

## TC Document

### I. Basic Information for TC

▪ Country/Region:	BRAZIL
▪ TC Name:	Development of Battery Energy Storage System (BESS) Investment Projects and Policy and Regulatory Support
▪ TC Number:	BR-T1497
▪ Team Leader/Members:	Sierra Gonzalez, Eduardo (IFD/CMF) Team Leader; Echevarria Barbero, Carlos Jose (INE/ENE) Alternate Team Leader; Amaro Andrade, Flor Evelyn (IFD/CMF); Ana Lozano (IFD/CMF); Avello Leon, Carolina Maria (IFD/CMF); Bernedo, Cecilia (IFD/CMF); Brakarz, Barbara (CSD/CCS); Braly-Cartillier, Isabelle Frederique (IFD/CMF); Callau Ferreira, Vanessa (CSD/CCS); Cavazzoni Lima, Rafael (IFD/CMF); Chaparro Montana, Luis Rodrigo (IFD/CMF); Da Rosa Fernandes, Leonardo (CSC/GBR); Diaz Briones, Karina Miriam (VPC/FMP); Eschavez, Guillermo Antonio (LEG/SGO); Fonseca, Daniel Fernando (IFD/CMF); Frisari, Giovanni Leo (CSD/CCS); Isabella Espana Quezada (IFD/CMF); Juarez Olvera, Mariel (CSD/CCS); Malagon Orjuela, Edwin Antonio (INE/ENE); Martinez Lopez, Cynthia (IFD/CMF); Netto De A. C. Schneider, Maria E. (IFD/CMF); Porras Herrera, Fanny Eliana (IFD/CMF); Schweizer, Luciano (IFD/CMF); Vasa, Alexander (IFD/CMF); Villela De Toledo Estevanato, Leise (VPC/FMP)
▪ Taxonomy:	Operational Support
▪ Operation Supported by the TC:	BR-G1011, BR-L1576.
▪ Date of TC Abstract authorization:	October 20, 2021
▪ Beneficiary:	Banco Nacional de Desenvolvimento Econômico e Social (BNDES).
▪ Executing Agency and contact name:	Inter-American Development Bank
▪ Donors providing funding:	Clean Technology Fund(CTF)
▪ IDB Funding Requested:	US\$1,000,000.00
▪ Local counterpart funding, if any:	US\$200,000.00 (In-Kind)
▪ Disbursement period (which includes Execution period):	40 months (Executing period: 40 months)
▪ Required start date:	December, 2022
▪ Types of consultants:	Individuals, Firms
▪ Prepared by Unit:	IFD/CMF-Connectivity Markets and Finance Division
▪ Unit of Disbursement Responsibility:	IFD/CMF-Connectivity Markets and Finance Division
▪ TC included in Country Strategy (y/n):	Yes
▪ TC included in CPD (y/n):	No
▪ Alignment to the Update to the Institutional Strategy 2010-2020:	Institutional capacity and rule of law; Productivity and innovation; Social inclusion and equality

### II. Description of the Associated Loan/Guarantee

- 2.1 This Technical Cooperation (TC) will support the loan Program to Finance the Sustainable and Productive Recovery of Micro, Small and Medium Enterprises (MSME) ([5452/OC-BR](#); [GRC/TC-19109-BR](#)), whose objective is to promote sustainable economic recovery of MSMEs in Brazil. The loan program consists of a global credit operation, which uses US\$240 million from Bank's Ordinary Capital, US\$10 million of loan funds from the CTF to finance medium and long-term MSME sustainable investments

([5452/OC-BR](#)), and a US\$5 million Contingent Investment Grant<sup>1</sup> ([GRC/TC-19109-BR](#)) for a guarantee fund for MSMEs investments in Battery Energy Storage System (BESS). The specific objective of the loan program is to enhance the availability of medium and long-term financing in the context of the COVID-19 pandemic for MSMEs and entrepreneurs' productive investments. This will be attained by ensuring provision of financing for climate related investments, vulnerable areas, and women businesses. The TC will particularly support development and execution of BESS related investments and will be financed by a US\$1 million Grant from the Clean Technology Fund (CTF).

### III. Objectives and Justification of the TC

- 3.1 The main objective of this TC is to support the early development of the BESS market in Brazil by: (i) helping the proper identification and assessment of a portfolio of BESS projects; (ii) facilitate knowledge sharing and the establishment of alliances among key stakeholders; (iii) supporting the enhancement of a regulatory environment that enables the scale up of BESS investments; and (iv) strengthening BNDES capabilities for evaluating and monitoring BESS projects and supporting the development of proper tools to perform the financial and technical evaluation of BESS investments.
- 3.2 Over the last years, BESS integration with renewable energy has been recognized as one of the key technologies to address climate change and promote energy diversification due to its ability to increase resilience of the power grid, enable further penetration of variable renewable energy sources, reduce or defer transmission and distribution infrastructure investments, reduce overall cost of energy and peak time consumption, reduce the vulnerability of companies to grid stability and reduce local pollution. In 2019, the Energy Research Office (EPE)<sup>2</sup> of Brazil launched a specific study on the use of batteries which identified a series of benefits for the use of electrochemical batteries, such as: energy management, backup, load balancing, frequency control, voltage control, grid stabilization, black-start, compensation of the variability of wind and solar generation, which allows for greater penetration of these renewable sources and, consequently, a reduction in Greenhouse Gas (GHG) emissions.
- 3.3 Despite its advantages, BESS currently face various barriers in Brazil including higher Capital Expenditures (CAPEX), risk perception, regulatory challenges, and lack of suitable financing options. The higher CAPEX cost is also hindered by tax burden in Brazil, which reaches up to 80% for this technology. Risk perception is still high as it is not a widely disseminated technology within MSMEs. Furthermore, the current legislation does not recognize it, and therefore, does not remunerate some services that battery systems are able to offer, such as demand management,<sup>3</sup> energy arbitration,<sup>4</sup> and mitigation of short-term energy supply restrictions. On the financial side not only, the financial system does not have a specialized lines of credit for BESS, but also MSMEs face significant

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<sup>1</sup> Corresponding to Investment Grant [GRC/TC-19109-BR](#), which is being processed jointly with [5452/OC-BR](#). If Guarantees benefiting from this grant resources were not called, funds will be returned to the CTF according to the Operating Regulations (OR) of the program.

<sup>2</sup> EPE is linked to the Brazilian Federal Government, through the Ministry of Mines and Energy, and is responsible for the preparation of studies that support energy policies (<https://www.epe.gov.br>).

<sup>3</sup> This service allows that during operational stress, some users can be disconnected from the grid and consume their own energy. A set of batteries can supply the energy demand during these times.

<sup>4</sup> Acquisition and storage of energy in times of surplus and sale of energy or disconnection from the grid during peak hours. These schemes can help expand wind and solar generation and add operational security to the systems.

restrictions accessing credit, due –among others– to the higher CAPEX needs as well as their limited availability of traditional forms of collateral.

**Table 1. Cost Summary by Technology**

Technology	Storage - Batteries	Photovoltaic	Biomass (Sugarcane bagasse)
CAPEX min and max [R\$/kW]	6.000 - 9.800	3.000 - 5.000	2.000 - 5.500
O&M [R\$/kW/year]	70	50	90
Taxes / fees [R\$/kW/year]	310	150	190

Source: EPE, *Plano Decenal de Expansão de Energia 2030*, page 56.

- 3.4 Brazil's overall installed capacity is 222 GW with about 83% from renewable energy sources. The electrical matrix is dominated by large hydropower plants (61.6% of installed capacity). Biomass power plants, mainly fueled by sugarcane bagasse, accounted for 8.9% of overall capacity; wind power represented 10.4%, while distributed solar photovoltaic facilities represented 1.5% of overall electrical generation capacity. EPE, estimates a 3.1% per year growth of electricity demand for the next ten years.<sup>5</sup> Vulnerabilities in the electric system and volatility of electricity prices have stimulated increased interest in renewable energy auctions and Energy Efficiency (EE) measures. Regarding behind-the-meter systems, companies have been offering solutions tailored to the needs of commercial or industrial users, that need to reduce the demand for electricity and/or generation during peak hours.
- 3.5 In its National Determined Contribution Brazil has committed to a 37% reduction in its emissions by 2025 and 43% in 2030 (for the entire economy), based on the 2005 emissions. There is no formal distribution between different sectors, so the country can achieve the goals through different alternative paths. BESS combined with renewable energy can contribute to achieve this target while guarantee the continuity of production processes in times of instability in the electricity supply service.
- 3.6 BNDES has a strong presence and experience in supporting the development and implementation of renewable energy and energy efficiency solutions . BNDES is in the process of capitalizing a guarantee program (*Fundo Garantidor para Eficiência Energética* - FG Energia) which will offer to the Local Financial Institutions (LFI) concessionally-priced guarantees to be used as alternative collateral in order to expand lending to SMEs for energy efficiency and their connected battery storage and distributed generation solutions. The fund is expected to become operational in Q1 2022 with US\$8 million from the National Electrical Energy Conservation Program (PROCEL). The US\$5 million funding from the CTF Contingent Investment Grant will supplement the PROCEL resources. The US\$240 million IDB-BNDES loan Program will provide medium and long-term financing to MSMEs and individual entrepreneurs for investments in three categories: (i) climate related investments; (ii) investments on MSMEs in vulnerable regions; and (iii) investments on women's MSMEs. CTF resources include a concessional loan (US\$10 million) and a US\$5 million Contingent Investment Grant for financing investments by MSMEs specifically in BESS projects. IDB and BNDES, with the support of this TC, seek to develop capacities that will allow the adequate identification and evaluation of projects, as well as the assessment of business models to bring more efficiently capital for financing BESS projects in the market.
- 3.7 The program is consistent with the Second Update to the Institutional Strategy (AB-3190-2) and aligned with the development challenges of: (i) Social Inclusion and

<sup>5</sup> *Sistema de Armazenamento em Baterias. Empresa de Pesquisa Energetica. EPE. 2019.*

Equality, through the financial support for MSMEs and vulnerable groups; and (ii) Productivity and Innovation, through support for MSME productive financing and the use of digital channels. It is also aligned with the crosscutting themes of: (i) Climate Change, through financing of climate related investments; and (ii) Institutional Capacity and Rule of Law in line with the activities to be developed under the proposed components through the development and implementation of proper tools and systems to perform the financial and technical evaluation and monitoring of BESS projects. The program will contribute to the Corporate Results Framework 2020-2023(GN-2727-12) through the indicators of number of MSMEs financed, and emissions avoided. It is also aligned with the Country Strategy for Brazil 2019-2022 (GN-2973), through the priority area of improving the business climate and narrowing gaps in sustainable infrastructure for enhanced competitiveness and the strategic objectives of promoting greater economic competitiveness, increasing the role of the private sector by improving the quality of the business environment, and narrowing infrastructure gaps; and with its cross-cutting themes of gender equality and sustainable development. The program is also consistent with the Sector Framework Documents of Support to SMEs and Financial Access/Supervision (GN-2768-7), Climate Change (GN-2835-3) and Gender and Diversity (GN-2800-8).

#### **IV. Description of activities/components and budget**

- 4.1 This TC will be divided into four components: (i) supporting the creation of an adequate financial environment that facilitate investments in BESS projects; (ii) knowledge sharing and promoting alliances among BESS market players; (iii) strengthening of regulatory aspects that enhance investments in BESS; and (iv) strengthening BNDES capabilities for the evaluation and monitoring of BESS projects.
- 4.2 **Component 1. Support to the creation of an adequate financial environment that facilitate investments in BESS projects (US\$660,000).** This component aims to unlock private funds for BESS investments by supporting the demand side in mitigating the risk perception of these projects. This component seeks to finance the studies and activities that facilitate the identification and evaluation of projects with high potential to be financed by BNDES. It will also support the assessment of business models proposed by technology providers when offering BESS solutions to MSME and identify the most suitable mechanism to bring more efficiently capital for financing BESS projects in Brazil.
- 4.3 The component will support the identification of key market players, the assessment of market potential, as well as the selection of promising BESS projects through technical and financial evaluations of potential investments. Furthermore, it will finance the evaluation of current business models offered worldwide by technology providers for deploying BESS projects such as selling of equipment, leasing, pay for performance, etc. The assessments will consider schemes to supplement resources of IDB-BNDES line of credit with the CTF supported investment grant and PROCEL's funds.
- 4.4 **Component 2. Knowledge sharing and promoting alliances among BESS market players (US\$120,000).** There are some BESS projects in Brazil that provide evidence of the potential and market interest of suppliers and investors. This component seeks to engage early BESS market movers, support the removal of knowledge barriers, and enhance market development by creating synergies with initiatives such as FGEenergia, PROCEL, the Brazilian Electricity Regulatory Agency (ANEEL), and technology providers. It also covers awareness-raising and capacity building of market actors on the benefits of the BESS investments and on BNDES financial offering.

- 4.5 This component may also finance knowledge-sharing activities such as: (i) coordination meetings with the private sector and meetings between public sector entities and regulatory entities; (ii) focused workshops with public and private sector entities on structuring BESS projects; and (iii) meetings with market players, financial entities, and other relevant local agents. Financed activities include: the logistics and organization of meetings, travel, lodging, consultancies for coordination of discussions, preparation of progress and final reports of the TC, and dissemination of results of the TC.
- 4.6 **Component 3. Strengthening of regulatory aspects that enhance investments in BESS (US\$180,000).** Component III resources will support the review of regulatory aspects that could facilitate the promotion of investments in BESS. It will seek to provide recommendations on ways to recognize and remunerate services such as demand management, energy arbitration, load balancing, frequency control, and mitigation of short-term energy supply restrictions that allow for the projects' financial viability. It will also explore the feasibility of promoting schemes to alleviate the tax burden that affect BESS investments in Brazil.
- 4.7 This component will build on the BESS efforts of EPE, ANEEL and the Energy Development and Planning Division of the Ministry of Mines and Energy. All these institutions will be supported through the beneficiary of the TC and supporting activities might include the enhancement of their modeling and planning capabilities when considering BESS projects.
- 4.8 **Component 4. Strengthening BNDES capabilities for the evaluation and monitoring of BESS projects (US\$240,000).** The fourth component focuses on supporting BNDES the development and implementation of proper tools to perform the financial and technical evaluation of BESS investments as well as in the establishment of a system that facilitates the evaluation and monitoring of BESS investments that are either financed by BNDES and/or benefit from the investment grant.
- 4.9 The TC will finance consulting activities to: (a) development of tools that facilitate BNDES a quicker financial and technical evaluation of the proposed BESS investments; (b) develop a system to evaluate and to track the BESS indicators of the loan operation (e.g: GHG emission reductions, power rating, energy rating, etc.) that is aligned with the existing BNDES monitoring and evaluation systems; (c) conduct on site reviews of the financed equipment, once deployed, to verify its characteristics and to identify potential areas of improvement when scaling up the initiative; and (d) collection of information that facilitate the improvement of norms and regulations that enhance the use of BESS investments.
- 4.10 **Budget.** The total financing of this TC will be US\$1,000,000, which will be financed by the Clean Technology Fund (CTF). In addition, BNDES will provide in-kind counterpart resources, including staff time, facilities for meetings, and events for an equivalent of 20% of the services received.

**Table 2. Indicative Budget in US\$**

Component	Description	IDB/Fund Funding	Counterpart Funding	Total Funding
1	Support to the creation of an adequate financial environment that facilitate investments in BESS projects	550,000	110,000	<b>660,000</b>
2	Knowledge sharing and promoting alliances among BESS market players	100,000	20,000	<b>120,000</b>
3	Strengthening of regulatory aspects that enhance investments in BESS	150,000	30,000	<b>180,000</b>
4	Strengthening BNDES capabilities for the evaluation and monitoring of BESS projects	200,000	40,000	<b>240,000</b>
	<b>Total</b>	<b>1,000,000</b>	<b>200,000</b>	<b>1,200,000</b>

## V. Executing agency and execution structure

- 5.1 As part of the clean energy component of the [5452/OC-BR](#) / [GRC/TC-19109-BR](#) Program, BNDES will have a dedicated line of work to support demonstration and scale-up of BESS. This technology is still a nascent market in Brazil, that face barriers like high CAPEX, as well as technological, regulatory and credit risks. BNDES has active lines of credit that are eligible for BESS investments, but no projects have materialized yet. According to BNDES this is in part due to the lack of technical and operational capacity to follow the market trends and regulations and duly and timely evaluate the projects. By IDB acting as executing agency BNDES will focus its efforts on the global operation and the IDB will bring its experience overseeing technical assistance to promote low-carbon and climate resilient investments. BNDES and IDB agree that this approach will enhance an independent review of the potential BEES investments to be either financed through the line of credit or benefited with the investment grant. Therefore, the executing agency will be the Inter-American Development Bank through the Connectivity, Markets and Finance (IFD/CMF) and Energy (INE/ENE) Divisions. Furthermore, the Bank is considered to have adequate systems to guarantee the proper execution of the operation and ensure the sustainability of the implementation of the project in line with Annex 2 of "Operational Guidelines for Technical Cooperation Products" (OP-619-4).
- 5.2 IFD/CMF and INE/ENE have a proven record of successfully partnering with international climate funds such as CIF's CTF to accelerate the deployment of climate-smart energy solutions. Furthermore, the Bank's systems will guarantee the proper execution of the TC in line with the "Operational Guidelines for Technical Cooperation Products" (GN-2629-1). Its execution will be supervised by Daniel Fonseca from the IFD/CMF in Washington D.C. The designated focal point in Brazil will be Carlos Echeverria, Alternate Team Leader from the INE/ENE Division.
- 5.3 An Execution Unit will be composed by members of the IFD and ENE Divisions. The main functions of the Execution Unit will be: (i) to serve as a liaison body with BNDES in relation to the execution of the activities of this TC; (ii) define the plan of activities and the execution schedule; (iii) prepare the progress and annual reports required by the Bank and CTF; (iv) coordinate the alignment of the activities to be financed by this TC with the Program to Finance the Sustainable and Productive Recovery of Micro, Small and Medium Enterprises (MSME) ([5452/OC-BR](#); [GRC/TC-19109-BR](#)); and (v) ensure that the materials developed by consultants as part of this TC are peer-reviewed by the Bank and, where applicable, by market experts.
- 5.4 **Monitoring and Evaluation.** The monitoring of the execution of the TC will be carried out through the following mechanisms: (i) periodic meetings to evaluate program progress; (ii) participation of a member of the Bank's team in training and reporting events; and (iii) annual reports to the CIF Administrative Unit following GESP's monitoring and reporting principles and approach. A final external evaluation will be conducted to determine the level of compliance with project objectives and submitted no later than 90 days after the last disbursement of funding resources.
- 5.5 **Acquisitions.** All activities to be executed under this TC have been included in the Procurement Plan (Annex IV) and will be contracted in accordance with Bank policies as follows: (a) AM-650 for Individual consultants; (b) GN-2765-4 and Guidelines OP 1155-4 for Consulting Firms for services of an intellectual nature; and (c) GN 2303 28 for logistics and other related services.

- 5.6 As the TC requires strong ownership and continued engagement of BNDES for the identification, monitoring and evaluation of BESS projects, BNDES is expected to dedicate the appropriate staff time and necessary logistical resources for its implementation as part of the in-kind local counterpart funding.
- 5.7 A request from BNDES for the TC is included in Annex I.

## **VI. Major issues**

- 6.1 BNDES is a large organization accustomed to managed and execute loan successfully, keeping the risks associated with the operation low. The main risk is the possibility of delays in raising awareness of the loan and grant benefits among investors that affects the demand for BESS projects. BNDES has ongoing efforts with FGEnergia to promote energy related investments; therefore, will seek to actively engage early BESS market movers through dissemination activities that describe their financial and technical support that will be offered to the market, from the outset of the technical cooperation.
- 6.2 BNDES has a strong presence and experience in support the development and implementation of renewable energy and energy efficiency solutions and has secured funds for a guarantee fund from FGEnergia. The fund is expected to become operational in Q1 2022 with US\$8 million from PROCEL. Additional funding is being request to KfW and GCF. Administrative delays could affect the timely operationalization of the fund. As this fund will complement the CTF investment grant BNDES is establishing the administrative procedures that facilitate the prompt use of the CTF investment grant funds once they became available.
- 6.1 BESS investments are a nascent market and will be a learning curve by market players as well as by BNDES. This will be mitigated with constant information among the BNDES core team and through the knowledge sharing activities of the TC.

## **VII. Exceptions to Bank policy**

- 7.1 The project does not include exceptions to the Bank's policies.

## **VIII. Environmental and Social Strategy**

- 8.1 This Technical Cooperation is not intended to finance pre-feasibility or feasibility studies of specific investment projects or environmental and social studies associated with them; therefore, this TC does not have applicable requirements of the Banks Environmental and Social Policy Framework (ESPF) (see links: [Safeguard Policy Filter Report \(SPF\)](#) and [Safeguard Screening Form \(SSF\)](#)).

### **Required Annexes:**

[Request from the Client - BR-T1497](#)

[Results Matrix - BR-T1497](#)

[Terms of Reference - BR-T1497](#)

[Procurement Plan - BR-T1497](#)