



Global
Sustainable Electricity
Partnership

Galapagos San Cristóbal Island Wind Project 2007-2013

Partners highlight achievements from
Ecuador's first large-scale wind project



Project Highlights after six years of operation

The Global Sustainable Electricity Partnership Galapagos San Cristóbal Island Wind Project, operating since October 1, 2007 by EOLISCA, the Galapagos Wind Company is:

- The first large scale wind project in Ecuador (three 800 kW turbines for a total installed capacity of 2,400 kW) that has cumulatively provided 18 million kWh of energy to San Cristóbal consumers.
- Ending its sixth year of operation, after a six year development and construction phase costing \$10 million.
- Reliably generating electricity available 93% of the time with little down time for repairs and maintenance.
- One of the world's largest wind-diesel hybrid systems, annually supplying approximately 32% of the island's electric needs through wind power, reducing diesel consumption by a cumulative total of 1.6 million gallons (31% of total needed) and avoiding CO₂ emissions by a cumulative total of 15,000 tons and reducing risk of a fuel spill.
- Not harming or impacting the endangered indigenous Galapagos Petrel.
- Registered under the Kyoto Protocol's Clean Development Mechanism yielding approximately 11,000 Certified and Verified Emission Reduction certificates worth approximately 110,000 US dollars for purchase on the international market.
- Financially stable and sustainable with annual revenue of approximately 400,000 US dollars under a Power Purchase Agreement with ELEGALAPAGOS S.A., the local utility company, initially innovatively capitalized with funding from UN agencies (UNF and UNDP), Ecuadorian taxpayer donations, the Government of Ecuador and Global Electricity Partnership companies.
- Listed as a destination for tourists visiting this UNESCO World Heritage Site.
- The recipient of Power Engineering Magazine, World Energy Forum, and Energy Globe awards.
- Complemented by two, 6 kW solar PV systems that have produced 100,000 kWh of electricity.
- This report and an earlier report and video of the project's development and construction phases are available in English and Spanish posted at www.globalelectricity.org/galapagos.

Why this project was undertaken

Displacing all of the diesel electricity generation with renewable energy on all four of the inhabited Galapagos Islands was a plan developed by the United Nations and the Republic of Ecuador in the 1990s. The UN Development Program had been seeking private sector partners to implement the plan and in 2001 asked the Global Sustainable Electricity Partnership (GSEP, formerly the "e8", a non-profit organization supported by 14 of the world's largest electric utilities from 12 countries: USA, Mexico, Brazil, Italy, South Africa, Canada, Russia, Japan, Germany, Spain, France and China) to lead it, after the Jessica Tanker Ship spilled approximately 150,000 gallons of fuel oil and diesel that it was delivering to the islands in January that year. GSEP, with its mission to promote sustainable energy development through building electricity sector projects hand in hand with local utility companies, pledged to meet the UN's goals to reduce the risk of diesel spills by displacing diesel fuel use, and reduce greenhouse gas emissions with renewable resources on San Cristobal Island. GSEP transparently shared all of its work and solutions to engineering, environmental, financing, and other challenges throughout the project's development and construction phases to make it easy for other UN partners to replicate it on other islands, Ecuador and other places in the world. The UN has found other partners to continue the renewable electrification on the islands.

Message from the Minister of Electricity and Renewable Energy

The Ministry of Electricity and Renewable Energy is making sure that there is abundant, affordable, reliable, and clean electricity for Ecuador's homes, industries, and commercial power users today and well into the future on the basis of a methodical and orderly use of the abundant natural resources that our country has been blessed, within a framework of absolute respect for people and the environment. In this context, the San Cristobal Island Wind Project has become an internationally known flagship project for its location within a natural heritage such as the Galapagos Islands and because after 6 years of successful operation, it has managed to reduce in a high percentage the use of diesel fuel in electricity generation, with great benefits for the fragile island ecosystem. This project has been a national pioneer in the use of wind resources and has served as a reference for the development of similar projects both in the Galapagos Islands and in the mainland Ecuador.

A decade ago, the group Global Sustainable Electricity Partnership (GSEP) began its efforts in Ecuador to support the development of this project and after this period it has

demonstrated that it is possible to successfully carry out joint actions between the government and private sectors and community. On this basis and with great enthusiasm, we are working to reach the goal of making the Galapagos a fossil fuels free territory within a short term.

The Ecuadorian government, through the Ministry of Electricity and Renewable Energy, welcomes the first six years of operation of the San Cristobal Wind Project and commits its full support in benefit of the Galapagos Islands.

Dr. Esteban Albornoz Vintimilla

*Minister of Electricity and
Renewable Energy*



Message from the Chairman of RWE

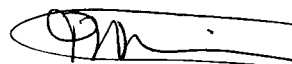
For two decades, the Global Sustainable Electricity Partnership has taken concrete actions towards increasing global access to clean and reliable electricity. By implementing numerous projects in different societal, political and economic frameworks, our Partnership demonstrated the viability of a bottom-up approach to sustainable energy development and climate change mitigation and adaptation. Access to electricity projects and workshops have touched over 60 developing and emerging countries, investing in the future of communities by providing them with cleaner and more efficient energy solutions.

Our installed renewable energy projects have already helped avoid almost 10,000 tons per year of CO₂ emissions. Furthermore, the public-private partnerships built for our projects provide business models for other similar energy projects needed in countless other places where energy needs are minimally met.

The San Cristóbal Island wind power project is a flagship activity of our project fleet. The Galapagos Islands, home of the unusual flora and fauna, are striving to use as much clean energy as possible to protect the area's biodiversity. This is easier said than done since the highly protected environment sets narrow limits to any kind of power supply projects. Under the dedicated lead of AEP, our Partnership took up this challenge knowing that we

will be globally visible in all project stages. The fact that the GSEP project team built the facilities not only professionally but managed the environmental risks at all stages in a prudent and sensible way as well cannot be overstated. Same applies to the EOLICSA, the local operators who are running the plant successfully in every respect since 2007.

Effective public-private partnerships are critical to addressing universal access to energy services and to achieving a sustainable development in this sector. Celebrating six years of operation is an important milestone for the partners having cooperated in good faith since project inception.



Peter Terium, CEO, RWE AG



Message from American Electric Power

The Galapagos San Cristóbal Island Wind Project began commercial operation in 2007 after six years of careful planning and construction by an international team including the United Nations Foundation, the United Nations Development Program, the Government of Ecuador, the Municipality of San Cristóbal, ELECGALAPAGOS S.A., the local power company and the Global Sustainable Electricity Partnership, formerly e8, a non profit international organization of electric utility companies. This timeline was required to ensure that the project's location and construction technologies were fully respectful to the island's unique and globally recognized environment.

The project, costing approximately \$10 million, is fulfilling its promised benefits under the leadership of Mr. Luis Vintimilla, formerly Ecuador Project Manager, now Company General Manager, and Mr. Jim Tolan, the US Project Manager and the continued support of AEP and RWE in EOLICSA, the Galapagos Wind Company that works side by side with ELECGALAPAGOS S.A. in the operations phase of the Project.

During the last six years, EOLICSA and ELECGALAPAGOS S.A., with the support of AEP and RWE have operated and maintained the wind-diesel hybrid Project in the same way our companies generate and deliver power in the United States and Germany, respectively. The Project has reliably delivered high quality, affordable electricity to San Cristóbal consumers and is financially and environmentally sustainable.

Together, we have developed the skills and confidence for Ecuador's first wind project and one of the world's largest hybrid systems to continue operating for years to come. We have freely shared our experience from the moment the Republic of Ecuador and the United Nations invited the Partnership to develop wind resources on the Islands. The Project was called "the cornerstone of renewable energy development for the Galapagos Islands" in 2007 and I am pleased that other renewable projects will be coming on line soon. In addition, it has been internationally recognized with prestigious awards.

On behalf of the Partnership, I am very pleased to celebrate six years of operation knowing that the continued success of the Project will serve the Galapagos Islands well and inspire all countries to boldly follow this approach to provide access to affordable electricity, especially to those that don't now enjoy its benefits.



Nicholas K. Akins, Chairman, President
and CEO, American Electric Power



Message from Conelec Executive Director

The National Electricity Council – CONELEC -, as the responsible agency for planning, regulation and control of the Ecuadorian Electricity Sector promotes the development and use of Non-Conventional Renewable Energy Resources, in order to diversify the energy sources on a sustainable basis in harmony with the environment. Within this frame, CONELEC issued the Permit Contract for the implementation of the 2.4 MW San Cristóbal Wind Project, as a first step toward the big goal of reducing the use of a fossil fuel in the Galapagos Islands within a short term.

As established in the electricity legal body, CONELEC exercises the control of the contractual obligations, having as a benchmark the continuity of electricity service, providing high relevance to the environmental management; in order to preserve integrity of the Galapagos Islands, worldwide recognized and declared as a World Heritage Site.

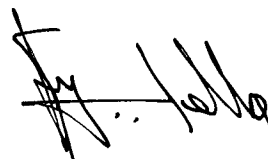
Dr. Andrés Chávez Peñaherrera

CONELEC Executive Director

UN Energy message

I have had the pleasure to co-chair the United Nations Sustainable Energy for All (SE4All) initiative over the last year. One of our principal goals is to help support all citizens of world to enjoy access to electricity services by the year 2030. While this might at first appear as only an aspirational goal, many countries are moving forward, demonstrating that the goal is clearly achievable. As an example, the successful Galapagos Wind Project helps demonstrate to our stakeholders that concrete progress is being made – even under difficult engineering, environmental and financial circumstances.

Through UN-Energy we have worked closely with the GSEP in producing the recommendations of private and public practitioners to strengthen public-private partnerships in recent surveys in 2011 and 2012. There are numerous other success stories that serve as useful lessons learned for our work, but here I would like to commend all of the partners in the Galapagos Project for their dedication and perseverance. Well done!



Kandeh Yumkella





Introduction

The main objective of the San Cristóbal Wind Project is to replace the electricity generation system based on burning diesel, with a clean energy source. The project was developed within the framework of the cooperation agreement signed between the Government of the Republic of Ecuador and Global Sustainable Electricity Partnership - GSEP (formerly “e8”), as a part of the overall re-electrification of the Galapagos Islands with renewable energy led by the Ministry of Electricity and Renewable Energy (MEER). In addition, the project is a component of the “Regional Plan for the Conservation and Sustainable Development of Galapagos” approved by the Governing Council of Galapagos (Consejo de Gobierno de Galapagos - ex INGALA).

The project, with an estimated cost of 10 million USD, was funded primarily through a grant of funds from member companies of GSEP and additional contributions from the United Nations Foundation (UNF), voluntary donations from income tax, and FERUM funds (Rural and Urban Marginal Electrification Fund) through ELECGALAPAGOS S.A. (the local public utility). To address these contributions, the San Cristóbal Wind Project Commercial Trust was created, with the companies AEP and RWE (GSEP members), as “settlers” and ELECGALAPAGOS S.A. as adherent and sole beneficiary of the Trust. The Trustee is Fondos Pichincha.

As required by the Electricity Law, the Independent Power Producer company Eólica San Cristóbal S.A. – EOLICSA was created, owned by the Trust and ELECGALAPAGOS S.A. EOLICSA is the owner and operator of the Project.

Description of Facilities

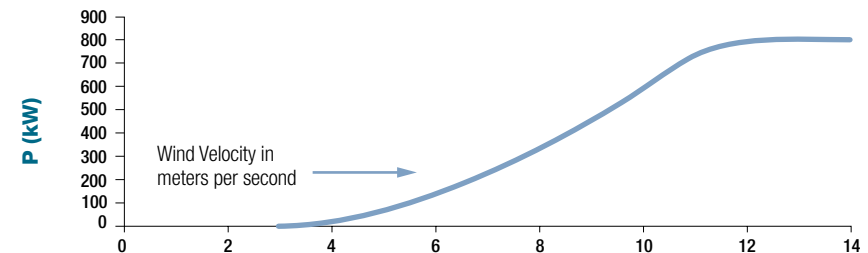
Wind Park

The wind park is located in “Cerro El Tropezón”, San Cristóbal Island. It is composed of three (3) wind turbines, 800 kW each, AE-59 model, manufactured by the Spanish company MADE, TECNOLOGÍAS RENOVABLES S.A. (currently GAMESA group). Therefore,

the total capacity is 2,400 kW. The towers are 51.5 meters high and the blades have a 59 meters diameter. Each unit is equipped with step up transformer, inverter, cables, auxiliary equipment and supplementary materials.

The machine design is appropriate to take advantage of the best wind conditions in the area. The units are variable speed, with synchronous generator and power inverters.

Wind Turbine Power Curve



The wind turbines were selected to best fit the model and actual wind conditions on San Cristóbal and to use as much as the wind energy as practical to produce electricity at a reasonable cost. As the performance curve shows, the turbines start to generate power at about 3.5 meters/second wind speed—very low for this type of turbine—and peak at about 12 meters/second. During commercial operation, maximum output is rarely attained due to operational restrictions such as electricity demand limitations and minimum on-line diesel requirements.

Transmission Line

The 13.2 kV transmission line connects the wind park with the substation located at the diesel plant owned by ELECGALAPAGOS S.A.: from here, the energy is distributed to the users on San Cristóbal Island.

The transmission line consists of an initial underground section, 3km long, as a protection for the birds in that area and especially for the “Galapagos petrel”, an endangered bird. The overhead section, 9 km long, is connected to underground cable and ends at the substation located at the ELECGALAPAGOS S.A. diesel plant. It is a conventional line on concrete poles, with aluminum conductor.



Interconnection Substation

At the substation located at the ELECGALAPAGOS S.A. diesel plant, the overhead line is connected to the bus bar through a vacuum circuit breaker, and associated disconnecting switches and lightning arresters.

Automation of diesel units

As a component of the Wind Project, the diesel units owned by ELECGALAPAGOS S.A. were automated in order to have a full automatic hybrid wind-diesel system in the Island. The diesel generation component is owned by ELECGALAPAGOS S.A..

Control Room

Within the premises of the ELECGALAPAGOS S.A. diesel plant, the control room for the wind-diesel hybrid system was installed. In the control room are located the following equipment and services:

- Control and protection panel for the 13.2 kV circuit breaker of the transmission line.
- SCADA (Supervisory Control and Data Acquisition) system for automatic control of wind-diesel hybrid generation: using this computerized system, an automatic optimal dispatch of generation units at all times is achieved, trying to optimize the use of the wind resource in order to minimize the use of diesel.

For technical requirements, it is necessary to maintain at least one diesel unit operating at 25% of its rated capacity. In the SCADA system operation, the same ELECGALAPAGOS operators working in the diesel plant are able to operate the new hybrid system, after adequate training on these new technologies. Supervision is under responsibility of the EOLICSA Operations Manager, Fernando Naranjo.

Photovoltaic system

Through a GSEP complementary grant, two photovoltaic systems were installed and they are interconnected at low voltage to the distribution grid of ELECGALAPAGOS S.A. A set of 5.1 kW solar panels is installed in the Pedro Pablo Andrade School and two sets of 5.1 kW and 2.5 kW respectively, are on the roof of the control room. Each system has its own energy measuring equipment.





Start of Operation

The execution of the project works demanded a high degree of coordination, due to the logistical difficulties of the San Cristóbal Island. These activities were carried out by MADE, TECNOLOGÍAS RENOVABLES S.A. from Spain, as the equipment supplier; SANTOS CMI from Ecuador in charge of transport, civil works and erection; Ecuadorian ELECDOR responsible for the transmission line, and several local firms and consultants who provided support for specialized tasks. The Project Management was under responsibility of the U.S. company IEA, with Jim Tolan as Project Manager and Luis C. Vintimilla as Local Manager. Paul Loeffelman, from AEP (GSEP member) was the Project Leader.

Once all the acceptance tests stipulated in the contracts were satisfactorily completed, the San Cristobal Wind Project began operation on October 1st, 2007. The official dedication ceremony was on March 18th 2008.

6 Years of Operation

On September 30th, 2013, the San Cristóbal Wind Project completed 6 years of operation, fulfilling its main objectives. Following paragraphs describe some of the more outstanding highlights.

Operation and maintenance

The operation and maintenance tasks are performed under the supervision and coordination of EOLICSA Operations Management (Operations Manager and Assistant) in addition to the ELECGALAPAGOS S.A. staff after an adequate training process about these new technologies. The manufacturer GAMESA, provides permanent remote assistance from Spain, as needed.

The operation of the wind-diesel hybrid system, automatically monitored by a SCADA system, provides dispatching preference to the wind generation in order to reduce fuel

consumption as much as possible. Because of the addition of two new diesel units by ELECGALAPAGOS S.A. and in order to update the system after 6 years of operation, a modernization of the SCADA and other functions is being conducted with coordinated participation of GAMESA, EOLICSA and ELECGALAPAGOS S.A.

Preventive and predictive maintenance programs are strictly completed by local staff, in accordance with the manufacturer's recommendations and in line with best practices and standards for this type of activity.

The corrective maintenance activities have always been successfully implemented by local staff to minimize the time of unavailability of wind turbines. The only notable event during the 6 years of operation occurred in May 2012, which resulted in the unavailability of 80 days of one wind turbine and required 2 specialists from the Manufacturer to be on site. The fault was cleared after an intensive and coordinated effort by our staff with the manufacturer specialists.

The global availability of the wind park for the six years of operation is 93%, which is considered a high value compared with other similar projects, especially taking into account its remote location, away from technology centers and with little infrastructure to support local logistics.

One of the activities that deserve special attention on an annual basis is the external cleaning of towers, blades and nacelles, and blades repair. This was originally performed with the assistance of a group of high altitude specialists from the Ecuadorian mainland. They have since trained local staff from ELECGALAPAGOS S.A. and EOLICSA to perform these activities.

EOLICSA Operations Management maintains a continuous training program for staff of operators and maintenance technicians from ELECGALAPAGOS S.A.





Economic and financial issues

EOLICSA accounting reports are recording accumulated losses since the start of the operation, mainly because of the high annual depreciation value of the project facilities and other operating and maintenance costs, facing the limited energy prices set by CONELEC for such projects in Galapagos. In spite of that, at all times a positive cash flow has been available for covering the costs of operation and maintenance and other related duties, since, due to the characteristics of the project financing, through non-refundable grants, it was not necessary to provide resources to recover the investment: this project had not been financially feasible under a strictly private financing scheme. Unfortunately, this situation has been seriously affected by a recent decision of the Internal Revenue Service (SRI) office obligating EOLICSA the payment of income tax, based on sales, assets and other parameters, although no profit has been registered. Such decision is against the exemption provisions established in the Electricity Sector Law, which was the rule on which the financial scheme of the project was grounded.

To the current date, there is a positive cash balance, appropriate to allow the project to continue functioning properly and smoothly. When EOLICSA will be transferred to ELECGALAPAGOS S.A. in 2016, the project shall face a better economical situation since publicly owned companies adhere to more benign taxation rules so the financial sustainability of the project is no longer at risk.

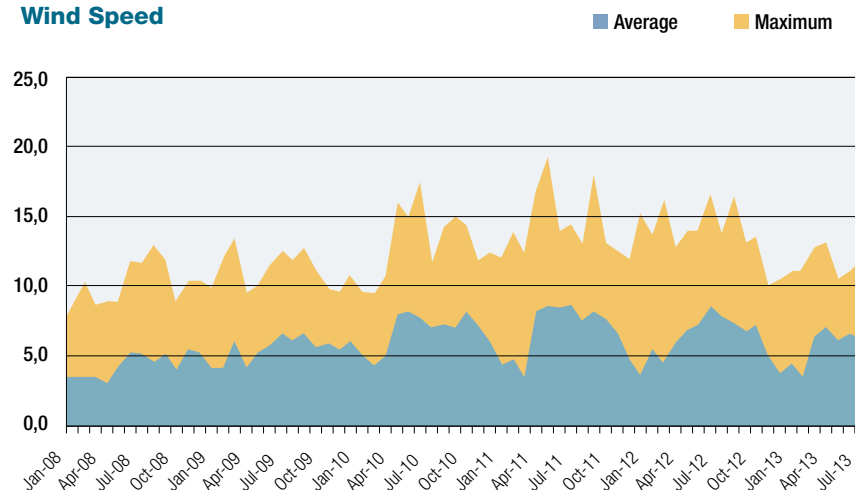


Wind resource

Actual wind conditions during the period 2008-2013 can be seen in the tables and graphs below, from which it shall be highlighted: a) that the period from January to May is the one with the least presence of wind, b) that the year 2008 was extremely low regarding presence of wind, c) that progressively wind conditions are improving increasingly from 2008, which shows a cyclic characteristics to be verified over the coming years.

The accumulated information on wind will provide valuable support for programming the operation in the future, and shall also provide a benchmark for other important projects in the Galapagos.

Wind Speed



Wind Speed (meters / second)

	2008		2009		2010		2011		2012		2013	
	Average (2)	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average (3)	Maximum	Average (3)	Maximum
Jan	3.5	7.9	4.2	10.0	6.1	10.8	6.0	12.4	4.7	12.0	5.1	10.2
Feb	3.5	10.3	4.2	12.2	5.1	9.7	4.5	12.1	3.8	15.2	3.8	10.5
Mar	3.5	8.7	6.1	13.4	4.4	9.6	4.7	13.9	5.5	13.8	4.5	11.2
Apr	3.0	8.9	4.3	9.7	5.0	10.8	3.5	12.5	4.6	16.2	3.5	11.2
May	4.3	8.9	5.3	10.1	8.1	16.0	8.3	16.8	6.1	12.9	6.4	12.8
Jun	5.3	11.8	5.8	11.5	8.2	15.0	8.6	19.3	7.0	14.1	7.1	13.2
Jul	5.2	11.6	6.6	12.6	7.8	17.5	8.6	14.0	7.3	14.1	6.2	10.6
Aug	4.7	13.0	6.3	11.9	7.1	11.8	8.7	14.5	8.6	16.6	6.5	11.2
Sep	5.1	11.9	6.6	12.8	7.3	14.3	7.6	13.1	7.9	13.9	6.2	11.9
Oct	4.1	9.0	5.7	11.2	7.1	15.0	8.2	18.0	7.4	16.4		
Nov	5.5	10.4	5.9	9.9	8.2	14.5	7.7	13.1	6.9	13.2		
Dec	5.3	10.4	5.5	9.7	7.2	11.9	6.7	12.5	7.2	13.6		
Average (1)	4.4		5.5		6.8		6.9		6.4		5.5	

(1) Annual average values are the average of the monthly averages (2) 2008 was an unusual low wind year (3) 2013 values are referred for the January - September period only



Energy production and penetration factor

The amount of energy generated by the wind park in each month depends on the availability of wind and its distribution throughout the day, as well as its matching with

the Island demand. The table and graph below, show the values of produced wind energy, compared with that from diesel generation.

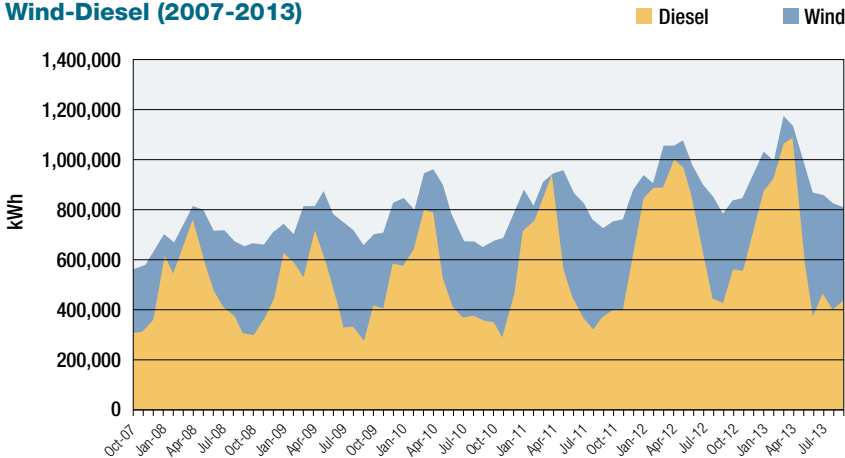
Wind vs. diesel generation (kWh)

Year	Diesel (kWh)	Wind (kWh)	Total (kWh)	Diesel (%)	Wind (%)	TON CO ₂ Avoided	Diesel Saved (Gallons)	Invoicing (USD)
2007	975,858	790,398	1,766,256	55.3%	44.7%	632	68,730	101,329
2008	5,834,693	2,682,461	8,517,153	68.5%	31.5%	2,146	233,257	343,891
2009	5,882,731	3,204,436	9,087,167	64.7%	35.3%	2,564	278,647	410,809
2010	5,919,000	3,434,854	9,353,853	63.3%	36.7%	2,748	298,683	440,348
2011	6,745,046	3,344,625	10,089,672	66.9%	33.1%	2,676	290,837	428,781
2012	8,752,958	2,398,372	11,151,330	78.5%	21.5%	1,919	208,554	307,471
2013	6,229,339	2,453,916	8,683,255	71.7%	28.3%	1,963	213,384	314,592
Total	40,339,624	18,309,062	58,648,686	68.8%	31.2%	14,647	1,592,092	2,347,222

Note: 2007 includes October - December period only

2013 includes Jan - Sep

Wind-Diesel (2007-2013)



The main indicators for the first six years of operation are:

- Wind energy total invoice: 18,309,062 kWh
- Penetration Factor: 31.2% (percentage of displaced diesel power)
- Greater penetration month: August 2011 (58.6% penetration)
- Emissions avoided: 14,647 Ton CO₂
- Fossil Fuel avoided: 1,592,092 gallons of diesel

Clean Development Mechanism

The Clean Development Mechanism (CDM) is one of the flexibility mechanisms defined in the Kyoto Protocol, which allows emission-reduction projects in developing countries to earn Certified Emission Reduction (CER) credits, each equivalent to one tonne of CO₂. These CERs can be traded and sold, and used by industrialized countries to meet a part of their emission reduction targets.

EOLICSA received support from RWE in the development of the project under the CDM. On May 13, 2008, the San Cristóbal wind project was approved as a CDM project by the United Nations Framework Convention on Climate Change (UNFCCC). In its first six years of operation, the project has avoided more than 14,000 tonnes of CO₂ emissions and approx. 1.6 million gallons of diesel were displaced by wind power. Emission reductions and diesel consumption were monitored locally by the plant staff and were verified by an independent entity.



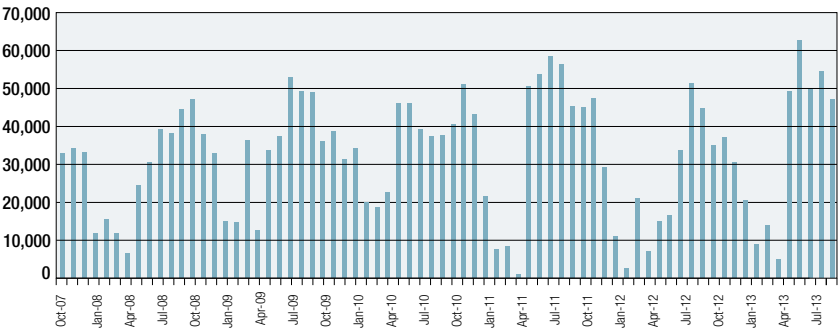
Photovoltaic Production

The two photovoltaic systems donated by GSEP companies have didactic purposes for local staff training in this type of technology. They have a total output of 12.7 kW and are permanently connected at low voltage to the ELECGALAPAGOS S.A. grid.

Period	Control Room (kWh)	School P.P. Andrade (kWh)	Total (kWh)
Oct - Dec, 07	1,572	1,208	2,780
Jan - Dec, 08	7,600	7,157	14,757
Jan - Dec, 09	9,387	6,776	16,163
Jan - Dec, 10	10,373	7,604	17,977
Jan - Dec, 11	10,333	7,522	17,885
Jan - Sep, 12	9,742	7,002	16,744
Jan - Sep, 13	6,930	5,454	12,384
Total (kWh)	55,937	42,723	98,660
Capacity 9kW	7.64	5.1	12.7

During the 6 years of operation, the photovoltaic system has delivered, free of charge, a total of 98,660 kWh to ELECGALAPAGOS S.A..

Invoicing (USD)



Invoicing

The power purchase agreement signed between ELECGALAPAGOS S.A. and EOLICSA establishes the selling price of electricity at USD 0.1282 / kWh, in accordance with the provisions of CONELEC regulations. Therefore, the total energy of 18,309,062 kWh billed during the period, represents a total turnover for the period of six years, of USD 2,347,222.

ELECGALAPAGOS S.A. has honored the payments to EOLICSA in a timely manner, within the terms established in the PPA, which is a positive signal that should build confidence in potential private investors who are interested in developing new renewable energy projects, both in the Galapagos and Ecuador mainland.

Environmental Management Plan (EMP)

The EMP is a component of the Definitive Environmental Impact Assessment (EIAD) which was approved by the Ministry of Environment and CONELEC as a prerequisite for the granting of the Ambient License. The Plan considers the execution of several programs that are strictly conducted by EOLICSA administration.

From these programs, certainly the most outstanding one is the “Petrels Conservation Program”, which involves serious commitment made by the San Cristóbal Wind Project to promote the preservation of this endangered species. Thanks to intensive research carried out prior to the operation of the wind park and based on strict monitoring carried out jointly with the Galapagos National Park, it can be confirmed with satisfaction, that after six years of continuous operation, no petrel specimen has been affected because of the wind park, and on the contrary, as a result of the intensive campaign of pest control and control of invasive species, conducted by EOLICSA and the Galapagos National Park, there are encouraging signals showing the increase of this bird population.

On an annual basis the Internal Environmental Audit is being submitted to CONELEC and the Ministry of Environment, receiving every time positive approvals.



A message from the Project Manager

It has my great pleasure to be a participant on the San Cristóbal Wind Project Team. The many years of study in the development phase and careful planning of the project logistics, allowed the project to be constructed on schedule with the highest standards of health, safety, and environmental management. Industry best practices were continued into the operational phase of the Project. Operation and Maintenance (O&M) of the project is managed by local EOLICSA staff with support from our partner ELECGALAPAGOS S.A., and under the dedicated guidance of Luis Vintimilla.

During the operational phase of the project, the wind turbine generators have achieved an availability of 93%. This has been a remarkable achievement considering the project's remote location and need to change wind turbine output frequently to match the island's grid demand. A 93% availability value is comparable to the performance of well-managed large-scale, utility connected wind farms around the world.

The Project is structured to allow for greater sustainability given that the available wind energy in the evenings often exceeds grid demand during the night-time hours when people sleep. It is my hope that EEPG and other agencies can introduce follow-on programs tied to the San Cristóbal Wind Project, such as hybrid electric vehicles, potable water production, and energy storage. Such projects could take advantage of the "excess energy" available at night. Such follow-on programs could significantly enhance the sustainability of the island infrastructure and do so on an economical basis.

The San Cristóbal Wind Project was a project of a lifetime for me personally. I was able to bring my family along with me to see the wind farm under construction and visit Galapagos and the Ecuadorian mainland. Professionally, it increased my ability to plan and manage renewable energy projects. I will also be grateful for my opportunity to help bring wind energy to San Cristóbal and work together with my project team partners.



Jim Tolan

Message from United Nations Office for Partnerships

Developing, financing, operating and managing a high-penetration, wind-diesel hybrid system in such a remote location on a sustainable, commercial basis is a technically complex endeavor that requires leading industry know-how and a long-term commitment. In this regard, the San Cristóbal Wind Project was exceptional in terms of its innovation and the experience and professionalism of the project management team working under AEP and GSEP (formerly the e8). From start to finish, the project was managed more like a traditional commercial power generation project than a non-profit venture always with an eye on mitigating risks while ensuring sustainability. It represents 'best practice' for the development, finance, operations and maintenance of a remote, off-grid renewable energy system.



Will Kennedy

Senior Programme Officer



Message from ELECGALAPAGOS S.A. Executive President

We, the officials, employees and workers of ELECGALÁPAGOS S.A. are aware of the responsibility for sharing with the San Cristobal Wind Company - EOLICSA the operation and maintenance of the San Cristobal Wind Project, one of the world's largest wind-diesel hybrid electricity generating systems, which has 6 years of successful operation for the benefit of Galapagos Islands community and in particular the San Cristobal Island. From the beginning of the project, our staff has been working and training in joint management with the staff of EOLICSA, and has been imbued with a culture of teamwork, with innovation and enthusiasm, and particularly with a deep commitment to respect and protect the environment as usual in our company.

The team shall be the responsible core for management of all renewable energy projects in the Galapagos Islands, taking advantage of the optimal experience that has been accumulated during the operation of the San Cristobal Wind Project, which will benefit the community served by our company.

At the completion of 6 years of operation of this project, we take this opportunity to thank and congratulate Global Sustainable Electricity Partnership (GSEP), as well as senior management and officials of EOLICSA for the important contribution they have given to the Galapagos Islands through this project.

Ing. Marco Salao Bravo

ELECGALAPAGOS S.A. Executive President

Message from Fondos Pichincha

Fondos Pichincha was selected to act as the Trustee of the San Cristóbal Wind Project Trust, the entity through which the works for the Wind Project were carried out. The Trust is currently the main shareholder of the San Cristóbal Wind Company - EOLICSA. Through this participation, we have become privileged actors in the management of this project that structured its financing scheme with an innovative public-private partnership with national and foreign participants, and which yielded successful results, thanks to the high professionalism and dedication of its principal leaders, the members of Global Sustainable Electricity Partnership (GSEP), and especially thanks to the project directors and managers, Paul Loeffelman, Hans-George Adam, Luis C. Vintimilla and Jim Tolan.

Upon completion of 6 years of project operation it is appropriate to emphasize that this project is working in stable operating conditions and we are absolutely confident that it will continue on this way, thanks to the vision and responsibility impressed by its sponsors.

Ms. Marcia Cardenas

Legal Representative

Fondos Pichincha



Message from United Nations Foundation

The world needs a clean energy revolution, both to meet the energy needs of the 1.3 billion people around the globe who still don't have access to electricity, and to avoid catastrophic climate change. Neither the public nor the private sector alone can bring about this revolution – only if the private sector uses the power of markets and innovation, and if the public sector incentivizes and leverages large-scale private investments in clean energy, will we bring about the change we need. The Galapagos Wind Project, which the United Nations Foundation helped support, illustrates how public and private entities can work with civil society to build and operate a successful clean energy project, even under the most challenging conditions. The UN Secretary-General's initiative on Sustainable Energy for All aims to encourage hundreds of such public-private partnerships in order to achieve universal energy access, to double the global rate of energy efficiency improvement, and to double the use of renewables in the global energy mix. The Global Sustainable Electricity Partnership deserves much credit for its participation and leadership.



Reid Detchon

Vice President, Energy and Climate

Message from the Mayor of San Cristóbal

It is a great pleasure for the people of San Cristobal island, Galapagos, to have the first wind farm in operation in Ecuador, making us the pioneers of renewable energy nationwide. The Municipality of San Cristóbal hosted, sponsored and provided support for this project from its conception by Global Electricity Partnership (GSEP), since it is a unique reference worldwide for its goal of reducing consumption of fossil fuels for electricity generation in this natural heritage, for the benefit of the ecosystem and the island population in general and especially the San Cristobal community.

After these first 6 years of operation, the San Cristobal Wind Project has become also an obligatory point of visiting domestic and foreign tourists, resulting in permanent benefit to this activity promoted by our Municipality.

We are firmly convinced that this clean energy source will continue providing a high quality electricity service to our population, the main goal of all these initiatives.

Lcdo. Pedro Zapata R.

Mayor of San Cristobal



Message from United Nations Development Program

I am very pleased that the San Cristobal Wind Project has completed its first six year milestone successfully. This achievement is a very powerful motivation to all the members of the team that is currently working to bring to life the Archipelagos' second Wind project on Baltra and Santa Cruz islands.

The Republic of Ecuador started working on a renewable energy future for the Galapagos Islands decades ago and UNDP is glad to have been part of that endeavor together with such committed partners as GSEP and other members of the international team that helped build the first wind project in San Cristobal Island.

The San Cristobal Wind Project blazed a new path for us and made it easier to address technical, environmental, financial and public policy issues in ongoing and future projects. We have no doubt that the San Cristobal Wind Project will continue to exceed our expectations as a symbol of sustainable energy generation for human development in Galapagos and the whole country.

Mr. Diego Zorrilla

Resident Representative UNDP – Ecuador



Message from RWE CDM Project Coordinator

A strong environmental benefit of the Galapagos San Cristóbal Wind Project is the reduction of greenhouse gas emissions. The wind turbines on San Cristóbal generate electricity-free of CO₂ emissions by displacing fossil fuel which otherwise would have been consumed by diesel generators. EOLICSA and RWE decided to develop the project under the Clean Development Mechanism and to earn certified emission reductions (CERs). From its commissioning in October 2007 until May 2012, the San Cristóbal Wind Project has verifiably avoided 11,111 tonnes of CO₂ emissions, earning 970 VERs (issued by the Voluntary Carbon Standard) and 10,141 CERs (issued by the United Nations). In this manner, the project contributes to combating global climate change. The commercialization of these carbon credits through an Emission Reduction Purchase Agreement with RWE generated additional revenues and enhanced the economic sustainability of the San Cristóbal wind project. May this project continue to be a showpiece for effectively reducing greenhouse gas emissions.



Uwe Mades

CDM Project Coordinator Latin America



Message from Petrels Committee

When the Wind Project began to generate electricity in 2007, we knew that GSEP, as the Project sponsor, had followed through on its commitments to design and construct the project with all of the environmental safeguards recommended by the Galapagos Petrels Committee, which was created to preserve this endangered bird from the risk of eventual injuries from the wind mills. During the first 6 years of operation, the Committee has been active and in close interaction with EOLICSA and the Galapagos National Park, which have been responsible for managing the preservation of petrels, as established in the Environmental Management Plan. We are very pleased that our collective goal of zero harm to the endangered Galapagos Petrel by the Project has been achieved, since, to date, no injured petrel has been reported because of wind turbines operation; on the contrary, the actions taken against predators and invasive species, predict an improvement in the population of this bird in the highlands of San Cristobal island.

We applaud GSEP's as well as local company EOLICSA willingness to share the environmental design safeguards and best practices so transparently with policymakers, communities and other project developers in Ecuador and around the world. With this opportunity we commit ourselves to continue providing our support as required.

Dr. Tjitte de Vries

Member of the Petrels Committee



Message from EOLICSA General Manager

The General Manager and staff of Eólica San Cristóbal S.A. - EOLICSA are very pleased to celebrate the 6th anniversary of the San Cristobal Wind Project. The project goals have been fulfilled, by reducing the fossil fuel consumption in the Galapagos Islands. During this period of operation a total of 18 million kWh of clean energy has been produced, equivalent to 32% of the San Cristobal Island demand. This equates to 1.6 million gallons of diesel that have not been transported and burned and the equivalent of 15,000 tons of CO2 was not emitted into the atmosphere. Those are very important achievements in favor of the fragile ecosystem of the Galapagos Islands, a Natural World Heritage.

One of our priorities is the strict compliance of the Environmental Management Plan approved by the Ministry of Environment and CONELEC. This plan focuses on the preservation of the endangered bird, the Galapagos petrel, for which EOLICSA received the permanent support of the Galapagos National Park. The results are outstanding, since after 6 years of operation no petrels have been injured because of the wind turbines.

The staff of ELECGALÁPAGOS S.A. are closely involved with EOLICSA staff and are trained in the operation and maintenance of the project facilities. It ensures the existence of a highly qualified professional team to take over the operation of this project and other renewable energy facilities to be in operation in the near future on the Galapagos Islands.

We take this opportunity after 6 years of operation to thank the public and private agencies and companies and, in particular, to the community of San Cristobal Island for their permanent and unconditional support to our project.

Ing. Luis C. Vintimilla C.

General Manager

Eólica San Cristobal S.A. - EOLICSA



Concluding Message from Project Leader

Commitment. Pride. Teamwork.

These important values are conveyed in our partners' messages we asked them to share about their project on San Cristóbal Island in the Archipelago and were essential to the success of this project. They will be prerequisites to accelerate the development of more power projects and avoid worldwide production shortages that are forecasted by the International Energy Agency.

We followed the practice in Ecuador and presented a bronze medallion to all those many persons who helped complete the Project. It has a meaning far beyond the Islands and Ecuador's borders. It symbolizes the desire of people in the world that electricity will be accessible to them too.

And they expect to have access to it sooner than later.

And as experience shows, once they have it, whether they run a business or a household, they'll only be satisfied if it is available anytime, as they demand it, at an affordable cost. They will quickly learn that electricity greatly contributes to their personal well-being, economic productivity and new employment.

Our partners were bold, innovative leaders who took calculated risks to become true pioneers, qualities that should provide inspirational guidance to public and private sector partnerships throughout the world to overcome challenges that would normally defeat such projects. Governments and private sector developers want projects that are successful, but historically, the commercial reality is that only a small number successfully pass all the way through development and construction phases.

A willingness by the local community and national government to try new, different approaches for introducing renewable energy and reducing diesel oil spill risks on San Cristóbal was important to the project's success. Although we had been invited by the United Nations to develop renewable electricity on the island, our GSEP team faced

skeptics jaundiced by unfulfilled promises from project developers before us, questions about the longevity of wind turbine machines, anxiety over the environmental impacts of wind technology new to the islands, fear of unaffordable electricity prices, and concerns about reliability.

They became strong advocates, passionately embracing night-time bird tracking technology and scientific methodologies that assured them the endangered petrel flew low and to the right of the project location on the hill, so the wind turbines could be safely located outside of their observed flight patterns. They agreed not to rely on lead acid batteries for traditional back up power and approved wind turbines with a wide operating range and the conversion of diesel generators to automatically adjust to changing wind conditions. They learned how to operate the computerized system and to adapt mountain climbing skills to maintain the turbines. They established new policies to enable renewable power to be deployed and endorsed a new electricity price tariff not from theoretical formulas, but based on costs to generate power with the local wind resource. Residents and businesses confidently count on using electricity from the hybrid system whenever they need it.

The financially and environmentally sustainable Galapagos San Cristóbal Wind Project demonstrates that it is possible for electricity to be accessible to all people on this planet, if they carefully and thoughtfully use their available resources and develop effective public policies to facilitate their efforts.

Congratulations to all of the partners for bringing a vision to life for Ecuador and the rest of the world.



Paul Loeffelman

American Electric Power



About the Global Sustainable Electricity Partnership

The Global Sustainable Electricity Partnership, is a non-profit international organization, composed of the world's leading electricity companies, whose mission is to play an active role in global electricity issues within the international framework and to promote sustainable energy development through electricity sector projects and human capacity building activities in developing and emerging nations worldwide. The organization, in partnership with UN agencies, key international organizations and local partners, contributes to enhancing access to energy for some of the 1.4 billion people around the world still without access to this essential resource.

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