

PROJECT **PATAGONIA – CHORRIACA HYBRID WIND/DIESEL AND COCHICO MICRO-HYDRO**

LOCATION Argentina, Neuquén Province, Chorriaca (S 37° 55' 57, 4'' – W 70° 06'14,1'') and Cochico (S 36°28'54'' W 70°13'17'') villages

TIMELINE June 2010 to December 2013.

CATEGORY GRANT/CSR – with the creation of a revolving financing mechanism embedded in a twenty year agreement to stimulate the deployment of renewable energy projects in the Neuquén Province. Developed in public-private partnership (PPP) with the Provincial Electric Utility EPEN.

TECHNICAL PARAMETERS Cochico micro-hydro power plant: construction of a 65 kW run-of-the river micro-hydropower plant and 5km transmission line to generate up to 450,000 kWh per year of electricity to be delivered 24/7 to the local distribution network (mini-grid). Chorriaca hybrid wind (3X25 kW) – diesel (120kW) power generating package will deliver up to 188,000 kWh per year of clean energy on a 24/7 basis to the small village grid in replacement of a conventional diesel power plant.

- OBJECTIVES**
- Provide 24/7 electricity using zero/low emission technologies based on renewables to two off-grid communities and design an innovative mechanism to promote the deployment of renewables in the region based on the fuel displacement savings;
 - Showcase locally based energy development and regional economic vitalization.

- BENEFICIARIES**
- GSEP member companies;
 - Provincial Government of Neuquen;
 - Neuquen Provincial Electric Utility EPEN (beneficiary of the facilities);

- PARTNERS**
- Chorriaca and Cochico communities and their representatives.

- OPERATORS**
- EPEN. GSEP contribution to the project includes the training of operators;
 - Human capacity building (HCB) and technology transfer through a continuous involvement of EPEN.

- FINANCE**
- Total Cost: USD 3,200,000 excluding Transmission lines supplied by EPEN (USD 225,000). Contribution of the Neuquen Government Road agency to build and fix the roads to the power generating facilities.
 - Development and Transfer Agreements between GSEP and EPEN which include a firm 20 years commitment of EPEN to apply the fuel savings from the diesel displacement to the development of renewables in the region. The agreement sets the calculation method and reporting obligations with non-compliance provisions;
 - IRR forecasted at: 7,50% (average of the two projects). Could not justify the CDM registration (high development cost vs. CO2 credits).

- ENVIRONMENT**
- Detailed environmental impact assessment (EIA) and environmental management plan (EMP);
 - Project siting with very low impact;
 - Reduced CO2 emissions and risk of diesel spills;
 - Run-of-the-river, maintaining minimum flow.

HUMAN CAPACITY BUILDING & TRAINING

- Sustained assistance for the development of the power plants and associated infrastructures.
- Full training of EPEN’s O&M staff on Hybrid system. Hands-on training for hydropower O&M (EPEN already familiar with hydro).
- Two years monitoring and assistance after the plant start-up to ensure long term operating and management skills transfer.

DEVELOPMENT OUTCOMES

- Institutionalization of RE development;
- Sustainable electricity production;
- Reduced electricity generation cost;
- Public-private partnership experience;
- Viability of the company and the RE deployment financing mechanism;
- Job creation and potential for local economic development.

SUSTAINABILITY

▪ **Projected Direct Sustainability Impacts**

- Number of household connections 170
- Total wattage provided by electrification Installed Capacity: 190 kW
Annual Energy Generation:1,117MWh
- GHG¹ emission reduced/avoided 233 Tons of CO2/year.
- Number of public buildings connected n.a.
- Energy efficiency Replace conventional power with RE
- Total person days provided in Capital Project n.a.
- Total capital invested (GSEP) US \$3.2 million
- Number of O&M training days provided Approximately 135 person-days
- Computers provided n.a.
- Internet connection provided n.a.
- Telecommunication connections provided n.a.

▪ **Projected Indirect Sustainability Impacts (qualitative description)**

- Facilitated health care: Refrigeration of medical products and use of medical tools that require electricity as well as improved lighting.
- Facilitated education: Improved lighting during school hours and lighting for extended hours.
- Potential water access/irrigation: Distribution of water from pumping
- Facilitated local entrepreneurial activity: Encouragement of small size Michell-Banki Turbine local design and fabrication
- Social Impacts: Minimization of emigration of young generation to look for job opportunities in nearby cities. Preservation of culture.
- Other impacts: Development of mechanized operation of farming and livestock operations; safety and security provided by ability to install outdoor and street lighting

¹ Green House Gases

- Diesel cost savings are sufficient to ensure sustainability of operation and maintenance and capital repayment with small return (however in this case, this part of the revenues is accrued against the future deployment of RE projects);
- Sufficient spare parts and replacements are considered and or local spare part distributors/vendors are available. Hydro generating equipment from local supplier;
- Innovative Hybrid System design that optimizes the wind contribution and complete training of the plant staff both in operation and maintenance activities followed by a minimum two year monitoring after start-up.

REPLICATION

- EPEN and the Neuquen Government have undertaken a regional RE inventory programme, including the installation of wind metering masts and hydro resources surveys. Wind resources data for more than seven years is now available and a ranking of hydro potential has been done.
- The financing mechanism established by the current project will help developing new sites.
- Availability of small/medium (low overhead) contractors with sufficient construction supervision skills.
- Availability of local technical skills though can require tailored human capacity building for specific technology/technical know-how transfer.

KEY SUCCESS FACTORS

- Support from local and regional authorities;
- Public awareness campaign / communication outreach activities;
- Effective structure of governance and dedication of EPEN;
- Strong Provincial Government support
- Production of pre-feasibility and environmental studies.

STATUS

- Inaugurated in May 2013 (Cochico) and December 2013 (Chorriaca). Assets to be transferred 1Q2016 after two years of monitoring by GSEP and operating by EPEN.
- Lessons Learned report available 1Q2015.

