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**REGIONAL**

**Pre-Feasibility Study for the “Arco Norte” Interconnection Project**

**(RG-T2257)**

**Non Reimbursable Technical Cooperation Document**

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**Technical Cooperation (TC) Document**

# Basic Information for TC

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| * Country/Region: | Guyana, Suriname, and Brazil.[[1]](#footnote-2) |
| * TC Name: | Pre-Feasibility Study for the “*Arco Norte*” Interconnection Project. |
| * TC Number: | RG-T2257 |
| * Associated Loan/Guarantee name: | n/a |
| * Associated Loan/Guarantee number: | n/a |
| * Team Leader/Members: | Sylvia Larrea (INE/ENE), Team Leader; Laura Rojas (INE/ENE); Enrique Rodriguez (ENE/CCR); Jorge Mercado (ENE/CDR); Olga Morales (INE/ENE); Chris Sewell (INE/ENE); Malaika Culverwell (INE/ENE); Jesus Tejeda (ENE/CEC); Marco Aurelio Castro (ENE/CBR); Haydemar Cova (INE/ENE); Yolanda Valle (INE/ENE); Steven Collins (VPS/ESG); Luciano Bornholdt (VPS/ESG); Ernani Pilla (VPS/ESG); Matthew Shearer (INT/INT), Javier Jiménez (LEG/SGO); Maria Eugenia Roca (VPC/FMP); under the supervision of Leandro Alves, Chief (INE/ENE). |
| * Date of TC Abstract authorization: | January 30, 2013 |
| * Donors providing funding: | Regional Infrastructure Integration Fund (RIIF) |
| * Beneficiary: | Guyana, Suriname, and Brazil. |
| * Executing Agency and contact name: | Inter-American Development Bank (IDB) through its Energy Division (INE/ENE) |
| * IDB Funding Requested: | US$1,900,000 |
| * Other Funding: | US$200,000 - *Agence Française de Développement* |
| * Local counterpart funding, if any: | US$967,500 |
| * Disbursement period: | 36 months |
| * Required start date: | June 1, 2013 |
| * Types of consultants: | Firm and/or Individual Consultants |
| * Prepared by Unit: | INE/ENE |
| * Unit of Disbursement Responsibility: | INE |
| * TC Included in Country Strategy: * TC included in CPD: | Yes  No |
| * GCI-9 Sector Priority: | (i) Social policy for equity and productivity (priority area (PA 1)); (ii) Infrastructure for competitiveness and social welfare (PA 2); (iii) Competitive regional and global international integration (PA 4); and (iv) Protecting the environment, responding to climate change, renewable energy, and enhancing food security respectively (PA 5). |

# Objectives and justification of the TC

## A. Objective

* 1. The general objective of the “Pre-Feasibility Study for the *Arco Norte* Interconnection Project” (the TC) is to assess the potential development of an electrical interconnection among Suriname, Guyana, French Guiana[[2]](#footnote-3) and the northern Brazilian (cities of *Boa Vista* in the State of *Roraima* and *Macapá* in the State of *Amapá)*, from this time forward “the *Arco Norte* Countries.”
  2. The specific objectives of the TC are to: (i) identify and evaluate the electricity demand in the *Arco Norte* Project area; (ii) identify and evaluate the power supply options such as hydroelectric or other electricity generation potential of Guyana and Suriname (focusing on run-of-the-river schemes) or other technologies with low to medium environmental and social impact; (iii) identify and evaluate the political, institutional, regulatory, technical, economic, environmental and social issues for an electrical interconnection of the *Arco Norte* Countries; (iv) identify feasible and sustainable alternatives for an electrical interconnection, taking into account (i), (ii) and (iii) above, and recommend the best electricity generation indicative expansion plan and the best transmission line alternative for interconnecting the *Arco Norte* Countries. The best alternative will be developed towards the pre-feasibility study and will provide for a progressive integration to achieve the ultimate objective of interconnection of the *Arco Norte* Countries; and (v) prepare a road map with critical path actions for the short, medium and long term development of the *Arco Norte* Project.

## B. Justification

* 1. The electric systems of the State of Amapá and Roraima in Brazil, French Guiana, Suriname and Guyana are not interconnected to the South American region. Therefore, infrastructure development in the context of the *Arco Norte* Project, if realized, would contribute to the sustainable integration of French Guiana, Suriname and Guyana, at the northeastern edge of South America, with the rest of the continent through Brazil. The development of such infrastructure would provide the basis for increasing economic growth and social well-being to the region by optimizing its power supply systems. Furthermore, it would increase the countries’ energy security and the reliability of their electricity supply, enable large scale projects (economy of scale), reduce investments on reserve capacity, diversify each country’s electricity matrix and reduce their dependence on thermal generation from fossil-fuels, with an important reduction of CO2 emissions[[3]](#footnote-4).
  2. Also, the electricity supply systems in the *Arco Norte* Countries are isolated from each other and have several challenges in providing clean generation, reliable service and competitive prices. For instance, Guyana, at present, relies on imported fossil-fuels for electricity generation with some old and costly thermal-based plants, but plans are in place to construct the Amaila Falls Hydro Power (AFHP), a 165 MW hydropower plant to meet the growing local demand. Suriname still relies on thermal-based plants during dry seasons, even though the Afobaka Hydroelectric Power plant delivers the majority of Suriname’s electricity. The Brazil electric matrix is based on renewable resources, specially hydropower (about 70%), and its planning criteria search for significant gains based on hydrological complementarity regimes, due to its large geographical area and topography characteristics. Therefore, there is a significant potential for energy complementarities among the *Arco Norte* Countries, which if interconnected, could improve the reliability of their systems, reduce their dependence on fossil-fuels for electricity generation, and reduce transmission losses with a positive impact on the economic development of the region.
  3. The *Arco Norte* Project[[4]](#footnote-5) is framed within the IDB’s [Latin America and the Caribbean Sustainable Energy for All initiative (LAC SE4ALL)](http://www.iadb.org/en/topics/energy/lac-se4all,6854.html). The objective of the LAC SE4ALL initiative, which is coordinated with the United Nations (UN) SE4ALL global initiative, is to end energy poverty in the Latin American and the Caribbean Region, by providing universal access to modern energy, expanding renewable energy generation and implementing energy efficiency measures. During the Rio+20 meetings in June 2012, the energy agencies and electricity utilities companies of the *Arco Norte* Countries: (i) Centrais Eletricas Brasileiras (Eletrobras); (ii) Energiebedrijven Suriname (EBS); (iii) Guyana Energy Agency (GEA); and (iv) Electricité de France (EDF) acknowledged the *Arco Norte* Project as an important contribution to the LAC SE4ALL initiative.
  4. From those meetings, the energy agencies and electricity utilities companies (Eletrobras, EBS, GEA, and EDF), the IDB and the *Agence Française de Développement* (AFD) formalized with a Memorandum of Understanding (MoU) the basis under which they may explore opportunities for cooperation and collaboration of a potential electrical interconnection. The MoU sets the framework of cooperation to facilitate collaboration among the Parties around activities to evaluate the feasibility of the *Arco Norte* Project. Furthermore, this “Pre-Feasibility Study for the *Arco Norte* Interconnection Project” TC will contribute with a concrete activity within the framework of the MoU. The MoU was signed by all Parties in the 2013 Annual Meeting of the IDB in Panama.
  5. The TC is aligned with the IDB’s institutional priorities as outlined in the Ninth General Capital Increase in Resources for the IDB Report (GCI-9) which considers regional integration as a priority sector and consequently assigns a target funding for 2015 of 15%. The TC contributes to 4 of the IDB’s 5 strategic priorities: (i) social policy for equity and productivity is enhanced by assessing the potential expansion of basic services and social safety nets to all members of the communities; (ii) infrastructure for competitiveness and social welfare, as the TC seeks to assess the benefits and necessary energy infrastructure of the *Arco Norte* Countries; (iii) competitive regional and global international integration is enhanced by the potential development of the *Arco Norte* Project; and (iv) protecting the environment, responding to climate change, renewable energy, and enhancing food security by promoting development of the electricity sector through renewable energy.
  6. In addition, the TC supports individual Country Strategy (CS). In Guyana, by promoting the development of a more sustainable and greener energy matrix (Strategic Objective (i), GN-2690-1, and Country Strategy 2012-2016); in Suriname, by enabling an energy sector which may be able to operate sustainably and use cost-effective technologies for supporting economic growth (Priority Area 2, GN-2637-3, and CS 2011-2015); and in Brazil, improving the condition of the country’s infrastructure by contributing, expanding, recovering, improving and conserving electric power generating capacity and transmission system by using renewable and alternative energy sources (Strategic Objective 2, Priority Sector 3, Objective 1 and 2, GN-2662-1, and CS 2012-2014).

# Description of activities/components and budget

* 1. **Component I: Baseline Study:** Component I will finance the following activities: (i) review existing studies: regulatory, institutional, technical, economic, environmental, social studies and others about the *Arco Norte* project; (ii) review current electricity demand and medium/long term projections for each country; (iii) review the energy agencies and electricity utilities companies in each country to assess the risks of each agency/company in implementing the Arco Norte Project (institutional, operational and financial risks); (iv) identify the hydroelectric, natural gas-fueled generation[[5]](#footnote-6) and any other environmental friendly energy potential of each country; (v) review of the existing electricity generation and transmission infrastructure of each country and their expansion plans including the potential for energy exchanges between the countries; (vi) set guidelines to orientate the electricity interconnection and market integration alternatives considering associated benefits and costs, which will be the basis for future bilateral and multilateral documents necessary to formalize these interconnections; and (vii) analyze possible alternatives for the development of the *Arco Norte* Project taking into account the regulatory and institutional framework, the economic, commercial and political environment, the technical constraints (i.e., security, reliability, voltage levels, etc.), the environmental, regulatory and social (including indigenous populations) issues of each country and others critical for the *Arco Norte* Project. 4 (four) reports with baseline analysis for each country and 1 (one) report with the studied alternatives and the preliminary recommendations for the continuation of the *Arco Norte* Project will be Component I’s deliverable, along with a presentation and discussion at the consultation workshops with the participation of all stakeholders.
  2. **Component II: Pre-Feasibility Study:** Component II will finance the following activities: (i) define a base case scenario for electricity demand projection in the *Arco Norte* project area (all considered electrical systems to be interconnected); (ii) identify project candidates for an integrated generation expansion plan and their optimal routes of integrated expansion, with the best alternatives for hydroelectric and other energy generation development taking into consideration environmental and social constraints, among others[[6]](#footnote-7); (iii) identify and evaluate the best possible sustainable alternative for electrical interconnection, considering (i) and (ii); (iv) propose the most realistic power generation scenario and the preliminary route of the transmission lines and substations sites, the preliminary lay-outs and the implementation schedule – given the scenario selected in (iii); (v) the best sustainable alternative will present a timetable with the optimal developing schedules and commissioning dates for the required regulatory framework and infrastructure including, investments, operation and maintenance costs and an assessment of substantial risks associated in order to underline the trade-offs and inform policy; (vi) assess the preliminary economic and financial project viability; and (vii) conduct a socio-environmental impact and risk analysis of the issues associated with the implementation of the identified solution. For component II a preliminary and a final report detailing the previous mentioned activities of the TC will be presented to all the stakeholders and discussed at the consultation workshops. The final product shall be drafted in a thorough, comprehensive and concise manner. It shall be used as a knowledge-based product and be in a publishable format in accordance with IDB standards. The final product will be published at the IDB and governmental websites after the consultation process is complete.
  3. **Component III: Stakeholder Consultation at Pre-Feasibility Stage:** Component III will finance at least 5 consultation meetings/workshops (Boa Vista, Macapá, French Guiana[[7]](#footnote-8), Guyana, Suriname) that seek to communicate information to relevant stakeholders, at an early-stage in the decision making process to be able to incorporate their feedback in the planning and pre-feasibility study of the *Arco Norte* Project. The main consultation meetings are, but should not be limited to: (i) consultation meeting for the discussion of the Baseline Study (Component I); (ii) consultation meeting for the discussion of the Pre-Feasibility Study (Component II); and (iii) a final coordination meeting for the presentation of the final product, which should incorporate the recommendations agreed in meetings (i) and (ii).
  4. The TC includes the hiring of a Project Manager who, together with the IDB’s Energy Division (INE/ENE), will be in charge of following up with all studies, workshops, including disseminating all reports/products to all stakeholders for their review prior to each meeting.

**Table 1. Indicative Budget[[8]](#footnote-9)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Activity/**  **Component** | **Description** | **IDB/Fund Funding** | **AFD[[9]](#footnote-10)** | **Brazil (Eletrobras)** | **French Guiana (EDF)** | **Guyana**  **(GEA)** | **Suriname**  **(EBS)** | **Total Funding** |
|  |  |  | | **(in-kind)** | | | |  |
| **Comp I. Baseline Study** | Production of work plan schedule and baseline reports | $675,000 | $80,000 | $220,000 | $80,000 | $33,300 | $50,000 | $1,138,300 |
| **Comp II. Pre-Feasibility Study** | Production of pre-feasibility studies | $675,000 | $80,000 | $75,000 | $100,000 | $33,400 | $50,000 | $1,013,400 |
| **Comp III. Stakeholder Consultation** | Outputs delivery, training and explanation among the parties | $110,000 | $40,000[[10]](#footnote-11) | $115,000 | $60,000 | $33,300 | $50,000 | $408,300 |
| **Document expenses for manuals, reports, and publications** | Preparation of information, consultation and publication(s) | $50,000 | 0 | $45,000 | 0 | 0 | 0 | $95,000 |
| **Support to Project implementa-tion, including Supervision, peer review and monitoring** | Consultant(s) in charge of the supervision and peer review of the reports in Component I to III | $350,000 | 0 | $22,500 | 0 | 0 | 0 | $372,500 |
| **Evaluation** | Consultant(s), travel, reporting | $30,000 | 0 | 0 | 0 | 0 | 0 | $30,000 |
| **Contingency** |  | $10,000 | 0 | 0 | 0 | 0 | 0 | $10,000 |
| **TOTAL** |  | **$1,900,000** | **$200,000** | **$477,500** | **$240,000** | **$100,000** | **$150,000** | **$3,067,500.00** |

# Executing agency and execution structure

* 1. Given the strategic objectives of the TC and its regional nature, the TC will be executed by INE/ENE. Additionally, considering the specificity of the subject and the need to ensure the dissemination of information to all stakeholders in the different countries, it is important for the TC to count on the regional coordination of the IDB. The TC includes the hiring of a Project Manager who, together with INE/ENE, will be in charge of coordinating with the stakeholders the selection of consultants, revision of all reports/products, and any activity related to the execution of the TC. The INE/ENE Team will be responsible for all aspects related to the results, monitoring and evaluation.
  2. The TC will follow the IDB’s Policies for the Selection and Contracting of Consultants financed by the Inter-American Development Bank (GN-2350-9) for the selection of consultancy firms, and the Human Resources Policies for the selection of individual consultants.

# Project risks and issues

* 1. There are not major risks in the implementation of the TC. However, being a study involving several countries, the need for coordination and cooperation are stressed. To mitigate the coordination risk; Component III will establish a stakeholder consultation process to convey comments from all stakeholders. The Project Manager, together with the INE/ENE team, will be in charge of channeling all comments and input from different entities and stakeholders.

1. **Exceptions to Bank policy**
   1. No exceptions to IDB’s policies are foreseen.

# Environmental and Social Strategy

* 1. According to the ESG toolkit, the classification of this project is C, i.e. no environmental or social risks expected. See environmental filters:

[IDBDOCS-#37704471-RG-T2257 - SSF](PCDOCS://IDBDOCS/37704471/1)

[IDBDOCS-#37704470-RG-T2257 - SPF](PCDOCS://IDBDOCS/37704470/1)

# Required Annexes:

* Procurement Plan: [IDBDOCS-#37704679-RG-T2257 - Procurement Plan](PCDOCS://IDBDOCS/37704679/R)

# Required Links:

* Request from the client (e.g. Letter of Request, Programming/Portfolio Review Mission Aide Memoire or Report requesting the TC):

[IDBDOCS-#37556691-RG-T2257 - Brazil SEAIN request Letter](PCDOCS://IDBDOCS/37556691/1)

[IDBDOCS-#37704515-RG-T2257 - Suriname Request Letter](PCDOCS://IDBDOCS/37704515/1)

* Terms of Reference for activities/components to be procured:

[IDBDOCS-#37704604-RG-T2257 - TORs](PCDOCS://IDBDOCS/37704604/R)

* Indicative Results Matrix

[IDBDOCS-#37756699-RG-T2257 - Arco Norte Results Matrix](PCDOCS://IDBDOCS/37756699/1)

1. The French territory of French Guiana and its electric system will be included in the studies although French Guiana will not be a beneficiary of IDB’s financing. [↑](#footnote-ref-2)
2. Ibid. [↑](#footnote-ref-3)
3. With IDB financing (TC and loans) Suriname and Guyana are engaging in sector reforms to improve the sector’s energy efficiency. [↑](#footnote-ref-4)
4. The Arco Norte is identified in the context of the Initiative for the Integration of Regional Infrastructure in South America (IIRSA), under the IIRSA Guyana Shield initiative. This initiative proposes the electric integration of the northern part of Brazil with Guyana, Suriname and French Guiana. [↑](#footnote-ref-5)
5. The IDB is in the process of approving a Technical Cooperation (TC) project (RG-T2243 – Natural Gas in the Caribbean – Prefeasibility Studies) to analyze the overall feasibility of establishing a commercial supply chain for Natural Gas (NG) in the Caribbean region considering in particular the potential role or regional suppliers such as Trinidad and Tobago (T&T) and regional small economies as off-takers. The decoupling between NG and oil prices has made NG a more attractive source of power particularly as it reduces the vulnerability to oil price changes. Introducing NG into the Caribbean market could also reduce the Caribbean Region’s unsustainable dependency on imported oil-based fuels for power generation, and enhance regional integration. Preliminary findings under the RG-T2243 will be considered under Component I of this TC. [↑](#footnote-ref-6)
6. Part of Eletrobras’ in-kind contribution will be the use of specialized planning tools for the development of an integrated generation expansion plan within the Arco Norte Project. Those special software tools are, currently used for the energy planning in Brazil carried out by the Ministry of Mines and Energy with support information from the Energy Planning Company (EPE). Energy planning in Brazil considers hydroelectric and thermoelectric optimal generation for every Brazilian region, as well as energy exchanges among regions. By using those tools, the Arco Norte Project can prioritize feasible generation projects, based on temporal and spatial allocations of the generation capacity required to meet the growth of demand over the planning horizon scenario. [↑](#footnote-ref-7)
7. French Guiana consultation will be financed by EDF and AFD. [↑](#footnote-ref-8)
8. The in-kind contributions presented in Table 2 are only indicative amounts and non-binding for the counterparts. [↑](#footnote-ref-9)
9. AFD has secured a grant of 150,000 Euros (equivalent to $200,000 USD at a 1.33 US$/euro exchange rate). [↑](#footnote-ref-10)
10. AFD’s contribution covers the Stakeholder Consultations to be held in French Guiana only. [↑](#footnote-ref-11)