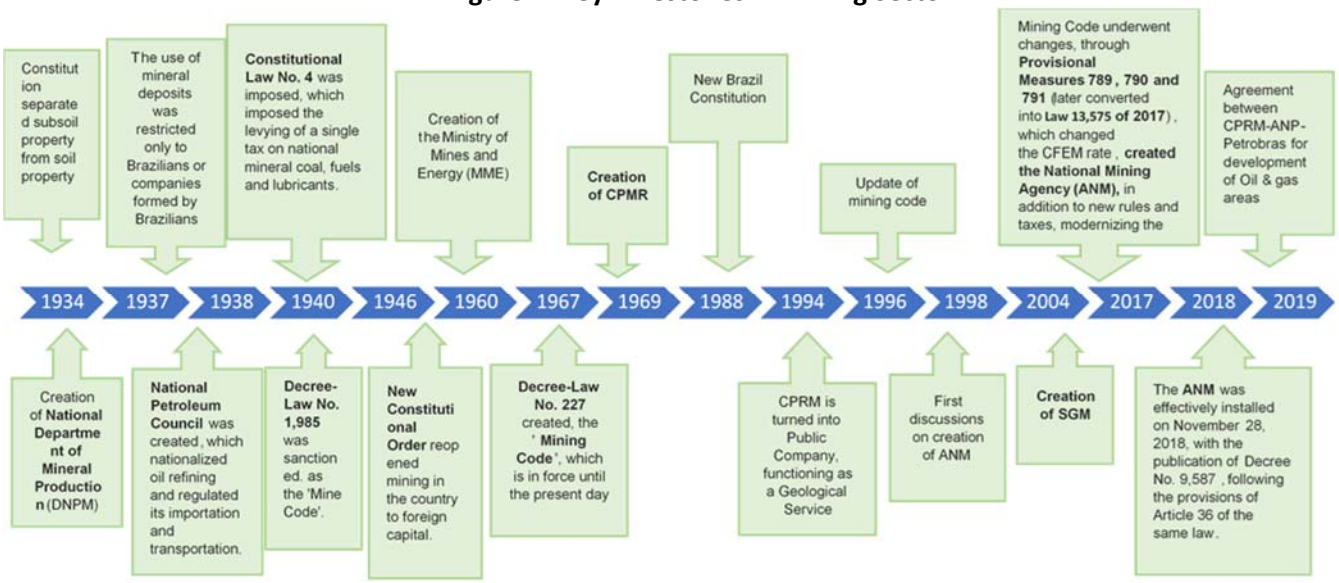
33. **Brazil's growth over the last four years has been driven to a significant extent by the expansion of the mineral sector and related industries**. Production, value added and exports in mining have risen rapidly since 2003. In 2018, the mining and mineral processing sector was responsible for 4 percent of GDP and 25 percent of total the country's commercial balance. Iron ore alone represented 8.89 percent of total exports in 2018. Currently, Brazil is one of the top three producers in the world of iron ore, gold, manganese, and bauxite. It is also an important producer of nickel, copper, zinc, and gold.

34. **Brazil is viewed as a country with an important mining potential** based on the country's vast territorial area and promising geological potential comparable to Canada and Australia. In addition to iron ore, gold, alumina, niobium, nickel, titanium, coating quality kaolin and vanadium, Brazil has a wide choice of targets for strategic minerals such as lithium, rare earth, thorium and uranium. Contrary to common belief, Brazil's most important mines (except iron ore and bauxite) are located outside the Amazon Basin, and the large majority of the country's surface area is still regarded as poorly explored for minerals when compared to other leading countries such as Canada, Australia, USA and South Africa.

35. **In the Amazon basin the biggest challenge lies in the unregulated and informal, and often illegal, Artisanal and Small-Scale Mining (ASM) operations**. ASM activities in the Amazon region are widespread and mostly focused on gold production. The artisanal miners, known as "*garimpeiros*" often use mercury to process the gold constituting a serious health and environmental hazard. Formalizations efforts in the past have had mixed results but mostly have been unable to curb the expansion of these mining practices. The Amazon's vast territory and the difficulty in accessing some of these areas have left an important regulatory gap that the current resources, human and financial, have been unable to address. The META 1 project financed a baseline study to map ASM operations throughout the country. As part of this exercise, a database was created to monitor the areas and number of ASM operations.

36. **While the country is expected to remain a world leader in mineral commodities production, the sector is facing several challenges that are hindering the development of its full potential**. These challenges relate to weak institutional capacity, aggravated by declining budget to fulfill their roles, weak regulatory capacity that has resulted in serious environmental impacts, but also, not less important, a lack of true vision and strategy for the sector that is clearly reflected in a context of absence of adequate and strategic public policies. The Fraser Institute ranks Brazil 56th as per Investment Attractiveness Index after Mexico, Suriname and Namibia. Brazil is falling behind on attractiveness for investments in the mining sector despite its known geological potential. Brazil has started to address the regulatory, planning and market limitations of the mining sector. As a first step to tackling some of these issues, Congress approved in 2017 a series of measures updating the mining legislation. This included, among other actions, the creation of the National Mining Agency, to modernize the country's regulatory capacity. In addition, the Brazilian Government approved a new strategic plan for the mining sector – the National Mining Plan 2030 (PNM). The PNM has three priority areas: (a) improved governance; (b) value-added processes; and (c) sustainability. The implementation of PNM so far has been limited due to lack of funds and political commitment. The proposed Project will finance studies and an update of the PNM aiming at designing a more strategic minerals sector strategy with emphasis on improved sustainable mining practices. Under the new institutional framework, the PNM 2050 is expected to influence a more coordinated effort on improving the sectors development and therefore its impact on Brazil's economic growth. The modernization of the sector and of the overall reform effort will call for substantial technical assistance and capacity building in a range of key mining sector institutions. Figure 7 shows the key milestones in the mining sector.

Figure 7: Key Milestones in Mining Sector



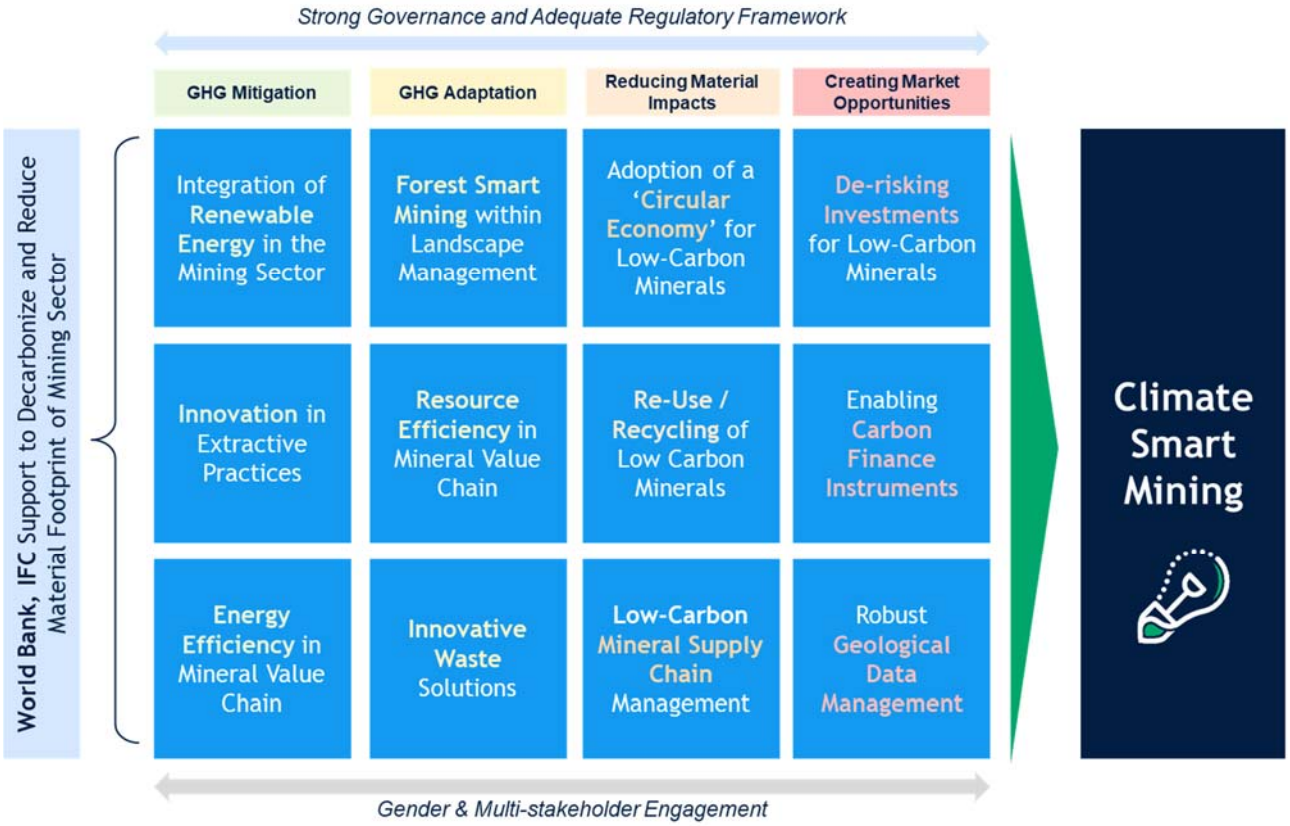
Source: World Bank, 2020

37. **Brazil's mining sector is at a cross road as its growth will depend on building a stronger focus on more sustainable mining practices.** The lack of regulatory enforcement and oversight has led to a series of catastrophic events in the past two years that have highlighted the urgent need for actions that will modernize the sector and provide the mechanisms for improved management. A new vision and strategy for the sector must be underpinned by sustainability. As Brazil focuses on critical minerals supply chains which can be developed in its integrity in country, adding value to the raw materials, it must consider how these will be developed. Minimizing the material and carbon footprints of these mineral supply chains will be critical. The Climate Smart Mining[28] framework, developed by the World Bank, provides the starting point to design a roadmap for more improved mineral supply chains with the adoption of sustainable mining practices that reduce the sector's carbon and material footprint.

35. Climate Smart Mining (CSM) supports the sustainable extraction and processing of minerals and metals to secure supply for clean energy technologies that minimize the material and climate footprint throughout the value chain of those materials. It provides the support to enable resource-rich developing countries to benefit from the increasing demand for strategic minerals for a green transition, while effectively decarbonizing and reducing the material footprint of their mining sector. The CSM framework is in concert with the Sustainable Development Goals (SDG). The framework focuses on key themes divided into four pillars: mitigation; adaptation; reducing material impacts and creating market opportunities. The themes are shown in Fig. 8 below.

[28] Climate Smart Mining, The World Bank 2019. *https://www.worldbank.org/en/topic/extractiveindustries/brief/climate-smart-mining-minerals-for-climate-action?cid=EXT_WBEmailShare_EXT*

Figure 8: Smart Mining



Source: World Bank, 2019

38. **Mining Institutional Framework. The July 2017 creation of the National Mining Agency (Agência Nacional de Mineração, ANM) was a push to promote an overall modernization of the sector's institutional framework through a more agile and independent institution.** The key objectives to be enforced by the ANM are a series of measures aiming at making the regulation of the sector more efficient such as (i) Impose on current Exploration reports, adherence to international rules of Resource and Reserves Reporting; (ii) Modernize the on-line staking process of first come first served basis; (iii) Develop an exploration database from companies that have lost or relinquished titles, available as open file data within a logical time frame; (iv) Support and coordinate with the relevant environmental institutions to expedite Environmental Licensing for Exploration Permits while maintaining high standards); (v) Create a more modern and efficient management system for the licensing and inspection of tailings (vi) Simplify the licensing process for construction, agriculture minerals/material.

39. **In contrast to the ANM, the Brazilian Geological Survey (CPRM) is a state-owned company, under the Ministry of Mines and Energy, which has been performing well.** Its mission is to produce and divulge geoscientific knowledge contributing to building Brazil's geological infrastructure. CPRM is a highly technical institution, which in the past 8 years has been able to build Brazil's geological knowledge in a very significant way. In addition, its laboratory infrastructure provides valuable services to mining companies, universities and overall environmental data. With support from the META 1 project, CPRM has also been able to build its technical capacity to provide mapping for disaster risk management. The company is working in several cities and municipalities in Brazil to support urban planning and risk mitigation actions in geologically unstable areas.

Mining Tailings

40. **The Samarco Dam failure, on November 5, 2015, caused the discharge of 62 million m^3 of iron mine tailings over 230 counties in the states of Minas Gerais and Espirito Santo, Brazil**. The tailings inundated the valley of Rio Doce and its tributaries, all the way to the Atlantic Ocean some 300 km away. Four years later the Brumadinho tailings dam disaster, on January 25, 2019, once again highlighted the fragility and inadequacy of the government's regulatory capacity and the weaknesses in Vale's operational standards. The accident resulted in the death of over 250 people. The urgency of the situation requires immediate action to ensure that such accidents do not occur again. Several measures need to be put in place and will require coordination between the MME, ANM and CPRM. Although META 2 is not directly supporting any activities aimed at addressing the framework for the licensing and monitoring of mining tailings dams, the project is supporting improved regulatory capacity of the ANM and an improved information technology (IT) platform for monitoring of mining sector operations that will be critical for a better management of mining tailings and the sector in general.

41. **A global coordinated effort is necessary to meet the scale of the tailings challenge**. International collaborative governance, enhanced regulations and innovation are essential to ensure this objective for sustainable development. With that objective, the International Council on Mining and Metals (ICMM) the United Nations Environment Program and the Principles for Responsible Investment (PRI), are developing new international standards that will be mandatory for all ICMM members and guidance for counties. To support that, the World Bank has commissioned an analytical piece to compare the tailings storage facilities regulation in Brazil with other large mining countries, Australia, Canada and Chile, considering that the GoB has proposed, since the catastrophic dam failures, deep changes in the licensing, construction, monitoring and closing steps of tailings storage facilities; to present an inventory of closed, abandoned or orphaned tailings storage facilities that may constitute a risk to human health and/or the environment through accidents, spills or leaks, and that need a focus to avoid possible future tragedies; to evaluate the economic impact of the new regulation for tailings storage facilities in Brazil in small and medium-size mining projects; and to compare the tailings dams' best practice guidance, to be published by ICMM in early 2020, with best practices guidelines adopted in Brazil, mainly the IBRAM guide published in September 2019. The study should be finalized by June 2020.

Previous World Bank Group engagement in the Energy and Mining Sectors

42. **The World Bank has provided continued support to the energy sector in Brazil for the last 25 years.** The Renewable Energy-SEB Project (1996–1998) was a large technical assistance program which set the basis for the restructuring, liberalization, and privatization of the power and gas sectors. The WB also provided assistance to make some adjustments to the sector model following the 2001-2002 power crisis. In particular, the Energy Sector Technical Assistance Project (ESTAL) (P076977) helped put the sector back on its track after the crisis.

43. **As a continuation, the Bank then engaged in a large technical assistance program.** This included: (i) a series of positions papers produced under the ESMAP "*Revisiting the Power and Gas Sector Reforms in Brazil*" (P161056) and disseminated in 2017[29], with a focus on governance in times of crisis and variable renewable integration and that helped inform the "*Gás para Crescer*" program; (ii) sectoral studies financed under the PMR, which reviewed the

[29] Papers include: (i) Transparency in pricing for the electricity market - subsidies and impacts on market efficiency; (ii) Development of a gas market in Brazil; and (iii) Long-term financing and risk allocation in infrastructure in Brazil and a Policy note that summarized the main recommendations, shred with the government in 2019.

structure and the recent evolution of the sectors of electricity and fuels[30], including the vulnerability of the power sector to the lower hydrology expected from climate change[31], and led to current technical discussions on carbon instruments for Brazil and (iii) META (Mineral and Energy Technical Assistance Loan, P126537), which was instrumental in, inter alia, helping the country improve its monitoring system, and equipping laboratories to develop expertise in ultra-high voltage transmission systems. As part of this assistance effort, several knowledge products were developed and best practices disseminated, on themes of high relevance to the sector such as managing power crisis, auction of electricity contracts, detailed least cost mitigation plans, energy efficiency in cities, and natural gas taxation, amongst others. The work provided by the Bank has been regarded by the Government as essential to help steer the evolution of the energy and mining sectors in Brazil.

C. Relevance to Higher Level Objectives

44. **The Project will support key analytics and capacity building that would inform the ongoing reform effort in the power, gas and mining sectors**, aiming at: (i) enhancing competitiveness and efficiency of the energy and mining sectors; (ii) leveraging private finance for sustainable energy and mining infrastructure; and (iii) strengthening climate change resilience. This is further described in the Results Chain and Theory of Change section below.

45. **The project is fully aligned with the World Bank Group's FY18-FY23 Country Partnership Framework (CPF) for Brazil (Report #113529-BR)**. The project supports Focus Area 2, Private Sector Investment and Productivity Growth, by addressing regulatory barriers in the energy and mining sectors, to enable private sector investment, as well as addressing other distortions (tariffs, cross-subsidies and taxes), which can affect incentives and growth in general. The project also supports Focus Area 3, inclusive and sustainable development, by addressing regulatory, and technical, issues which can affect sustainable urban services, as well as the development of rural areas, particularly given the ongoing disruptive technological changes (e.g. e-mobility, distributed energy resources, and microgrids). In addition, the proposed project will strengthen domestic capacity for planning, design and implementation of concessions with a dedicated capacity-building component.

46. **The preparation of the proposed project is informed by the Performance and Learning Review (PLR)** that assesses progress of the World Bank Group (WBG) 2018-23 Country Partnership Framework (CPF) with Brazil and places a strong focus on the sustainability of Brazil's growth model. Brazil's traditional growth model, based on a closed economy and large state footprint has led to a fragile fiscal situation, lagging learning outcomes, insufficient jobs, large infrastructure gap, and very low productivity do not bode well for a country that wants to meet the aspirations of its youth. The fragility of the country's economic model also puts at risk the social gains achieved over the last fifteen years, including the significant reduction in poverty and inequality. The proposed project aims to inform some of the critical reforms in energy and increase the institutional capacity in mining that are expected to have a positive impact on energy costs, energy security and mining safety and productivity.

47. **The proposed project is set to contribute to Brazil's efforts to mitigate climate change through several measures that are recognized to have climate co-benefits[32]**, including, inter alia: (i) climate-informed long-term planning for the electricity sector, with higher shares of renewables; (ii) the Project's support to the development and

[30] Reports included: (i) Electric Power Sector Diagnostics (2017); (ii) Recommendations for the Electricity Sector (2018); (iii) Fuel Sector Diagnostics (2017); and (iv) Recommendations for the Fuel Sector (2018).
[31] "Low Hydrology Scenario for the Brazilian Power Sector 2016-2030 - Impact of Climate on Greenhouse Gas Emissions" (Jan 2017, 123 p.) (http://mma.gov.br/publicacoes/clima/category/182-cen%C3%A1rio-de-baixa-hidrologia-para-o-setor-el%C3%A9trico-brasileiro)
[32] For more, please refer to: "Typology of Activities with Climate Co-Benefits by WB Sector", World Bank. Available at: *http://www.worldbank.org/content/dam/Worldbank/document/Typology.pdf*

enforcement of procurement processed for renewable energy (auctions); and (iii) policy and regulations that enable higher participation of distributed energy resources (DER) such as electric vehicles, renewable distributed generation, as well as the integration of variable renewable generation (VRE) and the optimization of dispatching. Under the Paris Agreement, Brazil made a Nationally Determined Contribution (NDC) to reduce GHG emission by 37 percent by 2025 and 43 percent by 2030 relative to 2005 levels. Moreover, Brazil's NDC states a goal of achieving 10 percent efficiency gains in energy sector by 2030 (approx. 105 TWh saved by 2030). This project will support the country's efforts to attain such targets.

48. **The project is fully aligned with the WBG climate change mitigation and adaptation commitments. The analytical work and capacity building programs developed under the project will address and consider climate change mitigation and adaptation throughout its activities**, particularly by reducing observed and anticipated climate change vulnerability and contributing to the GoB climate change mitigation efforts. This will be achieved by aiding the GoB in the modernization of the grid which would in turn take into account climate change affecting the hydro generation. The project will also help support the integration of other renewable forms in the current energy mix, as well as support the process of effective planning for mitigation measures to ensure a continuous power supply and therefore reduce negative effects of climate change. Furthermore, the project will introduce climate smart mining approach at the policy/planning level, which includes a number of climate change mitigation activities, with an expectation of tangible emission reductions along the mining supply chain.

49. **The proposed project will provide support towards enhancing women's opportunities in Brazil's energy, and mining sectors.** The World Bank's Gender Strategy (FY16-23) focuses on four objectives: (i) improve human endowments; (ii) remove constraints for more and better jobs; (iii) remove barriers to ownership and control of productive assets; and (iv) enhance women's voice and agency and engaging men and boys. The energy, oil and gas and mining sectors are traditionally male-dominated, with women accounting for a limited share of the industry's workforce, mostly in support/non-technical functions[33]. While the number of women in Brazil receiving engineering and earth sciences degrees has increased in recent years, and more women are now working in the mining, oil and gas and energy sectors, they are still underrepresented in leadership positions. A recent survey conducted of Brazil's key institutions with responsibility for the energy and mining sectors has indicated that only 25 percent of people currently in high management positions (Board of Directors, Executive Board, or Supervisory Board) are female. By supporting the implementation of a set of actions designed to increase the number of women in leadership positions (improving human endowment) – such as mentoring, capacity building sessions specifically focused on equal opportunities and the gains of gender equality and diversity - the proposed project expects to enable women to assume leadership roles, thus helping address the gender gaps identified in the World Bank Gender Strategy. The Project will monitor through a dedicated indicator (see Section VI) the increase in number of gender awareness initiatives geared towards enhancing female participation in management positions in key institutions with responsibility for the energy and mining sectors.

50. **The project will ensure the implementation of a citizen engagement mechanism with a feedback loop.** The project will support the development of platforms for social accountability and dialogue. MME will respond directly

[33] According to the Petersen Institute for International Economics, women account for only 11 percent of senior executive positions in the oil and gas industry in the world. Once they join, women tend to stay longer in their jobs. Research by the International Gas Union (IGU) and others has found the attrition rate for female employees to be significantly lower as compared to their male colleagues, in all regions of the world. In addition to lower attrition rate for female employees, in a study conducted by Ernest Young, 61 percent of participants believe that gender diversity increases financial performance, whereas 77 percent of participants believe it influences nonfinancial performance. This situation is similar in electricity and mining.

to citizen feedback, and the elements of such feedback will be incorporated as relevant in a transparent manner[34]. Citizens play a critical role in advocating and helping to make public institutions more transparent, accountable and effective, as recognized in the World Bank Group's *Strategic Framework for Mainstreaming Citizen Engagement* (2014). The dialogue platforms developed by this project will complement the established Brazilian public consultation processes to inform and give Brazilian citizens an opportunity to provide input and feedback among others on Brazil's power sector management and environmental and social impact management. This includes support to the engagement of project beneficiaries in the preparation, implementation, and monitoring of all project activities, stakeholder engagement, and the implementation of a well-designed communications strategy. To reflect this approach, the Project will monitor citizen engagement throughout project implementation through a beneficiary feedback indicator (see Section VI). Report on the beneficiary feedback indicator is expected by the third year of project implementation.

51. **The project also seeks to help mobilize finance for development and have a transformational impact on the private sector more broadly**. By supporting institutional strengthening and regulatory reforms the project will support the establishment of an investment environment, which will improve the utilization of Brazil's resources, optimize financing sources, increase infrastructure, and rebuild the competitiveness of several key industries. Ultimately, this will lead to significant improvements in the sectors' contribution to GDP growth, increased royalties and taxes from the new investments to the states and the federal government, and lower prices for all consumers.

52. **This operation supports the World Bank Group's twin goals as it will boost shared prosperity through activities that focus on creating the conditions for more modern, climate resilient and efficient energy and minerals sectors, supporting institutional strengthening, economic development and job creation.** The GoB is undertaking reform and modernization in energy and mining sectors, which calls for substantial technical assistance and capacity building in a range of agencies. This project – a second-generation energy and mineral multi-sector TA in Brazil - will promote innovative approaches towards sector development that take into consideration sustainable development needs and international experiences to support institutional strengthening of key institutions. The reforms informed by this operation are expected to benefit indirectly the bottom 40 percent by increasing affordability of electricity services, boosting industrial development and preventing energy crisis and catastrophic events in energy and mining infrastructure. The outputs from this Proposed project will likely contribute/become global knowledge products and the lessons learned during the modernization push supported through this project are expected to be useful to Brazil's regional and international peers.

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

To strengthen institutional capacity for market efficiency taking into consideration climate resilience in the energy and mining sectors in Brazil.

For the purpose of the project, climate resilience is understood as the ability to anticipate, prepare, and respond to

[34] Under GoB Federal policies, there is a procedural instruction system, called Sistema Eletrônico de Informações (SEI), in which all documents of ongoing activity processes are inserted, and made publicly available (can be accessed) by any citizen.

hydrological crisis and/or hazardous events, trends, or disturbances relate to or exacerbated by climate change.

For the purpose of the project Market Efficiency is understood as the existence of market arrangements that are fit for purpose and incorporate all the information available, providing agents throughout the value chain with incentives to operate their systems in an economic manner, with an appropriate balance of risk and reward that is in the interests of the end consumer.

PDO Level Indicators

1. Published Electricity sector expansion plans for increased security of supply (Number).
2. Climate-smart mining plan updated for the strategic development of mining sector (Number)
3. Policy and market regulatory changes, to enhance market efficiency, published for consultation (Number).

B. Project Components

53. **The proposed Project would support sector-wide efficiency, climate resilience and investments through three components**. Given the broad and complex reform agenda led by the GoB, the components focus on high impact activities, where the World Bank can leverage international experiences to contribute in a substantial manner to some key objectives of the reform agenda (climate resilience, increased efficiency and investment adequacy). The Project will seek to address gaps in policies, regulation and legal and institutional frameworks (see Annexes 4, 5 and 6), support regional or global public goods taking advantage of the experience in Brazil, incentivize private sector investments in sectors dominated by state owned enterprises. In addition, the Bank will seek to pilot strategic innovative approaches to address key development priorities, especially in areas also relevant to other developing countries. A detailed description of the proposed projects at this stage is included in Annex 8.

54. **Component 1 – Technical assistance to increase efficiency, long term infrastructure adequacy and climate resilience in the energy and mining sectors** (US$20.07 million). This component will comprise the following sub-components:

a. Subcomponent I: Analytical work to inform reforms in the power sector. This subcomponent will provide the inputs, analysis, best practice examples and models for the respective applicable agencies to update the planning, dispatching and pricing methodologies, as well as the market rules to transition from a hydro-thermal generation base, to one incorporating VRE and DER. The activities are specifically designed to help address climate change impacts on the national electric grid and increasing its resilience to the climate-induced hydrological crisis. These activities will include *inter alia:*

i. **Technical studies to increase the climate change resilience in the sector by informing the revision of the planning and dispatch methodologies** to adapt them for a system with a higher share of VRE (solar and wind). These new methodologies will help to make the system more resilient to energy crisis aggravated by climate change while minimizing sectoral costs.
Updating planning and dispatching rules and the mechanisms to ensure the financial viability of projects and minimize sectoral charges that have a very important impact in the tariff.

ii. **Technical assistance to inform the revision/creation of electricity markets** to increase competitiveness, attract investments and improve price formation while ensuring the necessary reliability and security requirements. This subcomponent will take advantage of international

experience to inform reforms - including energy, capacity and ancillary service markets**.** This key to enable the scale up of VRE maximizing the energy share of clean energy.

iii. **Improvement of Public Policy or Regulation for Distributed Energy Resources**. These models will evaluate/ mitigate the impact of Distributed Energy Resources (DER) and prepare the distribution sector for its adoption at large scale, including distributed generation, distributed storage, energy efficiency, demand response, electric vehicles, Advance Metering Infrastructure (AMI) and others. These activities will also inform the adaptation of the regulatory framework for neutrality in the insertion of new technologies (including, but not limited to, the review of regulation for the adoption of more climate friendly small-scale generation – solar and/or wind – which would substitute diesel generators) and adequate pricing. The uptake of distributed generation in Brazil is relatively minor up to now and studies are required to ensure a sustainable scale-up.

b. Sub-component II: Analytical work to inform reforms in the oil and gas sector. This sub-component follows the longstanding engagement with the GoB in this sector and is in line with the reforms currently being pursued for the oil and gas sectors. It will advise and provide the necessary underpinnings to key institutions responsible for the oil and gas sector such as ANP and EPE to move towards more efficient, open and competitive natural gas and downstream markets. In particular, it will finance a set of technical activities, which will focus inter alia on natural gas trading, natural gas storage, natural gas industrial utilization and downstream supply and demand, *inter alia*:

i. **Studies aimed at supporting the design of a competitive gas market**: consulting services to evaluate and identify the mechanisms to be adopted to promote the commercialization of natural gas in a competitive manner, including the use of virtual trading hubs.

ii. **Studies aimed at supporting the creation of flexible gas supply:** consultancy services that will evaluate mechanisms aimed at promoting flexible gas supply, including the evaluation of natural gas storage potential in Brazil by gathering technical, economic and regulatory data and drawing from international best practice.

c. Subcomponent III: Analytical work to implement reforms in the mining sector. This subcomponent will support the efforts by the Ministry and key mining sector institutions such as ANM and CPRM to allow for a more modern and efficient institutional framework for improved management, transparency and environmental and social management of the mining sector. In particular, this subcomponent will finance a set of technical activities focused on implementing the key sectoral reforms carried out by the GoB that were approved but are still lagging on implementation. It will also provide the needed resources for the operationalization of some key attributions of the ANM aimed at modernizing the institution and its ability to carry out its mandate more efficiently. Furthermore, the approach of the project is to ensure that climate smart mining is introduced at the policy/planning level which could possibly result in tangible changes on the ground that will help the mining sector manage the risks that climate change poses to operations and supply chains once these policies are implemented. The activities will include *inter alia*:

i. **Analytical Work to increase the climate change resilience in the sector** *by: (a) supporting the* revision of the National Mining Plan (PNM) with a Climate Smart Mining (CSM) approach aiming and reducing the carbon and material footprint of critical mineral supply chains. Furthermore, the revision of the PNM will include and encourage mining and mineral exploration companies to invest in renewable energy and low-carbon technologies; and (b) financing studies that will support the decision-making process for a more climate resilient minerals sector, based on the CSM framework, that will also address knowledge gaps on the climate change impacts and effective institutional, policy and

investments needed to improve adaptive capacity of the sector. These activities will support guidance on more climate resilient mining practices.

ii. **Analytical Work to inform best practices in the mining sector.** In line with some key strategic topics such as critical minerals for the energy transition, recycling of minerals and metals and sustainable and climate-friendly mining practices this subcomponent will finance a series of studies that will provide guidance to MME, CPRM and ANM on repositioning the Brazilian mining sector so that it is more competitive and in line with international themes and best practices. In addition, it will provide the necessary tools to modernize the country's regulatory capacity and efficiency.

55. **Component 2 – Institutional strengthening of energy and mining institutions to establish and implement strategies, policies and regulation** (US$17.48 million)**.** This component will comprise capacity building activities, data collection, digitalization and generation of knowledge products aimed to strengthen the capacity of the sector institutions to implement their mission. It will, in addition, also strengthen the capacity of the key institutions to manage the environmental and social aspects of these sectors and increase their awareness on related climate change impacts and effective response measures:

a. Subcomponent I: Strengthening the regulatory, planning and operational capacity of the power sector (including environmental and social aspects)**.** This sub-component will finance data gathering, optimization of methodologies and process digitalization aimed at enhancing the regulatory (improving monitoring and control capacity), planning, and operational capacity, allowing the Government to take effective policy and regulatory actions. The capacity building activities will include, inter alia:

i. **Activities aimed to include climate change parameters in power sector planning**, and update of data underpinning the analysis of energy balances. Such parameters will include changing climate and weather patterns (e.g. projected temperatures, rainfall, etc.) that affect power sector. By including them in the sector planning, the activities will ensure that climate change constrains are overcome based on the innovative methodologies and best international practices are included in the long-term expansion plan for the energy sector to help to mitigate future energy crisis. The work is expected to lead to a higher share of VRE, diversifying the matrix and increasing the climate resilience of the system. This work could be relevant for other hydrothermal systems in Latina America and other regions.

ii. **Digitalization and optimization of accounting and settlement systems:** Provision of specialized hardware and software for the modernization of accounting and settlement systems in the Brazilian electricity sector; this will enable further transformation in the market rules that could help to expand the free market.

iii. **Support for the development and implementation of Renewable energy (RE) forecasting models**, **control systems, and other tools** aimed at enhancing the operational capacity. This could have an important impact to reduce the balancing needs of the system, that are usually met with expensive thermal generation, particularly during dry seasons. The most advanced forecasting model could be easily implemented in Brazil, improving the dispatching efficiency of ONS and contributing to lower overall energy costs and fewer GHG emissions. As such, this support of work is expected to reduce the curtailment of Renewables leading to a reduction of thermal generation and the associated GHG emissions.

b. Sub-component II: Strengthening the planning, regulatory and monitoring capacity of key oil and gas sector institutions. This sub-component will finance activities aimed at improving institutional capacity of key oil and

gas sector institutions to allow them to assume more active roles in the regulation and monitoring of these sectors. As per the ongoing engagement with the GoB and drawing from international good practices, this sub-component will finance activities and training geared *inter alia* to improving institutional effectiveness, reducing administrative costs, enhancing ESG management including transparency and addressing anticompetitive practices.

c. Subcomponent III: Strengthening the planning and regulatory capacity of key mining sector institutions. This sub-component will finance activities aimed at improving the capacity of key mining sector institutions. The improved capacity will support them in planning, monitoring and managing the mining sector in a more efficient and effective way, including environmental and social aspects. The activities include studies and training aimed at improving the knowledge on key themes essential for improving mining sector management and informing the decision-making processes. These themes include, among others, urban mining and recycling, ASM, environmental and social sustainability, climate change adaptation investments for the mining sector and strategies to reduce GHG emissions associated with the mining practices and strategic minerals value chains.

d. Subcomponent IV: Institutional and management capacity building for Ministerial and Agency Staff**.** This subcomponent will, *inter alia*, finance the training of public sector staff from the MME and other participating agencies from the oil, gas, mining and power sectors from a business and public sector management perspective, to improve the overall public policy management in the sector including environmental and social aspects.

Component 3 – Implementation support, monitoring and Evaluation, and Knowledge Sharing and Dissemination (US$ 0.45 million). This component will provide support to the GoB to manage and coordinate all project activities financed under the proposed Project. More specifically, it will provide support the Government's procurement, financial management, environmental and social management and monitoring and evaluation capacity. This component will also support dissemination and knowledge sharing of the findings of the various reports and studies produced under the project, inter alia, through: workshops and other stakeholder engagement events; publications and translations. In addition, supported by Bank executed Trust Funds, the project through this component will also provide, as needed, technical assistance services; training, mentoring and coaching services in part designed to build up women's participation in energy and mining leadership positions, including through international workshops where women can share experiences; and finance the acquisition of goods and of operating costs. In addition, the project will support M&E efforts for ex ante economic, social and climate impacts of relevant policy reforms been supported by the project. The project will, under the M&E framework, support the generation of fresh data/databases produced under the project that could be made available to the public "global public goods".

C. Project Beneficiaries

56. **The main direct beneficiaries are various public institutions, sectoral agencies and departments**, such as (i) MME, including its Secretariat for Planning and Energy Development (SPE), the Secretariat for Electrical Energy (SEE), the Secretariat for Oil, Gas and Biofuels (SPG), the Secretariat for Geology, Mining and Mineral Processing (SGM), the Environmental Issues Advisory Team (AESA), the Secretariat for Planning, Budget and Administration (SPOA); (ii) Energy Research Office (EPE); (iii) the National Electricity Regulatory Agency (ANEEL); (iv) the Electricity Trading Chamber (CCEE); (v) Mineral Resources Research Company (CPRM); (vi) National Agency of Mining (ANM); (vii) National Agency of Petroleum, Natural Gas and Biofuels (ANP); and, (viii) the National Grid Operator (ONS). Women working in these institutions are also expected to benefit directly from training and mentoring opportunities that will

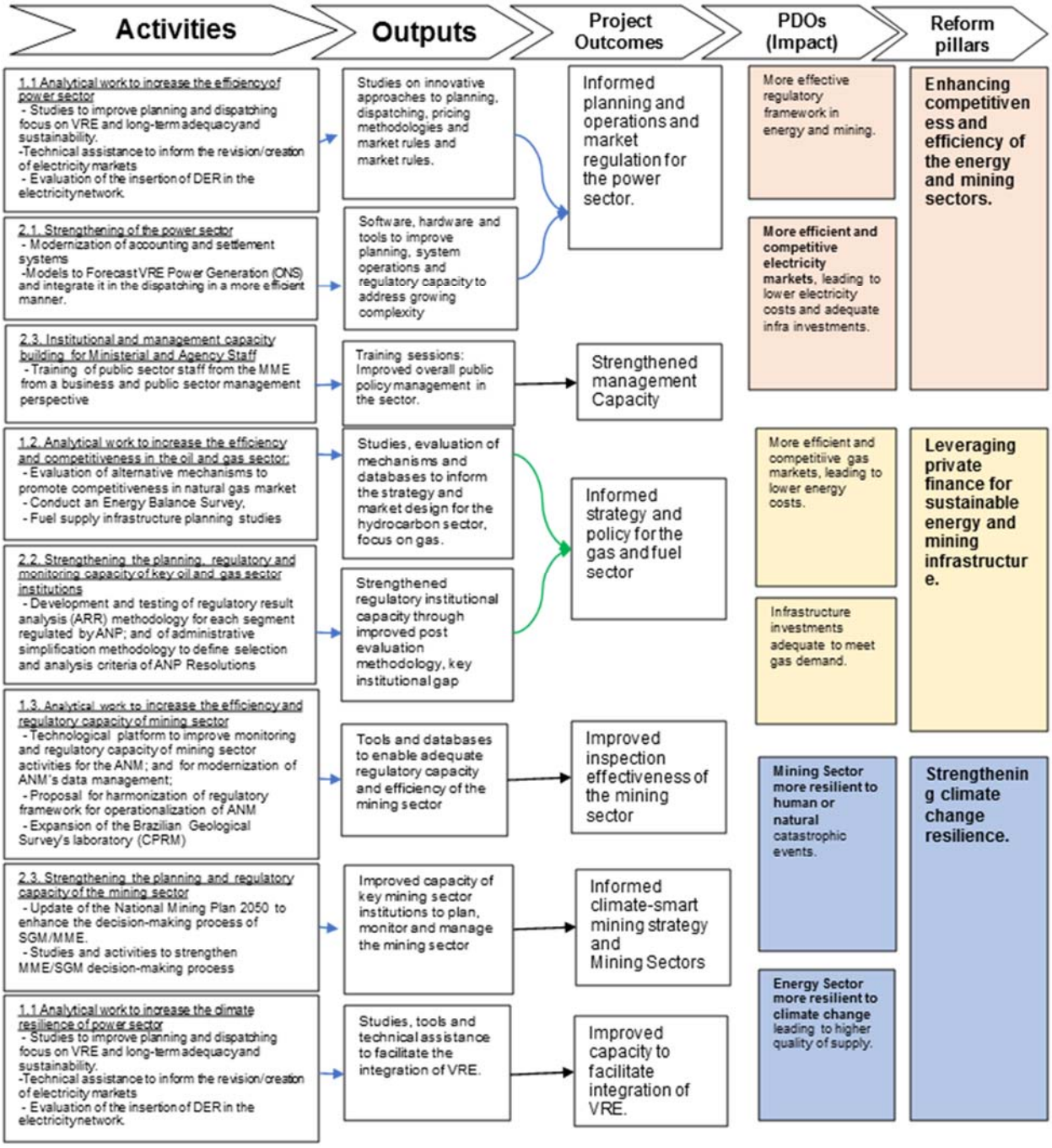
be designed to increase the number of women in leadership positions in the energy and mining sectors. Improved policies and institutions will enable enhanced energy security hedging the system against climate change risks, higher efficiency, environmental and financial sustainability, enhanced adaptability to changing economic conditions, higher leverage of private capital to fill infrastructure gaps and improved services for the population as a whole.

57. **The Brazilian population will indirectly benefit from the project through more reliable power at lower prices and from the economic benefits of a growing**, **more efficient and competitive energy and mining sectors**, which can spur industrial growth and create more jobs. The population will also benefit from improved planning, policies, leading to the execution of more environmentally and socially sustainable projects in the energy and mineral sectors.

D. Results Chain

58. **The main outcomes expected from the project are more efficient, climate smart and strengthened institutions, more efficient markets and more effective policy and regulations** in both the energy and the mineral sectors to increase the resilience of the energy and mining sectors to weather related events aggravated by climate change, increase efficiency by delivering regulatory adjustments, improve planning and support the modernization of infrastructure - in particular related to information systems and technology development - that are needed in order to support accelerated economic growth that is sustainable from both environmental and social perspectives.

Table 1: META 2 Results Chain (Theory of Change)



Source: World Bank, 2020

E. Rationale for Bank Involvement and Role of Partners

59. **Given its global experience, the Bank is well positioned to provide targeted support to energy and mining key areas of interest, through financing and transferring of global expertise and best practices** aimed at: enhancing

governance, resilience and planning, creating efficient markets, attracting private finance to energy infrastructure investments, and piloting innovative technical and financial solutions. In addition, as it was already mentioned, this is a follow-on project of the successful META 1 and ESTAL projects, which the Bank financed. As mentioned above, the Bank has been supporting Brazil in the energy sector for over two decades.

F. Lessons Learned and Reflected in the Project Design

60. **The following are lessons learned from former projects that have been incorporated into the project design**, including notably from the predecessor capacity building project (META 1). The full list of lessons learned from META 1 project are detailed in **Annex 3.**

a. **Implementation of complex reforms requires a strong, high-level orchestration between MME and the Ministries of Planning and Finance**, as well as between ANEEL and ANP on the energy regulatory side. The Project has been designed on the basis of strong inter-agency coordination.

b. **Government ownership, in particular by the relevant sector's ministry, is paramount to ensure that the allotted resources continue to fund relevant issues and that outputs translate into policy decisions and eventually progress on outcomes**. The Government has played an active role throughout project preparation, including notably in delineating early on in project preparation the activities to be carried out by aligning them with their publicly disclosed reform programs (notably "*Novo Mercado de Gás*" and "*Modernização do Setor Elétrico*").

c. **Although an initial set of activities has been identified and are linked to support the implementation of the newly proposed government reforms,** the project has been designed in a flexible manner so that the support provided to a sector ministry facing the quickly evolving challenges of an emerging economy can be adjusted during implementation.

d. **It is important that institutional arrangements reflect public institutions' interest in the Project's benefits by having the Project Implementation Unit (PIU) located at a high decision level and by allocating enough competent staff to the PIU.** The PIU is highly experienced with Bank projects and is located directly under the supervision of the Deputy Minister's office (see Implementation Arrangements below). Furthermore, the Project's Steering Committee members are also members of the reform agenda committees, such as ANP in the *Novo Mercado do Gás* and all Power agencies were committee members of the *Technical Group on the modernization of the Electricity Sector*.

e. **In order to avoid initial delays in implementation, project activities are at an advanced stage of definition,** with many having Terms of Reference (ToRs) already prepared. Furthermore, in order to address budgeting constraints, the first year of budget allocation has been confirmed, and budget absorption capacity has been accounted for in planning activity initiation and implementation.

f. **One of the lessons learned from the previous series of successful engagements is the clear advantage of the Bank's rapid response to client needs and its ability to deploy its best resources** to deal with the issues faced by the client, bringing an international perspective tailored to the specifics of the energy system in Brazil.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

61. **The Project will be coordinated by the MME following similar institutional and implementation arrangements to those defined for META 1.** META 2 is a continuation of a long collaboration between the MME and the Bank, which started with the ESTAL project (P076977) and continued through the recently closed META 1 (P126537). The Project Implementation Unit (PIU) in the MME will be responsible for management, overall coordination and oversight of the project implementation. The PIU was created within the Executive Secretariat, through a Regulation (Portaria) of the Minister of Mines and Energy, and META 2 will be the third World Bank project it implements (following ESTAL and META 1). The PIU is fully staffed to coordinate and oversee the contributions of the Participating Entities, has an Operational Manual ready, a Monitoring and Evaluation framework, Procurement Plan and will elaborate financial reports to the Bank for the whole Project. The Special Advisory department for the Environment (Assessoria Especial de Meio Ambiente - AESA) located within MME is assigned to provide all the support and expertise needed to the PIU to fulfill safeguards requirements.

62. **Engagement with GoB for project implementation/effectiveness.** The PIU will, additionally, maintain engagements with the Ministry of Economy (MoE), and with the Brazilian Congress, particularly related to the work in the gas sector, for which decisions/actions go beyond the Executive. The coordination is further reflected through two inter-ministerial units – the *National Committee for Energy Planning* (CNPE) and the *Committee for Monitoring the Opening of the Natural Gas Market* (CMGN) – both led by the MME, and which the MoE is a member.

B. Results Monitoring and Evaluation Arrangements

63. **The PIU in the MME will be responsible for implementing and executing all M&E activities, providing annual reports on the PDO level and intermediate results indicators.** Those indicators will be collected, distilled and agreed with the Participating Entities, before being submitted to the Bank. They will also be used as an instrument of Project performance to be examined by the high-level steering community (PSC). No major difficulties are envisioned to collect and process this information. The PIU has gained significant experience in working with the Bank.

64. **Furthermore, the Participating Entities are well established, competent organizations in the energy and mineral sectors.** Given the studies of the project will inform strategic decisions (such as possible regulatory changes, new forecasting and or management models), which are not yet defined, the PIU and Participating Entities will work together to determine indicators and impacts of any changes resulting from the outcomes of the studies to support the PDO level indicators of the project. The data collection for the PDO level and intermediate results indicators will be carried out by the PIU staff, with support from Participating Entities.

C. Sustainability

65. **The sustainability of the objectives of the META 2 Project over the long term will rest upon the Government 's commitment and ability to carry out the necessary energy and mining sector policies**. In the energy sector, MME has demonstrated strong leadership in the design of transformative power sector reforms during the last 20 years and, in particular, a high level of commitment to deliver results during the implementation of the META 1 project. Furthermore, the reforms in the gas, electricity and mining sectors are part of the overall GoB reform agenda, have been through extensive consultations with sector stakeholders and have been publicly promoted. The GoB has

confirmed MME's central role in the sector, as reflected though its leading role of the inter-ministerial committees (CNPE and CMGN). Successful results from META 1 have provided a solid platform for the new administration to build upon and make necessary changes during the course of the project. The project will help develop capacity among key Participating Entities, to ascertain sustainability of the long-term results. The topics to be covered by the technical assistance program have been jointly selected by the project participating entities and by the World Bank, and may be revisited as priorities evolve. They will constantly be fine-tuned during implementation to ensure that they respond to the most important and urgent needs and demands of the GoB.

IV. PROJECT APPRAISAL SUMMARY

A. Technical and Economic Analysis

Technical

66. **The activities financed by the proposed project are highly relevant and necessary to modernize the energy and mining institutions and advance the formulation and implementation of policies and regulatory reforms** leading to more efficient, sustainable and resilient energy and mining sectors. The MME is highly committed to the implementation of the project and the participating sectoral institutions are very interested in the proposed activities.

67. **The project design was informed by sustained World Bank engagement with the Government in the energy and mining sectors during the last years,** referred to in the Rationale for Bank Involvement (paragraph 42 above). Constant dialogue between Bank staff and management with the highest officials in the country and the direct engagement of technical staff from the Ministry of Energy and Mines and the Ministry of Economy, as well as with all the relevant energy and mining institutions have informed the design of the project, which sought to balance its activities with the current context and internationally accepted best practices.

68. **The project will deliver advisory services needed to strengthen the technical capacity of key agencies to oversee and manage the energy and mining sectors.** The detailed terms of reference (ToR) prepared to tender the activities financed under this project provide a clear definition of the work that needs to be done. There is also no duplication of work in the various consultancies planned under this project.

69. **The training activities undertaken under Component 3 will be based on an institutional diagnostic of key agencies and will be tailored based on existing capacity and future sector needs.** The participant organizations will be engaged to inform the design of the training programs, since they are aware of their specific needs.

Economic Analysis

70. **TA projects do not lend themselves to economic evaluation through cost-benefit, cost-effectiveness or other methods because they do not have quantifiable direct and indirect economic benefits to be compared with direct and indirect economic costs (e.g. the economic costs associated with the TA).** Therefore, the economic analysis of this TA project included description and summary of main indirect economic benefits that are expected to materialize from implementation of policies and other measures.

71. **The proposed project is forecast to have a positive development impact considering projected benefits and costs**. An economic analysis was conducted using a combination of qualitative and quantitative cost-benefit analysis, and based on the precedent of META 1, it is expected that the return will be much higher than the cost of the project. While attributing outcomes to the various components undertaken under the auspices of a technical assistance (TA)

project is complex, the results that could be at least partially triggered by the undertaking of this project are: (i) new mineral concessions; (ii) more and stronger linkages within activities of the mining sector; (iii) improved energy security and quality of supply in times of crisis; (iv) lower electricity costs for end consumer; (v) energy savings; and (vi) drop in the price of natural gas. The bottom 40 percent (b40) would also likely benefit.

72. **The proposed TA activities will take into consideration, when relevant, the distributional implications of different reforms.** This is particularly important to consider with respect to electricity prices for households; access to reliable energy for low income households especially in the Amazon basin where this is more difficult; impact of energy prices on consumer prices; impact of energy reforms on employment (though these sectors are not big job creators anyway - small scale mining might be one exception that is important for a specific low income population); health impacts of reducing pollution especially in low income/vulnerable population areas.

73. **The three sector areas of the project will be analyzed separately in the next sections**.

Electricity sector

74. **Project activities will contribute towards climate informed planning and systems operation** (scheduling and dispatching) leading to reduction in the volume of unserved energy (COUE), saving of economic cost of electricity supply, and reduction of CO2 emissions through TA measures aimed at improvement of the sector efficiency. Economic and social benefits of sub-components 1.1 and 2.1 could include: (i) reduction in the cost of unserved energy due to improved quality of supply reduction on the number of interruptions and voltage fluctuations), particularly in times of low hydrology. The COUE for middle-income countries similar to Brazil is quite high considering the foregone economic benefits of industrial and commercial enterprises due to interruptions in the electricity supply, the cost of adaptation to such interruptions (e.g. back-up generation), and the reduction of consumer surplus for residential consumers due to lost leisure time and adaptation cost; (ii) increased consumer surplus due to anticipated reduction of economic cost of supply from rationalization of the pricing methodology, adjustment of the dispatching and energy market rules,, (iii) and demand- demand-side response programs and digitalization of the distribution sector, (iv) reduction of the economic costs from local environmental pollution levels from reduced emission when introducing electric vehicles fueled with clean energy; and (v) reduction of CO2 emissions, which is a global environmental benefit. The mentioned benefits would also accrue to the bottom 40 percent (b40) of consumers.

75. Total savings can only be calculated ex-post, there is evidence from a similar, albeit smaller scale experiment (covering 51 million people) in the United States, which saved US$101 million in one year.[35]

76. **The project will also generate economic benefits through support to assessments on "locational signaling", which effectively allows the operator to "see" the system, real-time, from an energy costing/financial perspective**. This will help to meet the projected electricity demand in the economically efficient manner by optimizing the need for new electricity generation capacity, electricity transmission capacity, and timing of construction. The same type of economic benefits would accrue from climate-informed planning of expansion and dispatchability of the power system. Specifically, incorporation of the impacts of climate change in projections of water flows/hydrology scenarios, which are typically used as inputs for simulating the generation of hydropower plants (HPPs), would improve the availability of the electricity supply through further optimization of the type, size, and timing of the electricity generation capacity that needs to be constructed to meet the demand. This is essential considering that Brazil is a hydro-thermal power system and climate change impacts availability of water for both type of generation technologies. It should be noted that thermal power plants (TPPs) are also affected by climate change because they

[35] Gisin et al.

require steady water supply for technological needs (e.g. cooling) and may have to stop generating electricity in case of insufficient water supply to avoid severe damage to equipment. Ultimately, the climate-informed planning would diversify the electricity generation mix through inclusion of non-hydro renewable energy technologies (Solar PV, Wind, other) that would allow to fully meet the projected electricity demand at lowest possible cost and attain the target levels of energy supply reliability that are typically measured through value of lost load (VOLL).

Mining

77. **Despite favorable geology and an enormous land mass, Brazil is rated low by exploration companies with respect to exploration attractiveness[36] and it hasn't benefited from the large global upswing in exploration expenditure since 2016;** As discussed in detail in (Flochel and Jennings, 2016), the returns to exploration can be very high, and every US$1 million of government investment to enhance the geoscience knowledge base will likely stimulate US$5 million of private sector exploration expenditures, which, in turn, will result in discovery of new resources with an average in situ value of US$125 million. This is based on 13 separate studies across Australia and Canada. Subsequent work generally supports this rule of thumb." As a simple example, if more and better geological knowledge and a better licensing procedure leads to the discovery of one medium sized gold mine producing 7,000 ounces of gold a year, for 15 years, the direct fiscal return to the GoB would be about US$40 million (assuming it captures 25 percent of the value). Geoscience information has many other important uses in addition to exploration. These include land use management, particularly for agriculture, water flow management, land planning related to stability and contamination issues, including areas more susceptible to earthquakes and landslides.

78. **The project would also generate economic benefits in form of avoided economic costs from tailings dam failures and contingencies. Specifically,** the project will also support new measures for safety of tailings dam with respect to construction and independent monitoring**.** Therefore, there would be benefits in form of avoided economic costs from reduction of mortality and healthcare costs from catastrophic events caused by failure of tailings dams.

79. **Increased verticalization or linkages is one of the three pillars of the mining sector strategic plan, which this project will help to implement.** Mining companies buy tens and even hundreds of millions of dollars of inputs and capital goods. Success in this area would create employment and value added and fiscal revenues. Normally, there are many more jobs in supplying mines than in the mines themselves.

80. **Mine supply is one of the biggest industries in many countries[37]since it can also lead to downstream** surplus. In 2011 in Chile and Peru there were over 700,000 jobs in firms selling goods and services to the mining industry (McMahon and Moreira, 2014: p. 37). Clearly, success of the project in this regard could have a substantial impact on value added, employment and fiscal revenues, increases in all of which are likely to disproportionately benefit the b40. However, the GoB must be careful how it implements such policies to ensure domestic suppliers are competitive, which includes access to infrastructure and a skilled labor force as well as an encouraging business environment, or mining companies may be concerned about losing competitiveness and be less willing to invest in the country. Fortunately, there are many lessons to be learned from other countries as well as Brazil's own experience in the oil sector (see Anouti et al, 2013).

Natural Gas

81. **The project will support reforms to make the natural gas market more competitive and, in the process,**

[36] Fraser Institute, 2019

[37] Canada, Australia, South Africa inter alia

lower natural gas prices. Currently natural gas is costly in Brazil, at around 3 times the average world wholesale price ($4.38 per MMBTU). In 2018, Brazil's industrial users were obliged to pay almost $14/MMBTU, compared to an average European price of just over $8.80/MMBTU. Savings would be significant, if prices fell towards average world levels, particularly benefitting the b40. For example, a 1 percent decrease in current price would mean a savings of potentially $7.3billion/year. The potential of savings is further increased if one considers that gas consumption is expected to nearly double by 2026.

82. **Final Remarks. This analysis has attempted to show that there are several avenues by which this project could generate large returns.** There would also be other, even more difficult to quantify benefits, particularly for the b40. Better environmental management in the mining sector would particularly benefit rural people in the region. A better geological survey is important for land planning and disaster mitigation, a tool which can even be used in cities. Removing or reducing cross subsidies in the market for electricity would particularly benefit the poor. Similarly. A more stable power sector is very important to the B40, as they can at least protect themselves from power shortages or else only do so at high cost.

B. Fiduciary

83. **Integrated Fiduciary Risk Rating**: The integrated fiduciary risk rating is Low.

(i) Financial Management

84. **A financial management (FM) assessment of the project was conducted in accordance with OP/BP 10.00 and the Financial Management Manual for World Bank IPF Operations (OPCS5.05-DIR.01, issued February 10, 2017)**. More detail can be found in Annex 1.

85. **The scope of the FMA included**: (i) an evaluation of existing FM systems to be used for Project monitoring, accounting and reporting; (ii) a review of staffing arrangements; (iii) a review of the flow of funds arrangements and disbursement methods to be used; (iv) a review of internal control mechanisms in place, including internal audit; (v) a discussion with regards to reporting requirements, including the format and content of Unaudited Interim Financial Reports (IFRs); and (vi) a review of the external audit arrangements.

86. **The overall conclusion of the FMA** is that: (i) the FM arrangements for the proposed Project are considered adequate; (ii) the funds flow, disbursements, monitoring, auditing and supervision arrangements have been designed in a way to respond to the Project's implementation arrangements; and (iii) the residual FM risk associated with the Project is rated as LOW. There are no FM-related conditions for negotiations, board and/or effectiveness.

87. **The FMA identified the following risks to the achievement of the Project Development Objective**: (i) the close coordination that will be required between MME and the other Project executors, and (ii) the Federal Government's fiscal situation that can restrict Project's budget allocations and delay implementation, issues that will be mitigated by close Bank support and supervision.

(ii) Procurement

88. **The procurement risk rating is Low.**

89. **Procurement will be carried out in accordance with the Bank's Procurement Regulations for IPF Borrowers dated July 2016, revised November 2017 and August 2018**. The Bank is undertaking an assessment of Brazil's system for national open competitive procurement to check whether it meets the requirement of par. 5.4 of the Procurement Regulations. If the assessment is positive, sample bidding documents for national procurement acceptable to the Bank

will be prepared for the Project based on the national procedures.

90. **The Procurement policy framework, regulation, and procedures are well documented and publicly available and are designed to meet Core Procurement Principles of value for money, economy, efficiency, effectiveness, integrity, transparency and fairness and accountability**. Public procurement methods, procedures, contracts are regulated by Law 8,666/93. E-auction is the default method for goods and services. CPRM and EPE are federal SOEs associated with the MME, and their procurement is regulated by Law 13,303/16, which prescribes a common procurement procedure for all biddings. CPRM and EPE have their own regulations. All policies are documented and publicly available, and they meet Core Principles. CCEE and ONS are CSOs and have their own regulations. All Agencies have a clear system of accountability with clearly defined responsibilities. Project implementation is typically not delayed, and Procurement plans are aligned with the budget. All Agencies have experienced staff; only CCEE and ANP did not participate in META 1. META 2 will be audited by the CGU every year, including procurement. Records are adequate. The complaints mechanism follows due process, and it is widely accepted. CCEE and ONS will need to adopt the Bank's complaint handling mechanism. Fraud, corruption, and ESHS risks are dealt with as prescribed in respective applicable laws. Methods and documents are adequate for type, value and complexity of the contract. Procedures are described in the documents and followed. Evaluation and award are transparent. Notices and awards are announced as prescribed. CCEE and ONS will adopt the Bank's requirements. All Agencies manage contracts to ensure delivery as contracted. The target market can respond competitively, and it views the purchasers as attractive. There are no restrictions to open competition. Procurement will not necessarily be complex, but there is a substantial aspect of innovation. The procurement will be centralized within the Agencies. The Procurement arrangements will not require specialized skills. The delivery/contract implementation related risks are largely within the supplier'/consultant's control. Contracts and their terms and conditions will be standard.

91. **The Bank will carry out procurement post reviews on an annual basis with an initial sampling rate commensurate with the risk rating of the Project.** This rate will be adjusted periodically during project implementation based on the agencies' performance. The Bank will also carry out procurement supervision missions on a semi-annual basis. All agencies shall upload all procurement and contract information in STEP, which will be used to provide the World Bank with a consolidated list of all contracts for goods, works, and consultants' services awarded under the Project. The post review contract sample will be selected from STEP. Detailed procurement documentation may be referenced as such and made available in the project files and the Operations Portal. The detailed 18-month procurement plan, once agreed with the Borrower, is published on the World Bank website. For more information, refer to the "*World Bank Procurement Regulations For Borrowers*." More detail can be found in **Annex 1** (Implementation Arrangements) and a draft procurement plan is included in **Annex 6**.

C. Legal Operational Policies

Not applicable.

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

D. Environmental and Social

92. **The project comprises, solely, of technical assistance activities, with minor potential to cause direct and adverse environmental risks and impacts**. The main requisites, relevant to the project, are the need to assess, manage and monitor the environmental and social risks and impacts of the project throughout the project life cycle. The Project will not finance activities such as the preparation of feasibility studies, technical, engineering design studies and bid documents that may result in the construction of physical infrastructure (which may or may not be financed by the Bank). The project focuses on institutional strengthening activities, analytical works and conceptual studies that may provide inputs for regulatory and political improvements of both energy and mineral sectors. The institutional capacity strengthening activities shall bring environmental benefits, improving the agencies' environmental and social management systems, including their capacity to propose and enforce policies that promote sustainable practices in the mineral and energy sectors. These institutional strengthening activities can be implemented in accordance with national legislation, considering the Bank Environmental Health and Safety Guidelines (EHSGs).

93. **The subprojects comprising technical studies may lead to downstream implications as their products may be used as inputs for future reforms and changes in policies, plans and the regulatory framework of the highly sensitive energy, gas, oil and mining sectors**. The project involves a series of studies addressing sensitive environmental and social issues, such as national plans and strategies for the mining and energy sectors, underground gas storage and fuel supply infrastructure, that may demand special attention. The Substantial Risk rating for environmental and social is proposed due to a series of reasons, including the potential downstream implications of some proposed regulations and the capacity of some implementing agencies. Subprojects involving formulation of policies, programs, plans, strategies, legal and regulatory frameworks may lead to deferred effects in relation to environmental and social aspects as those related to the mining sector. In the energy sector, the subprojects assessing natural gas underground storage and fuel supply infrastructure have a series of potential environmental and social implications. Another reason for proposing a substantial risk rating is the capacity of the recently created Mining Agency – ANM.

94. **The Borrower prepared a Scoping Paper to advance the knowledge of the Project's impacts**, aiming to ensure that the Terms of Reference (TORs) for the planned technical assistance (TA) activities will take into consideration a comprehensive view of the Project's social and environmental impacts, including issues of concern for the potentially affected groups and individuals. The Borrower has also prepared an Environmental and Social Commitment Plan (ESCP) and a Stakeholder Engagement Plan (both disclosed on the Bank's website on January 28, 2020) and Labor Management Procedures (see annexes of the Scoping paper). The three environmental and social risk management instruments prepared by the Borrower have been disclosed and consulted upon between December 29, 2019 and January 18, 2020. During Project implementation, the Borrower's Environment and Social Unit will be engaged in the preparation and review of the Terms of Reference (ToR) and TA products, which will be submitted - as relevant according to the environmental and social risk classification of the sub-projects and as per selection criteria established by the social and environmental team (AESS) of the Bank - to a prior review by

the Bank Task Team to ensure that they address the proper environmental and social considerations. The main entity involved with the operation – the Ministry of Mining and Energy has a social and environmental advisory unit (AESA) directly subordinated to the Ministry's Executive Secretariat MME's responsible for ensuring, monitoring and assessing compliance of project's activities with social and environmental safeguard policies, including the activities developed by the MME and its subordinated agencies.

95. **The environmental and social management systems of the agencies related to MME are at different development stages.** The electricity sector agencies have, commonly, bound environmental and social systems, but the recently created national mining agency, ANM, lacks policies, procedures and instruments to address social and environmental issues. Institutional strengthening measures may be required if MME transfer the management of certain subprojects to other implementing agencies. MME will: prepare and submit to the Bank regular monitoring reports (semi- annual) on the environmental, social, health and safety (ESHS) performance of the Project and Characterization and Assessment Study of Social and Environmental Impacts, including but not limited to the implementation of the ESCP, status of preparation and implementation of E&S documents required under the ESCP, stakeholder engagement activities, functioning of the grievance mechanism(s); establish and maintain an organizational structure with qualified E&S staff and resources in the PIU; all ToRs will be submitted by the Bank for prior review and clearance while final products (including E&S sections) of subprojects classified as substantial risk will be submitted to the Bank for review (Terms of reference need to be finalized before the start of the subprojects); conduct a comprehensive training program on the Environmental & Social Framework (ESF) requirements with participation of the PIU E&S staff of all implementing agencies; conduct annual training programs.

V. GRIEVANCE REDRESS SERVICES

96. **Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS).** The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit *http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service*. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

VI. KEY RISKS

97. **The proposed project overall risk is assessed as Moderate.**

98. **Sector Strategies & Policies risk is rated Substantial.** The reforms that are being sought for the energy and mining sectors are ambitious in timing and broad in scope. Considering previous reform efforts as well as the number of stakeholders involved (and their confronted interests), there is significant uncertainty as to the success of the ongoing reform effort. While this project aims to support the formulation, approval and implementation of

these reforms, it is designed in a way that it can adjust to changing circumstances while still supporting the project development objective.

99. **Mining Sector Risks, both related to sector strategies and policies as well as reputational risk can be defined as substantial**. After the tragic tailings accident in Brazil, public perception of the mining sector globally has increased the distrust and association of mining activities to environmental degradation. The project's technical design will not directly address tailings legislation or environmental oversight of mining sector operations in general, but it will be supporting institutional strengthening of the regulatory agency ANM and some key studies and equipment to support the GoB's effort to modernize the Brazilian mining sector. The mitigation measures adopted to minimize the risks using an environmental and social framework that will guide all activities financed under the project. The ESF documents prepared under this framework have been subject of public consultation by MME to ensure project objectives and activities are clear. A strong focus on promoting a sustainable and more climate resilient minerals sector for the country will also support the mitigation of such risks.

100. **Environmental and Social risk is rated Substantial under the World Bank's new Environmental and Social Framework (ESF).** Although a TA project where activities do not themselves have direct adverse environmental or social impacts, the Substantial Risk rating environmental and social is proposed due to the potential downstream implications of some proposed regulations and the limited capacity of some implementing agencies. Subprojects involving formulation of policies, programs, plans, strategies, legal and regulatory frameworks may lead to deferred effects in relation to environmental and social aspects, as those related to the mining sector. In the energy sector, the subprojects assessing natural gas underground storage and fuel supply infrastructure have a series of potential environmental and social implications. To mitigate these risks, the required safeguards instruments have been prepared and will be used for screening and monitoring project implementation. All substantial risk rated ToRs of the activities carried out during the project will require compliance of the output with ESF, and all deliverables of activities highlighted in the ESF documents as having a substantial risk rating, will be carefully reviewed by the Bank to ensure compliance with the ESF.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework
COUNTRY: Brazil
Energy and Mineral Sectors Strengthening Project II

Project Development Objectives(s)

To strengthen institutional capacity for market efficiency taking into consideration climate resilience in the energy and mining sectors in Brazil.

Project Development Objective Indicators

Indicator Name	DLI	Baseline	End Target
Pillar: Climate resilience			
PDO 1- Published Electricity sector expansion plans for increased security of supply (Number) (Number)		0.00	2.00
PDO 2 - Climate-smart mining plan updated for the strategic development of mining sector (Number) (Number)		0.00	1.00
Pillar: Market Efficiency			
PDO 3 - Policy and market regulatory changes, to enhance market efficiency, published for consultation (Number). (Number)		0.00	2.00

Intermediate Results Indicators by Components

Indicator Name	DLI	Baseline	End Target
C1- TA to increase efficiency, long term infrastructure adequacy and climate resilience			
Number of operational procedures updated (Number)		0.00	3.00
Climate-informed methodology adopted in the energy expansion plans (Yes/No)		No	Yes
Climate resilience informed electricity dispatching methodology utilized (including adjustments on hydrological patterns) (Yes/No)		No	Yes
Electricity sector policy or market regulation developed (Number) (Number)		0.00	1.00
Gas sector policy or market regulation developed (Number). (Number)		0.00	1.00
New methodology for electricity price formation formulated (YES/NO). (Yes/No)		No	Yes
C2- Institutional strengthening of energy & mining institutions to implement strategies and policies			
Monitoring of mining activities by satellite images (YES/NO) (Yes/No)		No	Yes
Number of new tools or methodologies introduced or upgraded (Number)		0.00	10.00
Sectoral databases created or disclosed for planning or monitoring (Number). (Number)		0.00	1.00
National government staff trained (including independent/implementing agencies) (Number). (Number)		0.00	200.00
C3– Implementation support, monitoring and evaluation, knowledge sharing and dissemination.			
Number of training, mentoring and gender awareness initiatives geared towards enhancing female participation in management positions in key energy and mining institutions. (Number)		0.00	8.00
Share of female employees stating in the survey that training, mentoring and gender awareness initiatives had a positive		0.00	50.00

Indicator Name	DLI	Baseline	End Target
impact on their career planning (Percentage) (Percentage)			
Results of citizen feedback on project-supported products published on Ministries websites (Number)		0.00	5.00

Monitoring & Evaluation Plan: PDO Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
PDO 1- Published Electricity sector expansion plans for increased security of supply (Number)	This indicator will measure the number of climate informed deliverables produced with support from the project, that have resulted in actual plans or procedures published. This will be measured relative to a baseline of zero, based on administrative information collected by the PIU and regularly reported in the Implementation Progress Report.	Annual	Project Implementation Progress Report	Administrative data collection	PIU
PDO 2 - Climate-smart mining plan updated for the strategic development of mining sector (Number)	This indicator will measure the formulation of a climate-smart mining plan for the strategic	Annual	Project Implementation Progress Report	Administrative data collection	PIU

	development of the sector by the national government of Brazil, with the project's support, incorporating a climate smart mining framework. The current plan does not incorporate a climate smart mining framework, and thus this will be measured relative to a baseline of zero. The indicator will be based on administrative information collected by the PIU.				
PDO 3 - Policy and market regulatory changes, to enhance market efficiency, published for consultation (Number).	This indicator will measure the project's success in supporting the development and publication of updated policy or regulation material to enhance market efficiency in the energy and mining sectors. The project will support this objective by informing these changes through studies, policy notes, and assessments. The indicator be based on administrative information collected by the PIU. Market efficiency is understood as : "The extent to which the price of an	Annual	Project Implementation Progress Report	Administrative data collection	PIU

	asset reflects all information available about the actual value of the underlying assets." Thus, as the quality and amount of information increases, the market becomes more efficient, reducing opportunities for arbitrage and above-market returns. In addition to this, a more practical definition refers to: "The existence of market arrangements that are fit for purpose, providing actors throughout the value chain with incentives to operate their systems in an economic manner, with an appropriate balance of risk and reward that is in the interests of customers, who ultimately pay for the costs of an energy system operation."				

Monitoring & Evaluation Plan: Intermediate Results Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Number of operational procedures updated	This indicator will measure the number of operational procedures implemented, based on studies financed by the project and informed by climate-change considerations. This will be measured relative to a baseline of zero, based on administrative information collected by the PIU and regularly reported in the Implementation Progress Report.	Annual	Project Implementation Progress Report	Administrative Data collection	PIU
Climate-informed methodology adopted in the energy expansion plans	This indicator will asses if the energy expansion plans implemented with support from the project have been informed by climate-change considerations. This will be assesed based on administrative information collected by the PIU and regularly reported in the Implementation Progress Report.	Annual	Project Implementation Progress Report	Administrative data collection.	PIU
Climate resilience informed electricity dispatching methodology utilized	This indicator will asses if the electricity dispatch	Annual	Project Implementati	Administrative Data collection	PIU

(including adjustments on hydrological patterns)	methodology implemented with support from the project has been informed by resilience to climate-change considerations. This will be based on administrative information collected by the PIU and regularly reported in the Implementation Progress Report.		on Progress Report		
Electricity sector policy or market regulation developed (Number)	This indicator will measure the project's success in supporting the development and inclusion of updated policy or regulation material for the electricity sector, under component 1. The indicator will inform the fulfilment of the PDO indicator related to the development of policy and market regulatory changes, and will be based on administrative information collected by the PIU.	Annual	Project Implementation Progress Report	Administrative Data collection	PIU
Gas sector policy or market regulation developed (Number).	This indicator will measure the project's success in supporting the development and inclusion of updated policy or regulation material for the gas sector, under	Annual	Progress Implementation Report	Administrative Data collection	PIU

	component 1. The indicator will inform the fulfilment of the PDO indicator related to the development of policy and market regulatory changes, and will be based on administrative information collected by the PIU.				
New methodology for electricity price formation formulated (YES/NO).	This indicator will measure the project's success in supporting the implementation of an updated methodology for electricity price formation, under component 1. The indicator will be based on administrative information collected by the PIU.	Annual	Project Progress Implementation Report	Administrative Data collection	PIU
Monitoring of mining activities by satellite images (YES/NO)	This indicator will measure the project's success in supporting the ANM's the development of a satellite-based monitoring system aimed at the continuous monitoring of mining activities, under component 2. The indicator will be based on administrative information collected by the PIU.	Annual	Project Implementation Progress Report	Administrative Data collection	PIU

Number of new tools or methodologies introduced or upgraded	This indicator will measure the number of activities (Improved methodologies, tools implemented and trainings implemented) completed. These activities will strengthen planning, management and control capacity for the power, gas and mining sectors, under component 2. This will be measured relative to a baseline of zero, based on administrative information collected by the PIU and regularly reported in the Implementation Progress Report.	Annual	Project Implementation Progress Report	Administrative data collection.	PIU
Sectoral databases created or disclosed for planning or monitoring (Number).	This indicator will measure successful creation or disclosure of sectoral administrative or technical databases related to the planning and monitoring of the sectors involved. This will strengthen the transparency of the power, gas and mining sectors, and empower stakeholders, under component 2. This will be measured relative to a baseline of zero, based on	Annual	Project Implementation Progress Report	Administrative data collection.	PIU

	administrative information collected by the PIU and regularly reported in the Implementation Progress Report.				
National government staff trained (including independent/implementing agencies) (Number).	This indicator will measure the number of national government staff (including national agencies) trained through the project. These activities will strengthen the planning, management and control capacity for public servants in the sectors, under component 2. This will be measured relative to a baseline of zero, based on administrative information collected by the PIU in each of the trainings and regularly reported in the Implementation Progress Report.	Annual	Progress report	Administrative data	PIU
Number of training, mentoring and gender awareness initiatives geared towards enhancing female participation in management positions in key energy and mining institutions.	The indicator will measure the amount of workshops, meetings and other fora to promote gender awareness at key institutions with responsibility for the energy, mining and oil and gas sectors, organized with support from the project.	Annual	Project Implementation Progress Report.	Administrative data	PIU

	These activities are expected to promote good practices, share lessons learned and encourage mentoring towards higher female participation in the sector, specially in management positions. This will be measured relative to a baseline of zero, based on administrative information collected by the PIU in each of the trainings, and regularly reported in the Implementation Progress Report.				
Share of female employees stating in the survey that training, mentoring and gender awareness initiatives had a positive impact on their career planning (Percentage)	The indicator will measure (through surveys conducted yearly) the impact of the gender-focused workshops supported by the project. The surveys would be disaggregated per assessment of impact, i.e. "positive", "neutral" and "negative". This would allow to capture the impact of its gender support measures. This will be measured relative to a baseline of zero percent, based on yearly surveys of female	Annual	Project Implementation Progress Report	Annual Survey and Administrative data collection.	PIU

	employees participating in gender-awareness initiatives (trainings, mentoring, and others), sent by the PIU, and regularly reported in the Implementation Progress Report.				
Results of citizen feedback on project-supported products published on Ministries websites	The indicator will measure the number of products supported by the project for which citizen-feedback results have been published on Ministries websites. The link to these results will be easily available to the general public, and a public notice on their availability will be temporarily posted on the relevant ministry's "news" section. Transparency on citizen feedback is expected to promote good practices, use of lessons learned and encourage higher awareness in the sectors. This will be measured relative to a baseline of zero, updated annually based on administrative information collected by the PIU, and regularly reported in the	Annual	Project Implementation Progress Report	Citizen feedback data collection through (*inter allia*) surveys and interviews, plus administrative data collection.	PIU

	Implementation Progress Report.				

ANNEX 1: Implementation Arrangements and Support Plan

COUNTRY: Brazil
Energy and Mineral Sectors Strengthening Project II

1. **META 2 Project will be implemented under the full responsibility of MME.** The institutional arrangement for the implementation of the Project will continue following the three-level structure used under META 1:

   (i) PIU for overall Project coordination and oversight and managerial, fiduciary and operational processes related to activities implemented by the MME Secretariats;
   (ii) PSC for high-level deliberative and decision-making processes;
   (iii) Co-executing units in the MME secretariats and Participating Entities originating the demands for project activities, which are: the MME SPE, SEE, SPG, SGM, SPOA, and the CPRM, the ANM, the EPE, the ANEEL, the ONS, the ANP and the CCEE. The Participating Entities will enter into cooperation agreements with MME.

2. **The MME decided to create a PIU located within the Executive Secretariat, through a Regulation of the Minister of Mines and Energy (Portarias No.528 and 529 de 12/09/2011).** The PIU will serve as the executive secretariat of the PSC, coordinating as needed the contributions of the Participating Entities, revising the Operational Manual, preparing the Procurement Plan, coordinating with the Participating Entities the elaboration of the ToRs and the supervision of the technical works, preparing and executing the procurement processes for activities under the responsibility of MME Secretariats, complying with fiduciary requirements, mobilizing resources from the Treasury, developing and implementing the M&E, preparing monitoring reports, and so on. The management of the activities financed by the Project will be shared between the PIU and the Participating Entities. MME will transfer to the Participating Entities, on a non-reimbursable basis, part of the Loan proceeds necessary to execute the Project activities under their responsibility.

3. **The basic PIU structure has already been designed.** The PIU will be headed by an experienced, full-time Project Manager who will provide general oversight and inter-agency coordination. The Project Manager, supported by the Deputy Project Manager, will have overall responsibility for Project implementation, and will work with a Coordinator for Planning and Finance, a Procurement Specialist, an Administrative Coordinator, Technical Specialist, and an Institutional Relations Coordinator. The Project Manager will report directly to the Executive Secretary of the MME. The Project Manager will have the responsibility for assuring that all Project actions adhere to the proposed principles and objectives, and that state-of-the-art methods are selected and implemented to support modernization, strengthening and sustainability of all actions, both during and after the Project execution period.

Figure 1. 1 – General Coordination Structure for the META 2 Project

4. **The PSC is a collegiate board composed of representatives of the MME and the Participating Entities.** The PSC was established by the MME under META 1, and will be meeting at least every six months. The PSC will oversee implementation, ensure high level coordination between activities undertaken by the different Participating Entities, supervise implementation and evaluate results. The PSC will ensure that the PIU and specific units established in Participating Entities are provided with the proper means and will approve the structure, functions, composition and duration of the PIU. Given the Participating Entities are also members of the reform programs, the PSC will help ensure that all project activities are aligned with the ongoing government priorities.

5. **Each co-executor will create a specific internal unit to co-execute the activities under its responsibility**. Its function and responsibilities will include the planning, preparation of procurement documents, implementation, supervision and monitoring of each of the activities under its responsibility as well as corresponding FM; it will provide to the PIU all fiduciary elements required for the PIU to elaborate financial reports to the Bank. As done under META 1, given the varying number of activities for each co-executing agency, these internal units will differ from each other. However, there will be a main project coordinator for each agency, who will also serve on the PSC, and each activity will have their own project manager. The fiduciary and safeguards aspects of the respective activities will fall under the responsibility of the existing agency structures. Each co-executing agency will implement their own procurement (under the guidance and coordination of the central PIU).

6. **One of the main lessons learnt from the former ESTAL and META 1 Projects, is that the project management of large TA projects needs to have strong political support and its delivery capacity**, particularly regarding preparing and executing procurement processes and other fiduciary requirements, should be high. By creating the high-level PSC and locating the PIU in the Executive Secretariat of the MME (under the deputy Minister), the proposed design addresses the need for strong political support. By formalizing the role of the Participating Entities through cooperation agreements (known as TED – Termos de Execução Descentralizada) approved by the World Bank, including their participation in the high level PSC, and requiring the formal appointment of specific units to co-execute the activities proposed by these entities, the proposed design increases considerably the implementing capacity of the Project, compared to a single centralized PIU, enabling the parallel implementation of many activities and, consequently, quick disbursement of the resources.

7. **Table 1.1 lists the current indicative financial allocations to the different Participating Entities by**

component of the Project. These allocations (in US$ thousands) could change during Project implementation depending on the priorities of MME in agreement with the WB team.

Table 1.1. Budget Allocation Per Participating Entity

	Component 1	Component 2	Component 3	Total
Gas				
ANP	0.52	2.10		2.62
EPE	1.83	0.11		1.94
SPE		0.49		0.49
Sub-total	2.35	2.71		**5.05**
Mining				
ANM	4.98	4.67		9.65
CPRM		1.07		1.07
SGM	2.69	3.58		6.27
Sub-total	7.67	9.32		**16.99**
Energy				
ANEEL		1.21		1.21
EPE	0.46			0.46
ONS	0.95	4.61		5.56
CCEE	2.06	3.86		5.92
SEE	0.49	0.49		0.99
SPE	0.59	0.16		0.75
Sub-total	4.56	10.33		**14.89**
Common				
SPOA		0.62		0.62
AEGE*			0.45	0.45
Sub-total	0.00	0.62	0.45	**1.06**
Project Total	**20.07**	**17.48**	**0.45**	**38.00**

* Includes project contingency

Source: World Bank, 2020

Procurement

8. **General**. Procurement will be carried out in accordance with the "The World Bank Procurement Regulations for IPF Borrowers" dated July 1, 2016, revised November 2017 and August 2018. A PPSD for the initial 18 months of project implementation was prepared and identified the procurement strategy and arrangements that are proportionate to risk and value of all contracts that will be executed during the implementation of the project. Those arrangements are reflected in the initial Procurement Plan.

9. **Implementing agencies**. The procurement will be carried out by several implementing agencies, many of which have implemented Phase I of the project.

10. **Capacity assessment**. Public procurement methods, procedures, contracts are regulated by Law No. 8,666/93. E-auction is the default method for goods and services. CPRM and EPE are federal SOEs associated with the MME, and their procurement is regulated by Law 13,303/16, which prescribes a common procurement procedure for all biddings. CPRM and EPE have their own regulations. All policies are documented and publicly available, and they meet the Core Principles. CCEE and ONS are civil society organizations and have their own regulations. All Agencies have a clear system of accountability with clearly defined responsibilities. Project implementation is typically not delayed, and Procurement plans are aligned with the budget. All Agencies have experienced staff; only CCEE and ANP did not participate in META 1. META 2 will be audited by the CGU every year, including procurement. Records are adequate. The complaints mechanism follows due process, and it is widely accepted. Fraud, corruption, and Environmental, Social, Health and Safety risks are dealt with as prescribed in respective applicable laws. Methods and documents are adequate for type, value and complexity of the contract. Procedures are described in the documents and followed. Evaluation and award are transparent. Notices and awards are announced as prescribed. All Agencies manage contracts to ensure delivery as contracted. The target market can respond competitively, and it views the purchasers as attractive. There are no restrictions to open competition. Procurement will not necessarily be complex, but there is a substantial aspect of innovation. The delivery/contract implementation related risks are largely within the supplier'/consultant's control. Contracts and their terms and conditions will be standard.

11. **To improve transparency and promote greater adherence to Bank's requirements, CCEE and ONS will adopt (i) the Bank's complaint handling mechanism and (ii) the Bank's publication and advertisement procedures**.

12. **Procurement documents**. Procurement of goods and services following an international approach and all selection of consultants will follow the Bank's standard procurement documents. Procurement of goods and services following a national approach will follow procurement documents acceptable to the Bank.

13. **Procurement Plan**. The Procurement Plan has been prepared and approved in STEP, defining appropriate selection methods, market approach and type of review by the WB. A draft procurement plan for the first 18 months can be found in **Annex 6**.

Financial Management (FM) Assessment (FMA) of the Ministry of Mines and Energy (MME) for the P170850 Brazil energy and Mineral Sectors Strengthening II Project

Introduction

14. **Bank Policy**: Investment Project Financing and Bank Directive: Investment Project Financing requires Borrowers/Recipients, to maintain FM systems adequate to ensure that, they can provide the Bank with accurate and timely information regarding project resources and expenditures.

15. **The objective of the FMA, is to determine whether the entity (or entities) implementing Bank-financed projects have acceptable FM arrangements.** The arrangements include the entity's system of planning and budgeting, accounting, internal controls, funds flow, financial reporting, and auditing. The entity's arrangements

are acceptable, if they are considered capable of recording correctly all budgets, transactions and balances, supporting the preparation of regular and reliable financial statements, safeguarding the entity's assets, and are subject to auditing arrangements acceptable to the Bank.

Executive Summary and Conclusion

16. **The FMA was carried out in accordance with Bank Policy: Investment Project Financing and Bank Directive-** Investment Project Financing and the Financial Management Manual for World Bank-Financed Investment Operations (effective March 1, 2010 and revised February 10, 2017).

17. **The scope of the FMA included**: (i) an evaluation of existing FM systems to be used for Project monitoring, accounting and reporting; (ii) a review of staffing arrangements; (iii) a review of the flow of funds arrangements and disbursement methods to be used; (iv) a review of internal control mechanisms in place, including internal audit; (v) a discussion with regards to reporting requirements, including the format and content of unaudited IFRs; and (vi) a review of the external audit arrangements.

18. **The overall conclusion of the FMA is that**: (i) the FM arrangements for the proposed Project are considered adequate; (ii) the funds flow, disbursements, monitoring, auditing and supervision arrangements have been designed in a way to respond to the Project's implementation arrangements; and (iii) the residual FM risk associated with the Project is rated as LOW. There are no FM-related conditions for negotiations, board and/or effectiveness.

19. **The FMA identified the following risks to the achievement of the PDO**: (i) the close coordination that will be required between MME and the other Project executors, and (ii) the Federal Government's fiscal situation that can restrict Project's budget allocations and delay implementation, issues that will be mitigated by close Bank support and supervision.

20. **Integrated Fiduciary Risk Rating: The procurement risk rating is Low.** The integrated fiduciary risk rating is Low.

FMA of MME

21. **Implementing Entity.** The Borrower will be the MoE and the Project will be implemented by the Ministry of Mining and Energy - MME, which was created by the law # 8.422/1992 as an entity of the Direct Administration. It represents the Federal Government as the formulator, inducer and supervisor of public policies on geology, mineral and energy resources, use of hydraulic energy, mining and metallurgy, and oil, fuel and electric energy, including nuclear. It is also responsible for rural energization, agro-energy, including rural electrification, funded by the National Electric System and ensuring the conjuncture and structural balance between demand and energy supply in the country. The UGP/SE38 has been legally stablished39 in 2011 to implement Project P126537 – Energy and Mineral Sectors Strengthening Project (META Project)40. In its turn, the META Project had already built on

38 Unidade de Gestão do Projeto, Project Management Unit.
39 Portaria MME nº 529, 12 de setembro de 2011 (Estrutura da Unidade de Gestão do Projeto), *Portaria MME nº 108, de 14 de março de 2017* (Estrutura e Atribuições da Assessoria Especial de Gestão de Projetos) and *Decreto nº9.675, de 2 de janeiro de 2019* (Estrutura Regimental do MME)
40 *Link to META Project's website*

experience accumulated under the satisfactory implementation of another preceding Bank financed project ESTAL P076977.

22. **The proposed institutional arrangements for the implementation of the project are structured in three levels**: (i) a PSC [41] for superior deliberative and decision-making processes; (ii) a PIU for managerial and operational activities (administrative and FM tasks, disbursements and project reporting); and (iii) specific supervision units in the MME secretariats and affiliated entities originating the demands for TA activities (co-executors), which are: (a) Assessoria Especial de Gestão Estratégica[42] – AEGE/SE; (b) AESA/SE; (c) SPE; (d) SEE; (e) SPG; (f) SGM; and (g) SPOA; (h)[43] ANEEL; (i)[44] ANM; (j) ANP; (k) CPRM; (l) EPE; (m) ONS; and CCEE. All co-executors are administratively and financially subordinated to MME, except for ONS and CCEE which receive sectorial funds upon ANEEL's approval.

23. **MME has maintained the UGP/SE structure created for META's implementation and the UGP/SE staff, composed by civil servants and consultants, for the implementation of P170850 (second phase of the Project).** All UGP/SE's consultants had their contracts extended until May to July 2020. Project P170850 is expected to be already signed by the time the consultant's contracts are to be renewed, and no/minor staff turnover is expected.

24. **The UGP/SE has an appropriate management structure.** Its General-Coordinator is subordinated to the MME's Executive Secretary, and his/her performance must be independent and harmonious, while respecting the institutional interests.

25. **MME is audited by the CGU and by the Federal Court of Accounts (Tribunal de Contas da União - TCU).** Information regarding MME's activities is also available to the public, via the Federal Government Transparency Portal (Portal da Transparência) created in 2004. This portal aims to guarantee public access to information on the use of public resources.

26. **MME's accounting function is managed/controlled by a specific unit SPOA/SE/MME.** The Accounting Coordination (Coordenação de Contabilidade– CONT) is the unit responsible for the accounting management within MME. Said Coordination is subordinated to the General-Coordination of Budget and Finance (Coordenação-Geral de Orçamento e Finanças – CGOF), which integrates the SPOA/SE/MME structure.

27. **In summary, MME has a suitable organizational structure to ensure responsible Project management, and UGP/SE staff are familiar and experienced with the Bank's policies and procedures**. It is important to mention that in their Implementation Completion Reports – ICRs, ESTAL Project, first Project implemented by MME, was rated satisfactory towards achievement of PDO and moderately satisfactory in terms of overall implementation progress, while META's overall outcome rating was also Moderately Satisfactory.

28. **Planning and budgeting.** The project will follow the Federal Government's budget cycle. The budget cycle

[41] The PSC is a committee composed of representatives of the MME (executor) and the affiliated entities (co-executors). It oversees implementation, ensure high level coordination between activities undertaken by the different co-executors, supervise implementation and evaluate results.
[42] Strategic Management Office.
[43] National Agency for Electric Energy.
[44] National Agency of Mining.

includes the planning and implementation of all government activities, which are reflected in the Multiannual Investment Plan (Plano Plurianual (PPA)), the Budget Guidance Law (Lei de Diretrizes Orçamentárias (LDO)), and Annual Budget Law (Lei Orçamentária Annual (LOA)).

29. **LDO and LOA have their own rites for elaboration, approval and implementation by the Legislative and Executive Branches**. The deadlines for the budget units to present the information under each phase of budget laws elaboration and execution are established by the Ministry of Economy through a Portaria. Following the stablished deadlines, the MME's SPOA requests each of its Unidades de Gestão[45] – UG to forward information related to its activities. Based on the amounts negotiated with SPOA and approved by the MME Executive Secretary, the Project Management Office (Assessoria Especial de Gestão de Projetos – AEGP) inputs the information regarding the first Meta Project in the Federal Government systems. The current PPA (2016-2019) ends in the current financial year. The preparation of the next PPA (2020-2023) was finalized on August 31, 2019 and the META II Project is foreseen under Action (Ação) 13E4.

30. **Most of project's budgeting and accounting transactions will be processed through SIAFI[46].** Payments will follow the official commitment (empenho), verification (liquidação) and payment (pagamento) routines[47]. The project's accounting routines are processed by the SPOA/SE/MME. Any request for an increase of the approved budget, requires pre-approval, that is sought through a budget supplemental process. Actual expenditures are compared to budgeted expenditures, with reasonable frequency, and justifications provided for variations relevant to the budget.

31. **ONS and CCEE would be the only exceptions as they do not follow the Government's budget process above-described,** considering both are private entities, regulated by ANEEL, created to support the proper functioning of the electricity sector in Brazil. ANEEL directly oversees both entities' budgets and approves transfers of sectorial funds from the MME to ONS and CCEE.

32. **From 2020, ANP, ANEEL and ANM will become budgetarily and financially autonomous.** However, under the META II Project, budgetary and financial decentralization processes will continue to be carried out directly by the MME, through the PIU.

33. **The UGP/SE will create specific program(s)/line(s) in the LOA for the Project**. This will enable the recording and reporting of Project operations / activities and their respective disbursement categories[48], using the

45 Management Units.
46 Sistema Integrado de Administração Financeira do Governo Federal – Federal Government Integrated Administration System.
47 At the commitment stage (*empenho*) proposed expenditure is verified to ensure that spending proposals have been approved by an authorized official, that funds have been appropriated in the budget, that sufficient funds remain available in the proper category of expenditure, and that the expenditure is proposed under the correct category. At the verification stage (*liquidação*) the documentary evidence that the goods have been received or that the service has been performed is verified. Before the payment stage (*pagamento*) confirmation is needed that a valid obligation exists, that the competent person has signed that the goods or services have been received as expected, that the invoice and other documents requesting payment are correct and suitable for payment, and that the contractor is correctly identified. These controls are built into SIAFI.
48 The LOA is divided into groups of expenditures depending on their nature, GND. Project's expenditures can be of two types: "3 - Other Current Expenditures" and "4 - Investments". Thus, the LOA structure partially reflects the structure of the Meta Project's categories ("4 - Investments" is usually equivalent to Category 1 and "3 - Other Current Expenditures" to other categories: Consultant's Services, Training

Government' (that is country) systems.

34. **The procedures in place to plan Project activities, prepare related budgets, and to collect information from the coexecutors is adequate. The Project plans and budgets** (to be reflected in the LOA) are realistic, based on valid assumptions and are prepared for all significant activities in sufficient detail to provide a meaningful tool to monitor subsequent performance (budget vs. actual variance analysis).

35. **The Federal Government has been under fiscal constraints, which can restrict Project's budget allocations (contingenciamento) and delay its implementation**. This same situation has been dealt with during the META Project and the Bank worked closely to the UGP/SE to reduce as much as possible the negative impacts of budget restrictions on the Project. This Project does require counterpart funding in the amount of US$ 3.473 million. The counterpart funding is budgeted as MME's and coexecutors' Project staff working hours.

36. **Accounting.** The Project will be implemented using the Federal Government's existing systems. The Federal Government's accounting standards (Modified Accrual[49]) will be followed. The MME follows: (i) the Brazilian Accounting Standards Applicable to the Public Sector (Normas Brasileiras de Contabilidade Aplicadas ao Setor Público - NBCASP); (ii) Law No. 4.320/64, that establishes certain high-level accounting principles (Normas Brasileiras de Contabilidade - NBC); and (iii) the Accounting Manual Applicable to the Public Sector (Manual de Contabilidade Aplicada ao Setor Público - MCASP) issued under Law No. 10.180 of February 6, 2001 and Decree 3.589 of September 6, 2001. There are written policies and procedures covering all routine accounting and related administrative activities and only authorized persons, may change or establish new accounting principles, policies or procedures.

37. **Both the NBCASP and MCASP were revised via Portaria STN 467 of August 6, 2009 and updated in 2013 to incorporate the text of the International Public-Sector Accounting Standards (IPSAS[50]),** with adaptations for the Brazilian reality. There is a work plan (National Treasury Secretariat (STN) Ordinance Implementation Plan n ° 548/2015) in progress, that will culminate in the convergence of 35 IPSAS currently in force by 2023.

38. **The MME has access to the World Bank's Client Connection system for up to date information relating to the disbursement of the proceeds of the Loan.** The Project's accounting records in SIAFI, will be reconciled on a regular basis with this information. SIAFI can produce the necessary financial data regarding the Project for the preparation of financial Reports (IFRs and SOEs) in Excel spreadsheets. Accounting and financial staff are adequately trained to use and maintain the system. All coexecutors use SIAFI, except for ONS and CCEE, which will receive Project's funds and document expenditures through SICONV[51], which has an interface with SIAFI.

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and Operating Costs). The Project's components are not reflected in the LOA, as the financial dimension of a budget action uses the following Expenditure's Nature classifiers: (i) Expenditure's Economic Category (What is the economic effect of spending?); (ii) Expenditure's Nature Group or GND (In which expenditure class will the expenditure be incurred?); (iii) Mode of Application (How will resources be applied?); and (iv) Expenditure Element (What inputs do you want to use or purchase?). Therefore, it would not be timely or convenient trying to reflect the Project's components in the LOA. For more information on the LOA expenditure's classification, check the *2020 Budget Technical Handbook*.

49 It recognizes revenues when they become available and measurable and, with a few exceptions, records expenditures when liabilities are incurred.

50 Issued by the International Public Sector Accounting Standards Board of the International Federation of Accountants (IFAC-IPSASB).

51 Sistema de Gestão de Convênios e Contratos de Repasse do Governo Federal.

39. **Internal controls.** Transactions processing will use the MME's internal approval processes and systems, that provide for reasonable segregation of duties, supervision, quality control reviews and reconciliation. The processes flows are well understood by UGP/SE's personnel.

40. **Most of project transactions will be processed within SIAFI, that enforces strict segregation of duties, controls the preparation and approval of transactions to ensure that these transactions are properly executed and recorded** (that is, different units or persons authorize the transaction and record the transaction), and guarantees the confidentiality, integrity and availability of data. Except for ONS and CCEE that will receive funds and document expenditures through SICONV. All accounting and support documents are retained on a permanent basis, using a system that allows for easy retrieval for the authorized user.

41. **The MME has in its structure an Internal Controls Office (Assessoria Especial de Controle Interno –AECI), which is responsible for assisting the Minister in areas as internal controls, risk management, Transparency and management integrity.** However, such office does not undertake any control over META Project as this attribution has been designated to the CGU, which has unlimited right to information within the Project's scope, having access to all premises and facilities and authorization to consult with any member of the UGP/SE to clarify questions. When CGU issues recommendations, the responsible official is notified to take the required mitigation measures. The UGP/SE and CGU follow-up on the recommendation's resolutions.

42. **The CGU is the Federal Government's internal control department responsible for carrying out activities related to the protection of public assets and increasing management transparency, through public audit, correction and prevention actions, corruption fight and ombudsman.** The CGU should also exercise, as Central Agency, the technical supervision of the federal entities that compose the Internal Control System and the Correction System and the Federal Executive Body's ombudsman units, providing the necessary normative guidance. Different departments within CGU are responsible for the internal and external audits of the Project.

43. **The project's bank account reconciliation is prepared by the Finance Coordination** (Coordenação Financeira – COFIN) team and approved by the responsible official (Ordenador de Despesa).

44. **There is also an adequate system for protecting the Project's assets from fraud, waste and abuse**. Project's assets will be managed by SPOA, following Federal Government's regulations for asset management. Goods acquired under decentralized execution agreements are inspected periodically by the UGP/SE team. At the end of the execution agreement, these goods are donated to the co-executors, as foreseen in such agreements.

45. **The Project's internal control system is documented in the Operational Manual (OM),** which comprises descriptions, flow charts, policies, templates and forms, user-friendly tools, tips and techniques to ensure that the approval and authorization controls continue to be adequate and are properly documented and followed with adequate safeguarding of the Project's assets (including the following topics in the FM and Disbursements section: flow of funds, chart of accounts, Project organizational structure and responsibilities, oversight lines, authority limits, internal and external audit arrangements, accounting practices, disbursement procedures and the financial reporting arrangements). The OM should be updated by the UGP/SE and be approved by the Bank within one month after Negotiations. The OM will be maintained/updated throughout the Projects' life. The OM for META and all other Project documents are available for public consultation in the Project's website.

46. **Borrower Actions to Prevent and Combat Fraud and Corruption in connection with the Use of Loan Proceeds.** In furtherance of the above-stated purpose and general principles, the Borrower will:

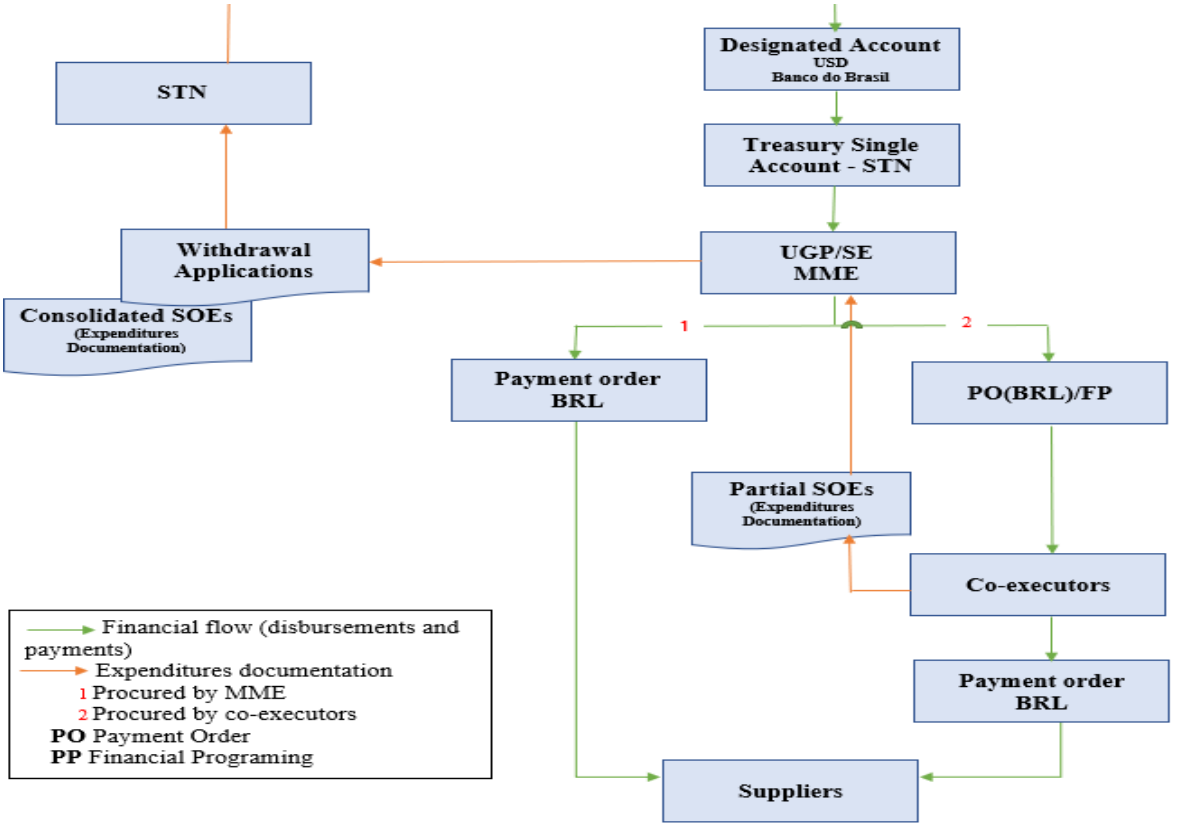
(i) take all appropriate measures to prevent Fraud and Corruption in connection with the use of Loan proceeds, including (but not limited to) (i) adopting appropriate fiduciary and administrative practices and institutional arrangements to ensure that the proceeds of the Loan are used only for the purposes for which the Loan was granted, and (ii) ensuring that all of its representatives involved with the project, and all recipients of Loan proceeds with which it enters into an agreement related to the Project, receive a copy of the Bank's IPF Anti-Corruption Guidelines and are made aware of its contents;
(ii) immediately report to the Bank any allegations of Fraud and Corruption in connection with the use of Loan proceeds that come to its attention;
(iii) if the Bank determines that any person or entity referred to in (a) above has engaged in Fraud and Corruption in connection with the use of Loan proceeds, take timely and appropriate action, satisfactory to the Bank, to address such practices when they occur;
(iv) include such provisions in its agreements with each recipient of Loan proceeds as the Bank may require giving full effect to the Bank's IPF Anti-Corruption Guidelines;
(v) cooperate fully with representatives of the Bank in any investigation into allegations of Fraud and Corruption in connection with the use of Loan proceeds; and
(vi) if the Bank declares any recipient of Loan proceeds ineligible take all necessary and appropriate action to give full effect to such declaration.

47. **Flow of Funds and Disbursement Arrangements.** The disbursement of Project funds will be processed in accordance with Bank procedures as stipulated in the Legal Agreement and in the Disbursement and Financial Information Letter. Funds will be disbursed in respect of eligible expenditures incurred or to be incurred under the Project and will be disbursed in accordance of agreed financing percentages.

48. **The primary disbursement method will be Advances.** The Project will be also able to process Reimbursements, if required. The funds flow will rely on existing Federal Government (i.e. Country) systems: all payments and transfer of funds will be made by the MME using the SIAFI system, once payment obligations have been committed and verified.

49. **The following diagram indicates the flow of funds for the Advance disbursement** method (Figure 2):

Figure 1.2. Flow of funds



(1) Funds will be transferred to the Treasury Single Account – TSA in Banco do Brasil, administered by STN that will be used as Project's Designated Account. The designated account will be denominated in United States Dollars (US$). A specific subsidiary bank ledger account will be created for the Project.

(2) Funds will be internalized by STN and the equivalent Brazilian Reais (BRL) will be made available to the UGP/SE for payment.

(3) The Project executes the financial resources in two ways:
(3.1) Centralized: Payment processes will be registered in SIAFI by the UGP/SE regarding the activities undertaken by MME;
(3.2) Decentralized: The UGP/SE provides resources to the decentralized coexecutors trough Ordem Bancária (transfer of funds) or Destaque Orçamentário (budget decentralization), depending on the coexecutor's legal constituency.

(4) Coexecutors report eligible expenditures to the UGP/SE through SIAFI, except for ONS and CCEE, which report expenditures through SICONV;

(5) The UGP/SE will consolidate information received from coexecutors with its own implementation. All information for reporting is available in SIAFI. All financial information must be supported by the accounting records[52]. UGP/SE will prepare consolidated SOEs and submit them to the Bank.

50. **The proposed Variable Ceiling for the DA will be based on the forecast for the next semester as provided in the semi-annually IFR.** The Minimum Application Size for Reimbursement Withdrawal Applications (WAs) will be US$ 1,500,000 equivalent. The frequency for the presentation of eligible expenditures paid from the DA, is at least once every six months.

51. **The Project will report on the use of Advances and process Reimbursement requests, through WAs supported by SOEs[53].** The UGP will sign off on the WAs documenting expenditures, based only on actual paid, ensuring that the Loan proceeds were exclusively used for eligible expenditures. The Project Application Deadline Date (final date on which the Bank will accept WAs from the Borrower or documentation on the use of loan proceeds already advanced by the Bank) will be four months after the Loan Closing Date. This "Grace Period" is granted to allow the orderly Project completion and closure of the Loan Account via the submission of WAs and support documentation for expenditures incurred before the Closing Date.

52. **No withdrawal shall be made for payments made prior to the date of the Legal Agreement**, except that withdrawals up to an aggregate amount not to exceed US$ 7.5 million equivalent may be made for payments made prior to the Signing Date, but in no case, more than one year prior to the Signing Date, for Eligible Expenditures as set out in the Legal Agreement.

53. **Financial Reporting.** The UGP/SE will prepare and submit to the Bank semi-annually IFRs, no later than 45 days after the end of each reporting period. These IFRs will be prepared in Excel spreadsheets with information extracted from SIAFI and will consolidate the Project's financial data for all co-executors, using the cash basis.

54. At the end of each fiscal year, the UGP/SE will prepare the annual financial statements for the Project that will be audited. The second semester IFRs with accompanying notes, will serve as the Projects' annual financial statements.

55. The following semi-annual IFRs (to be prepared in Reais, which is the currency of expenditure will be prepared for Project monitoring and management purposes and be submitted to the Bank:

(i) IFR 1 –Sources and Uses of Funds by Disbursement Category (period to date, year-to-date, Project-to-date) showing budgeted amounts versus actual expenditures, (i.e., documented expenditures), including a variance analysis;

[52] The General Conditions require the Borrower to retain all records (contracts, orders, invoices, bills, receipts, and other documents) evidencing eligible expenditures and to enable the Bank's representatives to examine such records. They also require the records to be retained for at least one year following receipt by the Bank of the final audited financial statements required in accordance of the Legal Agreement or two years after the Closing Date, whichever is later. Borrowers are responsible for ensuring that document retention beyond the period required by the Legal Agreement complies with their government's regulations.

[53] The SOE method has been maintained as the UGP/SE already set up its systems for the issuance of SOEs for disbursements purposes and a change in the disbursement method would cause unnecessary burden to the UGP/SE.

(ii) IFR 2 –Uses of Funds by Project Component (period to date, year-to-date, Project-to-date) showing budgeted amounts versus actual expenditures, (that is, documented expenditures), including a variance analysis; and
(iii) IFR 3 – DA bank reconciliation and accompanying bank statements.
(iv) IFR 4 – Disbursement forecast for the next period.
(v) Annex to the IFRs with co-execution detailing.

56. **External Auditing.** For Project purposes, the external audit of the Project, will be performed by the CGU following agreed ToR acceptable to the Bank, and in accordance with International Standards on Auditing (ISAs) (issued by The International Auditing and Assurance Standards Board of the International Federation of Accountants) or national auditing standards if, as determined by the Bank, these do not significantly depart from international standards.

57. **The audited financial statements will be prepared in accordance with accounting standards acceptable to the World Bank** (that is, IPSAS or national accounting standards where, as determined by the Bank, they do not significantly depart from international standards). The ToR should be prepared by the UGP/SE and be approved by the Bank within 1 month after the Signing Date.

58. **The audit report (and any accompanying management letter) should be submitted to the Bank no more than six months after the end of the fiscal year.** The Bank will review the audit report and will periodically determine whether the audit recommendations are satisfactorily implemented. The Bank also requires that the Borrower/Recipient disclose the audited financial statements in a manner acceptable to the Bank and following the Bank's formal receipt of these statements from the Borrower/Recipient, the Bank will also make them available to the public in accordance with The World Bank Policy on Access to Information.

59. **An audit exception to combine the 2020 and 2021 audits may be necessary, depending on the Signing Date of the Legal Agreement.** If necessary, the audit exception must be requested by the UGP/SE and approved by the Bank.

60. **Assessment of the external coexecutors:** The Bank will perform FM assessments of each external coexecutors: ANEEL, ANM, ANP, CPRM, EPE, ONS and CCEE before negotiations, to ensure that proper FM arrangements are in place by Project signing.

61. **Conditions or Nonstandard/Significant Financial Covenants (that is, Relevant issues to be included in the Legal Documents).** There are no significant FM-related conditions for Board and/or Effectiveness.

62. **Plan for FM Supervision during Implementation**. The Bank will undertake formal supervision of the Project based on a risk profile. Supervision missions will involve amongst other steps: (i) the review of the IFRs; (ii) a review of the auditors' reports and follow-up on issues raised by auditors, as appropriate; (iii) the follow up on any financial reporting and disbursement issues; (iv) a discussion of FM issues with the Project team; and (v) an update of the FM risk and performance rating in the Implementation Status and Results Report (ISR). The proposed FM Supervision Plan is as follows:

Table 1. FM Supervision Plan

Report	Periodicity	Due date
Review IFRs	Semi-annually	To be submitted by the Borrower by February 15 and August 15, with the Bank reviewing the IFRs within 30 days of receipt thereof
Audited Project Financial Statements	Annual	To be submitted by the Borrower within six months after the end of audit period, with the Bank reviewing the audit report within 30 days of receipt thereof
FM Mission Supervision	Risk Based	• High-Field mission every 6 months • Substantial-Mission every 6 months alternating between a Field mission and a Desk Review • Moderate and Low-Field mission every 12 months

63. The team resources estimations are summarized below:

(i) 2 Staff Weeks (W) for FM supervision in the first 12 months of the Project-(1 W for the review of each semi-annual IFR (x2), and 1 W for General Support and for 1 SPN mission); and

(ii) 3 W for FM supervision in the subsequent years of the Project (1 W for the review of each semi-annual IFR (x2), and 1 W for General Support and for 1 SPN mission and 1 W for Audit Report Assistance and Review.

ANNEX 2: ENERGY AND MINING REFORMS IN BRAZIL[54]

1. **The Constitution passed in 1988 allowed private investment in infrastructure, including energy, and provided the legal framework for regulating that investment**. However, the reorganization of the electricity sector in Brazil was set in motion only after the ratification of the Electricity Concession Law No. 9074 early in 1995 that provided for the unbundling of the sector, principally the functions of the dominant power generator and transmitter Eletrobrás.

Electricity

First wave of Reforms

2. **The first wave of reforms included important institutional changes, and several power sector institutions were created under legislation enacted** between 1995 and 1998:

a. The ANEEL was created by Law No. 9,427/96 as an independent regulatory entity with the purpose of regulating the generation, transmission, distribution and commercialization of electric power in the country.

b. The CNPE was created by Law No. 9,427/96 with responsibility for proposing national energy policies. The CNPE was also charged with improving coordination between the power and oil sectors.

c. The ONS was created by Law No. 9,648/98 to control power generation and transmission activities in the interconnected power system through a tight pool dispatch system (so that water use is optimized across all hydro generators, with a central determination of water values and of wholesale energy market prices).

d. The Wholesale Electric Energy Market (MAE) was also created by Law No. 9,648/98 to undertake all wholesale electricity purchase and sale transactions and to promote the accounting of the agents' transactions in the multilateral short-term market under market rules.

e. Law No. 9648/98 also set out Eletrobras unbundling of into six holding companies and 14 generation and transmission companies. Eletrobras retained ownership of the transmission grid, the Brazilian part of the binational Itaipu dam and hydropower power station, the nuclear power plants and CEPEL's research and development (R&D) activities. The generation companies formed from Eletrobras were priviatized.

3. **The largest privatization of distribution assets occurred between 1996 and 1999 and included Eletropaulo which was split prior to privatization into two distributors** (Eletropaulo Metropolitana, and Empresa Bandeirante), a transmission company and a generation company. Another major privatization of this period was the auction of the distribution companies of Rio de Janeiro (CERJ and Light). Other auctions included distributors in the states of Minas Gerais, Ceará, and Bahia. These privatizations yielded the highest values per customer served by distributors among the global wave of privatizations of power distributors at that time. As a result of these privatizations, private sector

[54] This Annex is based on the work carried out under the Programmatic ASA "*Revisiting the Power and Gas Sector Reforms in Brazil*" and the policy note that summarized the key findings and recommendations.

participation in the distribution sector increased from 2.6 percent in 1994 to about 60 percent by the end of 1998.

4. **To promote competition, the reform model created the categories of large consumers** which have the right to choose their suppliers and whose power purchases were not subject to price regulation, independent power producers and marketers[55], and it established open access for entities in these categories to the distribution and transmission grids. Private companies were also permitted to own transmission lines, which would be operated by the System Operator and regulated by ANEEL. Competition was also supported by regulations that imposed ownership limitations in each segment of the power supply chain to prevent the concentration of market power.

5. **Despite the reforms implemented since 1996 to attract additional investment in generation, the expansion of supply was unable to keep up with rising demand**. Installed capacity expanded by 28 percent from 1990 to 1999 while electricity demand grew by 45 percent. The government tried to address this supply constraint by launching in 2000 the Thermal Priority Program (PPT) to encourage private investment in gas-fired generation and to develop the market for natural gas. The plan included the construction of 59 power plants. However only 15 were built, as despite gas price subsidies, imported gas from Bolivia – the main source of fuel for gas fired power plants – remained expensive, and investors shied away from price and regulatory uncertainty.

6. **During the period 2001 to 2002, Brazil suffered one of the worst droughts on record that, together with lower than expected generation expansion during the previous years**, obliged the Government to implement a very strict rationing program for 9 months to reduce by 20 percent the load in 80 percent of the country. This rationing program succeeded in managing power demand within the constrained power supply and it was so effective that consumption did not recover to expected levels once the drought ended. Thus, the country went from a situation of power supply scarcity to one of surplus. This situation created other issues with distribution companies, as their sales of electricity were reduced and so were their revenues. Distribution companies were also blamed for passing high costs through to final customers, reflecting the contract terms on which they had to procure emergency power supplies.

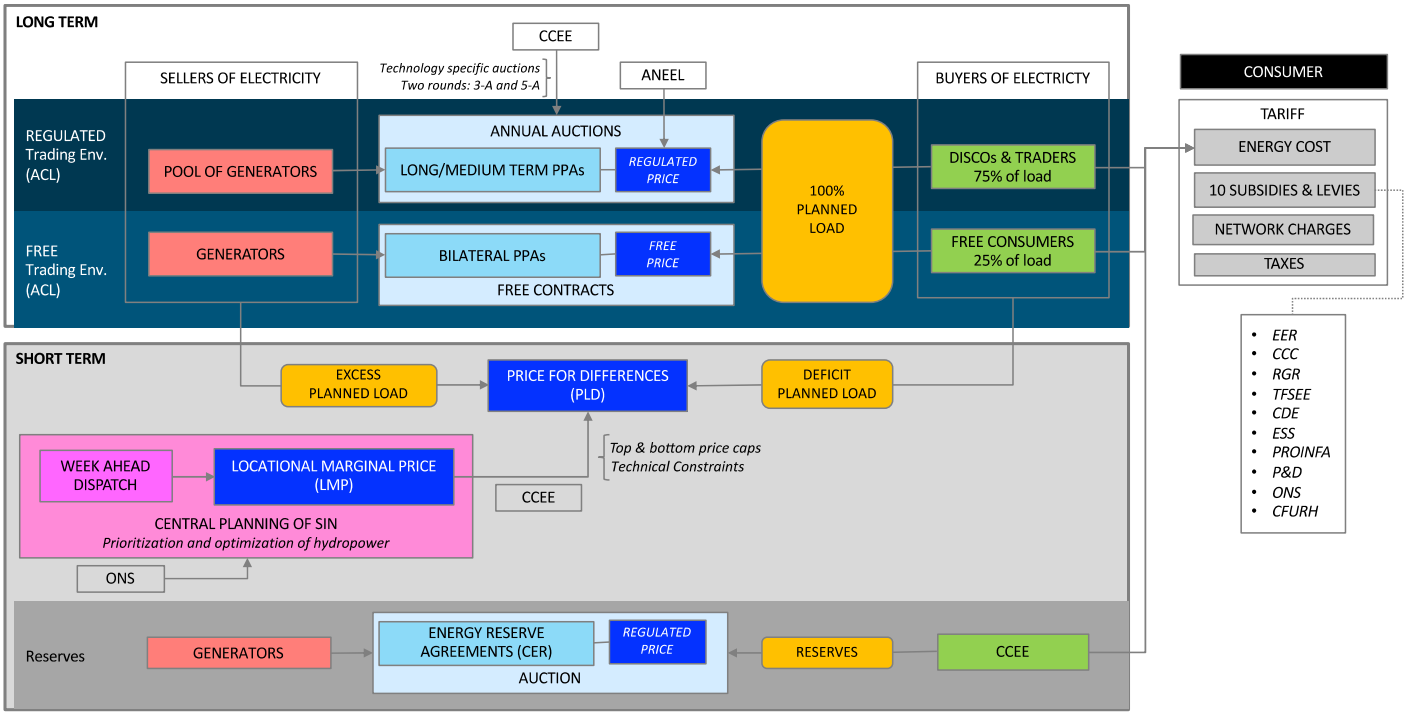
Second wave of reforms

7. **In 2004, the government implemented a second "wave" of power market reform in Brazil ("new model") to address some of the problems associated with incentives for installing new generation capacity, improving competitive conditions and strengthening the institutional framework**. The emphasis was to enable the coexistence between state-controlled and private companies. The main characteristics of this new model were: (i) Less emphasis on the short-term "spot" market as provider of signals for system expansion; (ii) More emphasis on the forward contract market to induce additions of new generation capacity. (iii) Strengthening of regulatory agencies. (iv) Prohibition on cross-ownership and self-dealing; (v) Postponement of the separation between distribution and retailing (commercialization); (vi) Requirement for mandatory energy auctions for distributions companies to cover 100 percent of all loads. Distributors can only acquire energy through contract auctions for long-term contracts (3 to 5 years) to reduce risks for generation investors and promote competition. Benchmark prices were used to pass-through wholesale power costs to consumers under the new energy auctions, reflecting the average price of all forward contracts signed.

[55] Private companies who operate in the electricity industry by selling energy to the unregulated consumers and to distribution companies

8. **The original wholesale market administrator MAE was absorbed by the CCEE which was given the responsibility for coordinating energy commercialization under the new rules** (Law No. 10,848, of March 2004). CCEE was created as a private and not-for-profit institution with responsibility for administering supply to both regulated customers and large customers. The new model also introduced the Power Sector Monitoring Committee to monitor service conditions. The new model led to contracts for over 16,000 MW of new generating capacity in five energy auctions with a high participation of thermal plants.

Figure 2.1. Market Design



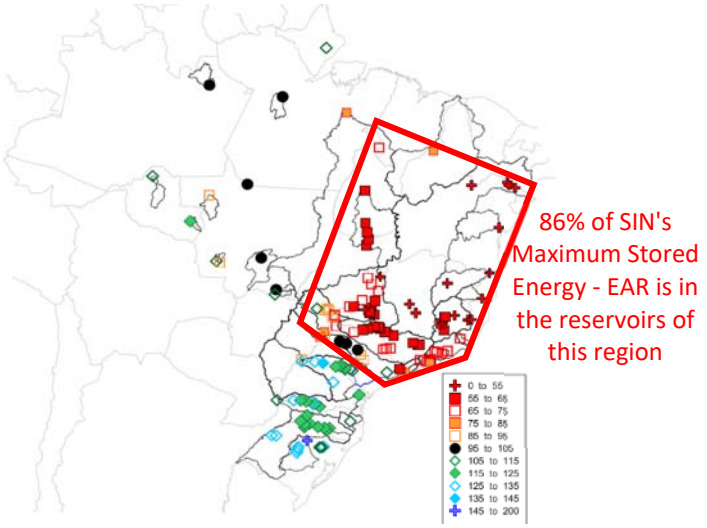
Third Wave of Reform

9. **Implementation issues with the second reform wave of 2004 and unintended consequences of market interventions in 2012 have left the market unbalanced and raise concerns over the security of supply**. While the 2004 reform managed to mobilize significant additional investment, contractual end consumer prices were high, exacerbated by a plethora of cross-subsidies and additional government levies. Consequently, in 2012, the Provisional Measure (MP) 579/2012 targeted lower tariffs by renewing concessions expiring between 2015 and 2017 (for 20 or 30 years) under specific conditions regulated by ANEEL. The MP offered generation companies to accept a reduction in the calculation of the generation costs in exchange for being exempted from hydrological risks (i.e. from purchasing more expensive power on the spot market to make up for supply shortfalls in dry periods). In turn, distribution companies were asked to assume the monthly hydrological risk but were allowed to pass the additional costs to the final consumers. Transmission companies had to accept changes to their contracts, including transmission grid upgrades. These interventions managed to reduce tariffs to final consumers by around 18 percent in 2013 but triggered

a number of unintended outcomes:

10. **The hydrological risk allocation rules divided generating companies in two groups: the first predominantly formed by risk exempted companies that belonged to the Eletrobras group** (with renewed concessions); and the second group formed mostly by private plants that sold energy in centralized auctions and by other state-owned concessionaires. These did not adhere to the renewal restrictions and remained exposed to both hydrological risk and the related financial losses. In response, the Government issued a Provisional Measure (MP 688/2015) in 2015 with the objective of offering alternatives for the mitigation of hydrological risk.

Figure 2.3: Average Natural Flow Observed during 2013-2018, Compared to Average Official History - 1931/2017 - (% MLT)



Source: ONS

11. **Climate volatility continues to threaten energy security**, due to the substantial contribution of hydropower to the energy mix. Since 2013 the parts of Brazil which store 86 percent of the hydro capacity of the country have experienced below average rainfall. To counter the hydrological risk, the country is significantly increasing the participation of VRE. The projected growth represents doubling the solar production from 1.78 GW in 2018 to 3.87 GW in 2023, and wind increasing by 3.2 GW from 2018 levels to 17.5 GW in 2023, and some projections even show a growth of up to 45 percent. However, increasing the VRE to such levels also brings complexity to managing the national grid system. The power sector planning in Brazil is based on a hydro-thermal generation grid. To achieve the growth in VRE: (i) planning and auction models and methodologies need to be modified to include a higher share of VRE[56]; (ii) regulatory adjustments are required so that the cost for accurately managing VRE is reflected in both determining the order of energy dispatch and in the final tariff price; (iii) accuracy of PV forecasting has to be improved to include 24-hour per intra-day weather forecasting models (which also affect other renewable energy sources, such as wind and hydro), so as to allow for greater efficiency in the energy dispatch, and improved energy exchanges between the energy regions[57]; and (iv) regulatory adjustments and guidelines (including legal, tariff setting, financial incentives, and so on) are needed to expand the use of DG.

12. **The transmission companies were supposed to be compensated by ANEEL for upgrade investments starting in 2013 but lack of funding delayed the conclusion of negotiations for repayment.** An agreement was finally signed in 2017 stipulating that the government owed US$20.3 billion to be paid over the course of 8 years. To finance this debt, the electricity tariffs for residential and industrial energy consumers were increased by 7.17 percentage on

[56] Current planning models estimate five to six years for new generation plants to become operational, and five years for new transmission lines. VRE, on the other hand, can take as little as one to two years to become operational; however, transmission line construction continues at around five years.

[57] The characteristics of the Brazilian transmission system is that it is divided into mainly four regions (North, Northeast, Southeast/Midwest, and South), and there are large energy exchanges between these regions in relation to the production capacity and demand.

average. The first installment of US$3.5 billion was paid in 2017. Many generation and distribution companies considered that the regulated tariff increases introduced by ANEEL in 2012-2015 are insufficient to cover their fixed cost, and sought protective measures in the courts, resulting in a so-called 'judicialization' of the sector. This paralyzed the market and led to stagnating investments. In addition, hydropower producers have been hit hard by the long draught starting around 2012, and several of them have accumulated unsustainable debt levels.

13. **Distribution companies have over-contracted energy purchases to mitigate price risk, but this has created severe financial pressure during the 2015-16 recession**. The Brazilian distribution companies are obliged to purchase 100 percent for the planned energy demand 5 years in advance Energy costs transfers to the end-consumer tariff is limited to a regulatory price cap of 5 percent. Under this arrangement, distribution companies are exposed to price risk for energy above the price cap, which led to "over contracting" to mitigate that risk. The economic crisis in the years 2015-16 forced distribution companies to enter into bilateral reduction agreements with generators and to auction surplus power in the free negotiation environment (Ambiente de Contratação Livre, ACL).

14. **Distributed generation scale-up**: In April 2012, the Normative Resolution No. 482/2012, issued by ANEEL, came into force and established the initial rules for the development of electricity distributed generation in Brazil. From that moment, Brazilian consumers have been able to produce electricity from renewable sources and offset the surplus with their local distribution company. ANEEL's policy initially allowed small generators using hydro, solar, biomass, wind, and qualified cogeneration of renewable sources of up to 1 MW of capacity to qualify for net metering. In 2015, ANEEL amended the rule to increase the maximum capacity for up to 3 MW for small hydropower and up to 5 MW for other qualified renewable sources.

15. **To try to solve the issues described above, the MME submitted to the President of Brazil a proposed bill relating to the reform of the electric sector and covering a variety of significant changes to the sector that have long been awaited.** The final text of the bill was the result of discussions held under Public Consultation No. 33/2017, undertaken by the MME with widespread participation by the entire sector aiming to restructure and modernize the model of the Brazilian power sector.

A New Road Map for Reform of the Electricity Sector

16. **The current Government which took over in January 2019 is continuing the reform process, recognized the work of the previous administration and continues to build on it to ensure the proper public policies and regulatory environment is in place to attract private sector investments**. The Government created a working group (GT) to assess in detail the needs to modernize the sector. To address the changes which have been affecting the power sector, on April 4th, 2019 the government established a GT, composed of MME, ANEEL, CCEE, EPE and ONS, to assess and present, within 180 days, an action plan for the modernization of the Electricity Sector taking into consideration the Brazilian regulatory and market context. Following a sequence of conferences, seminars and meetings (a total of 140 meetings took place, over 100 specialists, 1,500 participants and for which the World Bank also helped finance a seminar) with the various stakeholders from the public and private sector, the GT presented their findings and recommendations on October, 2019, and by the 29th of October, through the Portaria no. 403, the MME instituted a committee to implement the recommendations for the modernization of the sector. The Action Plan covers 88 actions in 15 areas: (i) Price formation; (ii) Supply criteria; (iii) Transition measures; (iv) Generation and energy production (including a contractual separation of capacity from production); (v) Auction processes; (vi) "Red tape" reduction and process improvement; (vii) Governance; (viii) New technologies; (ix) further liberalization of the market; (x) Rationalization of charges and

subsidies; (xi) Distribution sector sustainability; (xii) MRE[58]; (xiii) Contracting processes; (xiv) Transmission sustainability; and (xv) Integrating gas into electricity.

17. **Regarding electricity prices and tariffs, there is a need to make pricing methodologies more transparent, and rationalize subsidies, taxes and levies**. This is particularly important given the government plans to further liberalize the distribution market, and allow consumers consuming over 500 kW/month[59] to purchase electricity from the free market by 2022. Generation is driven by a complex auctioning process, and prices are regulated for retail customers, with cross-subsidies across: (i) consumer groups (ACR); and (ii) free spot prices set in power market auctions for bulk consumers (ACL). The pricing structure is characterized by significant distortions due to cross-subsidies and specific sector levies, leading to high and non-transparent end-consumer prices.

18. **Linked to the distribution sector, ANEEL released a *regulatory impact analysis* and conducted a series of *public hearing meetings* to discuss economic aspects and sustainable growth of DG at the end of 2018**. Although power companies have urged the GoB to reduce incentives for net metered solar DG, ANEEL has proposed maintaining them until PV reaches a certain proportion of the electricity sector. However, there is consensus regarding the need for a change in the current rules. The current net metering system allows the consumers to offset 100 percent of consumed electricity with the electricity generated by them, without paying any additional charges for the use of the distribution structure. DISCOs state that the system does not fairly compensate them for the use of the distribution service and that with the increase in the number of consumers adhering to the net metering system and the reduction of the distributors' consumer market, the consumers that do not have the capacity to generate their own energy will, ultimately, have their energy bills increased, since the burden of the costs with the distribution system will be redistributed among them. On the other hand, the consumers and the players of the generation market and its supply chain advocate that the current model should remain unaltered for a longer period to allow the market to develop and consolidate. It is also argued that allowing the market to develop brings many benefits to the electric system itself (such as the postponement of investments in expansion of transmission and distribution systems, reduction in network loading, minimization of losses and diversification of the energy matrix), and also to society, since the distributed generation has potential to combine low environmental impact, self-sustainability and the creation of jobs (among other social aspects). ANEEL's preliminary conclusions indicate that both sides have a point and that it is necessary to find a solution for the sustainable development of DG in Brazil focusing on two themes: (i) the need to establish that consumers who use the net metering system start paying certain charges related to the distribution system. and (ii) that such charges are only due after Brazil reaches a certain amount of energy from DG. ANEEL admits that this will add operational complexities to the system, would also allow the gradual evolution of the DG market, with reduced impact on other consumers. This proposal was discussed at public hearings promoted by ANEEL in early 2019 and the next step was the release of a draft of the new Normative Resolution that would amend the current rules.

Natural Gas

19. **Petrobras kept a monopoly in the oil and gas market, except gas distribution and import, until 1995.** Petrobras was established as the national oil company in 1953 under President Vargas under the nation-wide campaign

[58] The MRE is a financial mechanism aimed at sharing the hydrological risks that affect generation agents, seeking to ensure the optimization of hydroelectric resources of the SIN.

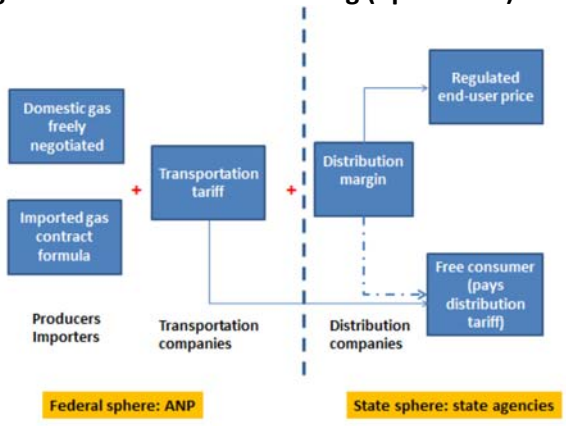
[59] The average consumer in Brazil uses approximately 200 kW/month. 500 kW level consumers thus represent small businesses and large homes. ANEEL and CCEE are scheduled to conclude a study, by December 2022, looking into opening the free market to consumers with <500 kW consumption.

"O petróleo é nosso" ("The petroleum belongs to us"). It held a monopoly, which was enshrined in the Constitution. Two gas distribution companies served the two cities of São Paulo and Rio de Janeiro (Comgas and CEG) while the cities in the North-East were served by 8 distribution companies owned by Petrobras. Only in 1995 an amendment of the Constitution allowed state and private companies to explore, import-export, and distribute natural gas. In 1997, a new national oil company was established, and the legal and regulatory framework was created. Law No. 9,478/97 (the Petroleum Law) set up the regulatory framework establishing the National Energy Policy, setting up the CNPE and the National Agency of Petroleum, Natural Gas and Biofuels (ANP) responsible for policy making and regulation of the petroleum sector, later extended to also cover biofuels.

20. **Brazil's institutional and regulatory frameworks for the oil and gas sector have undergone several modifications since the mid-1990s.** During the period 1997–99 the states of Sao Paulo and Rio de Janeiro privatized their gas distribution companies, while other states decided in favor of a tripartite ownership model in which the state government, Petrobras and private investors were shareholders. The state participation poses governance challenges, making distribution tariffs subject to political interference. States also raise a significant share of revenues from excise taxes on energy consumption and have often emphasized tax revenue objectives to the detriment of the profitability of distribution companies. The privatization of distribution companies with majority government stakes could greatly improve governance but faces challenges as it would require changes to the concession model based on a tripartite ownership model.

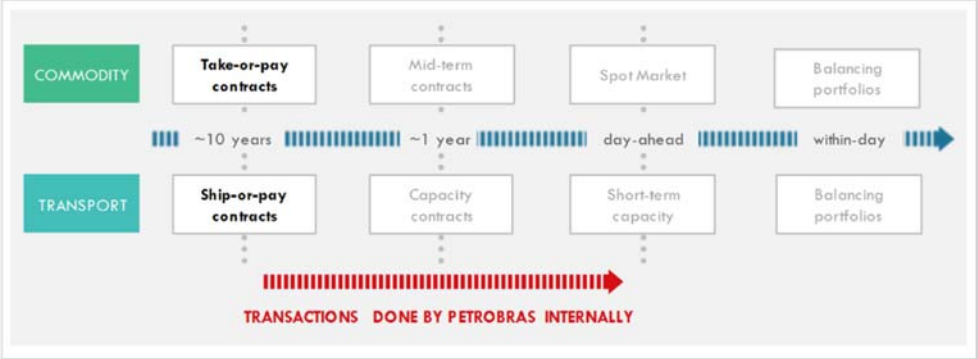
21. **Domestic gas pricing up to 2007 was non-transparent, as prices were bundled at "city gate" and did not discriminate between the commodity and transportation components (see figure 2.41**). In 2007, when gas shortages led to the need to import increasing amounts of LNG, Petrobras adopted a new pricing mechanism, known as the "New Pricing Policy". The new pricing was based on an index combining a fixed and variable portion to better reflect Petrobras portfolio (LNG imports and Bolivian gas imports). Suppliers could contract transmission capacity on the basis of ship-or-pay, allowing long-term commodity trading. However, transit tariffs, regulated by ANP, were not set transparently causing friction between suppliers, mainly Petrobras, and ANP. ANP is currently reviewing the methodology to determine transmission tariffs, including the separation of commodity and transmission prices, along the lines of the European Union reforms to mitigate strategic behavior by a dominant operator.

Figure 2.4. Domestic Gas Pricing (up to 2007)



Source: Adapted from Gomes (2014)

Figure 2.5. Petrobras Internal Transactions



Source: FGV (2018)

22. **The introduction of the Gas Law in 2009 (Law 11.909/09) in principle opened the gas transmission system up for third party access** – in practice this remains an issue, however, as discussed below. Gas demand in Brazil has historically been constrained by factors such as market structure and network access as a result of the de facto monopolistic position of the state-controlled company Petrobras, limited transparency in price formation, slow deployment of new distribution networks, limited development of secondary markets and different regional regulatory and taxation regimes. The 2009 Gas Law established a new role to the state, as planner and coordinator of gas transportation investments, at the federal and state level.

Federal level:

23. **The MME sets sector policies, executes high-level planning, and authorizes the import and export of natural gas;** the MME is also in charge of putting in place a 10-year plan for the expansion of the natural gas transportation system;

24. **The CNPE approves the exploration blocks to be auctioned by the ANP and sets guidelines for the development of Brazil's energy resources**; The National Petroleum Agency (ANP) organizes E&P auctions and gas transportation bids, monitors the execution of E&P activities, authorizes the construction of LNG import terminals and mediates conflicts involving producers, transporters, distributers and users; The EPE is responsible for forecasting long term energy demand as well as organize auctions for three and five-year power supply contracts, respectively A-3 and A-5 auctions.

State level:

25. **The regulatory agencies of the states approve distribution margins and tariffs and monitor gas distribution companies' concession contracts**. Most states have established energy regulatory agencies to ensure quality of service and approve the margins and tariffs of concessionaires. There is no uniform federal regulatory framework, which creates a challenge for operators interested in entering the market across different states.

26. **On the consumption side, the gas market has remained largely captive of Petrobras and local distribution companies.** The states of Sao Paulo, Espirito Santo and Rio de Janeiro allow large consumers to become so-called "free

consumers" after the 11th anniversary of the concession contract. However, since Petrobras remains the only supplier of gas and since a uniform distribution fee must be paid to network operators by free and captive consumers, there is no incentive to become a free consumer. Moreover, on the free market there is considerable supply risks, as alternative suppliers are so far limited. Against this background, Petrobras has begun to divest some of its natural gas network assets. The sale of Gaspetro (gas distribution activities) in 2015, Nova Transportadora do Sudeste (NTS) (gas transmission network) in 2016, and the expected sale of LNG terminals and power plants in the near future shows the change in the role played by Petrobras. Importantly, Petrobras sold in 2019 a majority stake in the National Gas transport Company (Transportadora Associada de Gás S.A, TAG), decreasing its control of gas pipelines by about half. Still, the company is constructing a new offshore pipeline to carry gas from pre-salt production onshore and is also constructing a new gas processing plant in Itaboraí, Rio de Janeiro State) and expanding another (Caraguatatuba). As long as Petrobras controls a large share of the transportation network, private investment upstream and in critical infrastructure may continue to remain below potential.

27. **Despite a regulatory framework that allows for entry of alternative suppliers and competitive provision, the market has remained highly captive and poorly regulated, resulting in higher prices for end consumers**. In principle prices in the wholesale market can be freely negotiated between suppliers (producers, importers and traders) and buyers (distribution companies or free consumers). However, lack of alternative supply and the resulting gas supply risk means that in practice two long-term supply contracts dominate: between Petrobras and distribution companies and large consumers on the one hand and between distribution companies and power plants on the other. Petrobras quasi-monopoly position has allowed it to collect significant rents to ensure security of supply (Figure 12). State level regulators have been inadequate in protecting consumers from this risk.

28. **For the reasons mentioned above, and despite its hydrocarbon reserves endowment, Brazil's end-user gas price has remained high in comparison with other South American and European markets**. Large industrial and residential consumers pay more than $16/MMBtu and $30-$50/MMBtu respectively (Figure 2-3).

Figure 2.6. Wholesale gas prices (USD/MMBtu)

Source: IEA (2018)

29. **While the divestment of Petrobras assets could have significant benefits, it poses some challenges for the security of supply in the short run**. Historically Petrobras has played the crucial role of the supplier of last resort. As such, for instance it aggregated domestic demand to negotiate the gas import contract with Bolivia. The end of the Bolivian supply contract in 2019 is a source of supply uncertainty, should Petrobras no longer purchase gas on behalf of domestic consumers. Over time, new sources of supply offshore as well as from LNG will reduce gas supply risks, but during the transition, the shift from long-term contracts in a captive market to greater reliance on competition will need careful support from the regulator.

30. **In 2016, the government launched the Gas for Growth Initiative as a plan designed to boost the country's natural gas supply**. The plan, that did not move ahead during the Temer administration, was expected to establish a set of business-oriented measures such as a free-trade negotiation process among operators, pipelines and gas storage terminal owners; non-discriminatory access of third parties to gathering lines; introduce natural gas production units and regasification terminals that allow the reduction of transaction costs; promote respect for the "pacta sunt servanda" principle (with important implications off on market structure and competition);introduce improvements to the natural gas sector's federal and local tax structure; promote harmonization between federal and states regulation pipelines; and create gas consumption rules based on efficiency and competitiveness. Transparency was considered to be urgently needed.

31. **More recently, Brazil launched the New Gas Market ('Novo Mercado de Gás') program in 2019**, which builds upon the Gas for Growth Initiative ("Iniciativa Gás para Crescer"), and aims to establish an open, dynamic and competitive natural gas market, cut the domestic price of gas by 40 percent and attract greater investment into the sector. The main pillars of the New Gas Market program are: i) competition promotion; ii) harmonization of the state and federal regulations; iii) integration of the natural gas sector with the power and industrial sectors; and iv) removal of tax barriers. After the failed attempts in 2016 and 2018 to change the natural gas law, the Government has opted to promote change in the short term through: i) approval of Resolution No.16 by the CNPE in June 2019 that provides guidelines for the sector to promote a competitive natural gas market; ii) the Agreement on the Commitment to Terminate ("Termo de Compromisso de Cessação"), which was reached between Petrobras and the CADE in July 2019, whereby Petrobras committed to sell-off several assets and get out of non-core sectors; iii) new regulations by ANP; iv) state regulations, incentivized through programs such as PEF; iv) submission of legal amendments to the National Congress; and v) tax adjustments such as SINIEF. The reform momentum is currently strong, but its ultimate success will hinge upon diligent oversight at both the federal and, critically, at the state level, as well as identifying the right incentives/ clear harmonized rules to attract new entrants while ensuring security of supply.

32. **The new vision for a competitive gas market in Brazil comprises non-discriminatory Third-Party Access (TPA) to the transmission system, negotiated access to essential infrastructure and the establishment of entry-exit zones with liquid virtual trading points (VTPs).** Within each entry-exit zone there will be a VTP or hub where shippers should be able to trade gas freely within and between each zone . The Brazilian market currently operates based on point-to-point system with transmission capacity contracts for single pipelines and/or group of pipelines. Point-to-point capacity contracts do not allow their holders (network users) to trade gas at a VTP and Petrobras remains the balancing provider for the system. Accordingly, it is crucial that the existing point-to-point capacity contracts are amended to entry-exit capacity contracts and that a proportion of the available capacity falls in the hands of the new Transmission System Operators who can then offer this capacity to new entrants on a non-discriminatory basis or through an exchange, the

market operator following standardized contracts.

Mining

33. **After 4 years of tense debates in the Brazilian Congress two new laws were enacted in December 2017 for the reform of the Brazilian mining sector**. The new laws changed the regulation of the Financial Compensation for the Exploitation of Mineral Resources (Compensação Financeira pela Exploração de Recursos Minerais – CFEM) and replaced the National Department of Mineral Production (Departamento Nacional de Produção Mineral, DNPM) with the ANM.

34. **The reforms aim to modernize the Brazilian mining legal framework** by increasing the level of independence and inspection attributions of the regulatory agency as well as revising the current royalty rates for some critical mineral commodities. The main reforms approved included:

35. **Institutional Reforms – Modernization.** The replacement of the DNPM by the ANM aims to increase the **independence** and the budget of the regulatory body. The agency now has an independent board of directors with fixed terms of office. Proposals for new regulation will be subject to prior public consultations, which should enhance the agency's transparency and independence. The reforms also establish sources of funding for the ANM which seeks to resolve the chronic issue of insufficient funding for the sector's regulation and enforcement. However, despite a clearer proposal on the funding sources, the current contingency practiced by the Brazilian Government is expected to continue effecting the ANM's ability to implement its mandate. A thorough review of the current regulations governing the mining sector still needs to be conducted to ensure the efficient use of the agency's limited human and financial resources.

36. **Fiscal regime: Royalties and Taxes.** The originally proposed reform sought to increase the CFEM (royalty) rates for practically all mining resources. However, it effectively increases the CFEM rates for the extraction of gold and diamonds. Most minerals, including gold, will remain at the prior fixed rate of 2 percent. However, iron ore will be subject to the relevant increase. The specific rate, which will be determined based on the international price of the product, will correspond to 4 percent when the price is equal to or higher than US$100 per ton. In addition, the CFEM was previously calculated based on the net sales of mineral products, deducting taxes levied upon such sales and insurance and transportation expenses. The compensation is now due based on the gross revenues of sales of mineral products, preserving the deductibility of taxes and expenses imposed after.

37. **Other costs to which mining activities are subject have also been increased**. Owners of real estate where mineral activities are performed shall allow the development of such activities by parties entitled to mining rights but have the right to receive part of the outcomes of the exploitation, corresponding to 50 percent of the amounts paid as CFEM. With the increase in the CFEM, the amount due to the owner of the property will also increase. Other amounts due to landowners by parties entitled to mining rights that were not revoked by the mining reform are: (i) revenues for the occupation of the land – corresponding to the loss of revenues of the landowner due to the occupation of the area by mining activities, in whole or in part; and (ii) indemnification for damages caused by mining activities to the respective land.

38. **The new framework also allows for**: (i) a deduction of 50 percent of the amount of CFEM in case of presence of mineral waste applied in other productive activities; (ii) alters the manner of distributing CFEM amounts among

federative entities and other governmental bodies related to mining activities and environmental protection; and (iii) sets forth the possibility of imposition of fines in case the calculation of CFEM by private parties is lower than its effectively due amount, such fine corresponding to 30 percent of the amount of CFEM calculated by the regulatory authority.

39. Under the new mining code, states and cities that are affected by transportation, shipment, or presence of industrial mining facilities will receive 15 percent of any CFEM payments.

40. **Mineral exploration and exploitation.** The new mining framework did not change the previous legislation **regarding** the exploration and exploitation of mineral resources. The two mining phases continue to be independent maintaining the current segregation of powers, in which the granting of exploration authorization falls under the ANM's authority, while the exploitation concession falls under the authority of the Ministry of MME. The commercialization of the mineral product resulting from the exploitation phase, the most important part of the mining activity therefore remains subject to the MME's authority, which is part of the Executive Branch. One important change is the standardization of the legal concepts of "resource" and "reserve" to comply with international standards. This allows for exploration activities to continue after the final exploration report has been submitted to proceed with the work needed to transform "resource" into "reserve". The relatively low barriers for initiating mineral research/exploration is a positive aspect maintained by the new regulatory framework, especially when taking into consideration the substantial costs that it entails. An important addition introduced by the new framework is the ability to do licensing of mining areas through bidding rounds improving the chances selecting better and more qualified investors.

41. **Environmental Licensing and Mine Closure/Reclamation.** Important changes originally proposed in the reform relating to environmental aspects in the Brazilian Mining Code did not become effective. For example, mine closure and reclamation are not directly linked to the mining concession approval process. However, Brazil's new mining code imposes liability on mining companies for environmental recovery of degraded mining areas. It also establishes mandatory mine closure work plans, which include: (i) recovery of areas degraded by mining activities; (ii) decommission of mining facilities and equipment; (iii) recovery and repurposing of mining areas; and (iv) monitoring of waste disposal systems, geotechnical stability, aquifers, and water drainage. The ANM is responsible for approving licenses and performing inspection, in a supplementary basis in relation to environmental authorities, regarding environmental supervision of mining sector activities. A harmonization of the current legislation and oversight regarding environmental compliance is still needed since, depending on the mining operation, it can happen at both the federal and state levels, representing a significant barrier for the licensing of new mining activities.

42. **Second Wave of Reforms**. Although there are currently no plans of major structural reforms for the minerals sector, the current GoB intends to adopt streamlined practices that aim at expediting the environmental licensing of new mining operations. The intent is to bring efficiency to the process without compromising on the quality of the environmental assessment. Brazil is notorious, as compared to other similar mining jurisdictions, to the slow pace of the permitting processes for new investments at all levels. This compromises the country's attractiveness for investors and has resulted in Brazil plummeting in terms of mineral exploration attractiveness. despite its known geological potential. The Fraser Institute ranks Brazil 56 as per Investment Attractiveness Index after Mexico, Suriname and Namibia (Fraser Institute, Annual Survey of Mining Companies, 2018).

43. **In addition, another important reform being proposed to Congress refers to the regulations regarding mining**

in indigenous lands/reserves. Although the Brazilian Constitution allows for mining in these areas, there are currently no regulations defining how it should happen. This is perceived as one of the reasons for the high occurrence of illegal mining activities in indigenous lands. MME hopes that by defining the regulations, with clear set of rules, it will allow for a more orderly development of mining activities in these areas. However, Congress not only has to approve the new regulations but also needs to approve any activities occurring in indigenous lands, including mining as mandated by the Brazilian Constitution.

44. **Final Considerations.** the new mining framework addresses some of the critical aspects of the inefficiency governing the public management of the Brazilian minerals sector but additional reforms are needed.

ANNEX 3: INSTITUTIONAL ASSESSMENT: ELECTRICITY SECTOR

1. **The Brazilian power sector encompasses a large cluster of institutional agents,** all with duties, responsibilities, skills and competences defined in ways that underpin the feasibility of the correct functioning of this sector, constantly pursuing fair tariffs, secure supplies and universal access to electricity.

Institutional Framework

2. **Policy formulation.** Brazil's energy sector is controlled by the MME (Ministério de Minas e Energia), which has overall policy competence (by Article 27, Item XVI of Law No. 10,683 of May 28, 2003, and Decree 7.798 of September 12, 2012) for the following: (i) Geology, and mineral and energy resources; (ii) Use of hydraulic energy; (iii) Mining and metallurgy; (iv) Oil, fuels, and electric power, including nuclear; (v) Energy access in rural areas and agro-energy, including rural electrification, when funded with resources from the national electrical system. The MME presides over the CNPE, the main institution for proposing national policies and specific actions to the president of the republic. The CNPE policy setting was established in 1997 (by Law 9.478, Article 2). It includes the MME minister, eight other ministers, and five other government officials.

3. **Planning.** EPE, linked to MME provides services and studies to the development, planning, and research of the energy sector, including the areas of electricity, petroleum, natural gas and oil products, coal, renewable energy, and energy-efficiency measures. The company was established in 2004 (by Law No. 10,847) and is an independent entity subordinate only to the Minister of Mines and Energy. Every year the company presents to the CNPE the Ten-Year Plan for the Expansion of the Energy Sector (Plano Decenal de Expansão de Energia), and every two years the Long-Term National Energy Plan (Planos Nacionais de Energia).

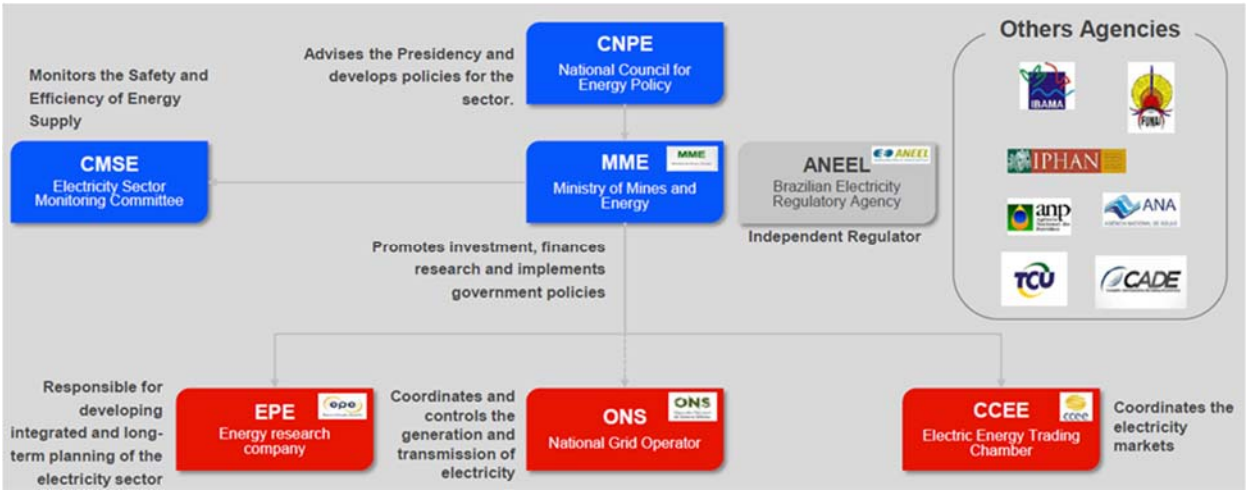
4. **Monitoring.** The Electric Sector Monitoring Committee (Comitê de Monitoramento do Setor Elétrico, or CMSE) was established in 2004 (Law No. 10,848), and a decree the same year (Number 5,175, on August 9, 2004) provided its regulations. The CMSE is chaired by the Minister of Mining and Energy and has nine permanent members: four representatives from MME, and the principals of ANEEL, ANP, CCEE, EPE, and ONS". Its primary responsibility is to monitor and analyze the power supply (including generation, transmission, distribution, import, and export) and its services, reliability, and safety across the country.

5. **Eletrobras and Petrobras are also both linked to MME, both being mixed ownership enterprises,** in addition to the EPE, the Power Sector Regulator (ANEEL), the Oil, Gas and Biofuels Industry Regulator (ANP) and DNPM. In turn, Eletrobras controls several enterprises in the Brazilian power sector, particularly in the Generation and Distribution segments. Notwithstanding the privatization process of the 1990s, state control still plays a role in the electricity sector in Brazil. Large government-controlled companies dominate the sector: nationally owned Eletrobras holds about one-third of generation capacity, and state-owned companies CESP, CEMIG, and COPEL each control about 7 percent. Eletrobras is Brazil's semi-public national electric utility and the largest power company in Latin America. Founded in 1962, it is a holding company for Brazil's large regional electric companies. It takes part in the generation, transmission, and distribution of electricity, in addition to owning half of the Itaipu electricity complex.

6. **Regulation.** ANEEL oversees the production, transmission, distribution, and commercialization of electricity. It handles the promotion of auctions for the purchase of electricity through long-term contracts within the national interconnected system and sets tariffs for consumers where applicable. It also oversees and runs the concessions, bids, and inspections of utilities services. It supervises competition for electricity-system expansion to resolve conflicts among agents, designs and implements new regulations, and establishes power accessibility targets for each distribution utility. Its overall mission is to provide favorable conditions for maintaining a balance among the agents of the electric power market to the benefit of society. The agency also oversees a R&D program established by the law, wherein the electric power generation, transmission, and distribution concessionaries have to invest a minimum percentage of their net operating incomes into R&D every year. ANEEL is managed by a director general and four directors, all appointed by the president of the republic and subject to approval by the federal senate. All directors have a mandate of four years. **The electricity regulatory framework includes two other organizations:**

- **ONS** is a private non-profit entity under the control of ANEEL. It was created in 1998 (Law No. 9,648) and is responsible for coordinating the generation and installation that make up the nation's transmission system. ONS oversees Brazil's SIN for electricity transmission, which covers most of the country's power grid. It must be stressed that the operating decisions are taken by the ONS, together with other agents in this sector, at regular meetings where all agents are guaranteed representation. Furthermore, to ensure the continuity and security of electricity supply nationwide, the operations of the National Interconnected System are overseen and assessed by the Power Sector Monitoring Committee (CMSE).
- **CCEE** is a private non-profit civil organization formed in 2004 by government decree to carry out the wholesale transactions and commercialization of electric power within the SIN. CCEE is also in charge of determining the settlement price for differences (spot price) to value short-term market transactions.

Figure 3.1. Institutional Framework



7. **Institutional gaps.** While the above mentioned institutions have well qualified staff, there is a general sense in Brazil that the electricity sector contains significant procedural inefficiency and excessive bureaucracy. Thus, there is a need to evaluate the possibility of simplifying, deleting or improving processes and activities:

- **There is a need for greater digitization and digital integration between institutions** in the granting process and standardization of processes for free-market and regulate (ACL and ACR) projects, as well as improvements in the processes for technical qualification for generation auctions and improvements related to transmission grants.
- **There is need for and integrated government approach to regulatory quality supported at the highest political level.** The use of evidence in the regulatory process through ex ante RIA could be used in a more consistent manner in the electricity sector. It would thus be important to harmonize RIA methodology and expand its use with a focus on regulations with major impacts, establishing independent quality control through a body outside the institutions.
- **Autonomy of regulators.** According to OCED policy outlook,[60] Brazil would also benefit from strengthening the autonomy of regulators, both from governmental political interference and from the interests of regulated firms. This includes further limiting the scope for political appointments since empirical research suggests that political appointments are associated with lower agency capacity.

8. **Market regulations.** In 2004, the Brazilian government implemented a new model for the electricity sector: a hybrid approach to state involvement that split the sector into regulated and unregulated markets for different producers and consumers. This approach allows for both public and private investment in new generation and distribution projects. One of the major changes introduced was the creation of two energy trading environments: a regulated contracting environment (RCE), in which distributor-captive consumers negotiate contracts through auctions, and a free contracting environment, in which consumers freely negotiate their contracts. The commercialization of electricity is carried out through a specific auction system coordinated by the government. Under the RCE, participants include generators, distributors, and traders (who can only trade in existing energy auctions). Participants in the RCE enter into contracts, regulated by ANEEL, through energy auctions, held by the CCEE, which settle the price. In the free contracting environment, generators, traders, and consumers freely negotiate prices, contract rules, and establish the types of contract. The participation of an agent in the CCEE is defined by the Commercialization Convention of Electricity, which was introduced by ANEEL in 2004 and specifies a set of rules and obligations for all participants.

[60] https://www.oecd.org/policy-briefs/Brazil-Regulatory-Reform-EN.pdf

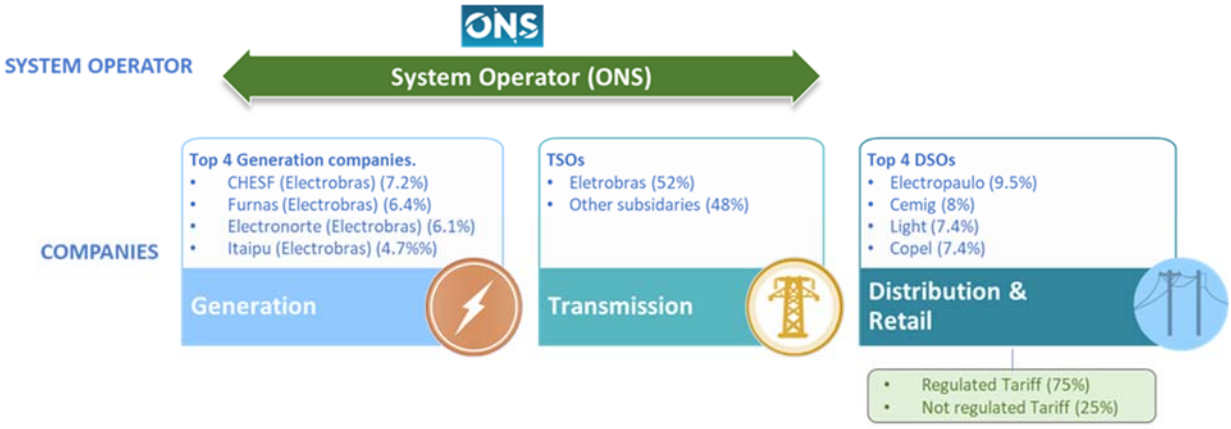
Figure 3.2. Market Structure

Source: ENEL.

9. **Market agents**

- **Generation:** A large share of power generation in Brazil is concentrated in few companies that tend to be public.
- **Transmission:** Transmission is mostly under government control, either under Eletrobras (federal) or state companies (Sao-Paulo-CTEEP, Minas Gerais - Cemig, and Parana - Copel). While regulation allows for private sector concessions, most of them have gone to Eletrobas subsidiaries.
- **Distribution:** 73 percent of the distribution in Brazil is controlled by the private sector. Distribution is also concentrated in few companies. The top ten revenue companies have a 56.4 percent revenue market share and a 57.2 percent of the consumers' market share. In 2012, ANEEL introduced new regulation (Resolution 482/2012) establishing conditions for micro-generation (up to 100 kW of power) and mini-generation (from 100 kW to 1 MW), allowing consumers to install smart generators and exchange electricity with local distributors. Under this system of mini-grids or off-grids, consumers can generate their own power (using renewable energy such as solar and wind), which if not consumed is injected into the system in exchange for a credit applied in subsequent months. This regulation was updated in 2015 with more flexibility to allow for micro-generation and raising the limits on generation to 5MW. On the consumption side, the country has a large customer base of 72,377,000 end consumers of electricity, of whom the vast majority (61,687,000) are residential. The total consumption has reached 448,117 GWh with an average consumption of 516 kWh per month; the residential sector has reached 117,646 GWh, with an average consumption of 159 kWh per month. Electricity access in Brazil, according to the World Bank, stands at 99.5 percent. This level of near universal coverage is a substantial achievement, considering access stood at 90 percent in 1990 and is largely the result of programs like Luz Para Todos, in force today and started in 2003, which emphasized the inclusion of low income consumers to the electricity grid.

Figure 3.3. Market Agents



10. **Market regulation gaps.**

- **Eliminate barriers for new technologies (including distributed energy resources).** Given the new technologies that can affect both the consumption and generation of energy, it was seen that the Brazilian energy sector needs to identify market designs, and legal and regulatory framework, that preserve the principle of technology neutrality. Thus, there is a need to evaluate what makes the insertion of these new technologies possible through regulation without barriers and implicit subsidies to specific technologies.
- **Enable further liberalization of the market.** The GoB would like to engage in an opening of the market without increasing the cross-subsidization between the consumers of the regulated market, currently main group ensuring the adequacy of the system, and the free market consumers, who benefit from the adequacy of the market and tariff subsidies to use the system. Thus, opening of the market should be done with a "fair" cost and risk allocation. To achieve this, it is necessary to improve the pricing mechanisms of the Short-Term Market (whatever the model, whether by costs or by offering prices), the separation of power and energy, improvements in financial guarantees, symmetry. information and treatment of default. In this sense, the reduction of free market access limits to demand values of less than 1,000 kW should occur after the implementation of improvements in pricing and short-term market functioning, and after or concurrently with the separation of power and energy. This system has to be perfected before 2026, which is when the Government is intending to enable consumer with loads below 500kW to be eligible to participate in the free market. Furthermore, the allocation of any unintentional excess of electricity contracting from distributors arising from the migration of consumers from the regulated market to the free market ought to be subject to a charge to be paid by all consumers. Consequently, market opening will need to be a gradual process. Finally, full liberalization of the market leads to the separation of distribution service provision and energy supply. Those consumers who do not wish to migrate to the free market could be served by the Regulated Energy Trader figure. To make this structure

feasible, ANEEL and CCEE need to study the issues and impacts of full liberalization of the free market mentioned above.

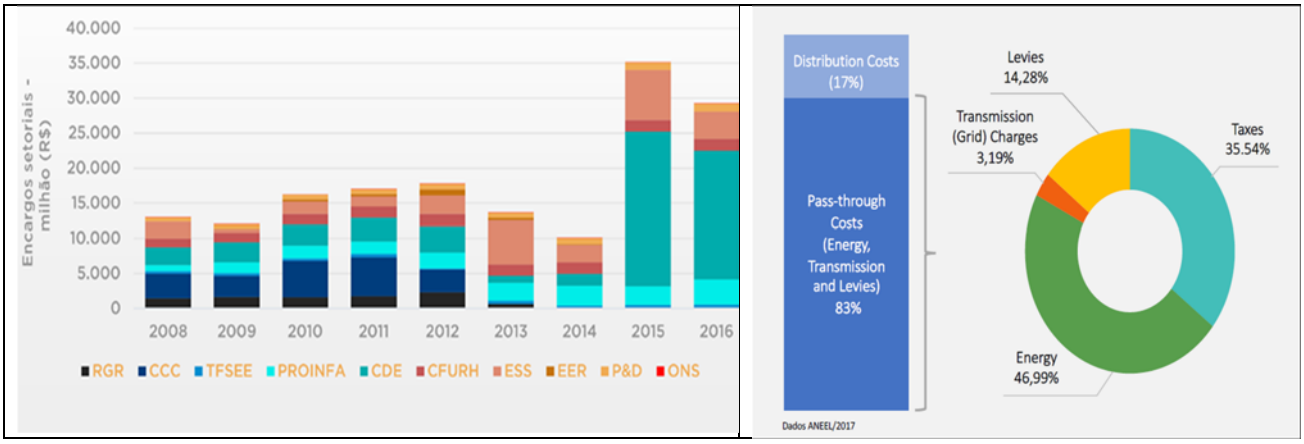
- **Need to improve contracting processes.** There is a need to increase the efficiency of the contracting process, reduce costs and mitigate impacts, especially for the Distributors. For this purpose, there is a suggestion by the working group designated by the government to create a Centralizing Contract Agent, by 2022, in the context of Centralized Financial Settlement in the RCE. However, further in-depth (and impact) analysis is needed for how the Centralizer could be a facilitator of the transition to a new model of the Brazilian energy market, such consideration must be in line with the final modernization design of the sector.
- **Distribution sector sustainability.** Global transformations toward generation decentralization, network digitization, electrical mobility, and the valuing of individual choices, push for improvements in the distribution segment, including requiring studies of what role the distribution sector should play where all consumers are, potentially, in the free market. To overcome the issues that affect the sustainability of electricity distribution, there are potential measures, such as the adoption of a low voltage binomial tariff. However, there is a need for further assessment, such as locational and time signaling for consumers from the free market or who generate their own energy, to the separation of electricity trading and distribution services among others. In addition to the diagnosis and first indications of measures, the group proposed an Action Plan containing conducting evaluation studies, as well as transition rules, deadlines and impacts, valuing the transparency and predictability of the sector.

11. **Pricing structure and tariffs.** The Brazilian power market has regulated prices for retail customers, embodying cross-subsidies across consumer groups (ACR); and free spot prices set in power market auctions for bulk consumers (ACL). The regulated electricity tariffs are established by ANEEL through Periodic Tariff Reviews and vary for each energy distribution company.[61] "Free" customers can contract energy at more competitive prices[62] and conditions stipulated in bilateral contracts.

12. **The pricing structure is characterized by significant distortions due to cross-subsidies and specific sector levies, leading to high and nontransparent end-consumer prices.** First, with respect to sector specific charges, as Figure 15 illustrates about half of the electricity tariff is represented by taxes and levies. The introduction of sectoral charges in the regulated tariff has been used as tool for the implementation of government policies from promoting renewables and energy efficiency to ensuring access for the poor, leading to significant tariff increases**.** Indeed, levies have more than offset any efficiency gains obtained from more recent long-term power supply auctions and have increased considerably faster than average energy costs (see figure 3.4).

[61] The tariffs depend on the type of client and are composed of several "charges" such as taxes, average cost of the energy, tariff of use of the Distribution System (TUSD), return on capital, among several other costs. The pricing framework is characterized by a flat scheme for all low-tension consumer with a subsidy for rural areas (10 percent discount) and for public services (15 percent discount). Low-income residential consumers enrolled in the Social Programs Registry of the Federal Government benefit from a pro-poor IBT mechanism.

Figure 3.4. Sectoral Charges Evolution and Composition of the Electricity Tariff



Source: FGV (2017b) and Dutra (2018).

13. **Cross subsidies between different energy sub-sectors are widespread.** The Energy Development Account (CDE) is currently the most relevant charge but it is not the only one (see table 3.1 below). Moreover, the CDE charge was modified in 2013 to incorporate various other levies and charges and considerably broadening its scope. In addition, the various cross-subsidies have perverse regional implications**.** Because of the multitude of users that are benefiting from reduced tariffs, it turns out that the more developed regions have received larger share of total subsidies than the poorer regions (see figure 3.5).

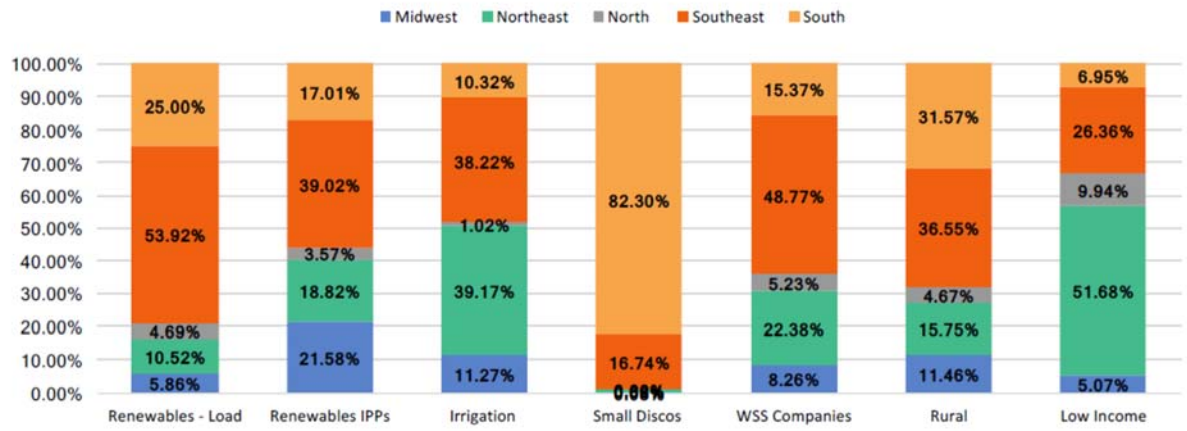
Table 3.1. Charges and Levies

Charge	Description
CCC (Fuel Consumption Account) - extinguished by MP 579, with major assignments moved to CDE)	Subsidize the thermal generation of isolated systems (mainly in the North)
RGR (Global Reserve of reversal) (extinguished by MP 579, with major assignments moved to CDE)	Compensate assets linked to the concession and promote the expansion of the electric sector
TFSEE (Electric Power Services Monitoring Rate)	Provide resources for the operation of ANEEL
CDE (Energy Development Account)	Provide energy development from alternative sources; Provide the universalization of the energy service; and subsidize the tariff of low-income residential consumers
ESS (System Service Charges)	Subsidize the maintenance of the reliability and stability of the National interconnected system
PROINFA - Incentive Program for Alternative Sources	Subsidizing alternative sources of energy, generally more expensive than conventional sources
P&D (R&D and energy efficiency)	To promote scientific and technological research related to electricity and the sustainable use of natural resources
ONS	Provide resources for the operation of the national system operator
CFURH - Financial Compensation for the Use of Water Resources	Financially compensate for the use of water and productive land for generating electric power

Charge	Description

Source: ABRADEE.

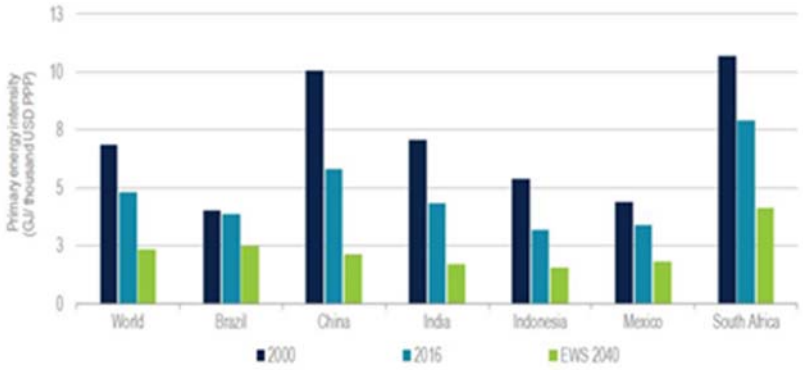
Figure 3.5. Cross-subsidies between Regions



Source: Dutra (2018).

14. **Clean energy investments.** Brazil has a strong track-record in mobilizing renewable energy investments. The country currently features globally in the top ranking in terms of annual investments in hydropower, biofuels (biodiesel and ethanol) and solar water heating capacity. However, Brazil still scores very low in energy efficiency performance and in energy intensity. The American Council for Energy Efficiency Economy (ACEEE) measures this performance with a variety of indicators including investment per capita, management efficiency and so on. Between 1986 and 2015, the National Electrical Energy Conservation Program (Programa Nacional de Conservação de Energia Elétrica, PROCEL) invested US$808 million, which led to electricity savings of 92.2 TWh. During the last 18 years, PEE projects totaled 9.48 TWh per year in electricity consumption reduction and 2.95 GW in demand reduction during peak hours. With this performance, in a list of 23 countries reviewed by ACEEE, Brazil comes in second to last. When compared to the other major emerging economies Brazil as of 2016 show some marginal reduction in energy intensity, but still far from reductions recorded for the other countries or even worldwide. An energy efficiency turning point is needed in Brazil to contain emissions growth in the energy sector. A consultation (Public Consultation No. 7/2018) on efficiency auctions in Brazil is considering a reverse power generation auction, within the framework of the Energy Efficiency Program (PEE). A pilot project is planned for Roraima, the only state not connected to SIN, which depends on energy imports. The idea of the tender is for companies to compete to deliver energy savings of at least 500 average kilowatts (kW) and up to a maximum of 1 average megawatt (MW) per year. ANEEL is expecting the participation of alternative projects focused on reducing energy consumption such as DG renewable energy systems and public lighting upgrades. A success of this auction could encourage greater competition among alternative energy saving technologies and lead to a more substantial expansion of this market.

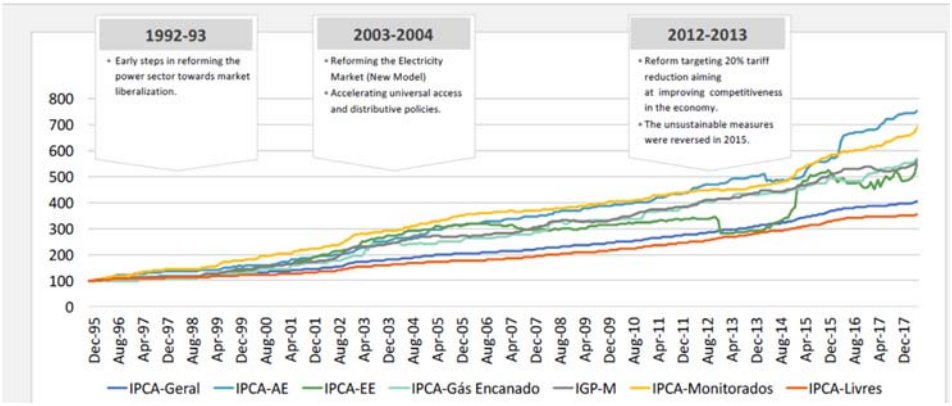
Figure 3.6. Energy Intensity Evolution



Source: IEA (2018).

15. **Electricity prices.** The evolution of prices over time show a substantial increase in the regulated prices. Industrial prices are also relatively high compared to other countries in the region

Figure 3.7. Evolution of Regulated Prices



Source: Dutra (2018).

16. **Price formation gaps.**

- **Need to update price formation mechanisms.** The currently electricity system adopts the pricing mechanism based on cost minimization computational models. The working group is evaluating pricing by models, by order of dispatch and a hybrid form of these two mechanisms. Moving from the current mechanism to one based on merit of dispatch would capture better agents' risk perception and would not require the need to audit cost information. However, some agents could exercise market power abuse and it would be more difficult for the government to ensure energy security. It was thus determined an in-depth analysis was needed to support a decision, including how to address legacy instruments of the current market.

- **Need to update the supply criteria and the current mechanism to ensure adequacy of supply** (including a contractual separation of capacity from energy production) - The working group designated by the government looked at how to ensure a supply of electricity so that all consumers are met at any time, even during critical periods. For this, two main factors were identified that point to the need for separate contracting of power capacity and energy production and consequent alteration of the current mechanism of adequacy of supply. The first factor is the change in the Brazilian energy matrix and consequent restriction of the system not only in energy, but also in power capacity. The second is the allocation of security of supply costs and capacity fulfillment mostly to the consumer served in a regulated manner by the distributors, rather than to the apportionment of these costs, as a public good, among all electricity consumers, that is, with the participation of consumers who operate in the free market. Furthermore, joint pricing of power and energy undermines the pricing of new products needed for the system by jointly negotiating system suitability with a financial product. Therefore, there is a need to evaluate the way of contracting the system requirements to guarantee the sustainable expansion of the energy supply, guaranteeing reliability and system security and focusing on the project financing. As a result, the working group proposed the implementation of suitable contracting mechanisms separating the commercialization of electricity power capacity production from and power capacity. However, to achieve this separation, there is a need to deepen the concepts and methodologies, as well as define transitional actions aimed at addressing the possible contracting of capacity/power with the least possible critical legacy.
- **Modernizing auction models.** The government is seeking to modernize their auctioning models, which is currently based on a hydro-thermal basis, to, among other things, incorporate other sources (such as VRE). The work to modernize the system would need to cover the following aspects: contracting of the new energy auctions marginal enterprise (LEN); adoption of yield margin as a selection criterion; review of negotiated products and contract models in LEN; improvement of the calculation and revision methodology of the Transmission Systems Use Tariff; as well as studies on any new systems that may be necessary for auctions during a transition period and in the new model
- **Need for rationalization of charges and subsidies.** Part of the suggestions received in MME Public Consultation No. 45/2018 have been implemented and the others require changes in legislation. There is a need for further studies on the implicit subsidies in micro and distributed mini-generation, based on tariff realism, so that consumers also participate in the other costs related to network availability and public policy costs to which other consumers are subject.
- **Updating dispatching rules and MRE.**[63]The working group identified possible three-pillar enhancement proposals for the MRE, consisting of actions that, for the most part, can be implemented in the short and medium term. The first pillar brings together actions that aim to improve the MRE, seeking to identify and remove the non-relevant factors to hydrological risk. The second pillar are actions aimed at improving the functioning of the mechanism itself. Finally, a proposal was made for the elaboration of a voluntary financial protection mechanism (hedge) for the MRE plants from the volumes settled by the reserve energy in the short-term market. However,

[63] The MRE is a financial mechanism aimed at sharing the hydrological risks that affect generation agents, seeking to ensure the optimization of hydroelectric resources of SIN.

there is a need for a structural solution to prevent the problem from reoccurring, that evaluates how to adjust the physical guarantees to the operative reality of the system, but also the improvements in the MRE pointed out here. which reinforces the relevance of monitoring actions through the Action Plan.

- **Transmission sustainability.** The gaps in transmission are related to regulatory end-of-life transmission facilities in SIN and the simplification of the settlement of Transmission System Use Charges (EUST). Furthermore, there is a need for ANEEL to assess the proposed simplified EUST settlement process, as well as ANEEL's assessment and deliberation of measures related to end-of-life transmission assets that aim at mitigating the uncertainties of the transmission companies regarding the remuneration of their investments and the adequacy of the economic signal to induce the maximum availability of the transmission facilities. There is also a need to evaluate the feasibility of proposing financing mechanisms for the modernization of regulatory end-of-life transmission equipment with financial institutions.
- **Need for integrated planning of gas and electricity.** To allow for a greater participation of gas in the power market, and enable further penetration of VRE in the electricity matrix, there are gaps in how to align the two sectors. This would include an updating of the diagnostics and recommendations made under the Gás para Crescer program, an assessment of the costs and risks of integrating the two sectors, as well as review the performance of the exiting thermal plant contract models.

ANNEX 4: INSTITUTIONAL ASSESSMENT: NATURAL GAS

1. As per the existing legal framework, the authorities with responsibility for the natural gas sector in Brazil are: the **CNPE**, **MME**, the National Agency of Petroleum, Natural Gas, and Biofuels (Agência Nacional de Petróleo, Gás Natural e Biocombustíveis, or **ANP**), and the local (state) regulatory agencies.

   (a) **The CNPE has a good reputation with respect to policy setting/Inter-governmental coordination.** The **CNPE** was created by the law no. 9.478/1997, also known as Petroleum Law. It is responsible for advising the Presidency and its main goal is to prepare/formulate energy policies and guidelines, including for natural gas. The council is chaired by the Minister of Mines and Energy and includes several high-level members of government, including the Minister of Economy, the Minister of Infrastructure and the Minister of Foreign Affairs. In April 2019, a Committee for the Promotion of Competition in the Natural Gas Market was established under the CNPE to identify and promote measures that would increase competition in the sector, ultimately leading to the launch of the New Gas Market program. Throughout 2019, the CNPE remained very active, issuing 29 resolutions (vis-à-vis 19 in 2018), reflecting in part the priority given to energy/natural gas sector reform by the current government/presidency.

   (b) **MME has strong technical bodies in charge of policy setting/supervision but is facing constraints (human, financial) to support the natural gas sector reform.** The MME was established in 1960 by the Law No. 3,782 and it is the granting authority, formulator and supervisor of public policies for the mining and energy sectors. For natural gas, for example, MME is responsible among others for determining which gas transport pipelines are to be built or expanded. To fulfill this responsibility, the ministry must prepare, with the support of EPE and of ANP, the Decennial Plan for Expansion of Transport Gas Pipelines. Under the existing structure, natural gas issues within the MME are primarily handled through the Secretariat for Petroleum, Natural Gas, and Biofuels (Secretaria de Petróleo, Gás Natural e Biocombustíveis) and its Natural Gas Directorate (Departamento de Gás Natural (DGN)). The Secretariat for its part is dealing with limited resources/capacity and growing responsibilities associated with the fact that the success of the natural gas sector reform push requires clear policy formulation and continuous policy implementation oversight from MME.

   (c) **ANP has a good technical reputation but is facing several challenges affecting its ability to perform as the federal regulator for the natural gas industry**. ANP was established by Law No. 9,478/97 and is in charge among others of regulating, contracting and supervising economic activities related to the oil, natural gas and biofuels industry, with a focus on guaranteeing fuel supply and protecting consumers' interests. ANP is also responsible for supervising compliance with safety standards and its regulations. ANP is a reference center for data and information on the oil and gas industry. Moreover, to promote competition in the petroleum and gas markets, Article 10 of the Petroleum Law calls for ANP to inform the relevant government authorities of any potentially anticompetitive practices in the markets it regulates. The introduction of Law No. 11,909, the Natural Gas Act, gave ANP the following tasks: (i) authorize natural gas sales within the Federal Government's sphere of jurisdiction; (ii) organize auctions and sign concession contracts for gas transportation pipelines; (iii) establish (in the case of concessions) or approve (in the case of permits) rates for transporting natural gas; and (iv) supervise the resulting contracts and permits. ANP also regulates and supervises natural gas storage, oversees the product's traffic through the transportation network, and

coordinates natural gas distribution in contingency situations. As per the Natural Gas Act and Law 9.478 also introduced "self-production" and "self-importer" agents, which use gas as a raw material or a fuel in their industrial processes, are required to preregister with ANP and submit detailed plans for how they will use natural gas, from production or import through to final consumption. Currently, the regulation and supervision of the natural gas sector is dispersed among various departments within ANP and capacity/expertise to oversee the sector is limited. ANP is set to assume a much more active role in the natural gas sector however as Petrobras' sector dominance breaks down; requiring renewed focus, regulations (resoluções) to enhance clarity of roles/responsibilities as well as additional human resources, tools and equipment for ANP. ANP's head indicated in 2019 its intention of hiring an additional 20-30 people to focus exclusively on natural gas market regulation at ANP. In addition, ANP is experiencing a growing leadership vacuum with 3 of the 5 members of the ANP directorate – including the ANP head - having to be appointed in 2020. At a time when much is expected from ANP with respect to assuming a more active and strong role in the natural gas sector, the uncertainty associated with the lack of clear leadership poses serious risks to the reform.

(d) **The state regulators for the most part don't possess the experience, capacity and resources to effectively regulate a more open/competitive gas market**. The current legal understanding is that the Federal Government can introduce mandatory rules up to the state city gates only. According to this understanding, the Federal Government can neither introduce mandatory rules across the whole country for local distribution network businesses and regulation nor regarding taxation. Consequently, there is no uniform natural gas distribution tariff in Brazil. Regional price differences arise as a result of there not being a unique regulatory procedure for natural gas prices for households and industry across states. The lack of harmonization in regulations across the country also deters investors as it adds a significant level of complexity, particularly those interested in operating at a national level. A large number of states, including Rio de Janeiro, São Paulo and Bahia, have established local regulatory agencies to monitor the operations of the local distributors of natural gas. These local regulatory agencies have often fallen prey to local political pressure and do not possess the capacity and resources needed to effectively regulate, particularly if Petrobras loses its dominance of the sector and local regulators are expected to contend with multiple players.

2. In addition to the entities mentioned above, Brazil has other authorities that work on matters related to the natural gas sector, such as the MoE, CADE, and EPE:

(a) **EPE has a good technical reputation but faces constraints (primarily human) when responding to the growing demands arising from natural gas sector reform**. EPE was established in 2004 by Law No. 10,847. It is an independent entity subordinate only to MME, which provides services and studies to the development, planning, and research of the energy sector. Specifically on natural gas, EPE conducts studies regarding: i) resources appraisal, exploration and production potential of each area of the country, production forecasts and estimates for investments and equipment demand, ii) natural gas supply and Infrastructure sectors, including price projections, domestic and international supply, demand and supply balance of natural gas and simulation of the transmission pipelines network, among others; and iii) projections of the thermoelectric and non-thermoelectric demand for natural gas. EPE plays an important role in informing the current natural gas sector reform push by providing inputs critical to identifying gaps and assisting in the follow-up, as one of the five members of the Committee for the Promotion of Competition in the Natural Gas Market. Much like

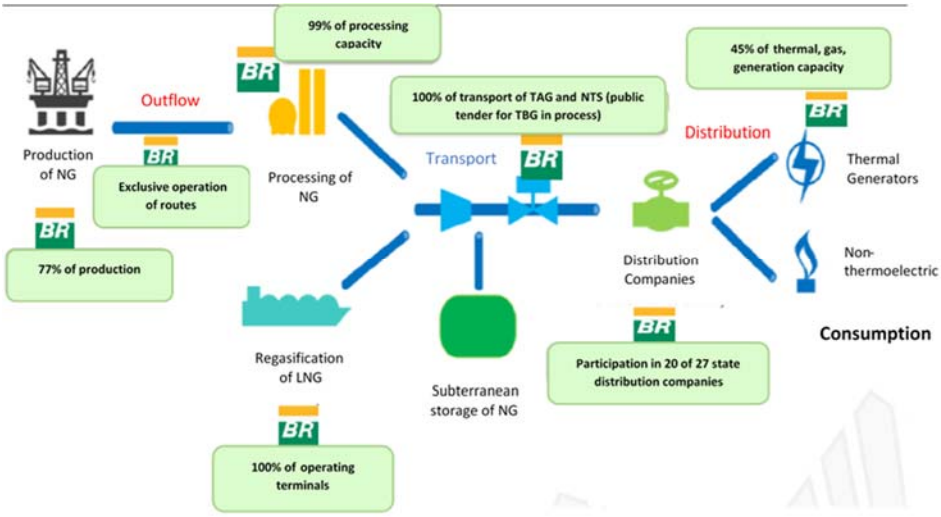
ANP and MME, EPE is facing constraints (primarily human) to deal with the new demand for research and services associated with the reform of the natural gas market.

(b) **The MoE has strong capacity and contributes to natural gas sector management**. The Provisional Measure 870 of January 1, 2019 established the new structure of the Federal Government. Within the organization of the organs of the Presidency of the Republic and the ministries, the MoE was created, integrating the attributions of the Ministries of Finance, Planning, Development and Management, Industry, Foreign Trade and Services, and Labor. The structure of the MoE was finalized with the conversion of the MP into Law No. 13,844, of June 18, 2019. The Secretariat of Evaluation, Planning, Energy and Lottery (SECAP) under MoE contributes to the improvement of the energy sector, including natural gas, focusing on promoting competition, monitoring public policies and analyzing regulatory impact. It also evaluates and proposes actions related to infrastructure policy management in the energy sector. SECAP also prepares studies and quantitative research to support the formulation of public policies for the energy sector. SECAP represents MoE at the CNPE. MoE is an active member of the Committee for the Promotion of Competition in the Natural Gas Market and has played a critical role in the reform push by facilitating and putting its significant weight behind measures such as tax simplification. Currently, natural gas transportation has the same treatment as other commodities, whose taxation occurs on the physical flow, incompatible with the fungibility characteristics of natural gas and with flow optimization operations. This barrier prevents the entry and exit regime, considered one of the pillars of the New Gas Market.

(c) **CADE has a good technical reputation and it has been critical to push for changes in the natural gas market**: The Administrative Council for Economic Defense was established by Law No. 12,529/11. It is an independent agency reporting to the Ministry of Justice, which aims to ensure free competition. It investigates and decides, ultimately, on competition issues, as well as is responsible for fostering and promoting the culture of competition in Brazil. In 2015, CADE opened an Administrative Proceeding to assess potential anticompetitive conduct in the service of natural gas supply by Petrobras. In July 2019, after several years of negotiations, Petrobras signed an Agreement with CADE, which consolidated understandings between the parties on the promotion of competition in the natural gas industry in Brazil, including the sale of shareholdings in companies operating thereof. The purpose of the Agreement was to preserve and protect the competitive conditions, aiming to open the Brazilian natural gas market, encouraging new agents to enter this market, as well as suspending administrative procedures established by CADE to investigate Petrobras' natural gas business. CADE is closely following the implementation of this Agreement, deemed critical to its mission of promoting competition, but also to the reform of the natural gas market. CADE is one of the members of the Committee for the Promotion of Competition in the Natural Gas Market.

3. Historically, the natural gas market in Brazil has been *de facto* controlled by Petrobras as per the figure below.

Figure 4.1. Natural Gas Market



Source: WB based on MoE/SECAP, 2019.

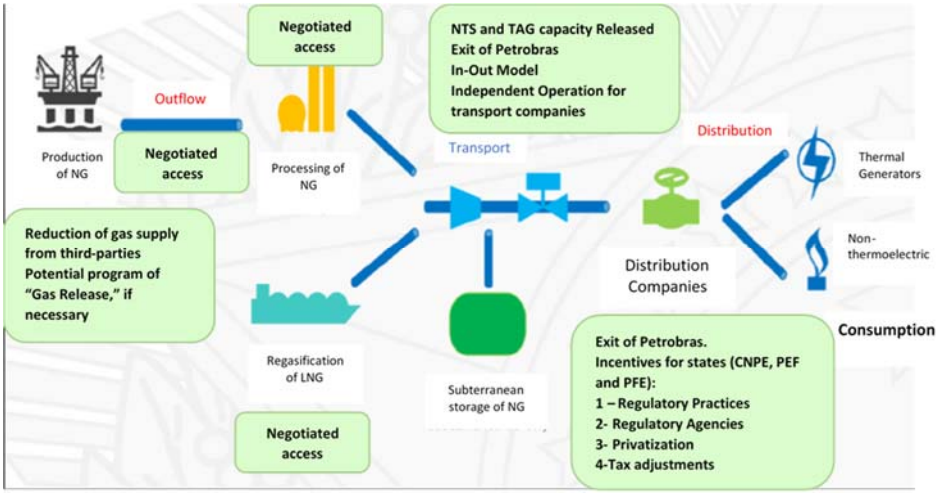
4. **Petrobras** has long played a dominant role in the natural gas sector in Brazil. In addition to producing over 77 percent of the domestic gas output, Petrobras was essentially the only natural gas supplier to the market, as it purchased and marketed practically all the remaining production and all of the country's natural gas imports. Through its subsidiaries, Petrobras has also controlled most of the country's processing and transmission infrastructure and 45 percent of thermal plants (main consumers). Petrobras has a mixed-capital structure, with floating shares traded domestically and internationally but with the Federal Government controlling the majority of its voting rights.

5. After decades of *de facto* state (that is, Petrobras) monopoly, signs of an effective opening the gas market are becoming visible. As a result of Petrobras's PPI program, which resulted in more than US$20 billion in asset sales since 2015, new parties have been able to acquire parts of the natural gas transmission and distribution systems of the country. On June 13, 2019, Petrobras closed the sale of 90 percent of its participating interests of TAG, a pipeline company which is in charge of transportation of natural gas in the entire coastline of the Southeast and Northeast regions of Brazil, with a gas pipeline infrastructure of approximately 4,500 kilometers. So far, this has been the largest divestment in the history of Petrobras. In July 2019, Petrobras reached an agreement with CADE whereby it committed to sell the following shareholdings: (i) Nova Transportadora do Sudeste S.A. (NTS) - 10 percent; (ii) TAG - 10 percent; (iii) Brazilian Natural Gas Transport Company (*Transportadora Brasileira Gasoduto Bolívia-Brasil S.A.*) - 51 percent; and (iv) indirect participation in gas distribution companies, either by selling its 51 percent interest in Gaspetro, or by selling its indirect participation in distribution companies. While divestments are not carried out, Petrobras shall appoint, within a period of up to six months from the date of signature of the Agreement, independent members of the Board of Directors in these transportation companies and in Gaspetro, according to the "Novo Mercado" listing industry rules, aiming at ensuring the functional unbundling of companies. Petrobras also undertakes to indicate in the transportation systems the maximum injection and withdrawal volumes at each receiving point and delivery area, for further adjustments to the current transportation service contracts, so that transportation companies, under the supervision of ANP, can offer the remaining capacity to the market, thus enabling other companies to use the transportation network not used by

Petrobras. Furthermore, the company is committed to other actions to allow greater competitiveness in the natural gas market, such as: (i) negotiation of access to outflow and processing assets, (ii) refrain from purchasing new gas volumes from partners/third parties, except in certain situations provided for in the Agreement, and (iii) lease of the Regasification Terminal in the state of Bahia. Petrobras has stated that the signing of the Agreement is in line with the company's strategy of improving its capital allocation, reducing leverage and regulatory risk, acting competitively in the trading of its own gas and completely withdrawing from gas distribution and transport.

6. The Agreement between Petrobras and CADE is a key element of the New Gas Market program, as it provides a tool to enforce several of the guidelines to promote a competitive natural gas market detailed in the CNPE's Resolution No.16 (2019), particularly those pertaining to breaking down Petrobras' dominant role in the natural gas sector and opening of the natural gas market in both upstream and midstream. In turn, the incentives for improvements in the state regulation of the piped gas distribution service will mainly occur through the passing of two pieces of legislation that address the promotion of fiscal balance and strengthening of states: (i) PEF, which is already in the National Congress and allows states with fiscal problems to receive guarantees from the Union in future credit operations, provided that that they make certain commitments, including the adoption of reforms and structural and behavioral measures in the provision of piped gas services; and (ii) State Finance Strengthening Program (PFE), which allows for the transfer to the states of governmental oil and gas holdings that are now owned by the Union. Part of the funds will be based on indicators related to improvements in the regulation of natural gas. A ranking of states will be created by EPE and those with better indicators will receive more resources. This ranking will mainly take into account adoption of modern regulatory practices, according to ANP guidelines, creation, maintenance and strengthening of state regulatory agencies, adherence and maintenance to the agreement SINIEF No. 3/2018 regarding the ICMS in the transport of natural gas, and privatization of the state distributor of natural gas. The implementation of all of these measures is expected to result in the New Gas Market as detailed in figure4.2.

Figure 4.2. Implementation of Reforms



Source: World Bank based on MoE/SECAP, 2019.

7. The New Gas Market program is expected to help reverse the dynamic of divestment and national deindustrialization in Brazil, resulting from the high cost of natural gas in Brazil that raised the production costs of

the energy-intensive industries and the reduction of manufactured prices in the world. MoE/Fazenda/SECAP have conducted some simulations on the impact on Industrial GDP of a shock in energy prices (natural gas and electricity) to assess potential and expected impacts of the New Gas Market, which show, for example, with a shock that brings a 30 percent drop in energy prices (gas for the industrial sector), industrial GDP growth of 6.3 percent will take place in the same year and in following year a growth of 4.1 percent (see table 4.1). These numbers are best estimates based on the information available. The final price and actual impact will be shaped by market conditions. In any case, the evidence suggests that the New Gas Market has the potential to attract new investments, develop infrastructure, increase production, promote grid growth and residential and industrial consumption, promote national energy security, increase revenue from government contributions, including state taxes, promote jobs, contribute to GDP growth and, not least, help reduce GHG emissions (when natural gas replaces coal or diesel in thermoelectric generation, for example).

Table 4.1. New Gas Market Impact on Industrial GDP

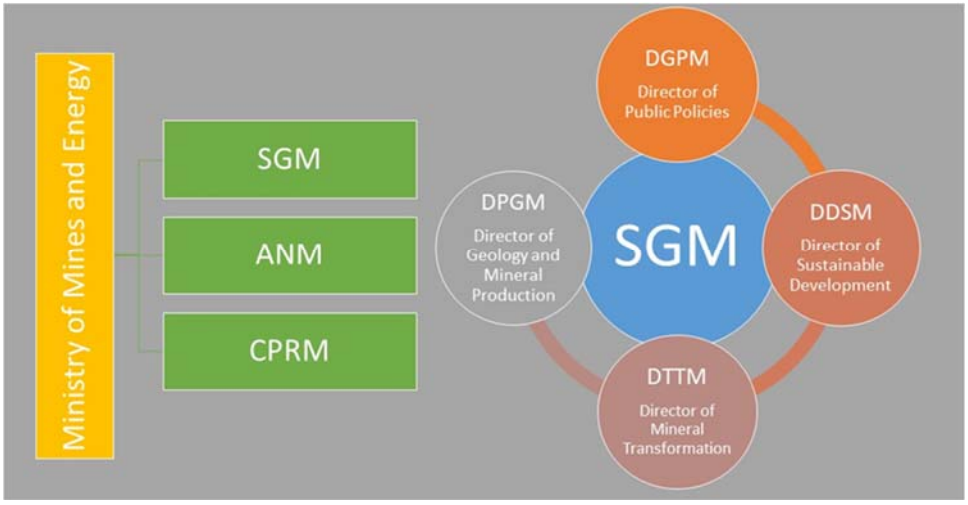
Year	-20% in Energy Price	-30% in Energy Price	-40% in Energy Price
0	4.2%	6.3%	8.5%
1	2.8%	4.2%	5.6%
2	1.9%	2.8%	3.7%
3	1.3%	1.9%	2.6%
4	0.9%	1.3%	1.8%
5	0.6%	0.9%	1.3%
6	0.5%	0.7%	0.9%
7	0.3%	0.5%	0.7%
8	0.3%	0.4%	0.5%
9	0.2%	0.3%	0.4%
10	0.1%	0.2%	0.3%

Source: MoE/Fazenda/SECAP.

ANNEX 5: INSTITUTIONAL ASSESSMENT OF THE MINING SECTOR

1. Congress approval of the new mining framework in July 2017 represented a significant institutional reform. The new framework was approved after 4 years of extensive debates in congress over the many different proposals that ranged from institutional reforms to royalty rates. Despite being a major step in modernizing a sector that was plagued by inefficiency do to an old model that could not respond to Brazil's dynamic mining sector, some important aspects were left out due to the lack of consensus in some of the proposed reforms. The main reform approved was the replacement of DNPM with a more independent ANM.

Figure 5.1. The Mineral Sector into the Ministry of Mines and Energy



2. **ANM.** The July 2017 approval of ANM is seen as a positive step over the aging DNPM. The objective was to improve the licensing processing bureaucracy, reducing processing costs and overall modernization of the sector. The improvements in the new Mining Code include the following: (i) international standard for reporting of Reserves and Resources; (ii) online/electronic processes; (iii) easier surface/property access by the title holder; and (iv) the bidding of more than 30,000 titles.

3. In addition, Brazil's 9 key drivers for Expansion of the Extractive industry to be regulated and enforced by the ANM are: a series of measures aiming at making the regulation of the sector more efficient such as (i) Impose on current Exploration reports, adherence to international rules of Resource and Reserves Reporting; (ii) Modernize the on-line staking process of first come first served basis; (iii) Develop an exploration database from companies that have lost or relinquished titles, available as open file data within a logical time frame; (iv) Support and coordinate with the relevant environmental institutions to expedite Environmental Licensing for Exploration Permits while maintaining high standards); (v) Create a more modern and efficient management system for the licensing and inspection of tailings; and (vi) Simplify of the licensing process for construction, agriculture minerals/material.

4. Despite the reforms and the creation of the ANM some challenges for its implementation remain. Brazil's current fiscal deficits have resulted in a series of budget cuts (contingenciamento) which has hindered, in the case of ANM, its ability to hire new civil servants to support the implementation of its expanded mandate and has posed a serious impediment to building up the agency's crippling infrastructure, including IT equipment and systems, technical equipment and basic everyday use material.

5. **CPRM.** Founded in 1969 CPRM is Brazil's Geological Survey Company. The company has over 1.700 professionals, of whom some 500 are geologists, hydro geologists, hydrology engineers and mine engineers. A third holds a masters or doctoral degree. The main responsibilities of CPRM are to support the formulation of mineral and geological policy, to participate in planning, coordination and execution of the geological and hydrological services of responsibility of the Union throughout the national territory. The mission is to promote mineral discoveries and use of the country's mineral and water resources. Also, to develop information systems, charts and maps that translate national geological and hydrological knowledge, making it accessible to interested parties, expand the geophysical knowledge of the whole national territory through aerial acquisitions (executed since 1953), in partnership with other public institutions, and carry out terrestrial surveys (as geochemical surveys), whose objectives are to meet the guidelines of the projects developed institutionally.

6. **CPRM, through its technical staff, has been used, as far as the mineral and energy sector is concerned, mainly for geological cartography, developing maps and carrying out mapping projects** in association with universities and, rarely, with private companies. Geophysical and geochemical surveys are also carried out, looking for data coverage of the entire Brazilian territory. In the past years, with support from the META 1 project, CPRM has been able to build its technical capacity to provide mapping for disaster risk management. The company is working in several cities and municipalities in Brazil to support urban planning and risk mitigation actions in geologically unstable areas.

7. **CPRM has a good technical reputation with a strong technical body.** It has been able to greatly advance on building Brazil's geological infrastructure. Compared to other countries in Latin America, with a similar mining potential such as Peru and Colombia, Brazil is way ahead in terms of geodata acquisition and maps. The Brazil Aerogeophysical Projects Database, which is named AERO, was created by CPRM - Serviço Geológico do Brasil/Geological Survey of Brazil in 1995 and its main scope aims at providing the user with basic technical information on all the phases of the principal airborne geophysical surveys that have been carried out in Brazil since 1952. This is an important database which provides investors with the needed technical information on the decision-making process for exploration and exploitation projects. The generated geodata is also an important source of information for land use planning, agriculture, infrastructure development, water resource management as well geological hazard mapping and prevention.

8. **Despite the advances achieved in developing the county's geological infrastructure there is still a significant portion of the country to be covered**, including important mineral provinces such as Carajas and Alta Floresta. The mapping, aerogeophysical and geological, of the country requires investments to obtain the necessary scale for the use of the data. This data is critical to attract investments for the sector and make Brazil a competitive investment destination.

9. **SGM.** SGM is part of the structure of MME and among a range of responsibilities in charge of: (i) define general mining policies and coordination; (ii) coordinate studies for planning and propose actions for the

sustainable development of the mining and mineral transformation sectors; (iii) monitor and evaluate the performance of the minerals sector and its implementing agencies; (IV) promote and support research activities and technological innovation in the fields of geology and of the mining industry; and (v)coordinate the process of mineral rights allocations and supervise the monitoring and inspection of mining activities.

10. **SGM has qualified technical staff and the necessary structure to implement its mandate.** Among the main challenges is budget allocation which often results in the inability to carry out important sectoral studies and research. SGM provides overall policy recommendations to MME and the GoB on mining sector issues. It is also responsible for preparing, updating, consulting on and disseminating the PNM. The PNM is the overall sector strategy that guides the GoB on the implementation of the sectoral policies. In the past, the PNM, has been more effective as policy guidance than an implementable strategy. The new updated PNM , supported by the META 2 project, intends to be more actionable with clear mandates, responsibilities and time frames for its effective implementation.

ANNEX 6: LESSONS LEARNED FROM META 1 PROJECT

1. **Leaving certain room for flexibility in the TA project design can allow for continuous overarching borrower support and adaptation to better fulfill the needs of the client within the same line of work.** This is particularly important for a middle-income country willing to borrow for policy TA. It allows for the addition and/or substitution of new activities based on the understanding that the overall broad objectives remain constant. It is particularly important for a sector, and technology, which are evolving at an increasingly faster pace, where it is unclear what knowledge will be needed in the near future. It also allows for timely knowledge intervention needed to address unexpected crises.

2. **This TA project will also become a platform for client engagement and leverage Bank executed funds.** It provides the World Bank with access to other donor funding (which can be scarce for middle-income countries) to carry out critical knowledge activities, which may reorient the ongoing dialogue and in turn have new or changed activities executed under the project, thus bringing greater added value to the World Bank-client engagement. However, particular attention must be given to the indicators to allow for the measurement of progress.

3. **Specific studies and reports targeting improved regulation and market mechanisms can increase transparency and efficiency in the sector, while leveraging private investments**. The study of Contractual Balance in Energy Market is a good example. This was a timely study, with recommendations, where the framework produced enabled the GoB to measure and solve the problem of over contracting energy, in which both the Government and the private sector ended up as winners.

4. **In the case of Brazil, when multiple implementation agencies are involved, having a central PIU coordinating activities (as opposed to implementing themselves) improves ownership, plus the project's progress and achievements.** In the case of the META Project, there were more than 70 ToRs implemented under the project by the MME and eight other institutions. Implementation improved at an almost highly satisfactory pace when each institution implemented its own procurement activities, and the central PIU acted in a coordinating/supporting role, including creating guidelines and evaluating results, rather than execution.

5. **The dissemination of the project outcomes through workshops to the upper government management and other stakeholders can be an important way to ensure continuous government commitment.** In the case of META, workshops clarified to the many sector stakeholders the importance of the targeted interventions and studies. According to a key ministerial adviser at the results workshop, while they were compiling a report on key legislation which had significant impact to the sector, before the workshop they were unaware that this legislation (in this case modification to the Contractual Balance in the Energy Market) was a result of META interventions. Furthermore, in this particular case, given that the Government had just changed when the results workshop occurred, the workshop itself was critical to demonstrate the far-reaching benefits of TA activities, leading to the request of a follow-on META 2.

6. **In the case of Brazil, projects at the federal level where the loan is spent as part of the regular ministerial (or agency) budget, it is important to size the loan, and duration of the project, based on the ministerial/agency spending caps at the beginning of the Brazilian fiscal year.** Brazilian law prohibits departmental overspending

(where employees can be jailed) and issuing bidding documents without 100 percent secure financing. The latter is more important because even if the department is promised a top-up later in the fiscal year, that assurance is not enough to allow for bidding.

ANNEX 7: ECONOMIC ANALYSIS

1. **TA projects do not lend themselves to economic evaluation through cost-benefit, cost-effectiveness or other methods** because they do not have quantifiable direct and indirect economic benefits to be compared with direct and indirect economic costs (for example, the economic costs associated with the TA). Therefore, the economic analysis of this TA project includes description and summary of main indirect economic benefits that are expected to materialize from implementation of various policy and other measures.

2. **The proposed project is forecast to have a positive development impact considering projected benefits and costs.** A qualitative economic analysis was conducted and based on the precedent of META 1, it is expected that the return will be much higher than the cost of the project. While attributing outcomes to the various components undertaken under the auspices of a TA project is a difficult task, the results that could be at least partially triggered by the undertaking of this project are described below for each subsector. The three sector areas of the project will be analyzed separately in the next sections.

Electricity

3. **Project activities will contribute toward climate-informed planning and systems operation** (scheduling and dispatching) leading to reduction in the volume of unserved energy (COUE), saving of economic cost of electricity supply, and reduction of CO_2 emissions through TA measures aimed at improvement of the sector efficiency. Economic and social benefits of Subcomponents 1.1 and 2.1 could include: (i) reduction in the cost of unserved energy due to improved quality of supply [64](reduction on the number of interruptions and voltage fluctuations), particularly in times of low hydrology. The COUE for middle-income countries similar to Brazil is quite high considering the foregone economic benefits of industrial and commercial enterprises due to interruptions in the electricity supply, the cost of adaptation to such interruptions (for example, back-up generation), and the reduction of consumer surplus for residential consumers due to lost leisure time and adaptation cost; (ii) increased consumer surplus due to anticipated reduction of economic cost of supply from rationalization of the pricing methodology, adjustment of the dispatching and energy market rules,, (iii) and demand- demand-side response programs and digitalization of the distribution sector, (iv) reduction of the economic costs from local environmental pollution levels from reduced emission when introducing electric vehicles fueled with clean energy; and (v) reduction of CO2 emissions, which is a global environmental benefit. The mentioned benefits would also accrue to the bottom 40 percent of consumers.

4. **Total savings can only be calculated ex-post.** As indicative reference, there is evidence from a similar, albeit smaller scale experiment (covering 51 million people) in the United States, which saved US$101 million in one year.[65]

5. **The project will also generate economic benefits through support to assessments on "locational signaling", which effectively allows the operator to "see" the system, real-time, from an energy costing/financial perspective**. This will help to meet the projected electricity demand in the economically efficient

[64] The 2001 reduced GDP growth by an estimated 1 percent, clearly illustrates the adverse macroeconomic economic impact that rationing can have.
[65] Gisin et al.

manner by optimizing the need for new electricity generation capacity, electricity transmission capacity, and timing of construction. The same type of economic benefits would accrue from climate-informed planning of expansion and dispatchability of the power system. Specifically, incorporation of the impacts of climate change in projections of water flows/hydrology scenarios, which are typically used as inputs for simulating the generation of hydropower plants, would allow to improve the availability of the electricity supply through further optimization of the type, size, and timing of the electricity generation capacity that needs to be constructed to meet the demand. This is essential considering that Brazil is a hydro-thermal power system and climate change impacts availability of water for both type of generation technologies. It should be noted that thermal power plants are also affected by the climate change because they require steady water supply for technological needs (for example, cooling) and may have to stop generating electricity in case insufficient water supply to avoid sever damage to equipment. Ultimately, the climate-informed planning would allow to diversify the electricity generation mix through inclusion of non-hydro renewable energy technologies (Solar PV, Wind, other) that would allow to fully meet the projected electricity demand at lowest possible cost as well as attain the target levels of energy supply reliability that are typically measured through value of lost load.

Mining

6. **Despite favorable geology and an enormous land mass, Brazil is rated low by exploration companies with respect to exploration attractiveness[66] and it hasn't benefited from the large global upswing in exploration expenditure since 2016;** As discussed in detail in (Flochel and Jennings 2016), the returns to exploration can be very high, and every US$1 million of government investment to enhance the geoscience knowledge base will likely stimulate US$5 million of private sector exploration expenditures, which, in turn, will result in discovery of new resources with an average in situ value of US$125 million. This is based on 13 separate studies across Australia and Canada. Subsequent work generally supports this rule of thumb." As a simple example, if more and better geological knowledge and a better licensing procedure leads to the discovery of one medium sized gold mine producing 7,000 ounces of gold a year, for 15 years, the direct fiscal return to the GoB would be about US$40 million (assuming it captures 25 percent of the value). Geoscience information has many other important uses in addition to exploration. These include land use management, particularly for agriculture, water flow management, land planning related to stability and contamination issues, including areas more susceptible to earthquakes and landslides.

7. **The project would also generate economic benefits in form of avoided economic costs from tailings dam failures and contingencies. Specifically,** the project will also support new measures for safety of tailings dam with respect to construction and independent monitoring**.** Therefore, there would be benefits in form of avoided economic costs from reduction of mortality and health care costs from catastrophic events caused by failure of tailings dams.

8. **Increased verticalization or linkages is one of the three pillars of the mining sector strategic plan, which this project will help to implement.** Mining companies buy tens and even hundreds of millions of dollars of inputs and capital goods. Success in this area would create employment and value added and fiscal revenues. Normally, there are many more jobs in supplying mines than in the mines themselves.

[66] Fraser Institute, 2019

9. **Mine supply is one of the biggest industries in many countries[67]since it can also lead to downstream industries,** although many of these are very energy intensive, which can cause problems unless there is a power surplus. In 2011 in Chile and Peru there were over 700,000 jobs in firms selling goods and services to the mining industry (McMahon and Moreira 2014: p.37). Clearly, success of the project in this regard could have a substantial impact on value added, employment and fiscal revenues, increases in all of which are likely to disproportionately benefit the bottom 40 percent. However, the GoB must be careful how it implements such policies to ensure domestic suppliers are competitive, which includes access to infrastructure and a skilled labor force as well as an encouraging business environment, or mining companies may be concerned about losing competitiveness and be less willing to invest in the country. Fortunately, there are many lessons to be learned from other countries as well as Brazil's own experience in the oil sector (see Anouti et al. 2013).

Natural Gas

10. **The project will support reforms to make the natural gas market more competitive and, in the process, lower natural gas prices.** Currently natural gas is costly in Brazil, at around 3 times the average world wholesale price (US$4.38 per MMBTU). In 2018, Brazil's industrial users were obliged to pay almost US$14/MMBTU, compared to an average European price of just over US $8.80/MMBTU. Savings would be significant, if prices fell toward average world levels, particularly benefitting the bottom 40 percent. For example, a 1 percent decrease in current price would mean a savings of potentially US$7.3 billion/year. The potential of savings is further increased if one considers that gas consumption is expected to nearly double by 2026.

11. **Final Remarks. This analysis has attempted to show that there are several avenues by which this project could generate large returns.** There would also be other, even more difficult to quantify benefits, particularly for the bottom 40 percent. Better environmental management in the mining sector would particularly benefit rural people in the region. A better geological survey is important for land planning and disaster mitigation, a tool which can even be used in cities. Removing or reducing cross subsidies in the market for electricity would particularly benefit the poor. Similarly. A more stable power sector is very important to the B40, as they can least protect themselves from power shortages or can only do so at high cost.

References:

Anouti, Yahya; Manzano, Osmel E.; Tordo Silvana; Warner, Michael. 2013. Local content in the oil and gas sector (English). A World Bank study. Washington D.C.; World Bank. *http://documents.worldbank.org/curated/en/549241468326687019/Local-content-in-the-oil-and-gas-sectorD.C.*

Boulton, R. B. 1999. Refinement and Validation of a Costs, Benefits and Impact Model for the Targeted Geoscience Initiative. Unpublished report, prepared for the Geological Survey of Canada, Natural Resources Canada, 57.

Flochel, Thomas and Keenan Jennings (20l6), "An Economic Appraisal of Geological Information Provision and Capacity Building in Africa", working paper, World Bank, Washington, D.C.

[67] Canada, Australia, and South Africa, among others.

Fraser Institute Annual Survey of Mining Companies (2019), Fraser Institute, Vancouver, Canada (https://www.fraserinstitute.org/sites/default/files/annual-survey-of-mining-companies-2018.pdf)

McMahon, Gary and Susana Moreira (2014), "The Contribution of the Mining Sector to Socioeconomic and Human Development", Extractive Industries for Development Series #30, World Bank, Washington, D.C.

Gisin, Doris; Qun Gu; James V., Mitsche; Simon Tam; and Hong Chen (2) "Perfect Dispatch – As the measure of PJM Real Time Grid Operational Performance "

ANNEX 8: DRAFT PROCUREMENT PLAN

1. Table 8.1 shows the project's draft Procurement Plan, defining appropriate selection methods, market approach, and type of review by the World Bank.

Table 8.1. Draft Procurement Plan

ID (MME)	Type	Agency	Description	Amount US$	Risk	Procurement Approach	Selection Method	Evaluation Method
1	**CS**	**MME**	Ministerial supervision and corporate governance of state-owned companies.	148.148,15	1	National Open	CQS	Rated criteria
2	**NCS**	**ANEEL**	Technological solution for storing information from power generation projects, integrated with the existing IT structure, which includes modeling and development of new database, interface structuring, traceability, data mining and quality monitoring of information contained in database.	556.445,87	1	National Open	RFB	lowest evaluated cost
3	**CS**	**ANEEL**	Digital transformation project to improve ANEEL's analytical maturity.	656.472,22	1	National Open	QCBS	Rated criteria
4	**NCS**	**ANM**	Contracting services of specialized geoprocessing, interpretation and generation of geospatial information, support to the database and geospatial data infrastructure to improve surveillance, and monitoring of mining and dam activities.	4.666.666,67	2,2	International Open	QCBS	Rated criteria
5	**G**	**ANM**	Modernization of the technological infrastructure and improvement of ANM's Information Security, to improve the efficiency in the service to the regulated sector and compliance with the General Data Protection Law.	3.252.469,14	1,8	National Open	RFB	lowest evaluated cost

ID (MME)	Type	Agency	Description	Amount US$	Risk	Procurement Approach	Selection Method	Evaluation Method
6	**CS**	**ANM**	Modernization of the Regulatory Stock of the Mineral Sector.	1.728.703,70	1,6	International Open	QCBS	Rated criteria
7	**CS**	**ANP**	Development of Regulatory Result Analysis (ARR) methodology and application to 3 (three) pilot projects, one for each segment regulated by ANP: oil and natural gas exploration and production, fuel production and fuel supply.	125.000,00	2	National Open	CQS	Rated criteria
8	**NCS**	**ANP**	Develop an IT solution aimed at obtaining automated information on the retail marketing of automotive fuels and LPG (volumes and prices), considering the increased scope and agility, contributing to the identification of regulatory violations and signs of anticompetitive conducts (cartels in the resale of fuels).	1.851.851,85	1,8	National Open	RFB	lowest evaluated cost
9	**CS**	**ANP**	Evaluation of Mechanisms that Promote Competitiveness in the Natural Gas Market in Brazil: Search for Competition in Energy Trading in the Country and Establishment of Virtual Natural Gas Trading Points.	518.518,52	2	National Open	QCBS	Rated criteria
10	**CS**	**ANP**	Development of administrative simplification methodology to define selection and analysis criteria (qualitative and quantitative) of ANP Resolutions, aiming to reduce unnecessary administrative costs	125.000,00	2	National Open	CQS	Rated criteria

ID (MME)	Type	Agency	Description	Amount US$	Risk	Procurement Approach	Selection Method	Evaluation Method
			(regulatory burden) for regulated agents and application to 3 (three) pilot projects, one for each segment regulated by the ANP: exploration and production of oil and natural gas, fuel production and fuel supply.					
11	**NCS**	**CCEE**	Modernization of accounting and settlement systems in the Brazilian electricity sector - online system modules.	1.735.320,33	1,8	National Open	RFB	lowest evaluated cost
12	**NCS**	**CCEE**	Modernization of accounting and settlement systems in the Brazilian electricity sector - system calculation engine.	1.735.320,33	1,8	National Open	RFB	lowest evaluated cost
13	**NCS**	**CCEE**	Modernization of accounting and settlement systems in the Brazilian electricity sector - reference architecture for CCEE's B2B integration model.	385.626,74	1,6	National Open	RFB	lowest evaluated cost
14	**CS**	**CCEE**	Study on the offer price formation in several countries (mainly with hydroelectric predominance), evaluating its benefit in relation to the model price formation, aiming to propose a methodology / systematic of supply price formation in the Brazilian electricity sector, including indicating the necessary adjustments to the business environment, regulatory and best business practice arrangements.	2.062.031,81	1,8	International Open	QCBS	Rated criteria
15	**G**	**CPRM**	Expansion of the Laboratory Base of CPRM - Acquisition of Chemical and Geochemical Analysis	1.072.117,50	1,6	National Open	RFB	lowest evaluated cost

ID (MME)	Type	Agency	Description	Amount US$	Risk	Procurement Approach	Selection Method	Evaluation Method
			Equipment for the Laboratory of Mineral Analysis - LAMIN Network.					
16	**CS**	**EPE**	Natural Gas Underground Storage Evaluation (ESGN) in Brazil.	838.779,95	1,6	National Open	QCBS	Rated criteria
17	**CS**	**EPE**	Studies on improvements in the transmission locational signal calculation methodology, including analysis of nodal prices, transmission financial rights and their destination within the energy market (with training).'	311.111,11	1,2	National Open	QCBS	Rated criteria
18	**CS**	**EPE**	Market Design Study and Auction "Systematics" (including training).	148.148,15	1,2	National Open	CQS	Rated criteria
19	**CS**	**EPE**	Light Vehicle Fleet Assessment in Brazilian households (PeFROTA - Household Automobile and Motorcycle Fleet Survey).	111.111,11	1,2	National Open	CQS	Rated criteria
20	**CS**	**EPE**	Fuel Supply Infrastructure Planning Studies.	493.827,16	1,2	National Open	QCBS	Rated criteria
21	**CS**	**EPE**	Data collection on the consumption of firewood and charcoal in the residential sector.	493.827,16	1,2	National Open	QCBS	Rated criteria
22	**CS**	**ONS**	Carry out the necessary studies, develop and implement a methodology to evaluate the costs of the operation of SIN with analysis of impacts in real time and post operation, as well as to measure the benefits arising from the performance of ONS.	950.617,29	1,2	National Open	QCBS	Rated criteria
23	**CS**	**ONS**	Development of technical studies to identify changes in the flow regime and the main meteorological variables of interest for the operation of SIN.	2.424.135,81	1,8	International Open	QCBS	Rated criteria

ID (MME)	Type	Agency	Description	Amount US$	Risk	Procurement Approach	Selection Method	Evaluation Method
24	**CS**	**ONS**	Solar Source Generation Prediction: Study of influential variables and prediction model development.	2.186.419,75	1,8	International Open	QCBS	Rated criteria
25	**CS**	**MME**	Evaluation of the insertion of electric vehicles in the National Electricity Matrix.	493.827,17	1,4	National Open	QCBS	Rated criteria
26	**CS**	**MME**	Public Policy for DG.	493.827,16	1	National Open	QCBS	Rated criteria
27	**CS**	**MME**	Technology insertion for productive improvement of small and medium mining companies. Extension and Technological Insertion Project for Improving the Production Process of Small and Medium Mining Companies.	740.740,74	1	National Open	QCBS	Rated criteria
28	**CS**	**MME**	Mining and society The objective is to prepare the municipality - population, managers and organized society - for the diversification of the economic matrix - extractive-mineral activity. It aims to provide public authorities and communities with recognition of the productive and socio-environmental potentialities of municipalities or mining regions, to enable public policies that guarantee local sustainability and enable diversification and autonomous economic development.	1.728.395,06	1,6	International Open	QCBS	Rated criteria
29	**CS**	**MME**	Utilization of mining waste (Execution in partnership with CPRM) Utilization of Solid Waste and Mining Waste.	1.728.395,06	1,2	International Open	QCBS	Rated criteria
30	**G**	**MME**	National Mining Observatory	1.234.567,90	1	National	QCBS	Rated

ID (MME)	Type	Agency	Description	Amount US$	Risk	Procurement Approach	Selection Method	Evaluation Method
			- Mining Sector Database Setting up a Geology and Mining information system.			Open		criteria
31	**NCS**	**MME**	Mineral Economics - Support the structuring of the "Mining Observatory" and the subject of Mineral Economics.	98.765,44	1	National Open	CQS	Rated criteria
32	**NCS**	**MME**	Urban Mining: Reuse of waste from electro-electronic equipment.	123.456,79	1	National Open	CQS	Rated criteria
33	**NCS**	**MME**	National Mining Plan Review - PNM 2050 Promote the review of PNM 2030, published in 2011 by SGM/MME.	617,283,95	1,4	National Open	QCBS	Rated criteria
34	**NCS**	**MME**	Hiring consultancy to identify climate change and map threats to SIN in the face of climate change. Proposition of methods and processes for the study of the systemic vulnerability of SIN in the face of climate change.	160.493,83	1,4	National Open	QCBS	Rated criteria
35	**NCS**	**MME**	Power Generation Source Attributes in the RCE.	592.592,59	1	National Open	QCBS	Rated criteria
36	**NCS**	**MME**	Procedures for the preparation of the Useful Energy Balance (with energy audit).	493.827,16	1	National Open	QCBS	Rated criteria
37	**NCS**	**MME**	Capacity building of institutions to solve business problems (MME, ANEEL, CCEE, EPE, and ONS).	617.283,95	1	National Open	QCBS	Rated criteria