Selection process # BR-T1529

TERMS OF REFERENCE

Assessment Of Country Energy Sector Scenarios To Get Carbon Neutrality By 2050 Through The Digitization, Decentralization, And Democratization Of The Electricity System With The Validation Of Environmental Benefits To Guarantee Safety Supply And Competitiveness.

BRAZIL
BR-T1529

1. Background and Justification

1.1 The Inter-American Development Bank (IDB) is the main source of funding for social and economic development in Latin America and the Caribbean (LAC). The Bank supports efforts to optimize the contribution of the mining-energy sector to sustainable economic development with particular attention to social and environmental aspects.

1.2 The objective of this Technical Cooperation (TC) is to support the Government of Brazil (GoB) to strengthen its institutional, technical, and regulatory capabilities to promote a greater integration of low carbon technologies in the Brazilian energy matrix.

1.3 Brazil is globally considered as the seventh largest Green House Gas (GHG) emitter with an amount of 2.9% emissions. Electricity and other energy use account for 28% of emissions, which after the transport sector, makes it the most polluting industry.

1.4 To achieve the climate goals adopted by the Parties to the UNFCCC (United Nations Framework Convention on Climate Change) and its Paris Agreement during the 26th Conference of the Parties; Brazil's National Determined Contribution (NDC) has established the target of reducing country emissions based on the levels of 2005 by 37% in 2025 and by 50% in 2030. To decrease GHG levels in the energy sector, the energy mix must achieve 45% of renewables by expanding the use of renewable energy sources (other than hydropower) in the total energy mix to between 28% and 33%.

1.5 The electricity matrix in Brazil is dominated by hydroelectric generation, although this dependence has been gradually reduced. While in 2000 hydroelectricity represented 83% of Brazil's installed capacity and 87% of the generated electricity, in 2021%) and solar generation, which contributed only the hydroelectric source still represented about 63% of the country's installed power and gross electricity production, well above other renewable sources such as wind (9.2%), biomass (9%) and solar generation, which contributed only 3%, significantly below of its potential use, although variable renewable energy resources (wind and solar) have had an accelerated growth in recent years.

1.6 As it was mentioned and despite the gradual reduction in hydroelectricity generation, the country's electricity edifice is highly dependent on the availability of water resources for generation. In this sense, a country's vulnerability to different climate hazards such as rainfall or droughts, makes it difficult to provide certainty in the electricity market price formation

process which directly impacts the volatility of prices in the electricity system. Thus, to meet the electricity demand, the operator has been forced to allow more frequently the operation of some thermoelectric power plants, increasing the electricity generation cost and Greenhouse Gas Emissions (GHG)[1].

1.7 As noted, along with the abundance of hydro-energy resources, Brazil has an enormous potential to exploit other renewable sources such as wind, solar and biomass. Although these renewable resources have had great growth in recent years, in case of solar PV with an amount of 90.4% of micro and macro distributed generation, at this stage, the use of these resources for electricity generation is quite far from its potential low scale use. As a first step to get a more flexible, accessible, and secure electricity matrix around the Brazilian territory, a more diversify energy matrix will be required to be able to reduce its vulnerability, its high dependence on hydroelectric generation and increasing its infrastructure resilience to different climate hazards.

1.8 Due to the historical prevalence of hydroelectricity generation, the rules of expansion and operation of the electricity system have been designed around the technological characteristics of this source. Currently the electricity sector is going through a transformation process because of a massive new integration of variable renewables, increase of Distributed Generation resources (DG), sectoral digitalization and automatization process, sector's coupling (energy, transport, telecommunication, etc.), and the need to boost the transition to a zero-emission economy.

1.9 In this new scenario with a technological transformational changes, higher complexity, and greater uncertainty, it is required the Brazilian electrical system progressively adapts to this context becoming more flexible and resilient. Moreover, a more sophisticated energy market, pricing signals, and more interconnection arrangements between electricity subsystems and neighbor countries will be essential to optimize the expansion and operation of the system, considering the diversity of Brazilian´s energy resources and its geographical dispersion throughout the territory.

1.10 To respond to this situation, in April 2019, the Ministry of Mines and Energy (MME) published the Portaria No. 187, which established a Working Group (WG) to lead and articulate a participatory process to carry out proposals, strengthening consensus, to modernize the electricity sector, based on the following pillars: i) Governance; ii) Transparency; and iii) Legal-regulatory stability. The WG deals with topics such as, among others, market environment and mechanisms for enabling Brazilian electricity system expansion, pricing, cost and risk allocation, and sustainability of distribution services.

1.11 As result of the WG´s efforts, in October 2019 it was presented an Action Plan which included 15 tasks and 88 subtasks to contribute to the modernization of the electricity sector. The UK Sustainable Infrastructure Program (UKSIP) is a British fund that provides technical assistance in Brazil to enhance regulatory frameworks and low carbon policies in key infrastructure sectors, such as renewable energy, to enable the market conditions for the private sector.

[1] https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/Paginas/Brazilian-Energy-Balance-2021.aspx

2. Project objectives

2.1. *Promote the decarbonization, digitization, decentralization, and democratization of the Brazilian electricity system*. The transformation process in which the Brazilian energy sector is immersed has few past references. This process responds to the new paradigms that guide the development of the energy sector at a global level oriented to promote its decarbonization, decentralization, democratization, and digitalization. This component will support the Ministry of Mines and Energy (MME), and the entity responsible for energy planning (Empresa de Pesquisa Energetica -EPE-), to strengthen their capacity to adequately promote the development and consolidation of these new paradigms, in parallel to the ongoing power sector modernization process.

3. Scope of Services

3.1. The main focus of this component is to Assessment of country energy sector scenario to get carbon neutrality by 2050 through the digitization, decentralization, and democratization of the electricity system with the validation of environmental benefits to guarantee safety supply and competitiveness. A just transition within the sector will be prioritized, given its high potential to reactivate the regional and circular economies, support jobs, and their sociopolitical priorities.

4. Key Activities

4.1. **Implementation of smart-grid and low carbon technologies**. Multiple factors such as the need to maintain the criteria of electricity system's performance to manage a greater integration of variable renewable energies; the rapid increases of distributed generation, or electricity storage and transport technologies penetration; as well as the greater awareness and knowledge of consumers who everyday demand more detailed information and new value-added electricity services; determine the need to undertake a process of digitization and automation of Brazilian´s electricity network, promoting the process of transition of its electrical system towards an "intelligent network". Despite the undeniable benefits derived from the installation of smart meter systems, so far, its penetration in the Brazilian case could be classified as timid.

4.2. The studies to be carried out within the framework of this activity are aimed to develop a country sector diagnosis and roadmap to support net zero emission scenario with a boost of a more digitalized energy network, determine the key barriers and risks that currently exist in the market to accelerate low carbon energy investments; and make an assessment of relevant solutions and bold ideas that address each of the barriers. As a list of potential solutions have been identified, based on anticipated highest impact and possibility to execute, smart meter's pilots will then be defined when relevant while implementation pathways will be articulated for solutions and recommendations that can be applied straight away.

5. Expected Outcome and Deliverables

5.1. Work plan with schedule and details of activities

5.2. Country sector diagnosis with the process of transition of its electrical system towards an "intelligent network".

5.3. Roadmap to support net zero emission scenario by 2050

5.4. Barriers and solutions to implement the activity

Final report with results. The consultant must hold a presentation workshop for each of the products, in addition to a fourth workshop to present the final results to the IDB.

6. Project Schedule and Milestones

Work plan	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Work plan with schedule and details of activities						
Country sector diagnosis						
Roadmap to support net zero emission scenario by 2050						
Barriers and solutions to implement the activity						

7. Reporting Requirements

7.1. All reports must be submitted in Word, in Portuguese, or English, in an editable file, including annexes, spreadsheets, and other required material. The file must be in a publishable format and edition in accordance with IDB standards.

7.2. All reports will be confidential.

7.3. The final report must be in Portuguese and English.

8. Acceptance Criteria

8.1. The products will be accepted for payment once they have the written approval of the IDB team.

8.2. Partial products or products that are not accepted will not be paid

9. Other Requirements

9.1. Work Team: The consultancy must present a minimum work team in its proposal, considering the following specialties:

9.1.1. Project Manager. Degree in engineering, economics, or related areas, with specialization, master's or doctorate in related areas. At least 15 years of general experience, 10 years of experience in project management for the energy sector, with fluent in Portuguese, or English. Relevant experience in the hydrogen sector. Experience in Latin America and the Caribbean is desirable.

9.1.2. Specialist in the energy sector. Degree in engineering or related areas, with a master's or doctorate in energy planning, energy economics, or related subjects. With the specific experience of at least eight (8) years in structuring and evaluating projects in the energy sector, with fluent in in Portuguese, or English,. Experience in Latin America and the Caribbean is desirable.

9.1.3. Specialist in climate change sector: Degree in engineering or related areas, with a master's or doctorate in climate change, climate economics, energy decarbonization or related subjects. With the specific experience of at least eight (8) years in the energy sector with an emphasis on energy mitigation and adaptation options, with fluent in in Portuguese, or English. Experience in Latin America and the Caribbean is desirable.

9.2. Confidentiality: All information shared with the consultancy will be considered confidential. The consultancy may not disclose to third parties any product of this consultancy, without the express consent of the IDB, in writing.

10. Supervision and Reporting: The team leader will be Carlos Jose Echevarria Barbero (INE/ENE), Sector Lead Specialist.

TERMS OF REFERENCE

Country pathways for sector evaluation of the Universalization of Access and Use of Electrical Energy in Brazil and transition to a low carbon social policy

BRAZIL

BR-T1529

1. Background and Justification

1.1 The Inter-American Development Bank (IDB) is the main source of funding for social and economic development in Latin America and the Caribbean (LAC). The Bank supports efforts to optimize the contribution of the mining-energy sector to sustainable economic development with particular attention to social and environmental aspects.

1.2 The objective of this Technical Cooperation (TC) is to support the Government of Brazil (GoB) to strengthen its institutional, technical, and regulatory capabilities to promote a greater integration of low carbon technologies in the Brazilian energy matrix.

1.3 Brazil is globally considered as the seventh largest Green House Gas (GHG) emitter with an amount of 2.9% emissions. Electricity and other energy use account for 28% of emissions, which after the transport sector, makes it the most polluting industry.

1.4 To achieve the climate goals adopted by the Parties to the UNFCCC (United Nations Framework Convention on Climate Change) and its Paris Agreement during the 26th Conference of the Parties; Brazil's National Determined Contribution (NDC) has established the target of reducing country emissions based on the levels of 2005 by 37% in 2025 and by 50% in 2030. To decrease GHG levels in the energy sector, the energy mix must achieve 45% of renewables by expanding the use of renewable energy sources (other than hydropower) in the total energy mix to between 28% and 33%.

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1.6 As it was mentioned and despite the gradual reduction in hydroelectricity generation, the country's electricity edifice is highly dependent on the availability of water resources for generation. In this sense, a country's vulnerability to different climate hazards such as rainfall or droughts, makes it difficult to provide certainty in the electricity market price formation process which directly impacts the volatility of prices in the electricity system. Thus, to meet the electricity demand, the operator has been forced to allow more frequently the operation of

some thermoelectric power plants, increasing the electricity generation cost and Greenhouse Gas Emissions (GHG)[2].

1.7 As noted, along with the abundance of hydro-energy resources, Brazil has an enormous potential to exploit other renewable sources such as wind, solar and biomass. Although these renewable resources have had great growth in recent years, in case of solar PV with an amount of 90.4% of micro and macro distributed generation, at this stage, the use of these resources for electricity generation is quite far from its potential low scale use. As a first step to get a more flexible, accessible, and secure electricity matrix around the Brazilian territory, a more diversify energy matrix will be required to be able to reduce its vulnerability, its high dependence on hydroelectric generation and increasing its infrastructure resilience to different climate hazards.

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1.9 In this new scenario with a technological transformational changes, higher complexity, and greater uncertainty, it is required the Brazilian electrical system progressively adapts to this context becoming more flexible and resilient. Moreover, a more sophisticated energy market, pricing signals, and more interconnection arrangements between electricity subsystems and neighbor countries will be essential to optimize the expansion and operation of the system, considering the diversity of Brazilian´s energy resources and its geographical dispersion throughout the territory.

1.10 To respond to this situation, in April 2019, the Ministry of Mines and Energy (MME) published the Portaria No. 187, which established a Working Group (WG) to lead and articulate a participatory process to carry out proposals, strengthening consensus, to modernize the electricity sector, based on the following pillars: i) Governance; ii) Transparency; and iii) Legal-regulatory stability. The WG deals with topics such as, among others, market environment and mechanisms for enabling Brazilian electricity system expansion, pricing, cost and risk allocation, and sustainability of distribution services.

1.11 As result of the WG´s efforts, in October 2019 it was presented an Action Plan which included 15 tasks and 88 subtasks to contribute to the modernization of the electricity sector. The UK Sustainable Infrastructure Program (UKSIP) is a British fund that provides technical assistance in Brazil to enhance regulatory frameworks and low carbon policies in key infrastructure sectors, such as renewable energy, to enable the market conditions for the private sector.

[2] https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/Paginas/Brazilian-Energy-Balance-2021.aspx

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3. Scope of Services

3.1. The main focus of this component is to develop a decentralized low carbon energy generation framework in line with mechanisms to guarantee safety supply and competitiveness. A just transition within the sector will be prioritized, given its high potential to reactivate the regional and circular economies, support jobs, and their sociopolitical priorities.

4. Key Activities

4.1. Promote a decentralized low carbon energy generation framework. The Brazilian distributed generation (DG) industry has been growing quickly since 2015, driven by proper regulations (including net metering regulations), financing availability and technological developments, in addition to the natural incentive for electricity cost reduction. There are around 340.000 operational DG projects that added 4.3 GW of installed capacity to the Brazilian electricity system. This represents approximately only 2% of the total installed capacity in Brazil. Ninety-nine percent of the Brazilian DG projects are photovoltaic installations. The Brazilian DG market is competitive and attractive from a financing perspective; however, some obstacles remain for wider adoption of the technology by all parts of the society and economy. The new energy generation framework will tackle these obstacles to eliminate barriers for further private sector investments.

4.2. Promote a centralized low carbon energy generation framework and validation of environmental and social benefits of renewal energy in line with mechanisms to guarantee safety supply and competitiveness. Regarding allocation of costs and risks, energy efficiency gains can be achieved with a reduction in an over-exposure to single source of electricity that at the same time can be productive to stable energy pricing and make them more accessible to all the citizens.

4.3. The valuation of the environmental attributes of renewable sources aims to implement competitive and market mechanisms that can add value to the environmental benefit provided by such renewable sources.

5. Expected Outcome and Deliverables

5.1. Work plan with schedule and details of activities

5.2. Energy sector diagnosis and roadmap for a decentralized low carbon energy generation

5.3. Roadmap to promote low carbon energy sector investment

5.4. Barriers and solutions to implement the different results

Final report with results. The consultant must hold a presentation workshop for each of the products, in addition to a fourth workshop to present the final results to the IDB.

6. Project Schedule and Milestones

Work plan	M - 1	M - 2	M - 3	M - 4	M - 5	M - 6	M - 7
Work plan with schedule and details of activities							
Energy sector diagnosis and roadmap for a decentralized low carbon energy generation							
Roadmap to promote low carbon energy sector investment							
Barriers and solutions to implement low carbon energy measure							

7. Reporting Requirements

7.1. All reports must be submitted in Word, in Portuguese, or English, in an editable file, including annexes, spreadsheets, and other required material. The file must be in a publishable format and edition in accordance with IDB standards.

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9.1.2. Specialist in the energy sector. Degree in engineering or related areas, with a master's or doctorate in energy planning, energy economics, or related subjects. With the specific experience of at least eight (8) years in structuring and evaluating projects in the energy sector, with fluent in in Portuguese, or English. Experience in Latin America and the Caribbean is desirable.

9.1.3. Senior Energy Economist: Degree in economics, administration, or finance, with a master's or doctorate in economic or financial disciplines. With the specific experience of at least eight (8) years in the development of economic or financial studies for the structuring of infrastructure projects in the energy and hydrogen sector, with fluent in Portuguese, or English. Experience in Latin America and the Caribbean is desirable.

9.2. Confidentiality: All information shared with the consultancy will be considered confidential. The consultancy may not disclose to third parties any product of this consultancy, without the express consent of the IDB, in writing.

10. Supervision and Reporting: The team leader will be Carlos Jose Echevarria Barbero (INE/ENE), Sector Lead Specialist.

TERMS OF REFERENCE

Support female participation in non-traditional jobs of the energy sector

BRAZIL
BR-T1529

Background and Justification

The Inter-American Development Bank (IDB) is the main source of funding for social and economic development in Latin America and the Caribbean (LAC). The Bank supports efforts to optimize the contribution of the mining-energy sector to sustainable economic development with particular attention to social and environmental aspects.

The objective of this Technical Cooperation (TC) is to support the Government of Brazil (GoB) to strengthen its institutional, technical, and regulatory capabilities to promote a greater integration of low carbon technologies in the Brazilian energy matrix.

Brazil is globally considered as the seventh largest Green House Gas (GHG) emitter with an amount of 2.9% emissions. Electricity and other energy use account for 28% of emissions, which after the transport sector, makes it the most polluting industry.

To achieve the climate goals adopted by the Parties to the UNFCCC (United Nations Framework Convention on Climate Change) and its Paris Agreement during the 26th Conference of the Parties; Brazil's National Determined Contribution (NDC) has established the target of reducing country emissions based on the levels of 2005 by 37% in 2025 and by 50% in 2030. To decrease GHG levels in the energy sector, the energy mix must achieve 45% of renewables by expanding the use of renewable energy sources (other than hydropower) in the total energy mix to between 28% and 33%.

The electricity matrix in Brazil is dominated by hydroelectric generation, although this dependence has been gradually reduced. While in 2000 hydroelectricity represented 83% of Brazil's installed capacity and 87% of the generated electricity, in 2021%) and solar generation, which contributed only the hydroelectric source still represented about 63% of the country's installed power and gross electricity production, well above other renewable sources such as wind (9.2%), biomass (9%) and solar generation, which contributed only 3%, significantly below of its potential use, although variable renewable energy resources (wind and solar) have had an accelerated growth in recent years.

As it was mentioned and despite the gradual reduction in hydroelectricity generation, the country's electricity edifice is highly dependent on the availability of water resources for generation. In this sense, a country's vulnerability to different climate hazards such as rainfall or droughts, makes it difficult to provide certainty in the electricity market price formation process which directly impacts the volatility of prices in the electricity system. Thus, to meet the electricity demand, the operator has been forced to allow more frequently the operation of

some thermoelectric power plants, increasing the electricity generation cost and Greenhouse Gas Emissions (GHG)[3].

As noted, along with the abundance of hydro-energy resources, Brazil has an enormous potential to exploit other renewable sources such as wind, solar and biomass. Although these renewable resources have had great growth in recent years, in case of solar PV with an amount of 90.4% of micro and macro distributed generation, at this stage, the use of these resources for electricity generation is quite far from its potential low scale use. As a first step to get a more flexible, accessible, and secure electricity matrix around the Brazilian territory, a more diversify energy matrix will be required to be able to reduce its vulnerability, its high dependence on hydroelectric generation and increasing its infrastructure resilience to different climate hazards.

Due to the historical prevalence of hydroelectricity generation, the rules of expansion and operation of the electricity system have been designed around the technological characteristics of this source. Currently the electricity sector is going through a transformation process because of a massive new integration of variable renewables, increase of Distributed Generation resources (DG), sectoral digitalization and automatization process, sector's coupling (energy, transport, telecommunication, etc.), and the need to boost the transition to a zero-emission economy.

In this new scenario with a technological transformational changes, higher complexity, and greater uncertainty, it is required the Brazilian electrical system progressively adapts to this context becoming more flexible and resilient. Moreover, a more sophisticated energy market, pricing signals, and more interconnection arrangements between electricity subsystems and neighbor countries will be essential to optimize the expansion and operation of the system, considering the diversity of Brazilian´s energy resources and its geographical dispersion throughout the territory.

To respond to this situation, in April 2019, the Ministry of Mines and Energy (MME) published the Portaria No. 187, which established a Working Group (WG) to lead and articulate a participatory process to carry out proposals, strengthening consensus, to modernize the electricity sector, based on the following pillars: i) Governance; ii) Transparency; and iii) Legal-regulatory stability. The WG deals with topics such as, among others, market environment and mechanisms for enabling Brazilian electricity system expansion, pricing, cost and risk allocation, and sustainability of distribution services.

As result of the WG´s efforts, in October 2019 it was presented an Action Plan which included 15 tasks and 88 subtasks to contribute to the modernization of the electricity sector. The UK Sustainable Infrastructure Program (UKSIP) is a British fund that provides technical assistance in Brazil to enhance regulatory frameworks and low carbon policies in key infrastructure sectors, such as renewable energy, to enable the market conditions for the private sector.

Gender diversity in the Brazilian´s energy sector remains as a great challenge for inclusive development. The energy sector is traditionally male-dominated, with women accounting for a limited share of the industry's workforce, mostly in support/non-technical functions. While

[3] https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/Paginas/Brazilian-Energy-Balance-2021.aspx

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 energy sector, they are still underrepresented in leadership positions. According to the results of the study carried out on the 25 largest energy companies operating in Brazil, in the sectors of generation, transmission, distribution and commercialization, 19% of the jobs are held by women, with only 6% holding high level positions, such as CEO or leader of the Operations, Maintenance, New Business or Engineering/Construction areas.

Considering other corporate positions, such as the Legal/Regulatory, HR, Finance or Communication areas, the same study showed that the number of women increased to 13%. The electricity distribution segment is more inclusive, with 31% of women in management positions, followed by power generation (23%), while the transmission and commercialization sectors account for only 13% and 12%, respectively.

Main Activities

Incorporating gender and diversity perspectives into energy sector projects, policies and planning is critical to ensuring the effectiveness and sustainability not only of energy programs and policies, but also all development activities that involve energy use. In addition, it is key to support female participation in non-traditional jobs of the energy sector through activities such as: i) mentoring programs; ii) capacity building specifically focused on equal opportunities and gender equality and diversity; iii) promote the design and implementation of training programs (vocational trainings) for women in non-traditional jobs in alliance with universities and the private sector to stimulate their knowledge and skills and facilitate women labor insertion.

Work Plan development. To conduct training courses on the energy sector, in coordination with the Ministry of Mining and Energy (MME) and/or the local distribution company in the selected areas.

Literature review base on international best practices. Revisión de literatura y mejores prácticas. Review training issues for women in specialized sectors, including: (i) analysis of relevant training options in rural areas both in the country and in similar international contexts; and (ii) a mapping of key organizations and actors to support the implementation of women's projects.

Assessment of the population of women eligible to participate in the program. This includes: (i) identifying, together with the IDB team, the beneficiary communities and the populations of women susceptible to participate in the training program considering: (a) the main source of household income; (b) the productive activities currently carried out by women in the populations to be electrified; (c) the possibility and willingness of women to move to a nearby locality to follow the proposed training; (d) the willingness of women in the possession or access to new jobs and new challenges elaborate the selection criteria for program participants.

Women support initiatives. The design should include appropriate curricular content on electrical distribution networks so that women can be actively involved in the construction, and future maintenance and operation, of the program's works. In addition, it should: (i)

analyze the appropriate participation mechanisms for women participating in the training such as transportation, support resources for dependent care, among others; (ii) consider and integrate the proposals, capacities, and methodologies of government institutions, (iii) consider that the contents and implementation of the program in indigenous territories be culturally appropriate, offering social, cultural and environmental sustainability, while respecting the uses and customs, as well as the forms of indigenous organization, including an intergenerational and gender perspective; (iv) consider the key actors (public, private and non-profit organizations) that should either participate in the program or be consulted and informed about the program, for the benefit of both the users/beneficiaries of the courses and the entire community; (v) design materials should have a maximum classroom load of 20 hours, also including a guide of recommendations for follow-up and community building among the beneficiaries.

Expected Outcome and Deliverables

- **Product 1:** The consultant must present a detailed work plan, including the work methodology based on the criteria and a timetable. It should also include the support expected from the institutions participating in the training program, which should be agreed with the Bank.

- **Product 2:** A report containing the literature review and best practices in the design of training programs for women in specialized sectors, as well as the mapping of the population of women likely to participate in the program and the selection criteria.

- **Product 3:** A report containing the design of the training program for women in construction, maintenance, and operation of electrical distribution networks considering the criteria mentioned above. The consultant shall include the methodological design with modules and material developed, as well as the implementation scheme, follow-up and resulting indicators.

- **Product 4:** A report containing the training evaluation strategy including the empirical design of the evaluation and the variables needed for the evaluation.

Project Schedule and Milestones

Project Schedule	
Deliverable	**Deadline**
1. Work Plan (Product 1)	10 days after signing the contract
2. Delivery and approval of Product 2	40 days after signing the contract
3. Delivery and approval of Product 3	65 days after signing the contract
4. Delivery and approval of Product 4	80 days after signing the contract

The following procedure will be used to approve project deliverables:

1. All work will be managed in the cloud for easy access. Products can also be sent by email.
2. Products will be presented in Portuguese.
3. The IDB will submit a written approval (email) after receiving each deliverable with the specifications set forth in this item.

Payment Schedule

Payment Schedule	
Deliverables	**%**
Product 1	20%
Product 2	30%
Product 3	30%
Product 4	20%
TOTAL	**100%**

Payments will be made upon delivery of each of the corresponding products, which must be validated by the NSDI and the Bank's Team Leader.

What you'll need

- **Citizenship:** You are a citizen of one of our 48-member countries.
- **Consanguinity:** You have no family members (up to fourth degree of consanguinity and second degree of affinity, including spouse) working at the IDB Group.
- **Education:** Bachelor's degree or equivalent in psychology or related fields.
- **Experience:** At least 10 years of general professional experience. At least 5 years of work experience in conducting training courses (rural area desirable) and in the electrical sector (desirable).

Core and Technical Competencies

A professional with relevant experience in planning and development of training or curriculum development activities in the country's educational system, particularly with a gender perspective, is preferred. Preferably the consultant should have experience in developing outstanding actions related to reaching rural communities with rural electrification or socioeconomic development programs to improve the quality of life of its inhabitants. As well as:

- Problem Solving: Willingness and ability to face and respond to a given situation through the organization and/or application of a strategy or operational sequence.
- Teamwork: Willingness and ability to collaborate in a coordinated manner in the task performed jointly by a team of people to achieve a proposed objective.
- Autonomy: Ability to perform a task independently, executing it from start to finish, without the need to receive any guidance or direction.
- Project Management: Excellent command of process management tools, project management and monitoring and evaluation.

Opportunity Summary

- **Type of contract:** Full time Consultant, monthly.
- **Length of contract:** 5 months.
- **Location**: Brasil
- **Responsible person**: Lead Energy Sector Specialist
- **Requirements**: You must be a citizen of one of the IDB's 48 member countries and have no family members currently working at the IDB Group.

Our culture

Our people are committed and passionate about improving lives in Latin-America and the Caribbean, and they get to do what they love in a diverse, collaborative and stimulating work environment. We are the first Latin American and Caribbean development institution to be awarded the EDGE certification, recognizing our strong commitment to gender equality. As an employee you can be part of internal resource groups that connect our diverse community around common interests.

Because we are committed to providing equal opportunities in employment, we embrace all diversity and encourage women, the LGBTQ+ community, persons with disabilities, afro-descendants, and indigenous people to apply.

About us

At the IDB, we're committed to improving lives. Since 1959, we've been a leading source of long-term financing for economic, social, and institutional development in Latin America and the Caribbean. We do more than lending though. We partner with our 48-member countries to provide Latin America and the Caribbean with cutting-edge research about relevant development issues, policy advice to inform their decisions, and technical assistance to improve the planning and execution of projects. For this, we need people who not only have the right skills but also are passionate about improving lives.

Our team in Human Resources carefully reviews all applications.

TERMS OF REFERENCE

Country diagnosis of current transmission lines with the evaluation of the potential transmission line expansion with new technologies, in order to support the transmission planning expansion activity in the integration of low carbon technologies in the Brazilian energy matrix

BRAZIL
BR-T1529

1. Background and Justification

1.1 The Inter-American Development Bank (IDB) is the main source of funding for social and economic development in Latin America and the Caribbean (LAC). The Bank supports efforts to optimize the contribution of the mining-energy sector to sustainable economic development with particular attention to social and environmental aspects.

1.2 The objective of this Technical Cooperation (TC) is to support the Government of Brazil (GoB) to strengthen its institutional, technical, and regulatory capabilities to promote a greater integration of low carbon technologies in the Brazilian energy matrix.

1.3 Brazil is globally considered as the seventh largest Green House Gas (GHG) emitter with an amount of 2.9% emissions. Electricity and other energy use account for 28% of emissions, which after the transport sector, makes it the most polluting industry.

1.4 To achieve the climate goals adopted by the Parties to the UNFCCC (United Nations Framework Convention on Climate Change) and its Paris Agreement during the 26th Conference of the Parties; Brazil's National Determined Contribution (NDC) has established the target of reducing country emissions based on the levels of 2005 by 37% in 2025 and by 50% in 2030. To decrease GHG levels in the energy sector, the energy mix must achieve 45% of renewables by expanding the use of renewable energy sources (other than hydropower) in the total energy mix to between 28% and 33%.

1.5 The electricity matrix in Brazil is dominated by hydroelectric generation, although this dependence has been gradually reduced. While in 2000 hydroelectricity represented 83% of Brazil's installed capacity and 87% of the generated electricity, in 2021%) and solar generation, which contributed only the hydroelectric source still represented about 63% of the country's installed power and gross electricity production, well above other renewable sources such as wind (9.2%), biomass (9%) and solar generation, which contributed only 3%, significantly below of its potential use, although variable renewable energy resources (wind and solar) have had an accelerated growth in recent years.

1.6 As it was mentioned and despite the gradual reduction in hydroelectricity generation, the country's electricity edifice is highly dependent on the availability of water resources for generation. In this sense, a country's vulnerability to different climate hazards such as rainfall or droughts, makes it difficult to provide certainty in the electricity market price formation process which directly impacts the volatility of prices in the electricity system. Thus, to meet

the electricity demand, the operator has been forced to allow more frequently the operation of some thermoelectric power plants, increasing the electricity generation cost and Greenhouse Gas Emissions (GHG)[4].

1.7 As noted, along with the abundance of hydro-energy resources, Brazil has an enormous potential to exploit other renewable sources such as wind, solar and biomass. Although these renewable resources have had great growth in recent years, in case of solar PV with an amount of 90.4% of micro and macro distributed generation, at this stage, the use of these resources for electricity generation is quite far from its potential low scale use. As a first step to get a more flexible, accessible, and secure electricity matrix around the Brazilian territory, a more diversify energy matrix will be required to be able to reduce its vulnerability, its high dependence on hydroelectric generation and increasing its infrastructure resilience to different climate hazards.

1.8 Due to the historical prevalence of hydroelectricity generation, the rules of expansion and operation of the electricity system have been designed around the technological characteristics of this source. Currently the electricity sector is going through a transformation process because of a massive new integration of variable renewables, increase of Distributed Generation resources (DG), sectoral digitalization and automatization process, sector's coupling (energy, transport, telecommunication, etc.), and the need to boost the transition to a zero-emission economy.

1.9 In this new scenario with a technological transformational changes, higher complexity, and greater uncertainty, it is required the Brazilian electrical system progressively adapts to this context becoming more flexible and resilient. Moreover, a more sophisticated energy market, pricing signals, and more interconnection arrangements between electricity subsystems and neighbor countries will be essential to optimize the expansion and operation of the system, considering the diversity of Brazilian´s energy resources and its geographical dispersion throughout the territory.

1.10 To respond to this situation, in April 2019, the Ministry of Mines and Energy (MME) published the Portaria No. 187, which established a Working Group (WG) to lead and articulate a participatory process to carry out proposals, strengthening consensus, to modernize the electricity sector, based on the following pillars: i) Governance; ii) Transparency; and iii) Legal-regulatory stability. The WG deals with topics such as, among others, market environment and mechanisms for enabling Brazilian electricity system expansion, pricing, cost and risk allocation, and sustainability of distribution services.

1.11 As result of the WG´s efforts, in October 2019 it was presented an Action Plan which included 15 tasks and 88 subtasks to contribute to the modernization of the electricity sector. The UK Sustainable Infrastructure Program (UKSIP) is a British fund that provides technical assistance in Brazil to enhance regulatory frameworks and low carbon policies in key infrastructure sectors, such as renewable energy, to enable the market conditions for the private sector.

[4] https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/Paginas/Brazilian-Energy-Balance-2021.aspx

2. Project objectives

2.1. *Strengthen the liberalization and competitiveness in the electricity sector in Brazil, increasing the mobilization of low carbon private investments***.** This component is oriented to finance activities aimed to promote measures to strengthen the competition and competitiveness in the distribution, transmission, and power generation segments of the Brazilian electricity sector.

3. Scope of Services

3.1. The main focus of this component is to develop country diagnosis of current transmission lines with the evaluation of the potential transmission line expansion with new technologies, in order to support the transmission planning expansion activity in the integration of low carbon technologies in the Brazilian energy matrix. A just transition within the sector will be prioritized, given its high potential to reactivate the regional and circular economies, support jobs, and their sociopolitical priorities.

4. Key Activities

4.1. Generation and transmission. Brazil is a pioneer in electricity commercialization using the auction mechanism. Since 2004, when this mechanism began to be used as a basis for the expansion of the Brazilian electrical system, it has been possible to observe, in practice, the benefits and advantages offered by this scheme. Properly designed market structure will be necessary to: have a better coordination between energy generators and transmission infrastructure required and a new energy auctions structure which can impose better behavioral rules and mitigate market failures apart from the private sector mobilization in the country. It is then recommended to structure both generation & transmission procurement procedures to promote a low carbon electricity market. This will achieve a more effective coordination in new energy auctions between the new contracted power supply and the commissioning of transmission infrastructure linked to the new generation projects contracted. It will also promote greater mobilization and coordination of private sector investments in the expansion of the electricity sector.

4.2. Transmission of new technologies roadmap. The increasing integration of the large amount of low carbon generation in the Brazilian power system (other than hydro) has becoming a crescent challenge for the actual transmission expansion planning activity. A geographically extended and interconnected power network roadmap needs to be developed, basically designed around the technological characteristics of larges hydropower generation, distant from the main load centers, has now, to be expanded under new and sometimes unexpected conditions. The integration of variable renewable generation (VRG), wind and solar, with the current regulation, which includes the network free access and the Free Contracting Environment (ACL), inserts additional difficulties. Uncertainties in generation connections to the network, related to geographical location and to the amount of power, are part of these difficulties, besides the impacts in the system operation, imposed by VRG technologies. Some of the vital network attributes, such as reliability, flexibility and resilience, need to be improved with the rise of the amount of VRG in operation.

4.3. Distribution. With the necessity of better allocation of costs and risks in the electricity sector, it is also important to define and establish the role of energy distribution companies. They will be responsible for energy demand projections and planning for the expansion of the distribution system in its concession areas as well as energy portfolio management for their regulated consumers.

5. Expected Outcome and Deliverables

5.1. Work plan with schedule and details of activities

5.2. Energy sector transmission and distribution lines diagnosis

5.3. Roadmap to promote the expansion of the energy system to promote low carbon energy matrix

5.4. Barriers and solutions to transmission system expansion plan

Final report with results. The consultant must hold a presentation workshop for each of the products, in addition to a fourth workshop to present the final results to the IDB.

6. Project Schedule and Milestones

Work plan	Month 1	Month 2	Month 3	Month 4	Month 5
Work plan with schedule and details of activities					
Energy sector transmission and distribution lines diagnosis					
Roadmap to promote the expansion of the energy system					
Barriers and solutions to implement low carbon energy measure					

7. Reporting Requirements

7.1. All reports must be submitted in Word, in Portuguese, or English, in an editable file, including annexes, spreadsheets, and other required material. The file must be in a publishable format and edition in accordance with IDB standards.

7.2. All reports will be confidential.

7.3. The final report must be in Portuguese and English.

8. Acceptance Criteria

8.1. The products will be accepted for payment once they have the written approval of the IDB team.

8.2. Partial products or products that are not accepted will not be paid

9. Other Requirements

9.1. **Work Team:** The consultancy must present a minimum work team in its proposal, considering the following specialties:

9.1.1. Project Manager. Degree in engineering, economics, or related areas, with specialization, master's or doctorate in related areas. At least 15 years of general experience, 10 years of experience in project management for the energy sector, with fluent in Portuguese, or English. Relevant experience in the hydrogen sector. Experience in Latin America and the Caribbean is desirable.

9.1.2. Specialist in the energy sector. Degree in engineering or related areas, with a master's or doctorate in energy planning, energy economics, or related subjects. With the specific experience of at least eight (8) years in structuring and evaluating projects in the energy sector, with fluent in Portuguese, or English. Experience in Latin America and the Caribbean is desirable.

9.1.3. Senior Energy Economist: Degree in economics, administration, or finance, with a master's or doctorate in economic or financial disciplines. With the specific experience of at least eight (8) years in the expansion of transmission lines, with fluent in Portuguese, or English. Experience in Latin America and the Caribbean is desirable.

9.2. **Confidentiality:** All information shared with the consultancy will be considered confidential. The consultancy may not disclose to third parties any product of this consultancy, without the express consent of the IDB, in writing.

10. **Supervision and Reporting:** The team leader will be Carlos Jose Echevarria Barbero (INE/ENE), Sector Lead Specialist.

TERMS OF REFERENCE

Energy market sector analysis and recommendations based on international best practices to promote a more competitive market with and higher participation in the private sector

BRAZIL
BR-T1529

1. Background and Justification

1.1 The Inter-American Development Bank (IDB) is the main source of funding for social and economic development in Latin America and the Caribbean (LAC). The Bank supports efforts to optimize the contribution of the mining-energy sector to sustainable economic development with particular attention to social and environmental aspects.

1.2 The objective of this Technical Cooperation (TC) is to support the Government of Brazil (GoB) to strengthen its institutional, technical, and regulatory capabilities to promote a greater integration of low carbon technologies in the Brazilian energy matrix.

1.3 Brazil is globally considered as the seventh largest Green House Gas (GHG) emitter with an amount of 2.9% emissions. Electricity and other energy use account for 28% of emissions, which after the transport sector, makes it the most polluting industry.

1.4 To achieve the climate goals adopted by the Parties to the UNFCCC (United Nations Framework Convention on Climate Change) and its Paris Agreement during the 26th Conference of the Parties; Brazil's National Determined Contribution (NDC) has established the target of reducing country emissions based on the levels of 2005 by 37% in 2025 and by 50% in 2030. To decrease GHG levels in the energy sector, the energy mix must achieve 45% of renewables by expanding the use of renewable energy sources (other than hydropower) in the total energy mix to between 28% and 33%.

1.5 The electricity matrix in Brazil is dominated by hydroelectric generation, although this dependence has been gradually reduced. While in 2000 hydroelectricity represented 83% of Brazil's installed capacity and 87% of the generated electricity, in 2021%) and solar generation, which contributed only the hydroelectric source still represented about 63% of the country's installed power and gross electricity production, well above other renewable sources such as wind (9.2%), biomass (9%) and solar generation, which contributed only 3%, significantly below of its potential use, although variable renewable energy resources (wind and solar) have had an accelerated growth in recent years.

1.6 As it was mentioned and despite the gradual reduction in hydroelectricity generation, the country's electricity edifice is highly dependent on the availability of water resources for generation. In this sense, a country's vulnerability to different climate hazards such as rainfall or droughts, makes it difficult to provide certainty in the electricity market price formation process which directly impacts the volatility of prices in the electricity system. Thus, to meet the electricity demand, the operator has been forced to allow more frequently the operation of

some thermoelectric power plants, increasing the electricity generation cost and Greenhouse Gas Emissions (GHG)[5].

1.7 As noted, along with the abundance of hydro-energy resources, Brazil has an enormous potential to exploit other renewable sources such as wind, solar and biomass. Although these renewable resources have had great growth in recent years, in case of solar PV with an amount of 90.4% of micro and macro distributed generation, at this stage, the use of these resources for electricity generation is quite far from its potential low scale use. As a first step to get a more flexible, accessible, and secure electricity matrix around the Brazilian territory, a more diversify energy matrix will be required to be able to reduce its vulnerability, its high dependence on hydroelectric generation and increasing its infrastructure resilience to different climate hazards.

1.8 Due to the historical prevalence of hydroelectricity generation, the rules of expansion and operation of the electricity system have been designed around the technological characteristics of this source. Currently the electricity sector is going through a transformation process because of a massive new integration of variable renewables, increase of Distributed Generation resources (DG), sectoral digitalization and automatization process, sector's coupling (energy, transport, telecommunication, etc.), and the need to boost the transition to a zero-emission economy.

1.9 In this new scenario with a technological transformational changes, higher complexity, and greater uncertainty, it is required the Brazilian electrical system progressively adapts to this context becoming more flexible and resilient. Moreover, a more sophisticated energy market, pricing signals, and more interconnection arrangements between electricity subsystems and neighbor countries will be essential to optimize the expansion and operation of the system, considering the diversity of Brazilian´s energy resources and its geographical dispersion throughout the territory.

1.10 To respond to this situation, in April 2019, the Ministry of Mines and Energy (MME) published the Portaria No. 187, which established a Working Group (WG) to lead and articulate a participatory process to carry out proposals, strengthening consensus, to modernize the electricity sector, based on the following pillars: i) Governance; ii) Transparency; and iii) Legal-regulatory stability. The WG deals with topics such as, among others, market environment and mechanisms for enabling Brazilian electricity system expansion, pricing, cost and risk allocation, and sustainability of distribution services.

1.11 As result of the WG´s efforts, in October 2019 it was presented an Action Plan which included 15 tasks and 88 subtasks to contribute to the modernization of the electricity sector. The UK Sustainable Infrastructure Program (UKSIP) is a British fund that provides technical assistance in Brazil to enhance regulatory frameworks and low carbon policies in key infrastructure sectors, such as renewable energy, to enable the market conditions for the private sector.

[5] https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/Paginas/Brazilian-Energy-Balance-2021.aspx

2. Project objectives

2.1. *Strengthen the liberalization and competitiveness in the electricity sector in Brazil, increasing the mobilization of low carbon private investments***.** This component is oriented to finance activities aimed to promote measures to strengthen the competition and competitiveness in the distribution, transmission, and power generation segments of the Brazilian electricity sector.

3. Scope of Services

3.1. The main focus of this component is to develop an energy market sector analysis and recommendations based on international best practices to promote a more competitive market with and higher participation in the private sector. A just transition within the sector will be prioritized, given its high potential to reactivate the regional and circular economies, support jobs, and their sociopolitical priorities.

4. Key Activities

4.1. Short-Term Market (STM) Improvements. At present, the electricity market has one third of its load negotiated in the STM, growing by 18% in the number of agents in the last 12 months. In the next decade, it is expected that this market will be able to double in size, especially because of the Gob's efforts to liberalize the market. In this context, the Electric Energy Trading Chamber (CCEE) has requested greater security, robustness, flexibility, agility, increased temporal granularity of operations and scalability in the accounting and liquidation of transaction processes of the STM, and in other services provided by the Chamber to the market. Therefore, it is necessary to strengthen the capacities of CCEE to guarantee the security, robustness, and agility of its operations and transactions. To strengthen CEE's capacities to manage and operate the STM in the coming years, it is necessary to address an institutional modernization process that encompasses two fronts:

4.1.1. Modernization of the existing structure to support the current increase in operations; and

4.1.2. Evolution of the accounting and liquidation model. This modernization process requires a structured and consultative study, involving the market agents and Brazilian financial entities. It aims to provide the STM greater agility, granularity (operations in less time) and interoperability (participation of more financial entities).

4.2. Distribution system in its concession areas as well as energy portfolio management for their regulated consumers.

5. Expected Outcome and Deliverables

5.1. Work plan with schedule and details of activities

5.2. Energy market analysis and recommendations based on international best practices

5.3. Modernization of the existing structure to support the current increase in operations evolution of the accounting and liquidation model

Final report with results. The consultant must hold a presentation workshop for each of the products, in addition to a fourth workshop to present the final results to the IDB.

6. Project Schedule and Milestones

Work plan	M - 1	M - 2	M - 3	M - 4	M - 5	M - 6	M - 7	M - 8	M – 9	M - 10	M - 11	M - 12
Work plan with schedule and details of activities	■											
Energy market analysis		■	■	■	■	■	■					
Energy market recommendations						■	■	■	■	■	■	
Modernization of the existing structure											■	■

7. Reporting Requirements

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8. Acceptance Criteria

8.1. The products will be accepted for payment once they have the written approval of the IDB team.

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9. Other Requirements

9.1. **Work Team:** The consultancy must present a minimum work team in its proposal, considering the following specialties:

9.1.1. Project Manager. Degree in engineering, economics, or related areas, with specialization, master's or doctorate in related areas. At least 15 years of general experience, 10 years of experience in project management for the energy sector, with fluent in Portuguese, or

English. Relevant experience in the hydrogen sector. Experience in Latin America and the Caribbean is desirable.

9.1.2. Specialist in the energy sector. Degree in engineering or related areas, with a master's or doctorate in energy planning, energy economics, or related subjects. With the specific experience of at least eight (8) years in structuring and evaluating projects in the energy sector, with fluent in in Portuguese, or English. Experience in Latin America and the Caribbean is desirable.

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10. Supervision and Reporting: The team leader will be Carlos Jose Echevarria Barbero (INE/ENE), Sector Lead Specialist.

TERMS OF REFERENCE

Technical support for the Implementation of the guidelines and activities contemplated in the Brazilian National Hydrogen Program

BRAZIL
BR-T1529

1. Background and Justification

1.1 The Inter-American Development Bank (IDB) is the main source of funding for social and economic development in Latin America and the Caribbean (LAC). The Bank supports efforts to optimize the contribution of the mining-energy sector to sustainable economic development with particular attention to social and environmental aspects.

1.2 The objective of this Technical Cooperation (TC) is to support the Government of Brazil (GoB) to strengthen its institutional, technical, and regulatory capabilities to promote a greater integration of low carbon technologies in the Brazilian energy matrix.

1.3 Brazil is globally considered as the seventh largest Green House Gas (GHG) emitter with an amount of 2.9% emissions. Electricity and other energy use account for 28% of emissions, which after the transport sector, makes it the most polluting industry.

1.4 To achieve the climate goals adopted by the Parties to the UNFCCC (United Nations Framework Convention on Climate Change) and its Paris Agreement during the 26th Conference of the Parties; Brazil's National Determined Contribution (NDC) has established the target of reducing country emissions based on the levels of 2005 by 37% in 2025 and by 50% in 2030. To decrease GHG levels in the energy sector, the energy mix must achieve 45% of renewables by expanding the use of renewable energy sources (other than hydropower) in the total energy mix to between 28% and 33%.

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some thermoelectric power plants, increasing the electricity generation cost and Greenhouse Gas Emissions (GHG)[6].

1.7 As noted, along with the abundance of hydro-energy resources, Brazil has an enormous potential to exploit other renewable sources such as wind, solar and biomass. Although these renewable resources have had great growth in recent years, in case of solar PV with an amount of 90.4% of micro and macro distributed generation, at this stage, the use of these resources for electricity generation is quite far from its potential low scale use. As a first step to get a more flexible, accessible, and secure electricity matrix around the Brazilian territory, a more diversify energy matrix will be required to be able to reduce its vulnerability, its high dependence on hydroelectric generation and increasing its infrastructure resilience to different climate hazards.

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1.9 In this new scenario with a technological transformational changes, higher complexity, and greater uncertainty, it is required the Brazilian electrical system progressively adapts to this context becoming more flexible and resilient. Moreover, a more sophisticated energy market, pricing signals, and more interconnection arrangements between electricity subsystems and neighbor countries will be essential to optimize the expansion and operation of the system, considering the diversity of Brazilian´s energy resources and its geographical dispersion throughout the territory.

1.10 To respond to this situation, in April 2019, the Ministry of Mines and Energy (MME) published the Portaria No. 187, which established a Working Group (WG) to lead and articulate a participatory process to carry out proposals, strengthening consensus, to modernize the electricity sector, based on the following pillars: i) Governance; ii) Transparency; and iii) Legal-regulatory stability. The WG deals with topics such as, among others, market environment and mechanisms for enabling Brazilian electricity system expansion, pricing, cost and risk allocation, and sustainability of distribution services.

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[6] https://www.epe.gov.br/sites-en/publicacoes-dados-abertos/publicacoes/Paginas/Brazilian-Energy-Balance-2021.aspx

2. Project objectives

2.1. *Boost to development of new technologies to support the decarbonization of the Brazilian energy matrix***.** This component is oriented to new technologies that aimed to promote measures to strengthen the competition and competitiveness in the distribution, transmission, and power generation segments of the Brazilian electricity sector.

3. Scope of Services

3.1. The main focus of this component is Boost to develop new technologies to support the decarbonization of the Brazilian energy matrix. The energy segments that are difficult to decarbonize are those in which, for technical or economic reasons, they have limited prospects for replacing fossil fuels with less polluting energy; for this reason this activity wants to provide new technical solutions to get de net zero emissions by 2050.

4. Key Activities

4.1. Hydrogen is an increasing disruptive technology and an important element in the context of decarbonization of the Brazilian energy matrix, particularly in the case of the above-mentioned segments of the economy. Considering this fact, Brazil has made efforts to develop a strategy that makes it possible to boost the country's hydrogen economy. To this end, the National Energy Policy Council (CNPE), through resolution 06/2021, determined that the MME should present to CNPE a proposal for guidelines for the National Hydrogen Program, considering, among other factors, the interest in developing and consolidate the hydrogen market in Brazil and international integration.

4.2. To ensure that hydrogen is effectively contributing to decarbonization, its entire production chain must have low or zero greenhouse gas emissions. Considering the impossibility of verifying this attribute only from the point of view of the hydrogen molecule, it is necessary to have a certification of the production chain, a country diagnosis, a potential of hydrogen adoption in the sector and all the incentives for the hydrogen chain granted by Brazil.

4.3. In this sense, a certification will be developed, based on a technological platform, which ensures for every final consumer of hydrogen (whether national or international) which carbon level is associated with the molecule. In addition, there is room for the construction of trading platforms for these certificates, with tracking functionalities that will ensure hydrogen buyers access to their origin.

4.4. Technical support to the Implementation of the guidelines and activities contemplated in the Brazilian National Hydrogen Program.

5. Expected Outcome and Deliverables

5.1. A state of the art of the hydrogen market currently in the country with structured information on the main buyers, sellers, research institutions involved, technologies used and their respective suppliers of equipment.

5.2. Potential of hydrogen adoption in national industrial sectors and legal-regulatory regulations

5.3. Certification or a platform of new technologies

5.4. Technical support to the Implementation of the guidelines and activities contemplated in the Brazilian National Hydrogen Program

5.5. Barriers and solutions to new technologies expansion plan

Final report with results. The consultant must hold a presentation workshop for each of the products, in addition to a fourth workshop to present the final results to the IDB.

6. Project Schedule and Milestones

Work plan	M - 1	M - 2	M - 3	M - 4	M - 5	M - 6	M - 7	M - 8	M - 9	M - 10	M- 11	M - 12	M - 13	M - 14	M - 15
State of the art of the new technologies	■														
Potential of new technologies adoption in the sector		■	■												
Legal-regulatory regulations				■	■	■									
Certification or a platform of new technologies						■	■	■							
Guidelines development for new technologies implementation								■	■	■					
Technical support to the Implementation of the guidelines										■	■	■	■		
Barriers and solutions														■	■

7. Reporting Requirements

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9.1.2. Specialist in the energy sector. Degree in engineering or related areas, with a master's or doctorate in energy planning, energy economics, or related subjects. With the specific experience of at least eight (8) years in structuring and evaluating projects in the energy sector, with fluent in in Portuguese, or English. Experience in Latin America and the Caribbean is desirable.

9.1.3. Senior Energy Economist: Degree in economics, administration, or finance, with a master's or doctorate in economic or financial disciplines. With the specific experience of at least eight (8) years in the expansion of transmission lines, with fluent in Portuguese, or English. Experience in Latin America and the Caribbean is desirable.

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10. Supervision and Reporting: The team leader will be Carlos Jose Echevarria Barbero (INE/ENE), Sector Lead Specialist.