TC ABSTRACT

I. Basic project data

▪ Country/Region:	Central and South America (CSC, CAN, and CID)
▪ TC Name:	Development of a clean and sustainable electric grid in Latin America.
▪ TC Number:	RG-T2405
▪ Team Leader/Members:	Team Leader: Claudio Alatorre (INE/CCS); Co-Team leader: Alberto Levy (ENE/CAR); team members: Sylvia Larrea (INE/ENE), Ramón Juan Espinasa (INE/ENE), Alberto Elizalde (ENE/CVE), Arnaldo Vieira (INE/ENE), Emiliano Detta (INE/CCS), Christoph Tagwerker (INE/CCS) and Milagros De Pomar (INE/CCS).
▪ Indicate if: Operational Support, Client Support, or Research & Dissemination.	Research and Dissemination
▪ Reference to Request: (IDB docs #)	Pending
▪ Date of TC Abstract:	September 2013
▪ Beneficiary:	Central and South America.
▪ Executing Agency and contact name	Bank Executed: Climate Change and Sustainability Division (INE/CCS) and Energy Division (INE/ENE).
▪ IDB Funding Requested:	US$1,250,000
▪ Local counterpart funding, if any:	N/A
▪ Disbursement period (which includes execution period):	18 months
▪ Required start date:	December 1st 2013
▪ Types of consultants:	Consulting firms and/or individuals
▪ Prepared by Unit:	INE/CCS and INE/ENE;
▪ Unit of Disbursement Responsibility:	INE
▪ Included in Country Strategy (y/n); ▪ TC included in CPD (y/n):	No No
▪ GCI-9 Sector Priority:	(i) Protect the environment, respond to climate change, and to promote renewable energy; (ii) Small and vulnerable countries; and (iii) Regional integration.

II. Objective and Justification

The main objective of this technical cooperation is to visualize the operational, investment and management characteristics of a low-carbon electricity grid system that would allow optimal participation of non-traditional renewable energy sources linked to the substantial endowment of hydropower in the region.

Latin America (LA)[1] has a substantial endowment of renewable sources for power generation. Recent assessments show that by deploying renewable energy technologies, the region could completely cover

[1] *For the purposes of this study, hereinafter LA or Latin America refers to the non-insular territories. Due to their smaller sizes and higher interconnection costs, the insular countries and territories of the Caribbean will require a separate study.*

current and expected electricity demand for centuries, even under scenarios of substantial shift of transportation systems towards electrification.

Extended renewable energy adoption could offer multiple benefits for the region. Compared to conventional sources –particularly hydrocarbons– renewables allow heightened energy security, less fuel cost volatility, larger grid resilience, lower operation and maintenance costs, net job creation, reduced local pollution and health impacts, increased acceptance among citizens, less stress to ecosystem services and protection of ecological biodiversity. These benefits, if adequately internalized, can make these technologies cost-competitive with conventional sources and deliver a number of additional qualitative social benefits.

Many of the renewable energy resources have different generation patterns over time and space, as compared to conventional sources: They are variable over time, and/or they are available only in specific sites. The integration of electricity grids represents an effective way to both harness geographically diverse resources and manage their time variability. However, grid integration involves also political and regulatory challenges. This TC will provide decision makers with tools to assess the costs and benefits of the "integrated" and "autarkic" paths of a low-carbon future.

As this involves understanding the political, technical, and commercial feasibility of electricity integration, this project adequately complements current efforts in INE/ENE related to technical, regulatory and political regional transmission interconnection projects in the region.

This study will visualize scenarios for an electricity grid for 2030 with varying degrees of integration, considering: (i) the coupling of the region's large hydropower capacity and potential with the endowment of non- traditional renewable energy sources; (ii) the incorporation of storage technologies, and (iii) the incorporation of demand response technologies and other distribution-level smart grid elements. This TC is aligned with the GCI-9 sector priorities as the activities will involve small and vulnerable countries and regional integration while striving to protect the environment, respond to climate change by promoting RE in the region.

III. Description of activities

Component 1: Review of the state-of-the-art for low carbon grid options and requirements as well as assessment of associated costs and benefits. This component seeks to build an applicable framework for Latin America in terms of laying out a credible and realistic ground from which to build the grid of the future.

Component 2: Assessment of Regional Integration in Latin America. This component will undertake a diagnosis of the political barriers that stand before regional integration for the purposes of large scale renewable energy adoption.

Component 3: Demand Projections, Resource Characterization, and Analytical Model for the Grid of the Future. This third component will develop an analytical model flexible enough to simulate large renewable energy penetration and its intermittency. Key technical aspects for such model are established as part of the activities.

Component 4: Cost and Benefits Analysis. The component will consist of a cost and benefit analysis and feedbacks into the electricity expansion model to include net cost reductions related to renewable generation in the monetary objective functions.

Component 5: Recommendations and Diffusion. Finally, this component builds on the previous four and adds recommendations on regulatory, institutional, and political issues that are required to foster such a

grid. This component is also concerned on diffusing these results and recommendations through the region.

IV. Budget

Activity/Component	Description	IDB Funding (US$)	Counterpart Funding (US$)	Total Funding (US$)
Component 1. Review of the state-of-the-art for low carbon grid options and requirements as well as assessment of associated costs and benefits	Build an applicable framework for Latin America in terms of laying out a credible and realistic ground from which to build the grid of the future.	150,000	0	150,000
Component 2. Assessment of Regional Integration in Latin America	Analyze and understand the barriers to trans-national electricity transmission expansion and to energy flows between countries	300,000	0	300,000
Component 3. Demand Projections, Resource Characterization, and Analytical Model for the Grid of the Future.	Develop an analytical model to define a credible electricity expansion path for LA, including tailored demand projections and characterization of the renewable resource from an electricity perspective.	400,000	0	400,000
Component 4. Cost and Benefits	Quantification of cost and benefits arising from large penetration of renewable energy sources accompanied with regional grid interaction in the LA context.	50,000	0	50,000
Component 5. Recommendations and Diffusion	Recommendations on regulatory, institutional, and political issues that are required to foster a very low carbon grid for LA. This component is also concerned on diffusing these results and recommendations through the region.	200,000	0	200,000
Coordination	Supervision and coordination of the consultants work and all project activities	150,000	0	150,000
Total		**1,250,000**	**0**	**1,250,000**

V. Executing agency and execution structure

This TC will be executed by the Bank due to its regional scope and that it is aimed to strengthen the Bank's support to the development of a very low-carbon electricity grid. INE/CCS will be the Unit with Disbursement Responsibility (UDR) and also be responsible for procurement and execution. Technical responsibility will be with INE/ENE and INE/CCS.

VI. Project risks and issues

The main risk for this project is that the main subjects – renewable energy, integration, and cost/benefits – are not adequately integrated between them. To mitigate this risk, the component's activities are explicitly designed to feed on previous or parallel results, forcing coherency throughout the different task's progress.

VII. Environmental and Social Classification

It is not anticipated that the activities to be financed under this TC will have negative direct social or environmental impacts. Therefore the team considers that, according to the Bank's Safeguards Screening Toolkit, this operation should be given a classification of "C": (i) no environmental or social risks; (ii) direct contribution to solve an environmental issue.