TC ABSTRACT
Analysis and Development of Energy Storage Options in Costa Rica – CR-G1003

I. Basic project data

▪ Country/Region:	Costa Rica
▪ TC Name:	Analysis and Development of Energy Storage Options in Costa Rica
▪ TC Number:	CR-G1003
▪ Team Leader/Members:	Christoph Tagwerker (INE/CCS), Enrique Rodriguez (ENE/CCR), Co-Team leaders; Emiliano Detta (INE/CCS); Angelo Angel (INE/CCS); Alfred Grünwaldt (INE/CCS); Jorge Luis Gonzales (FMP/CCR)
▪ Taxonomy:	Research & Dissemination
▪ Reference to Request: (IDB docs #)	
▪ Date of TC Abstract:	August 16, 2013
▪ Beneficiary	Costa Rica, Ministry of Environment and Energy (MINAE)
▪ Executing Agency and contact name	IDB
▪ IDB Funding Requested:	USD 1,400,000
▪ Local counterpart funding, if any:	USD 250,000
▪ Disbursement period:	24 months
▪ Required start date:	4Q-2013
▪ Types of consultants:	Firms, Individual consultants
▪ Prepared by Unit:	INE/CCS and INE/ENE
▪ Unit of Disbursement Responsibility:	CCR
▪ Included in Country Strategy (y/n); ▪ TC included in CPD (y/n):	Y N
▪ GCI-9 Sector Priority:	Protect the environment, respond to climate change, and promote renewable energy.

II. Objective and Justification

The Costa Rican electricity subsector has one of the lowest shares of fossil fueled power generation in Latin America and the Caribbean. In 2012 more than 90% of electricity generation was based on renewables[1]. This is coherent with, the Costa Rican Government definition of the National Climate Change Strategy, a national carbon neutral target to be achieved by 2021[2]. The Ministry of Environment and Energy (MINAE), through its Climate Change Unit, is the organization responsible, in coordination with other public agencies, to make this happen.

[1] Total Installed capacity is: 2,723.2MW (1,700.3 MW Hydro; 217.5 MW Geothermal; 612.6 MW Thermal; 148.1MW Wind; 47.7 MW Bioenergy; and 1.0 MW Solar); Total net generation: 10,076.3 GWh (7,242.8 GWh Hydro; 1,402.6 Geothermal; 830.6 GWh Thermal; 518.8 GWh Wind; 81.6 GWh Bioenergy and 0.3 GWh Solar); ICE: Annual Generation and Demand Report for 2012, 2013;

[2] Estrategia Nacional de Cambio Climático. http://cambioclimaticocr.com/2012-05-22-19-42-06/estrategia-nacional-de-cambio-climatico

The policies envisioned in the National Climate Change Strategy will mainly affect the energy and transport sector because these concentrate the largest CO2 emissions in the country. As for the energy sector additional private investments in renewable energy are required in the coming decade to achieve carbon neutrality. To integrate this new capacity and store clean energy surplus, operating practices need to be assessed and optimized allowing a more efficient use of existing generation assets, with a strong focus on existing hydroelectric plants. As for the transport sector the strategy calls amongst others for the application of new CO^2-clean technologies and strong involvement of private actors to take on mayor investments in the sector. Consolidation of a very low carbon footprint will require complementing existing hydro capacity with non-traditional renewables, some of which have high intermittency factors. It will also require a new thinking in terms of operation of existing reservoirs. As a consequence there is a need to examine options for energy storage that would optimize capacity margins. It will also require the development of options to substitute or displace existing, fossil-based liquid fuels in the transport sector.

The main objective of the proposed project is to support the technical and economic analysis of energy storage options consistent with the carbon neutral policy of the government including the deployment of a demonstration pilot. The specific objectives are: (i) evaluate different options for energy storage and operating practices of existing assets (considering Costa Rica's substantial installed hydroelectric capacity including pumped hydro –in order to allow higher penetration of variable renewable energies such wind energy in the electricity system); and (ii) provide a capital grant by means of a bidding process for a small scale energy storage pilot.

III. Description of activities

Component 1: Evaluation of different energy storage options at utility scale. Taking into account Costa Rica's installed capacity, this component will determine the optimal size for storage capacity that maximizes intermittent renewable integration in the national grid, based on a portfolio of technically, economically and environmentally feasible new and existing technologies. It will define the optimal storage size, mix of technologies, operational scheme, and potential investment stream associated with the optimal level. The following factors will be evaluated for each considered option: (i) storage capacity and related increase of intermittent renewable energy (RE) generation; (ii) estimated investment, operational, and maintenance costs; (iii) benefits provided through storage for: generation (increase penetration rate of RE projects, ancillary services like voltage and frequency regulation), transmission, distribution and operation/stabilization of the grid; (iv) effect on electricity price and overall grid greenhouse gas (GHG) emissions. The expected products of this component will be: (i) an implementation plan for the most feasible option/options evaluated; and (ii) a proposal for a pilot (demonstration) project to be developed within the context of Component 2. The replication potential of this technological option in other countries of the region will be highly considered.

Component 2: Investment grant for prototype deployment: This component will finance the deployment of a small scale energy storage prototype through a public bidding process implemented by the IDB. The technology and project location will be defined by the applicants in their proposal based on the results of Component 1. The prototype should demonstrate technical viability of the storage technology, applicability in Costa Rica and benefits in terms of integrating variable renewable energies. Potential for replication in other countries should be validated.

The product of the component will be an operating integrated prototype ready for field testing. The expected results of this intervention are: (i) useful data to better inform the design of energy policies for redefining the role of new and existing storage, its capacity, and technologies for an intensive renewable energy based national grid; and (ii) promotion of innovative low carbon technologies and technology transfer.

IV. Budget*

Components	IDB	Counterpart	Total
1. Evaluation of different energy storage options at utility scale	$400,000	50,000	450,000
2. Investment grant for prototype deployment	$870,000	200,000	1,070,000
Project management and coordination	$100,000	0	100,000
Consultants Travel	$10,000	0	10,000
Contingencies	$20,000	0	20,000
TOTAL	**1,400,000**	**250,000**	**1,650,000**

*Amounts in US dollars.

V. Executing agency and execution structure

CCR will have the Unit of Disbursement Responsibility. Procurement, execution and technical responsibility will be with INE/CCS and ENE/CCR.

VI. Project Risks and issues

There are no relevant risks associated to the execution of this technical cooperation for Component 1. There will be some technology risks for component 2, which is normal for any kind of prototypes, and which is one of the reasons why this Investment Grant is needed. To mitigate this risk, an agreement with the beneficiary will be signed in order to define conditions and milestones for the disbursements.

VII. Environmental and Social Classification

This Technical Cooperation is category C.