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CERRO DE HULA WIND PROJECT – HONDURAS

Figure 01: Section of the wind farm in its context.
Source: EEHSA

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Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective project design or implementation.

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1. PROJECT DESCRIPTION & LOCATION

The Cerro de Hula Wind Farm is located 24 km south of Tegucigalpa —the capital of Honduras— between the municipalities of Santa Ana and San Buenaventura in the Francisco Morazán department. The project is set on the hill of Hula and the Izopo mountain at a height that ranges from 1,324 to 1,730 meters above sea level. This 126 MW wind farm was built in two phases, the first one which started in 2011 with the operation of 51 Gamesa G87 wind turbines, and the second which started its construction in 2013 adding 12 wind turbines —seven Gamesa G97 turbines and five Gamesa G87S turbines— to the wind farm's total capacity. The owner and operator of this project is the Honduran company Energía Eólica de Honduras S.A. de C.V. (EEHSA), a subsidiary of Globeleq Mesoamerica Energy owned by Globeleq Generation Ltd., an experienced operating power company that develops energy solutions for emerging markets.

Globeleq Mesoamerica Energy was founded in 2004 by Mesoamerica Group —a private equity fund, an investment bank, and strategic consulting group— as a private equity vehicle for investing in renewable energy projects in Central America. That same year, Globeleq Mesoamerica Energy completed its first transaction by acquiring a 23 MW operating wind farm in Costa Rica. After that, the development team of the company evaluated several potential projects, among which the Cerro de Hula wind farm —the region's largest wind project— was conceived. The process of finding the ideal site for the construction of the project and acquiring it was a long one as EEHSA had to acquire 170 different properties that it later turned into a single 365 hectares site, of which only 40 hectares were used for the construction of the wind farm. The construction of the first phase of this project began in January 2011 and was already in operation by February 2012, while the construction of the second phase began in March 2013 and started operating already by November of the same year.

The total investment made by the owner of the project for both of its phases was of around US$290 million dollars, which they plan to have in return by the end of the 20-year contract. This contract was made with the federal government to supply them with energy and will save the Honduran government up to US$40 million dollars during that time. Before the construction of this wind farm —first of its kind not only in the country but in the region— Honduran government energy creation relied almost entirely on the energy produced in thermal power stations. The Cerro de Hula project is therefore not only at the forefront of the production of clean energy in Honduras, but also will help diversify the country's energy matrix and increase therefore its resilience. All the energy being produced by the wind farm is being sold through a 20-year contract to the Empresa Nacional de Energía Eléctrica (ENEE), a government owned company administering the national supply of electric power. At its full capacity, the project will

produce 360 GWh every year, enough energy to cover the energy demands of approximately 150,000 homes with clean and renewable energy, around a 6% of the total amount of energy consumed in Honduras before the construction of the Cerro de Hula wind farm. By providing only clean energy, the project will help reduce the country's dependence on fossil fuels and avoid the creation of 280,000 tons per year of carbon emissions. The companies in charge of construction of the project were Globeleq Mesoamerica Energy together with the Spanish Gamesa and with the Mexican branch of Iberdrola. The Cerro de Hula wind farm is also helping to mitigate climate change through the Kyoto Protocol and the Clean Development Mechanism, with annual average emission reductions of 280,000 tons of greenhouse gasses.

2. APPLICATION OF THE ENVISION RATING SYSTEM

The Envision™ system is a set of guidelines that aid in optimizing the sustainability of an infrastructure project during the planning and preliminary design phases, as well as a means to quantify the relative sustainability of the project. In this case study, the infrastructure to be assessed is the Cerro de Hula wind farm located 24 km south of Tegucigalpa, the capital of Honduras. Envision consists of 60 credits grouped into five categories: Quality of Life, Leadership, Resource Allocation, Natural World, and Climate and Risk. Each credit pertains to a specific indicator of sustainability such as reducing energy use, preserving natural habitat, or reducing greenhouse gas emissions. Those credits are rated on a five-point scale referred to as a 'level of achievement': 'improved', 'enhanced', 'superior', 'conserving', and 'restorative'. Evaluation criteria are provided to determine if the qualifications for each level of achievement have been met for a particular credit. In each of the five categories there is a specific credit called "Innovate or exceed credit requirements". This is an opportunity to reward exceptional performance that applies innovative methods within the subjects that Envision evaluates.

The criteria for the levels of achievement vary from credit to credit, but generally an 'Improved' level of achievement is awarded for performance that slightly exceeds regulatory requirements. 'Enhanced' and 'Superior' levels indicate additional gradual improvement, while 'Conserving' often indicates performance that achieves a net-zero or neutral impact. 'Restorative' is the highest level and is typically reserved for projects that produce an overall net positive impact. The Envision system weighs the relative value of each credit and level of achievement by assigning points. Credit criteria are documented in the Envision Guidance Manual, which is available to the public on the ISI[1] and Zofnass Program[2] websites.

[1] www.sustainableinfrastructure.org
[2] www.zofnass.org

3. QUALITY OF LIFE CATEGORY

Envision's first category, Quality of Life, pertains to potential project impacts on surrounding communities and their respective wellbeing. More specifically, it distinguishes infrastructure projects that are in line with community goals, clearly established as parts of existing community networks, as well as consider the long-term community benefits and aspirations. Quality of Life incorporates guidance related to community capacity building and promotes infrastructure users and local members as important stakeholders in the decision making process. The category is further divided into three sub-categories: Purpose, Wellbeing, and Community.

Purpose

Since its early stages, the project's purpose has been to improve the quality of life of surrounding communities, not only by satisfying the growing demand of electricity in the country, but also by contributing to local economies and improving the natural environment. The involvement of the project team in different social development initiatives and the organization of different information sessions with members of the different communities have been instrumental to being successful. In several meetings and public interviews the project team consulted the members of the community about their most urgent needs and expectations from the project[3]; as a result of the public consultation, the project team developed a list of measures to try and find a solution to community needs and issues that range from public infrastructure, health, education, and natural environment.

Some of the social development plans that the wind farm's team has been involved in include supporting local hospitals and schools, donating street lighting to the municipalities of Santa Ana and San Buenaventura, and electrifying remote communities. The project team also planned to train and improve the skills of the population, creating jobs[4]. In order to make sure these measures are implemented, the project team allegedly donated around US$580,000 dollars in the year 2014 and expects to donate an additional US$300,000 by the end of 2015. Another important aspect of this plan was to make sure that the normal lives of members of the community would not be disturbed by the construction and operation of the wind farm. This is the reason why the project team implemented an open-doors policy to stay in contact with the surrounding community[5].

[3] Energía Eólica de Honduras, *Proyecto Eólico Cerro de Hula: Acuerdo de Vecinos* (Honduras: EEHSA, 2010, 2013), 1-11.

[4] Energía Eólica de Honduras, *Proyecto Eólico Cerro de Hula: Plan de Desarrollo Comunitario* (Honduras: EEHSA, 2011), 10-12.

[5] Alana Paul, *Procedimiento de Resolución de Inconformidades* (Honduras: EEHSA, 2011), 3-11

Overall, the programs implemented by the project team consider the participation of the surrounding communities and the improvement of their skills and knowledge. With community development programs, the project team has set a mission to not only help improve the infrastructure and built environment in which the community members of Santa Ana and San Buenaventura live in, but to also to try and have a long-lasting impact on the population's personal assets. Part of these plans is to generate new employment opportunities around the area by hiring members of the community during the construction phase of the project and to also train them to improve their skills. Arguably the most successful plan implemented by the wind farm team was the project to help 220 of the local inhabitants with the process to obtain titles of each of their individual properties by inscribing them to the National Institute of Property.

Community

The wellbeing of the community has been a main concern of the project team since the conception of the wind farm. This is shown in different documents that proved their interest not only with the implementation of plans and programs required to them by law, but also with the identification of additional risks and/or discomforts caused by the construction and operation of the plant. In order to do this, project team members identified all potential situations derived from the operation of the wind farm that might put in risk the physical and mental health of the inhabitants of the surrounding communities, describing them and giving possible solutions[6].

One of the issues the team paid close attention to was the minimization of noise and vibration caused by the operation of the wind turbines. In order to understand whether the change in the levels of noise and vibration had changed drastically by the operation of the turbines, the project team studied those levels prior to the construction of the wind farm[7]. By comparing these levels to typical international norms[8], the project team was able to evaluate the state of noise and vibration and was able to respond with more accuracy to 12 cases of families complaining about the increase of those levels since the operation of the wind farm started. The complaints about noise and vibration were diverse and thus the responses ranged from the reparation of the structure of certain roofs, to the entire reconstruction of certain houses that could not be repaired as such. The project team also developed monitoring programs to make

6 Luis Rivera, *Identificación de Peligros, Evaluación de Riesgos y Determinación de Controles* (Honduras: EEHSA, 2013), 3-15.

7 Energía Eólica de Honduras, *Expansion of the Cerro de Hula Wind Plant: Exhibit B-11, Owner's EHS Requirements* (Honduras: EEHSA), 5.

8 Scarleth Núñez, *Evaluación de Emisión de Ruido al Ambiente General* (Honduras: EEHSA, 2012), 1-32.

sure the noise was reduced after the reparation works[9]. The wind farm's team also supported several communities around the site by improving some road's conditions and drainage systems.

In terms of access improvement to transportation hubs from the wind farm and the mobility of the community around it, there is room for improvement. More coordination with adjacent transportation nodes and/or local authorities in order to improve mobility around the premises of the project could be developed. In terms of ease of wayfinding inside and outside the wind farm, the project team recognized the importance of temporary and permanent signage for the orderly access and egress of workers to and from the wind farm not only during the construction phase, but also during its operation[10].

Wellbeing

Even though no archaeological remains were found during the construction process of the wind farm, the project team prepared a document in the case a historic or cultural finding would occur. This document outlined what the procedures would be for their preservation. This document also explains the different steps that contractors would need to follow including the implementation of a monitoring plan for the archaeological works, during which all construction work would be stopped, and for which a document listing all found resources would be made. All of this would be done under the recommendation of an accredited archaeologist[11]. The municipalities of Santa Ana, San Buenaventura —the area where the wind farm is located— are mostly composed of large, open green spaces with very few man-made structures. Therefore, in order to preserve the views and local character of the areas, the project team in conjunction with the Ministry of Natural and Environmental Resources (SERNA, for its name in Spanish) created a 10:1 reforestation plan agreeing to plant 10 trees for every one tree the contractor cut down during construction. The purpose of this plan, according to the reforestation plan document, was to enhance the "scenic beauty and forest density" of the greenfields inside and around the site of the project[12]. The selection of the areas to be reforested was made by taking into consideration the proposals of different community members, such as environmental coordinators, community organizations, and landowners[13]. Among the plans to enhance the existing public spaces around the wind farm was that of

9 Energía Eólica de Honduras, *Plan de Mitigación de Sonido: Fase III* (Honduras: EEHSA, 2013), 2-21.

10 Energía Eólica de Honduras, *Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement* (Honduras: EEHSA), 22-23.

11 *Carol D. Zelaya, Plan de Recursos Culturales (Honduras: EEHSA, 2013), 1-5.*

12 Rudy Hernández, *Plan de Reforestación* (Honduras: EEHSA, 2014), 7.

13 Rudy S. Hernandez, *Informe Anual de Avance en el Cumplimiento de Medida de Compensación Forestal 10:1, Etapa 2013* (Honduras: EEHSA, 2013), 5.

donating lighting fixtures to different villages and the renovation of a number of churches and school in the surrounding communities[14].

4. LEADERSHIP CATEGORY

Leadership evaluates project team initiatives that establish communication and collaboration strategies early on, with the ultimate objective of achieving sustainable performance. Envision rewards stakeholder engagement as well as encompassing a holistic long-term view of the project's life-cycle. Leadership is distributed into three sub-categories: Collaboration, Management, and Planning.

Collaboration

It was evident due to the large amount of documents provided by the project team that there was a meaningful commitment to the principles of sustainability in all the activities surrounding the design, construction, and operation of the wind farm. Demonstration of this commitment included several types of programs such as reforestations plans, programs to avoid the pollution of the air, the soil, and the water —before, during, and after the construction of the project— trash recycling, and rational use of resources programs[15]. Thus, the project established a sustainability management system that could manage the scope, scale, and complexity of these numerous plans and programs in order to improve its sustainability performance.

The wind farm management plan contains information on processes and management controls to monitor sustainability aspects of the project during its construction and also during its operation. The plan establishes the operators and contractors' obligation to produce frequent reports in order to achieve and maintain the project's sustainable goals. It also labors to make sure the roles and responsibilities of management aspects of sustainability are well defined in an organizational chart[16]. An essential part of the success of these programs was the close collaboration that existed throughout the entire design and construction process between the project team and the contractors. This relation was established through a document created by the project owner addressing the contractor's responsibility, both as a team and individually. These responsibilities ranged from environmental, health and safety issues, to making an adequate use of resources and the fulfillment of a code of conduct[17]. The team also formed a

[14] Energía Eólica de Honduras, *Proyecto Eólico Cerro de Hula: Plan de Desarrollo Comunitario* (Honduras: EEHSA, 2011), 7-9

[15] Energía Eólica de Honduras, *Objetivos, Metas y Programas (Ambiente)* (Honduras: EEHSA, 2013), 1-9.

[16] Scarleth Núñez, *Informe del Cumplimiento de Medidas Ambientales ICMA* (Honduras: EEHSA), 1-49.

[17] Energía Eólica de Honduras, *Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement, Exhibit B11* (Honduras: EEHSA), 1-11.

close bond with the communities that were located in the area before the project was built. This includes local authorities, people who work, and people who attend schools and hospitals nearby.

There were different plans and programs through which the project team involved all possible stakeholders during the processes of designing and constructing the wind farm. These plans ranged from the distribution of informative pamphlets and posters, to the organization of public councils with the community. One member from each community was chosen to voice the needs of the community at large and be the direct link between the community and the wind farm team[18]. Although efforts were made to involve stakeholders, efforts were insufficient as they involved the community in a superficial way and at a point when decisions about design and planning of the wind farm were already made. Thus, the involvement of stakeholders in this case was merely informative as opposed to a relationship where the community at large is engaged and has an input in the decision making process of the project.

Management

Managing and understanding the project as a whole is crucial when designing, building, and operating at the scale of the Cerro de Hula wind farm in Honduras. In order to do this and to achieve sustainability goals, the project requires a broad understanding of the systems that compose it and of those that are close enough to become part of one larger infrastructure system. In this area the project leaves room for improvement to create a more synergistic approach. The project team proved to be concerned with the reuse of resources and materials during its construction and operation[19], but no plan was actually implemented where they identified nearby facilities whose unwanted by-product supplies the wind farm could be reused for the maintenance of the built works as well as for the operation of the project.

The integration of the project with the existing infrastructure systems around the wind farm was also crucial in order to achieve all the sustainable goals that the project team set to itself. It is important that this new infrastructure element being placed in this setting would be linked to, supported by, and act harmoniously with other infrastructure elements. The fact that wind farms occupy small portions of land where they are located and are in most cases set in very open natural landscapes makes them easy to be integrated to the existing infrastructure elements in the surroundings. In this case, for example, the Cerro de Hula is well connected to all existing main roads, specifying the design parameters for the intersections between internal roads and main public roads in order to comply with the requirements set by the Honduran

[18] Energía Eólica de Honduras, *Proyecto Eólico Cerro de Hula: Acuerdo de Vecinos* (Honduras: EEHSA, 2010, 2013), 1-6.

[19] Scarleth Núñez, *Manejo de Residuos No Peligrosos* (Honduras: EEHSA, 2014), 4-10.

Ministry of Public Works, Transportation, and Housing (SOPTRAVI)[20]. The project team also gave priority to the repair of several roads and of the footpaths and drainage systems that accompany the road infrastructure around the wind farm. The goal of these repairs were to facilitate the correct flow of people, goods, and services to and from the wind farm.

Planning

Designing a project keeping with its operation monitoring and maintenance in the long-term in mind is another way the project team could achieve and maintain their sustainability goals. The project team built a working plan for the yearly maintenance and monitoring of the wind farm[21], which was confirmed by the signing of the neighbors' agreement with the surrounding communities. Through this document, the project owners agreed on holding two-month maintenance periods every year and to commit to keeping the population around the wind farm informed of any work activities[22].

A parallel plan to measure and follow-up the original sustainability goals of the project was also developed[23]. Yet, the personnel or resources that will occupy that role have not been identified yet. Other important aspects to understand and take into account for projects of this magnitude are the environmental and urbanization growing trends. Even if the Cerro de Hula wind farm is now set in a non-urban environment, the project team should have taken into account the potential future growing trends of the area and how these could affect the operation of the project.

Planning not only within the project team, but also in collaboration with local authorities, is of great importance in order to assess if laws, regulations, or policies unintentionally go against the sustainability principles being implemented by the project team. Unfortunately, the Cerro de Hula project team did not work with officials to identify and address any kind of legislation that might stop the project from achieving its sustainability goals.

5. RESOURCE ALLOCATION CATEGORY

Resource allocation deals with material, energy, and water requirements during the construction and operation phases of infrastructure projects. The quantity and source of these elements, as well as their impact on overall sustainability, is investigated throughout this

[20] Energía Eólica de Honduras, *Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement, Exhibit A7* (Honduras: EEHSA), 21.

[21] Carol D. Zelaya, *Plan de Gestión Ambiental* (Honduras: Iberdrola, 2014), 10-11.

[22] Carol D. Zelaya, *Plan de Gestión Ambiental* (Honduras: Iberdrola, 2014), 10-11.

[23] Energía Eólica de Honduras, *Parque Eólico Cerro de Hula: Plan de Mantenimiento Principal 2014* (Honduras: EEHSA, 2014), 1-13.

section of the Envision rating system. Envision guides teams to choose less toxic materials and promotes renewable energy resources. Resource Allocation is divided into three subcategories: Materials, Energy, and Water.

Materials

The minimization of the total amount of materials used in the construction, operation, and maintenance is also a fundamental aspect to the sustainability of a project. Minimizing the use of materials during these three phases of the project helps in reducing the amount of natural resources being extracted and processed as well as the energy being used to transport them. The evidence shows concrete as one of the well-thought out selected materials[24]. By investing in a better quality of materials and resources in the construction phase, the project team helped in reducing the amount of materials and resources that could potentially be consumed over the life of the project and thus reducing the net embodied energy of the materials over the project life. In terms of the future de-constructibility and recycling of the wind farm at the end of its productive life, the project team may consider making an inventory to identify the materials that could potentially be disassembled and reused in the future.

Even though the importance of the rational use of materials during the construction and maintenance phases was stressed by the project team[25], they did not stress the importance of the adequate extraction, manufacture, and transportation of the materials to the wind farm. Obtaining materials and equipment from companies or individuals that implement the aforementioned sustainable procurement practices is also an important component to take into consideration. In this regard, the project team did establish that all soil materials were sourced from reputable suppliers with valid licenses as a responsibility of the contractor[26]. It is not clear whether these type of suppliers were given preference over those who do not implement sustainable practices. Nevertheless, the project team did prove to have provided its material suppliers with a document delineating an environmental management plan[27]. In this document the team identified the policies to be taught to the contractors and suppliers and that would be followed while working in the site.

In terms of the reduction virgin materials used during construction and the reuse of useful materials, the project team left room for improvement. This is because the percentage of

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24 Energía Eólica de Honduras, *Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement, Exhibit A7* (Honduras: EEHSA), 18-19.

25 Scarleth Núñez, *Uso Racional de Recursos y su Conservación* (Honduras: EEHSA, 2013), 1-9.

26 Energía Eólica de Honduras, *Owner's EHS Requirements, Exhibit B-11* (Honduras: EEHSA), 6.

27 Carol D. Zelaya, *Plan de Gestión Ambiental* (Honduras: Iberdrola, 2014), 9.

recycled material does not reach 20% of the total volume of materials used[28], which is the Envision threshold. As mentioned before, the transportation of materials to the construction site of any project should be of great concern to the project team and contractors since transportation is a major consumer of fossil fuels and the source of greenhouse emissions and other pollutants. Given the Cerro de Hula wind farm's remote location in relation to the closest urban centers, the project team with the contractor created, operated, and shut down their own material extraction site and concrete plant to harvest soil, aggregate, cement and other local materials during the construction phase[29.] In terms of the amount of excavated materials retained on site, a quantity was not specified by the project team - although they did set the guidelines for the use of certain excavated materials for electrical ductwork and drainage pipes.

In terms of maximization of opportunities for reuse and recycle of waste generated inside the wind farm during its construction, there is also room for improvement. Although the project team did not create a management plan or identify potential sources and destinations for the recycling of materials, they did address the requirements for the management of what they call dangerous and non-dangerous materials and their possible reuse in the wind farm[30 31.]

Energy

One of the project team's concerns from the early stages of the design was certainly reducing overall energy use. This includes construction and operation phases of the wind farm, particularly the energy generated by non-renewable fossil fuel sources. In order to achieve this goal, the project team planned to monitor the performance of the wind farm's energy systems periodically[32]. This task was designated to a member of their own team as opposed to a third-party supervisor[33]. Unfortunately, the project team has not assessed whether these measures had an actual impact on energy consumption levels, and thus has left room for improvement.

Apart from reducing the overall energy use of the wind farm, it's important for project teams to consider meeting the project's energy needs through renewable energy sources. In this regard, none of the energy used for the operation of the project is being provided by renewable energy sources. However, according to the project team, it is expected that by the end of 2014 the project's energy needs for its operation will be met by using the energy produced from one 2

28 Scarleth Núñez, *Uso Racional de Recursos y su Conservación* (Honduras: EEHSA, 2013), 3-6.

29 Carol D. Zelaya, *Plan de Gestión Ambiental* (Honduras: Iberdrola, 2014), 6.

30 Scarleth Núñez, *Manejo de Residuos Peligrosos* (Honduras: EEHSA, 2013), 9-10.

31 Scarleth Núñez, *Manejo de Residuos No Peligrosos* (Honduras: EEHSA, 2013), 10-11.

32 Scarleth Núñez, *Informe de Cumplimiento de Medidas Ambientales ICMA* (Honduras: EEHSA), 46-49.

33 Carol D. Zelaya, *Plan de Gestión Ambiental* (Honduras: Iberdrola, 2014), 5.

MW turbine of the wind farm (although they did not mention whether the entire energy needs of the project would be covered in this way). Even though it is not clear when and how this plan will be implemented, the project is already counterbalancing this issue with the considerably larger amount of renewable energy being produced by the wind farm and provided to the Honduran national grid[34].

Water

Due to the scarcity of resources, specifically lack of water around the wind farm, it is critical that infrastructure projects of the scale and nature of the Cerro de Hula wind farm reduce their overall water use, particularly the use of potable water. The rational use of water, both during the construction and operation phases of the wind farm, were issues that the wind farm team considered when designing the project. According to the project team, there is no superficial fresh water available in the area around the wind farm, reason for which the project owner decided to drill deep water wells in order to obtain fresh water for the construction and operation of the project. These deep-water wells would not only comply with national legislations and regulations, but their use and performance would also need to be monitored to meet the sustainability goals of the project[35]. Even though there are no fresh water reservoirs around the premises of the wind farm, the project team proposed to implement a number of measures in order to avoid polluting the fresh water reservoirs that could potentially exist close to the wind farm.

They have also been putting into practice different methods to treat grey and recycled water for its reuse in all the activities that take place during the operation of the project. The project team also took into consideration the waste and residues that could potentially pollute the immediate environment or any kind of freshwater reservoirs[36]. The reduction in the consumption of potable water is crucial to the overall reduction of water during operation and was addressed by the project team. It is crucial for the project team to constantly monitor the water systems in order to make sure the sustainability goals of the project are achieved.

6. NATURAL WORLD CATEGORY

Natural World focuses on how infrastructure projects may impact natural systems and promotes opportunities for positive synergistic effects. Envision encourages strategies for conservation and distinguishes projects with a focus on enhancing surrounding natural systems.

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34 United Nations Framework Convention on Climate Change, *Project Design Document Form for CDM Project Activities* (United Nations Clean Development Mechanism, 2012), 1.

35 Scarleth Núñez, *Uso Racional de Recursos y su Conservación* (Honduras: EEHSA, 2014), 4.

36 Scarleth Núñez, *Control de Vertidos al Agua* (Honduras: EEHSA, 2014), 1-5.

Natural World is further divided into three sub-categories: Siting, Land and Water, and Biodiversity.

Siting

The correct siting of an infrastructure project is essential its sustainability. Although the impact of wind farms on ecological areas is lower than that caused by other types of infrastructure projects, the avoidance of areas of high ecosystem value or that serve as a diverse habitat, such as water bodies, wetlands, etc. should always be considered. Therein, Cerro de Hula wind farm was designed to comply with the Honduran national law for forests, protected areas, and wildlife. These regulations states that all projects designed to be within natural environments should be placed at least 100 meters (around 328 feet) away from water reservoirs, protected forests, and wildlife preserves[37]. The site where the project is located is a greenfield, therefore never previously developed. It has not been classified as prime farmland or protected green area according to the Honduran National System of Protected Areas or SINAPH for its name in Spanish (Sistema Nacional de Áreas Protegidas de Honduras)[38]. The area assessed consists mainly of low lying shrubs and trees, therefore in order to install the wind turbines and build other facilities necessary for the operation of the project cutting down some trees was unavoidable. Therefore, the project owners with the federal government established a compensatory environmental measure with the purpose of planting 10 trees for every tree cut down during the construction of the wind farm[39], which would be monitored by both entities[40].

The geological aspects of the site where the wind farm is located were also among the main concerns of the project team. The reason for this is that they had a consultant develop a thorough study to determine the best location for the wind turbines. With the help of this study the project team was able to determine that since the rocky substrate was very shallow, the foundations for the turbines needed to be superficial[41]. With the results of this same study the project team was able to determine that above the before-mentioned rocky substrate there were 2 to 3 meters of grubbed and organic material not suitable to bare any loads. This material needed to be cleared out before the construction of the foundations of each turbine. In terms of the erosion that could potentially be caused to the ground by the construction of the wind farm, the project team developed a plan to be implemented in case of soil erosion

37 Congreso Nacional República de Honduras, *Ley Forestal, Áreas Protegidas y Vida Silvestre* (Honduras: Congreso Nacional República de Honduras, 2007), Art. 122, Art. 123, Art. 124.

38 Secretaria de Recursos Naturales y Ambiente (SERNA), *Resolución SERNA 1330-2012* (Tegucigalpa: SERNA, 2012), 1.

39 Rudy Hernández, *Plan de Reforestación* (Honduras: EEHSA, 2014), 7.

40 Rudy Hernandez, *Informe Anual de Avance en el Cumplimiento de Medida de Compensación Forestal 10:1, Etapa 2013* (Honduras: EEHSA, 2013), 1-24.

41 Raúl Flores Peñalba, *Informe Geológico - Geotécnico "PE Cerro de Hula 2"* (Tegucigalpa: GeoConsult S.A. de C.V., 2012), 28-31.

where the turbines are located[42].

Land & water

According to the project's team, there were no superficial or deep bodies of water around the premises of the project before its construction, reason for which the impact on existing hydrologic and nutrient cycles was out of question. Even though the nature of this project poses a low threat to local drainage patterns, the project team should consider implementing a stormwater management program designed to study if the project has affected natural hydrological connections given the large amounts of precipitation the area gets every year.

There are certain substances, chemical, and residues that may pose a threat to surface or groundwater quality. According to this, contaminants such as pesticides and fertilizers that might contaminate water bodies has been avoided by the project team. There are no activities that take place during the operation of the wind farm where pesticides or fertilizers need to be used. The only activity where contaminate may happen is during the nursing of trees for the 10:1 reforestation program that is taking place on an extended area of the wind farm's site. One of the strategies used to avoid the excessive use of pesticides and fertilizers during the implementation of this program is by using local tree species that adapt quickly to the type of soil of the site[43]. The residues that may result from the operation of the wind farm —such as, solid, liquid, or gaseous wastes that due to their chemical characteristics may be a threat to the wellbeing of humans and the natural environment— are another type of contaminant that could affect surface or groundwater quality. Therefore, the project team put together an extensive document in which they describe a number of plans to detect, handle, and transport different types of dangerous and non-dangerous residues and plans of action for the case of an environmental emergency derived from the spillage or leaking of any type of contaminant[44] [45] [46] [47] [48].

Biodiversity

Infrastructure projects such as the Cerro de Hula wind farm should avoid negative impact on natural species and their habitats. The project team made great efforts to identify the different

[42] Carol D. Zelaya, *Control de Erosión* (Honduras: Iberdrola, 2014), 1-22.

[43] Rudy Hernández, *Plan de Reforestación* (Honduras: EEHSA, 2014), 9,13,16.

[44] Scarleth Núñez y Luis Rivera, *Plan de Respuesta a Emergencias (Sistema Integrado de Gestión)* (Honduras: EEHSA, 2013), 24, 35-37.

[45] Scarleth Núñez, *Manejo de Productos Peligrosos* (Honduras: EEHSA, 2013), 1-14.

[46] Scarleth Núñez, *Manejo de Residuos Peligrosos* (Honduras: EEHSA, 2014), 1-18.

[47] Scarleth Núñez, *Manejo de Residuos No Peligrosos* (Honduras: EEHSA, 2014), 1-13.

[48] Scarleth Núñez, *Control de Vertidos al Agua* (Honduras: EEHSA, 2013), 1-5.

existing habitats in and around the project's site in order to protect them from possible damages caused by the construction of the project. In order to do this, the project team created a document listing all the different native flora and fauna they identified and planned to preserve, and if possible, restore. The native species to be protected are identified in the ecosystems conservation document together with a list of animals that range from flying species to terrestrial fauna[49]. Given the threat that the blades of turbines pose to flying animals, the project team is mostly concerned with the preservation of species such as birds and bats.

In terms of the preservation of the habitats, the project team has implemented the 10:1 reforestation plan, which will not only preserve but will enhance the forest inside and around the project[50]. This long-term plan consists of the restitution of 10 trees for every tree cut down during the construction phase of the project and will be monitored by an expert who will generate a report of its observations every 12 months[51]. It's also important to note that the reforestation plan stipulates only locally appropriate and non-invasive plants to reduce the amount of invasive species in this habitat. Thorough studies of local and native species were developed by the project owners and can be found in the reforestation plan document that addresses aspects that range from the selection of ornamental, fruit, and timber-yielding species among others, their production in the nursery, the selection of their location, the design of their arrangement on the site, and their maintenance and protection once planted. According to the project team all of the aspects listed above were made together with members of the local communities and with authorities of the National Minister for Natural Resources and Environment of Honduras (SERNA).

According to the disturbed soil during construction, the wind farm team dedicated a section of the civil works parameters document to explaining that all excavated materials were to be reused during the construction phase. This section also detailed which parts of the material were suitable for certain works and which were not[52]. For example, the top layer of soil containing the grubbed and organic material removed for the foundation was considered to be unsuitable for covering up of foundations and therefore was specified for the landscaping and restoration of the topsoil of other affected areas.

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49 Scarleth Núñez, *Conservación de Ecosistemas (Sistema Integrado de Gestión)* (Honduras: EEHSA, 2013), 1-6.

50 Rudy Hernández, *Plan de Reforestación* (Honduras: EEHSA, 2014), 1-18.

51 Rudy Hernandez, *Informe Anual de Avance en el Cumplimiento de Medida de Compensación Forestal 10:1, Etapa 2013* (Honduras: EEHSA, 2013), 1-24.

52 Energía Eólica de Honduras, *Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement* (Honduras: EEHSA), 5-11.

7. CLIMATE & RISK CATEGORY

Envision aims to promote infrastructure development that are sensitive to long-term climate disturbances. Climate and Risk focuses on avoiding direct and indirect contributions to greenhouse gas emissions, as well as promotes mitigation and adaptation actions to ensure short and long term resilience to hazards. Climate and Risk is further divided into two sub-categories: Emissions and Resilience.

Emission

The reduction of dangerous emissions, both greenhouse gas emissions as well as other dangerous pollutants, during all stages of the project's life cycle is another important aspect for infrastructure projects to take into consideration. The wind farm is also helping to mitigate climate change through the Kyoto protocol and the Clean Development Mechanism with annual average emission reductions of 262,688 tons of greenhouse gases every year[53]. Although indirectly, the project is also contributing to fight global warming through the implementation of an extensive reforestation program, through which trees will remove CO2 from the atmosphere and deposit it in a reservoir where it will not reach the atmosphere[54].

Other air pollutants that would be generated by the wind farm during its operation and maintenance phases were identified in the control of emissions to air document where the project team listed the different contaminants that could potentially be generated by different activities and released into the atmosphere.

The pollutants Identified are particulate matter or dust, liquid and gas particles coming from vapor, emissions from fire prevention systems, gas emissions from vehicles, emissions from the burning of vegetation and residues, etc.[55] The reduction of greenhouse gas emissions of the wind farm will have an impact, not just on the environment surrounding the area, but also to help reduce overall global risk.

Resilience

Finally, the resilience of the project —or its ability to withstand short and long-term risks— is an important aspect considered by the project team. Understanding the various types of risks that a wind farm deals with would allow the project team to design and operate a project that

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53 United Nations Framework Convention on Climate Change, *Project Design Document Form for CDM Project Activities* (United Nations Clean Development Mechanism, 2012), 1.

54 Rudy Hernández, *Plan de Reforestación* (Honduras: EEHSA, 2014), 7.

55 Scarleth Núñez, *Control de Emisiones al Aire* (Honduras: EEHSA, 2014), 3-6.

anticipates and adapts to these risks. Along these lines, the project team of the Cerro de Hula wind farm did not take into consideration the potential climate variations that might pose a risk to this infrastructure project. In order to understand what these risks are, the project team should make an assessment of the long-term vulnerabilities of the project such as resource demand and supplies or operational costs. While designing an infrastructure project it is crucial for the project team to keep in mind that all of the parts that play a role in its operation should be able to withstand altered climate conditions. This will ensure the project's adaptability and therefore its operation in the long-term.

Although the project team does identify in several documents a number of short-term hazards such as earthquakes, flooding, fires, and man-made hazards such as material spills; there are no response plans that address the measures to be taken if they might occur[56]. These plans should thoroughly explain how operators and the community at large should prepare for the potential impact of these hazards.

8. SUMMARY AND CONCLUSION

The evaluation of the Cerro de Hula wind farm —the first project of its kind in Honduras— has shown the strengths of this project and its important contribution to the country's sustainable development. In addition, the evaluation has also highlighted the categories in which the project team has great opportunities for improvement.

In terms of the quality of life of the surrounding communities— which can be measured through the health and general wellbeing of its inhabitants— the project had its best performance out of all the categories considered for this evaluation. An especially important question to ask when evaluating the impact on quality of life of its surrounding communities is whether the project is purposeful. A project is purposeful when it is in line with community goals, incorporates itself into existing community networks, and when the community benefits from it in the long term. In this regard, the Cerro de Hula wind farm has played its part by not only satisfying the growing demand for electricity in the country but also by contributing to the local economy and improving the natural environment.

Other successful activities were the meetings organized by the project team to better inform the members of the surrounding communities about the works to be done and to consult them on their most urgent necessities, although the feedback gotten in these meetings was not

[56] GAMESA, *CERRO DE HULA II: Wind Farm Environmental Emergency Response Plan* (Honduras: GAMESA), 1-7.

necessarily captured on the design of the wind farm. The identified needs were on the areas of public infrastructure, health, education, and natural environment, from which the project team then developed a series of plans to try and find a solution for the needs and potential issues that could arise from the construction of the project. One of the major threats to the comfort and health of populations living close to wind farms is increased levels of noise and vibration. To give a solution to these problems, the project team created a plan to either repair or reconstruct some of the roofs of their homes. Wind farms have a lower impact on their surroundings than other types of infrastructure projects, nevertheless the preservation of views and natural features that characterized the areas around the wind farm were also among the main concerns of the project's team. Thus, the project team together with federal authorities created a reforestation program through which they would plant 10 trees for each tree cut down during the construction of the wind farm, helping to not only preserve but to also enhance the local character of the community.

From a leadership perspective, the involvement of a variety of stakeholders in creating diverse solutions for the project, while incorporating the traditional sustainability actions such as reducing energy and water use, will produce a truly sustainable project. In this respect, the project team proved to have a meaningful commitment to the principles of sustainability in every activity and program created during the design, construction, and operation phases of the wind farm. Some of these programs included the 10:1 reforestation plan, different programs to prevent the pollution of air, soil, and water before, during, and after the construction of the project, trash recycling plans, and programs to promote the rational use of various kinds of resources, among others.

Larger infrastructure projects like the Cerro de Hula wind farm require innovative leadership and commitment from the project's team, and thus, different kinds of management processes than other types of projects. In the case of this wind farm, the project's team established a sustainability management system that allowed them to control the scope, scale, and complexity of the numerous plans and programs implemented. This management plan contains the guidelines of the processes and monitoring systems that needed to be followed in order for the project to achieve its sustainability goals both during its construction and operation. Not only achieving but also maintaining these goals is key to a truly sustainable project; therefore, the project team assigned a member of their team to make frequent reports to assess the state of the systems that make the project work.

Regarding the integration of the wind farm systems with those of its immediate context the project team leaves some room for improvement. They proved, for example, to be interested in

implementing a plan for a more creative use of resources and materials during the construction and operation of the wind farm, but never explained whether these plans were put into practice and what their outcome was. This also applies to the identification of existing nearby facilities whose unwanted by-product supplies could be reused in some the project's activities. Nonetheless, the integration of the project in the rural context of the municipalities of Santa Ana and San Buenaventura was more successful due to the fact that the integration of wind turbines within the landscape is easier than that of other components of infrastructure projects. In terms of the connectivity of the wind farm with the existing road infrastructure, the project team specified the design parameters for the intersections between the public roads and the internal roads to comply with the requirements of the Honduran Ministry of Public Works, Transportation, and Housing. They also implemented a program to repair old roads and footpaths to facilitate the access of people, goods, and services. Large infrastructure projects should also be designed and planned for the long-term. In this regard, the project team of the wind farm elaborated a working plan for the long-term maintenance and monitoring of the project as part of a larger agreement, which was signed with the surrounding communities.

The subject of resource allocation is also relevant in the long-term, as resources are needed not only during the construction of a project, but also during its operation. This part of the evaluation —in which the project had one of its weakest performances— is mostly concerned with the quantity, source, and characteristics of the resources used and their impact on its overall sustainability. The first and most important aspect that the project team took into consideration was minimizing the total amount of materials used during the construction, operation, and maintenance of the wind farm. In order to do this, the project team created several documents that address ways to reduce the use of different materials during its operation phase. However, the provenance and quality of these resources, their extraction and processing, and their transportation to the site are aspects that the project team did not take into consideration.

Mainly due to the long distances to urban centers and the availability of useful natural resources in the area, the project team decided to extract some materials needed for the construction of the project on site. This plan also included a plant to extract and process soil, aggregate, and other local materials mainly for the production of cement, helping to reduce the energy used from material transportation to the site. Besides the construction phase, the team developed guidelines to follow during the operation and maintenance of the project, which are mainly directed at the rational use of freshwater. Since water is a scarce resource in the area, the project team decided to drill their own deep water wells for the extraction of water, although they never addressed their intentions to minimize withdrawals from these wells.

In terms of the energy used for the operation of the wind farm the latter is still entirely relying on energy sources that derive from the burning of fossil fuels, nevertheless the project team expects that by the end of 2014 all project's energy needs will be met by using the energy produced by one of the turbines in the wind farm.

In terms of impact of wind farms on the natural world surrounding the areas is lower than other types of infrastructure projects. Its correct siting is crucial to achieving its sustainability goals. Complying with the Honduran national law for forests, protected areas, and wildlife, the project team designed the wind farm leaving 100 meters (around 328 feet) of distance from water reservoirs, protected forests, and wildlife preserves. This initiative together with the 10:1 reforestation plan is helping to not only preserve the original qualities of the ecosystem around the wind farm, but also to enhance them.

In regards to the contamination of the land, the project team avoided the use of any kind of pesticide or fertilizer during the implementation of their reforestation plan. They did this by only utilizing native species of trees that would not require the use of chemicals during their acclimatization process. Along similar lines the project team created a series of documents to clarify the correct ways to handle both dangerous and non-dangerous residues during the construction and operation of the wind farm to avoid pollution of soils and water.

Finally, on the subject of climate change and emissions produced by the project during the wind farm's life cycle —specifically those of greenhouse gases— there is still room for improvement on behalf of the project team. Until now, none of the energy used for the operation of the wind farm is coming from renewable sources. Nonetheless, the amount of energy coming from the burning of fossil fuels being used to operate the project is small when compared to that produced by the wind turbines.

This report evaluates the sustainability performance of the Cerro de Hula wind farm project according to the Envision™ Rating System. The report identifies areas in which the project scored highly, as well as low-scoring areas that represent opportunities for which the project team can learn and improve on in future projects, as they strive to achieve sustainable project design and construction methodologies.

APPENDIX:

APPENDIX A: PROJECT PICTURES AND DRAWINGS

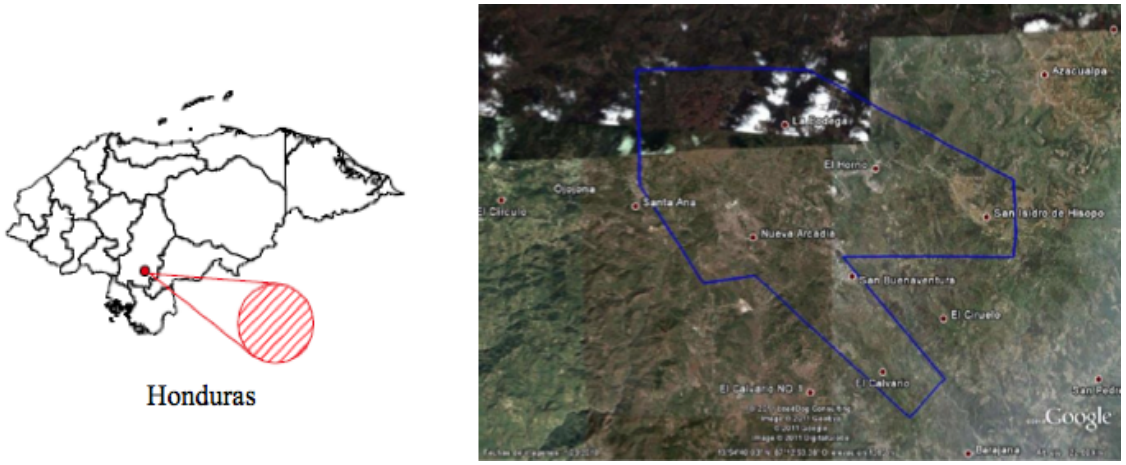

Figure 02: Project location, national and regional context.
Source: CDM Project Design Document, p. 4

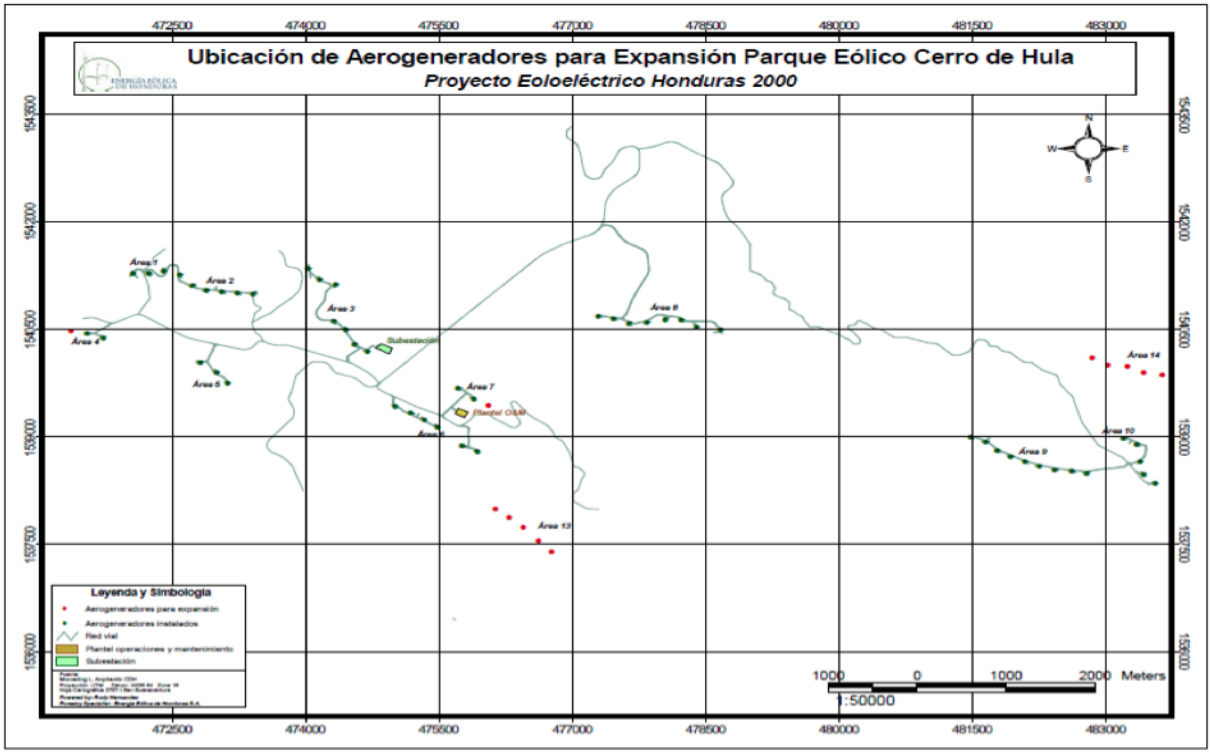

Figure 03: Location of wind turbines on the site.
Source: EEHSA, Informe de Cumplimiento de Medidas Ambientales ICMA, p. 5

Figure 04: Construction process.
Source: EEHSA.

Figures 05 & 06: Meetings with community members.
Source: EEHSA, Proceso de Socialización y Beneficios Económicos en las Comunidades, p. 4

Figures 07 & 08: EEHSA's support to schools and institutions.
Source: EEHSA, Plan de Desarrollo Comunitario, p. 9

Figures 09 & 10: State of the houses of the community members complaining about noise before the implementation of EEHSA's program.
Source: Plan de Mitigación de Sonido Fase III, p. 6, 7

Figures 11 & 12: Temporary signage in construction areas.
Source: EEHSA, Informe de Cumplimiento de Medidas Ambientales ICMA, p. 8, 9

Figure 13: View of the landscape in the site of the project.
Source: Acciones de Apertura, Operación y Abandono en "Escombrera 13-2", p. 4

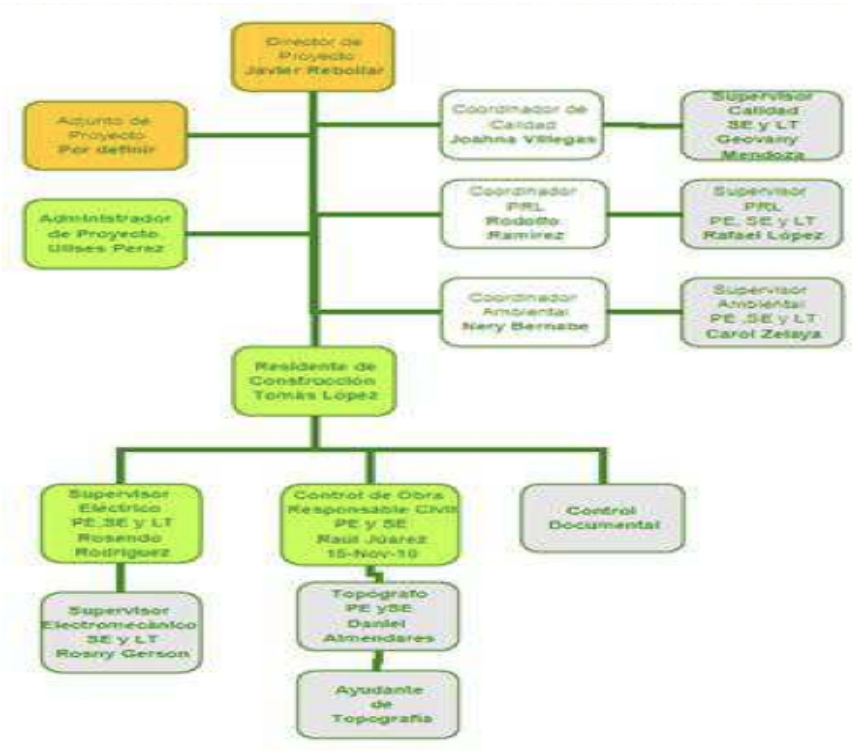

Figure 14: Construction team's organizational chart.
Source: Plan de Gestión Ambiental, p. 4

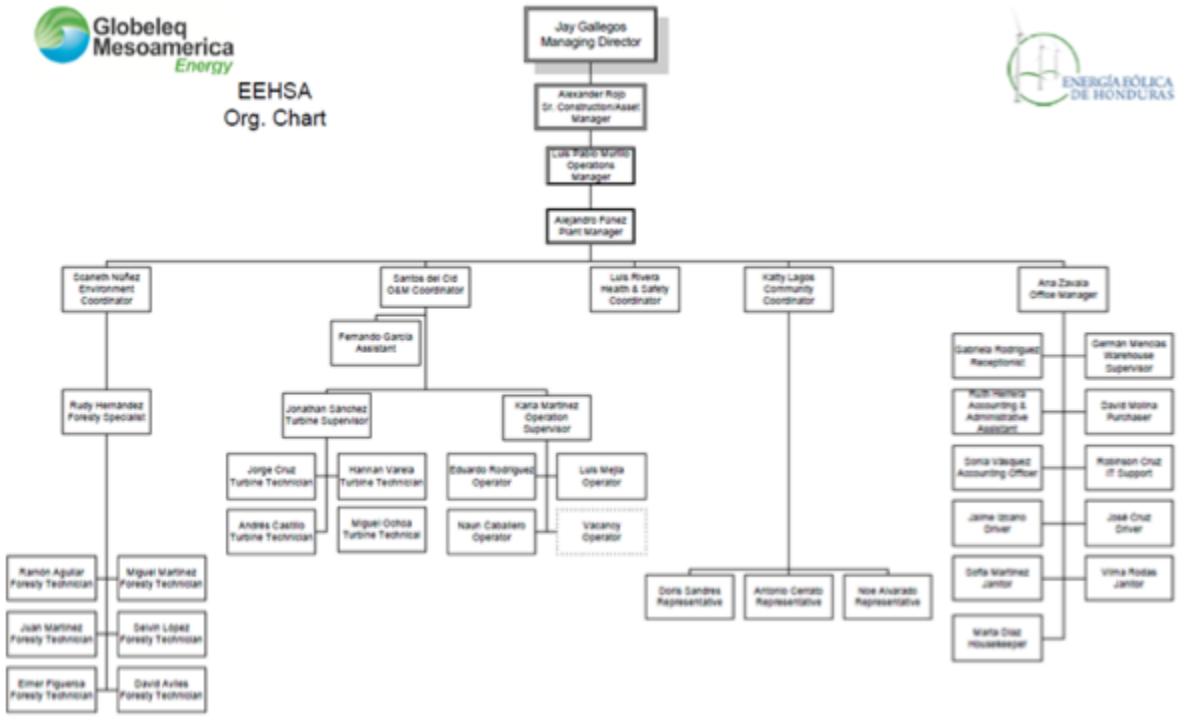

Figure 15: Operation team's organizational chart.
Source: Plan de Gestión Ambiental, p. 41

Figure 16: Public meeting with members of the surrounding communities.
Source: EEHSA.

Figure 17: Construction of an intersection.
Source: EEHSA, Informe de Cumplimiento de Medidas Ambientales ICMA, p. 16

Figure 18: Wind farm's concrete plant.
Source: EEHSA, Informe de Cumplimiento de Medidas Ambientales ICMA, p. 16

Maintenace Schedule Summary 2014-EEHSA

ACTIVITIES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dic
WIND TURBINES												
6 Month PM												
12 Month PM												
Elevator PM												
Life lines Inspection												
Emergency Equipment Inspection												
GBs Oil Analysis												
Video Bore Scope Inspections												
Slip Rings PM												
Blade Inspection and Cleaning												
ELECTROMECHANICAL BOP												
6 Month PM												
12 Month PM												
3 Month PM												
CRANES												
750 hrs. Maintenance												
ROADS AND CRANE PADS												
Annual Maintenance												

Figure 19: 2014 maintenance working plan.
Source: EEHSA, Plan de Mantenimiento Principal 2014, p. 13

Figure 20: Location of one of EEHSA's deep water wells.
Source: EEHSA, Informe de Cumplimiento de Medidas Ambientales ICMA, p. 23

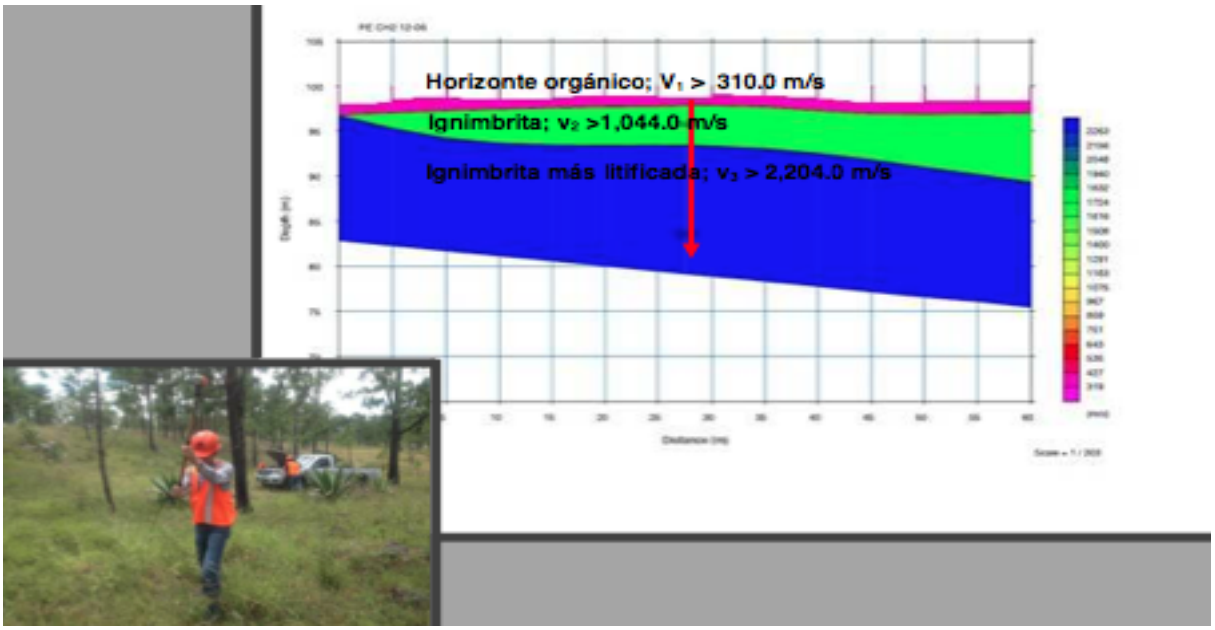

Figure 21: Ground section of one of the areas analyzed inside the project site.
Source: Informe Geológico - Geotécnico PE Cerro de Hula 2, p. 28

Figure 22: Context in which the project is located.
Source: EEHSA.

Figure 23: Temporary storage space for dangerous residues.
Source: EEHSA, Informe de Cumplimiento de Medidas Ambientales ICMA, p. 19

Figure 24: Works during reforestation plan.
Source: EEHSA, Informe de Cumplimiento de Medidas Ambientales ICMA, p. 33

APPENDIX B: ENVISION POINTS TABLE

CREDIT SCORING

				IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
1	QUALITY OF LIFE	PURPOSE	QL1.1 Improve community quality of life	2	5	10	**20**	**25**
2			QL1.2 Stimulate sustainable growth and development	1	2	5	13	**16**
3			QL1.3 Develop local skills and capabilities	1	2	5	12	**15**
4		COMMUNITY	QL2.1 Enhance public health and safety	2			**16**	
5			QL2.2 Minimize noise and vibration	1			8	**11**
6			QL2.3 Minimize light pollution	1	2	4	8	**11**
7			QL2.4 Improve community mobility and access	1	4	7	**14**	
8			QL2.5 Encourage alternative modes of transportation	1	3	6	12	**15**
9			QL2.6 Improve site accessibility, safety and wayfinding		3	6	12	**15**
10		WELLBEING	QL3.1 Preserve historic and cultural resources	1		7	**13**	**16**
11			QL3.2 Preserve views and local character	1	3	6	11	**14**
12			QL3.3 Enhance public space	1	3	6	11	**13**
							Maximum points possible:	**181**
13	LEADERSHIP	COLLABORATION	LD1.1 Provide effective leadership and commitment	2	4	9	**17**	
14			LD1.2 Establish a sustainability management system	1	4	7	**14**	
15			LD1.3 Foster collaboration and teamwork	1	4	8	**15**	
16			LD1.4 Provide for stakeholder involvement	1	5	9	**14**	
17		MANAGEMENT	LD2.1 Pursue by-product synergy opportunities	1	3	6	12	**15**
18			LD2.2 Improve infrastructure integration	1	3	7	13	**16**
19		PLANNING	LD3.1 Plan for long-term monitoring and maintenance	1	3		**10**	
20			LD3.2 Address conflicting regulations and policies	1	2	4	**8**	
21			LD3.3 Extend useful life	1	3	6	**12**	
							Maximum points possible:	**121**
22	RESOURCE ALLOCATION	MATERIALS	RA1.1 Reduce net embodied energy	2	6	12	**18**	
23			RA1.2 Support sustainable procurement practices	2	3	6	**9**	
24			RA1.3 Use recycled materials	2	5	11	**14**	
25			RA1.4 Use regional materials	3	6	9	**10**	
26			RA1.5 Divert waste from landfills	3	6	8	**11**	
27			RA1.6 Reduce excavated materials taken off site	2	4	5	**6**	
28			RA1.7 Provide for deconstruction and recycling	1	4	8	**12**	
29		ENERGY	RA2.1 Reduce energy consumption	3	7	12	**18**	
30			RA2.2 Use renewable energy	4	6	13	16	**20**
31			RA2.3 Commission and monitor energy systems		3		**11**	
32		WATER	RA3.1 Protect fresh water availability	2	4	9	17	**21**
33			RA3.2 Reduce potable water consumption	4	9	13	17	**21**
34			RA3.3 Monitor water systems	1	3	6	**11**	
							Maximum points possible:	**182**
35	NATURAL WORLD	SITING	NW1.1 Preserve prime habitat			9	14	**18**
36			NW1.2 Protect wetlands and surface water	1	4	9	14	**18**
37			NW1.3 Preserve prime farmland			6	12	**15**
38			NW1.4 Avoid adverse geology	1	2	3	**5**	
39			NW1.5 Preserve floodplain functions	2	5	8	**14**	
40			NW1.6 Avoid unsuitable development on steep slopes	1		4	**6**	
41			NW1.7 Preserve greenfields	3	6	10	15	**23**
42		LAND & WATER	NW2.1 Manage stormwater		4	9	17	**21**
43			NW2.2 Reduce pesticide and fertilizer impacts	1	2	5	**9**	
44			NW2.3 Prevent surface and groundwater contamination	1	4	9	14	**18**
45		BIODIVERSITY	NW3.1 Preserve species biodiversity	2			13	**16**
46			NW3.2 Control invasive species			5	9	**11**
47			NW3.3 Restore disturbed soils				8	**10**
48			NW3.4 Maintain wetland and surface water functions	3	6	9	15	**19**
							Maximum points possible:	**203**
49	CLIMATE & RISK	EMISSIONS	CR1.1 Reduce greenhouse gas emissions	4	7	13	18	**25**
50			CR1.2 Reduce air pollutant emissions	2	6		12	**15**
51		RESILIENCE	CR2.1 Assess climate threat				**15**	
52			CR2.2 Avoid traps and vulnerabilities	2	6	12	16	**20**
53			CR2.3 Prepare for long-term adaptability				16	**20**
54			CR2.4 Prepare for short-term hazards	3		10	17	**21**
55			CR2.5 Manage heat islands effects	1	2	4	**6**	
							Maximum points possible:	**116**
								803

**The five innovation credits are bonus points and not included in total point tallies*

APPENDIX C: GRAPHS

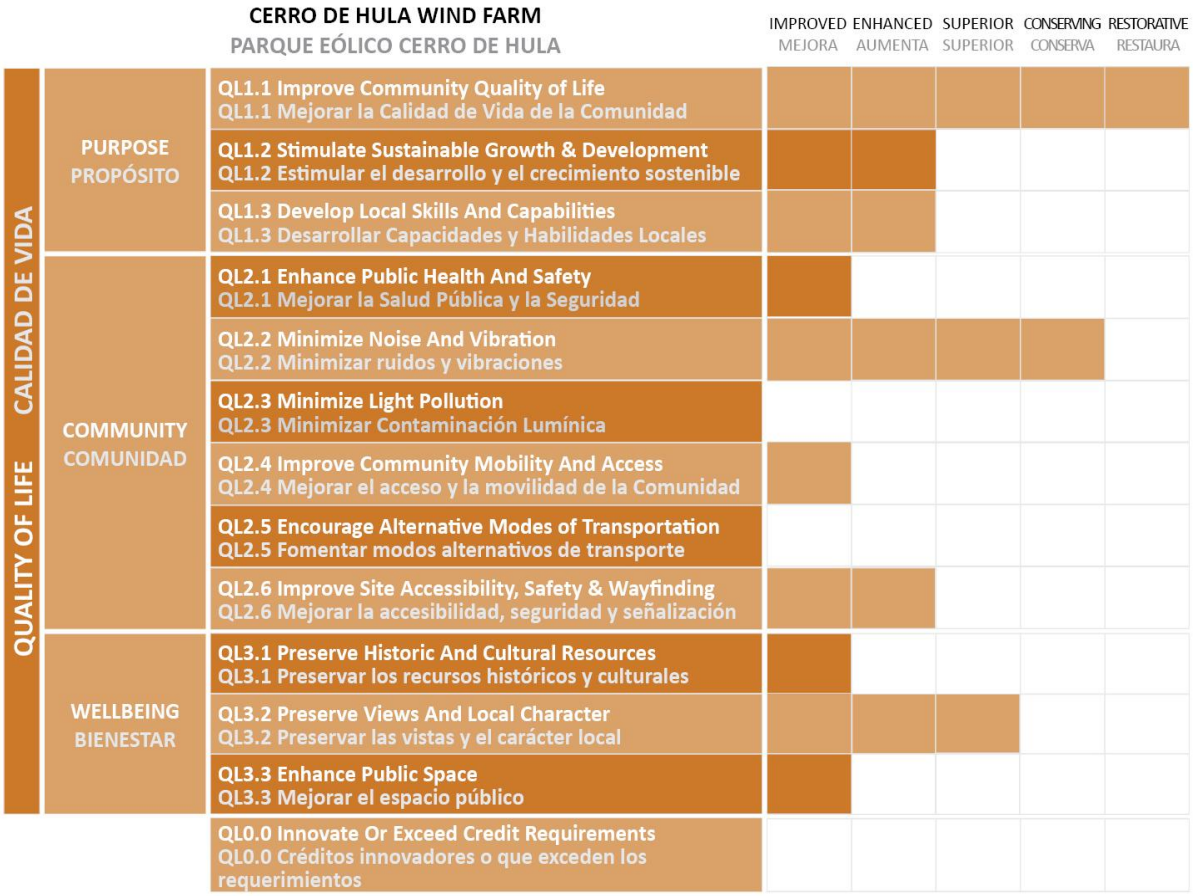

Figure 25: Quality of Life category_ Summary of results

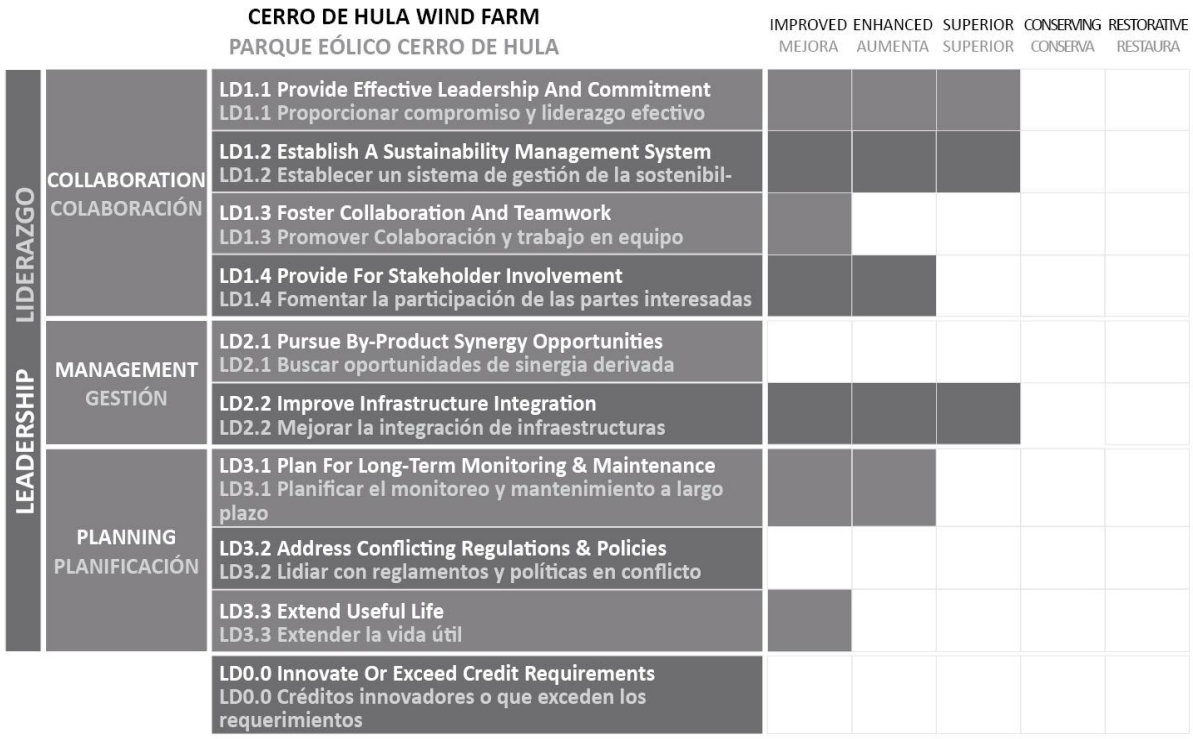

Figure 26: Leadership category_ Summary of results

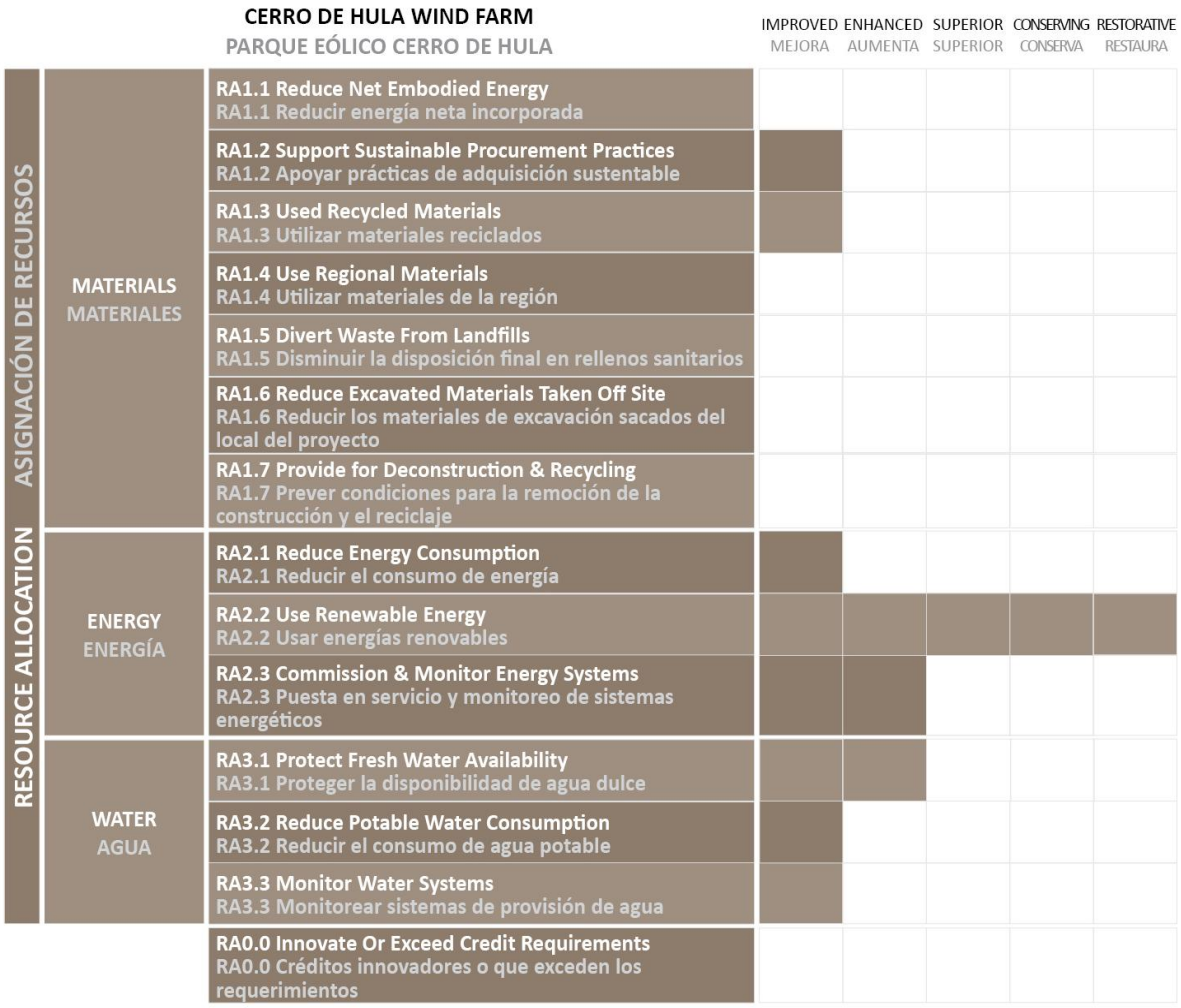

Figure 27: Resource Allocation category_ Summary of results

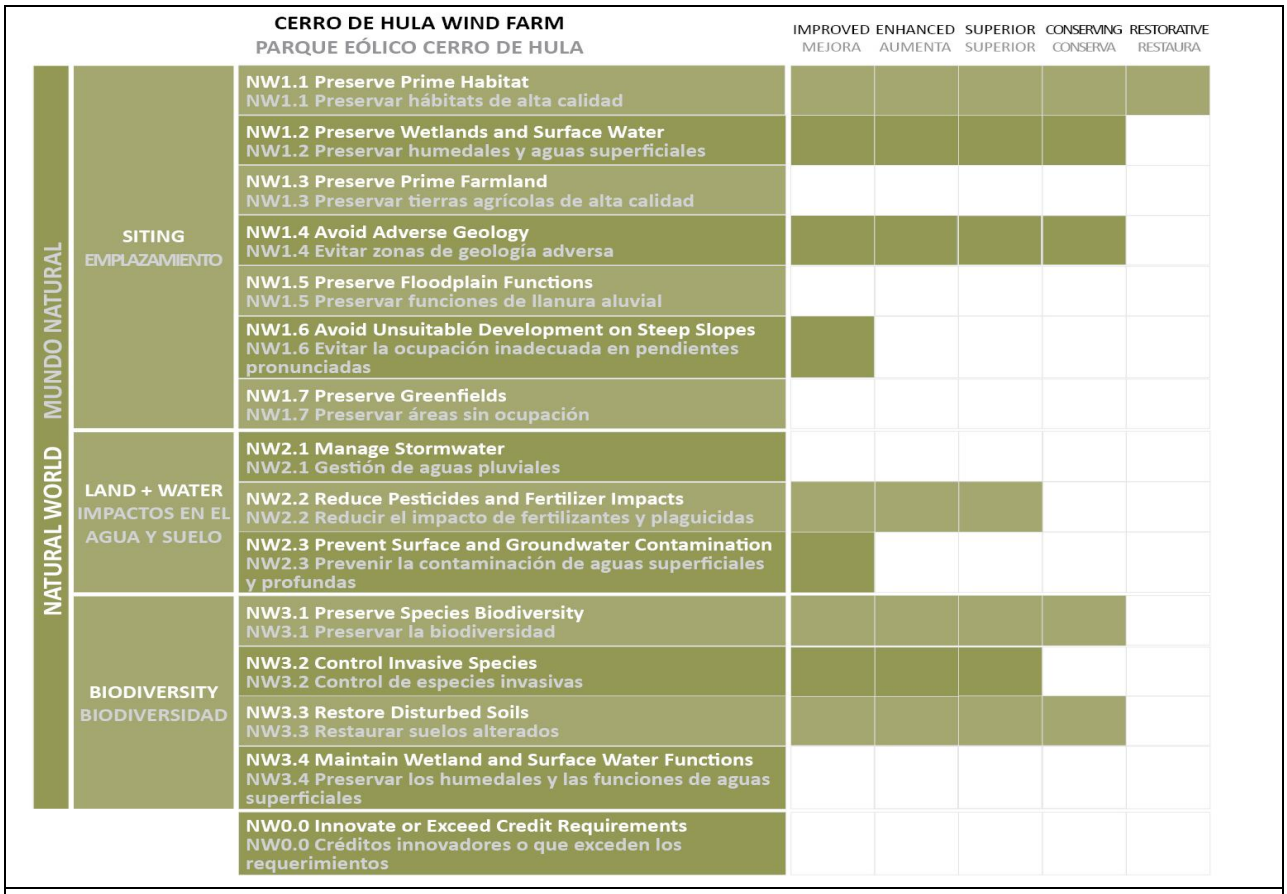

Figure 28: Natural World category_ Summary of results

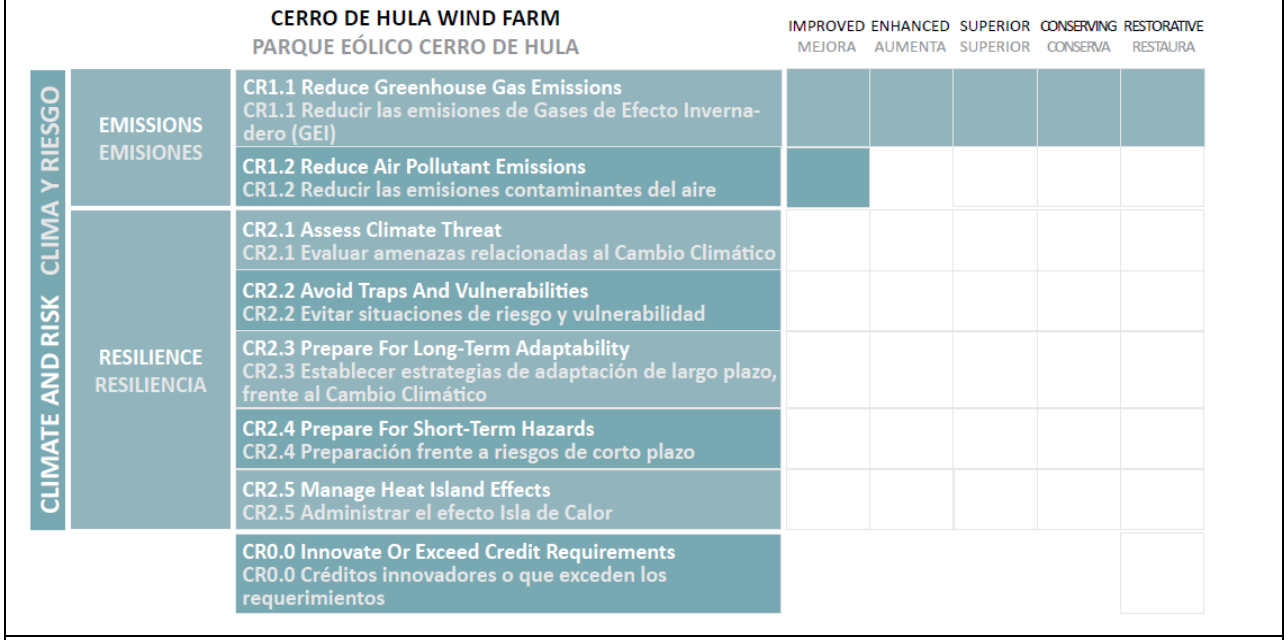

Figure 29: Climate & Risk category_ Summary of results

Figure 30: People & Leadership award Summary of results

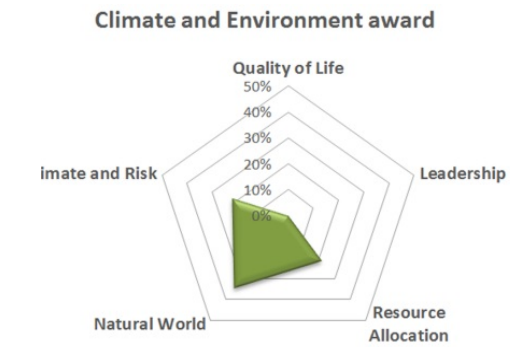

Figure 31: Climate & Environment award Summary of results

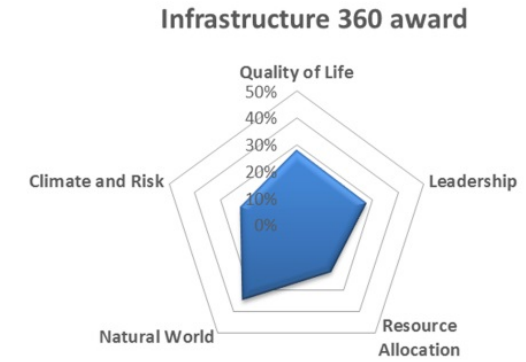

Figure 32: Infrastructure 360 award Summary of results

			CERRO DE HULLA WINDFARM, HONDURAS	PT.	Performance
1	QUALITY OF LIFE	PURPOSE	QL1.1 Improve Community Quality of Life	25	Restorative
2			QL1.2 Stimulate Sustainable Growth & Development	2	Enhanced
3			QL1.3 Develop Local Skills And Capabilities	2	Enhanced
4		COMMUNITY	QL2.1 Enhance Public Health And Safety	2	Improved
5			QL2.2 Minimize Noise And Vibration	8	Conserving
6			QL2.3 Minimize Light Pollution	0	No score
7			QL2.4 Improve Community Mobility And Access	1	Improved
8			QL2.5 Encourage Alternative Modes of Transportation	0	No score
9			QL2.6 Improve Site Accessibility, Safety & Wayfinding	3	Enhanced
10		WELLBEING	QL3.1 Preserve Historic And Cultural Resources	1	Improved
11			QL3.2 Preserve Views And Local Character	6	Superior
12			QL3.3 Enhance Public Space	1	Improved
			QL0.0 Innovate Or Exceed Credit Requirements	0	0
			QL	51	

			CERRO DE HULLA WINDFARM, HONDURAS	PT.	Performance
13	LEADERSHIP	COLLABORATION	LD1.1 Provide Effective Leadership And Commitment	9	Superior
14			LD1.2 Establish A Sustainability Management System	7	Superior
15			LD1.3 Foster Collaboration And Teamwork	1	Improved
16			LD1.4 Provide For Stakeholder Involvement	5	Enhanced
17		MNGMT.	LD2.1 Pursue By-Product Synergy Opportunities	0	No score
18			LD2.2 Improve Infrastructure Integration	7	Superior
19		PLANNING	LD3.1 Plan For Long-Term Monitoring & Maintenance	3	Enhanced
20			LD3.2 Address Conflicting Regulations & Policies	0	No score
21			LD3.3 Extend Useful Life	1	Improved
			LD0.0 Innovate Or Exceed Credit Requirements	0	N/A
			LD	33	

			CERRO DE HULLA WINDFARM, HONDURAS	PT.	Performance
22	RESOURCE ALLOCATION	MATERIALS	RA1.1 Reduce Net Embodied Energy	0	No score
23			RA1.2 Support Sustainable Procurement Practices	2	Improved
24			RA1.3 Used Recycled Materials	2	Improved
25			RA1.4 Use Regional Materials	0	No score
26			RA1.5 Divert Waste From Landfills	0	No score
27			RA1.6 Reduce Excavated Materials Taken Off Site	0	No score
28			RA1.7 Provide for Deconstruction & Recycling	0	No score
29		ENERGY	RA2.1 Reduce Energy Consumption	3	Improved
30			RA2.2 Use renewable energy	20	Restorative
31			RA2.3 Commission & Monitor Energy Systems	3	Enhanced
32		WATER	RA3.1 Protect Fresh Water Availability	4	Enhanced
33			RA3.2 Reduce Potable Water Consumption	4	Improved
34			RA3.3 Monitor Water Systems	1	Improved
			RA0.0 Innovate Or Exceed Credit Requirements	0	N/A
			RA	**39**	

			CERRO DE HULLA WINDFARM, HONDURAS	PT.	Performance
35	NATURAL WORLD	SITING	NW1.1 Preserve Prime Habitat	18	Restorative
36			NW1.2 Preserve Wetlands and Surface Water	14	Conserving
37			NW1.3 Preserve Prime Farmland	0	No score
38			NW1.4 Avoid Adverse Geology	5	Conserving
39			NW1.5 Preserve Floodplain Functions	0	No score
40			NW1.6 Avoid Unsuitable Development on Steep Slopes	1	Improved
41			NW1.7 Preserve Greenfields	0	No score
42		L & W	NW2.1 Manage Stormwater	0	No score
43			NW2.2 Reduce Pesticides and Fertilizer Impacts	5	Superior
44			NW2.3 Prevent Surface and Groundwater Contamination	1	Improved
45		BIODIVERSITY	NW3.1 Preserve Species Biodiversity	13	Conserving
46			NW3.2 Control Invasive Species	5	Superior
47			NW3.3 Restore Disturbed Soils	8	Conserving
48			NW3.4 Maintain Wetland and Surface Water Functions	0	No score
			NW0.0 Innovate or Exceed Credit Requirements	0	N/A
			NW	70	

			CERRO DE HULLA WINDFARM, HONDURAS	PT.	Performance
49	CLIMATE	EMISSION	CR1.1 Reduce Greenhouse Gas Emissions	25	Restorative
50			CR1.2 Reduce Air Pollutant Emissions	2	Improved
51		RESILENCE	CR2.1 Assess Climate Threat	0	No score
52			CR2.2 Avoid Traps And Vulnerabilities	0	No score
53			CR2.3 Prepare For Long-Term Adaptability	0	No score
54			CR2.4 Prepare For Short-Term Hazards	0	No score
55			CR2.5 Manage Heat Island Effects	0	No score
			CR0.0 Innovate Or Exceed Credit Requirements	0	N/A
			CR	27	

Total points	**220**	**0**

APPENDIX D: CREDIT DETAIL

CERRO DE HULA WIND FARM: CREDIT SPREADSHEET WITH DETAILS		
CATEGORY I, PEOPLE AND LEADERSHIP		
SUB CATEGORY: QUALITY OF LIFE		
	Score	**CERRO DE HULLA WINDFARM, HONDURAS**
QL1.1 Improve Community Quality of Life	**25**	**Restorative**
		The owners of the project and EEHSA, the company operating it, have made it their mission to not only satisfy the growing demand of electricity in the country; but also to contribute to local economies, to improve the natural environment, and thus become a good neighbour. EEHSA is also willing to take responsibility for any impact or discomfort this project's operation may cause on the lives of nearby communities. In order to achieve this, the EEHSA has implemented a number of different initiatives with the goal to strengthen its ties with the adjacent communities. An example of this would be the EEHSA holding information sessions throughout the targeted region and by the EEHSA being involved in several social development projects aiming to improve the quality of life of the inhabitants of nearby communities. From the very beginning the project team has held an "open doors" policy with the community, allowing the latter to easily get in touch with the company in the case that the operation of the wind farm is interfering in their quality of life. Supporting local hospitals and schools, donating street lighting to the municipalities of Santa Ana and San Buenaventura, and electrifying remote communities are some of the numerous plans that have been implemented by the project team in the area in order to improve the nearby communities' quality of life. They also helped repair the structure of roofs and even reconstruct some houses of members of the community who complained about the noise being produced by the turbines of the wind farm. The project team also installed 100 ecological fireplaces in the houses of some members of the surrounding communities, in order to help them reduce costs and time from heating the house and the cooking by burning firewood, and thus helping the environment by reducing the emission of smoke. The project team organized a public poll among the surrounding communities in order to identify the most urgent needs and expectations of the project's social contribution. As a result of that consultation, the project team came up with a list of plans that are either already being implemented or will be put in action in the near future regarding public infrastructure, health, education, and natural environment. They plan to achieve these goals by implementing different strategies funded by donations allegedly adding up to US$580,000 dollars by the year 2014 and additional donations of US$300,000 dollars by the end of 2015. By carrying out these plans, the project team proves its interest in contributing to the socio-economic vitality and prosperity of the community; helping to set it on a realistic and efficient path to future development. In order to measure their progress against commitments, the project team has developed different periodical assessment documents.
		Source: *Alana Paul, Procedimiento de Resolución de Inconformidades (Honduras: EEHSA, 2011), 3-11.* *Energía Eólica de Honduras, Plan de Mitigación de Sonido: Fase III (Honduras: EEHSA, 2013), 2-21.*

		Energía Eólica de Honduras, Donaciones 2013: Ecofogones (Honduras: EEHSA, 2013), 1-2. Energía Eólica de Honduras, Proyecto Eólico Cerro de Hula: Acuerdo de Vecinos (Honduras: EEHSA, 2010, 2013), 1-11.
		RECOMMENDATIONS
		To incorporate into the reports of information meetings held with various local community members whether some of the plans were reviewed and verified by through their input in order to align the company's plans with the needs of the local communities.
QL1.2 Stimulate Sustainable Growth & Development	**2**	**Enhanced**
		As a result of the consultation conducted, a number of plans including training and improving the skills of the population, creating jobs, supporting schools, churches, and hospitals via monetary or goods donations were implemented. The way to do this was by improving their facilities, providing public recreation spaces, improving road conditions, electrifying isolated communities, and providing fresh water. The progress against the commitments made in some of these initiatives has been measured through periodical assessment evaluations.
		Source: *Energía Eólica de Honduras, Proyecto Eólico Cerro de Hula: Plan de Desarrollo Comunitario (Honduras: EEHSA, 2011), 10-12.*
		RECOMMENDATIONS *In order to make sure that the implementation of these projects contribute to the growth and development of the community, the project team should consider appointing a member to be in charge of creating an annual report addressing the implementation status of these projects.*
QL1.3 Develop Local Skills and Capabilities	**2**	**Enhanced**
		All programs implemented by the project team consider the participation of the surrounding communities and the improvement of skills and knowledge of their workforce. With community development programs, the project team has identified its mission to not only help improve the infrastructure and built environment in which the community members of Santa Ana and San Buenaventura live in, but to also have a long-lasting impact on the population's personal assets. An element of these plans is to generate new employment opportunities around the area by hiring members of the community during the construction phase of the project and to train them to improve their skills. The progress against the commitments made in some of these initiatives has been measured through periodical assessment evaluations.
		Source: *Energía Eólica de Honduras, Proyecto Eólico Cerro de Hula: Plan de Desarrollo Comunitario (Honduras: EEHSA, 2011), 3-12.*
		RECOMMENDATIONS *The company should work to develop its relationship with the local community and train and employ more of its members during different stages, not only during the construction phase. No documentation of how and when these plans would be implemented could be found. The involvement with the local communities therefore seems superficial and as such the company should consider implementing strategies to strengthen these relationships.*

QL2.1 Enhance Public Health And Safety	**2**	**Improved**
		As shown in several documents, the project team is concerned not only with implementing plans and programs required to them by law, but also with identifying additional risks created by the operation of the plant. The project team has detected all possible kinds of dangers derived from the wind farm's operation that would put at risk the physical and mental health of the inhabitants of the communities. This document lists dangers to the health and safety of the community by classifying them into types, explaining the way in which they may occur, and suggesting possible solutions to the issues.
		Source: *Luis Rivera, Identificación de Peligros, Evaluación de Riesgos y Determinación de Controles (Honduras: EEHSA, 2013), 3-15.* *Energía Eólica de Honduras, Expansión of the Cerro de Hula Wind Plant: Exhibit B-11, Owner's EHS Requirements (Honduras: EEHSA), 2-11.*
		RECOMMENDATIONS *In addition to the health and safety programs required by law, the project team should consider making an assessment in order to identify and apply new methods and procedures to address additional risks. These risks are generated by the application of new technologies, materials, equipment, and methodologies in the construction and operation of the wind farm.*
QL2.2 Minimize Noise And Vibration	**8**	**Conserving**
		The project team has made efforts to study the state of noise and vibration levels in and around the site prior to construction of the project, starting by identifying noise and vibration as a risk to people's physical health. The team has also made efforts to predict these same levels after the construction and operation of the wind farm. In order to make a judgement of the state of the noise and vibration levels after the construction of the project was finalized, the project team used international norms as a comparative. To date, the project team has also responded to 12 cases of families that complained about an increase in the regular noise levels of the area after the construction of the project, to which the project team responded by improving the conditions of their houses. These works ranged from the repair of parts of their roof structures to even rebuilding the houses entirely when needed. As part of the noise mitigation program implemented during the renovation and reconstruction of some of the community members houses, the project team closely monitored the progress of work being done to these properties to ensure that the works would be finished in time and form.
		Source: *Energía Eólica de Honduras, Expansion of the Cerro de Hula Wind Plant: Exhibit B-11, Owner's EHS Requirements (Honduras: EEHSA), 5.* *Luis Rivera, Identificación de Peligros, Evaluación de Riesgos y Determinación de Controles (Honduras: EEHSA, 2013), 12.* *Scarleth Núñez, Evaluación de Emisión de Ruido al Ambiente General (Honduras: EEHSA, 2012), 1-32.* *Energía Eólica de Honduras, Plan de Mitigación de Sonido: Fase III (Honduras: EEHSA, 2013), 2-21.* *Energía Eólica de Honduras, Plan de Mitigación de Ruido: Notas de Agradecimiento (Honduras: EEHSA, 2012), 1-8.*

		RECOMMENDATIONS *In addition to simply meeting noise level standards and regulatory requirements, a goal of the project team should be to further reduce ambient noise and vibrations to restore them to original levels prior to the wind farm's construction.*
QL2.3 Minimize Light Pollution	**0**	**No score**
		There is no information available related to this credit.
		Source: *No sources available.*
		RECOMMENDATIONS *The project team should provide documentation of the lighting assessments made for the project.*
QL2.4 Improve Community Mobility And Access	**1**	**Improved**
		With regard to plans to improve mobility and access in and around the wind farm, the project team showed to have limited coordination with adjacent transportation nodes around the wind farm. No proof was found to suggest the project owners and operators addressed the importance of improving traffic and mobility. Information provided on the existing road infrastructure only mentioned the required specifications for the design of the intersections between the latter and the new roads built inside the wind farm. The project team was concerned with the general mobility around the site of the project and the impact that the construction and operation of the wind farm could have on it. This was the reason why the team decided to implement a plan to improve the conditions of existing roads and drainage systems connecting the project with different adjacent communities.
		Source: *Energía Eólica de Honduras, Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement (Honduras: EEHSA), 21-22.* *Energía Eólica de Honduras, Parque Eólico Cerro de Hula: Plan de Mantenimiento Principal 2014 (Honduras: EEHSA, 2014), 9.* *Energía Eólica de Honduras, Informe Fotográfico Comportamiento Obras de Drenaje (Honduras: EEHSA), 1-3.* *Energía Eólica de Honduras, Estudio y Diseño para el Mejoramiento del Callejón Peatonal de Aldea la Bodega a Cerritos Ayasta (Tegucigalpa: CINSA, 2014), 1-16.*
		RECOMMENDATIONS *An assessment should be made to locate, design, and construct the project in a way that will improve access to and from the project and to avoid traffic congestions caused by construction and operation of the project. The project owners and operators should do this by working side by side with decision-makers in adjacent facilities and transportation hubs.*
QL2.5 Encourage Alternative Modes of Transportation	**0**	**No score**
		There is no information available related to this credit.

		Source: *No sources available.*
		RECOMMENDATIONS *The project owners and operators should assess the connectivity of the wind farm with existing public transportation networks in order to support improved accessibility strategies and encourage use of non-motorized transportation.*
QL2.6 Improve Site Accessibility, Safety & Wayfinding	**3**	**Enhanced**
		Included in one of the documents provided by the project owners to the contractors, the owners list job tasks and hazards the contractors should take into consideration including signage on roads to guarantee proper findings. Information on this matter is also included on the document provided by the project owners to identify the dangers related to work inside the wind farm. In the category titled "Location"; signage, demarcation, and emergency exits are some of the requirements listed as needed in order to establish the necessary preventive measures. The need for temporary and permanent signage in order to have an orderly entrance and egress of workers to and from each turbine during the construction phase and operation of the project is addressed on the civil works parameters document.
		Source: *Energía Eólica de Honduras, Expansion of the Cerro de Hula Wind Plant: Exhibit B-11, Owner's EHS Requirements (Honduras: EEHSA), 3.* *Luis Rivera, Identificación de Peligros, Evaluación de Riesgos y Determinación de Controles (Honduras: EEHSA, 2013), 13.* *Energía Eólica de Honduras, Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement (Honduras: EEHSA), 22-23.*
		RECOMMENDATIONS *An assessment of the state of different means of access and safety for adjacent communities during construction should be made in order to improve aspects inside the wind farm as well as to and from it.*
QL3.1 Preserve Historic and Cultural Resources	**1**	**Improved**
		The project owners and contractors have shown a good predisposition to preserve all architectural and archaeological resources that could potentially be found inside the wind farm during construction. As stated on the cultural resources plan document provided by the project owners; in the case of an archaeological finding during the construction phase of the project, the contractors are required to implement a monitoring archaeological plan. During this time all construction work will be stopped and documentation of the resources found would be made, advice of an accredited archaeologist would also be looked for.
		Source: *Carol D. Zelaya, Plan de Recursos Culturales (Honduras: EEHSA, 2013), 1-5.*
		RECOMMENDATIONS *In the case of any archaeological resources being found in the site of the wind farm, the project owners should consider redesigning the wind farm to fully preserve the character and defining features of that resource.*
QL3.2 Preserve	**6**	**Superior**

Views and Local Character		The area where the wind farm is located is a rural area mostly composed of large green open spaces. Therefore the project owners and the Ministry of Natural and Environmental Resources (SERNA, for its name in Spanish) came to an agreement where the owners would plant 10 trees for each tree cut down during the civil works phase. This serves to enhance the "scenic beauty and forest density" —as expressed on the reforestation plan— of the area around the wind farm. The different areas for the reforestation were selected and/or proposed by different members of the community. These members hailed from different backgrounds such as environmental coordinators, community organizations, landowners, and private land users. Although it is clear that the project team is interested in preserving the views and local character, as proven by their plans to not only preserve but also enhance the natural landscape features around the wind farm, there was no document to be found where the team specifically addressed the visual impact of the project on the area.
		Source: *Rudy Hernández, Plan de Reforestación (Honduras: EEHSA, 2014), 7.* *Rudy S. Hernandez, Informe Anual de Avance en el Cumplimiento de Medida de Compensación Forestal 10:1, Etapa 2013 (Honduras: EEHSA, 2013), 5.*
		RECOMMENDATIONS *When trees must be cut down, the replanting process should try to resemble the original conditions and local character in the area.*
QL3.3 Enhance Public Space	**1**	**Improved**
		Among the documents provided by the project owner and operators, very few plans to help with the improvement of existing public spaces inside or around the wind farm were mentioned. Some of these plans included the donation of lighting fixtures for existing public spaces and the renovation of a number of churches and schools located in different communities around the wind farm. No documentation could be found where project owners and operators implemented projects to enhance existing public parks or plazas. No documentation could be found where certain areas of the wind farm were being planned to become public wildlife refuges.
		Source: *Energía Eólica de Honduras, Proyecto Eólico Cerro de Hula: Plan de Desarrollo Comunitario (Honduras: EEHSA, 2011), 7-9.*
		RECOMMENDATIONS *Considering the surroundings of the project, the owners and operators should consider opening certain areas of the wind farm for public recreation and enjoyment.*
QL0.0 Innovate Or Exceed Credit Requirements		
	51	

SUB CATEGORY:LEADERSHIP		
	Score	**CERRO DE HULLA WINDFARM, HONDURAS**
LD1.1 Provide Effective Leadership And Commitment	**9**	**Superior**
		By providing extensive documentation on this matter, the project team has proven a commitment to not only keep the wind farm's site and surroundings as they were originally found, but to also to improving them. These documents range from reforestation programs, plans to avoid the pollution of air, soil, and water before, during, and after the construction of the project, trash recycling, and rational use of resource programs to educate the surrounding community on issues and to develop community brigades to fight fires. In order to implement these, the project team started by developing a document listing their objectives, goals, and programs. Proof of the implementation of many of the above-mentioned plans and programs was extensively documented in the environmental measures report put together by an EEHSA team member.
		Source: *Energía Eólica de Honduras, Objetivos, Metas y Programas (Ambiente) (Honduras: EEHSA, 2013), 1-9.* *Scarleth Núñez, Informe de Cumplimiento de Medidas Ambientales ICMA (Honduras: EEHSA), 1-49.*
		RECOMMENDATIONS *Based on the extensive documentation provided on this matter, the project team seems to be meaningfully committed to the principles of sustainability and the improvement of the project's sustainable performance. In order to make sure these goals are achieved, the project team should consider producing periodic reports on the performance of the sustainable goals of the wind farm. Currently, only one document with an assessment of project sustainability goals could be found.*
LD1.2 Establish A Sustainability Management System	**7**	**Superior**
		The project team proves to be committed to create a system that can manage the complexities of a project focused on improving its sustainability performance. The wind farm management plan contains information on processes and management controls to monitor sustainability aspects of the project during its construction and during its operational phase. The plan establishes the operator's' obligation to produce frequent reports in order to achieve the project's sustainable goals. The roles and responsibilities of managing aspects of sustainability are well defined in an organizational chart, but there is no documentation regarding the expertise of each one of these project team members in their different areas.
		Source: *Scarleth Núñez, Informe del Cumplimiento de Medidas Ambientales ICMA (Honduras: EEHSA), 1-49.*
		RECOMMENDATIONS *A annual assessment of the sustainability performance of the project should be made in order to create a system allowing the project to improve its sustainability performance long term. Project owners and operators should make sure there is a high degree of clarity in the*

		environmental performance document regarding how sustainable aspects of the project are addressed. The measures taken should be divided into two: measures implemented before the construction phase, and measures implemented during project operation. Wind farm owners and operators should then consider subdividing these two groups into more specific categories.
LD1.3 Foster Collaboration And Teamwork	**1**	**Improved**
		No documentation provided by the project team explained whether collaboration existed between the different members of the team during the design phase of this project. Nonetheless, the design team did create a document with the contractor separate from a contract or agreement addressing the parameters the contractor needed to follow during the construction phase of the wind farm. In this document, the team addressed the contractors' responsibility both in terms of team and individual responsibilities (of each worker). These responsibilities ranged from environmental, health, and safety issues, to the adequate use of resources and the fulfillment of the code of conduct. No document could be found showing a contractual relationship with any proof of risk sharing between parties.
		Source: *Energía Eólica de Honduras, Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement, Exhibit B11 (Honduras: EEHSA), 1-11.*
		RECOMMENDATIONS *The project owners and operators should encourage teamwork at all levels of the project team in order to create one system and optimize the project's performance. One way of doing this is would be to organize meetings with the design team members to identify opportunities for improving the sustainable performance and design conflicts of the project even after its construction.*
LD1.4 Provide For Stakeholder Involvement	**5**	**Enhanced**
		Through the implementation of the "neighbors agreement" document the project owners and team have managed to keep an active engagement and dialogue with the inhabitants of the communities around the wind farm, local authorities, schools, and hospitals. This program consists of different approaches to the community such as visits to houses around the wind farm to inform the community about the project, public councils with the community at large, and constant communication via pamphlets and posters about work being done inside the wind farm. The project owners and operators have also implemented a plan to have close contact with members of the communities around the wind farm. This is done by each community electing a member to become the link between both the owners and the people. Certain needs of the communities have been identified by the project team members, though none of these had an impact on the design of the wind farm.
		Source: *Energía Eólica de Honduras, Proyecto Eólico Cerro de Hula: Acuerdo de Vecinos (Honduras: EEHSA, 2010, 2013), 1-6.* *Energía Eólica de Honduras, Proyecto Eólico Cerro de Hula: Plan de Desarrollo Comunitario (Honduras: EEHSA, 2011), 10.*
		RECOMMENDATIONS *Considering that the project was already built and the input of the community members had no impact on the design of the wind farm, the project team should consider entering a process where they improve per the needs of the population and make sure the majority of concerns are*

		addressed. If there are major issues, the owners should consider implementing modifications.
LD2.1 Pursue By-Product Synergy Opportunities	**0**	**No score**
		Even though the project team accounted for the recycling and reuse of different materials inside the wind farm and also expressed its compromise to obtain the resources needed for the construction of the project in nearby borrow banks, no document could be found proving that such initiative actually took place or specifying the amount of resources that were brought from one facility to be reused during the construction process of the wind farm.
		Source: *Scarleth Núñez, Manejo de Residuos No Peligrosos (Honduras: EEHSA, 2014), 4-10.* *Energía Eólica de Honduras, Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement, Exhibit A7 (Honduras: EEHSA), 6-10.*
		RECOMMENDATIONS *The project team should identify all nearby material borrow banks from which they could potentially secure unwanted by-product supplies to be used both during the maintenance and operation of the wind farm.*
LD2.2 Improve Infrastructure Integration	**7**	**Superior**
		The project team has made an effort to design a project that attempts to fully integrate itself into the surrounding communities' sustainability plans. The wind farm was designed to not only have internal optimal infrastructure performance but to also integrate itself with the existing infrastructure elements around the wind farm. Information on these matters can be found on the civil works parameters document where it is stated that only the public existing roads that were used during the construction phase will be provided maintenance for. It is also stated on this document that intersection of existing public roads and new roads being developed inside the wind farm were done to as to ensure full compliance with the Honduran Ministry of Public Works, Transportation & Housing (SOPTRAVI) requirements. The project owners have also implemented several programs to repair and replace certain existing infrastructure elements around the wind farm such as roads, footpaths, and drainage systems. All this was done to facilitate the correct flow of people, goods, and services to and from the wind farm, as expressed on the "good neighbors" document. The progress against the commitments made in some of these initiatives has been measured through periodical assessment evaluations, and in some instances these are accompanied by photographic evidence.
		Source: *Energía Eólica de Honduras, Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement, Exhibit A7 (Honduras: EEHSA), 22.* *Energía Eólica de Honduras, Parque Eólico Cerro de Hula: Plan de Mantenimiento Principal 2014 (Honduras: EEHSA, 2014), 9.* *Mauricio Almendarez, Reporte de Avance Mejoramiento de Cuneta Viviendas en Cofradia Acceso 13.0 Existente (Honduras: 2014), 1-2.* *Energía Eólica de Honduras, Informe Fotográfico Comportamiento Obras de Drenaje Área 13 (Honduras: EEHSA, 2014), 1-3.* *Energía Eólica de Honduras, Estudio y Diseño para el Mejoramiento del Callejón Peatonal de 3.00m de Ancho que Conduce de Aldea la Bodega a Cerritos Ayasta (Honduras: EEHSA, 2014), 1-16.* *Energía Eólica de Honduras, Proyecto Eólico Cerro de Hula: Acuerdo de Vecinos (Honduras: EEHSA, 2010, 2013), 4.*

		RECOMMENDATIONS *The project team should consider developing a thorough assessment of all existing infrastructural elements around the wind farm. The team should also define a plan to improve elements that will help the connectivity of the project to surrounding settlements and also improve the development capacity of the communities.*
LD3.1 Plan For Long-Term Monitoring & Maintenance	**3**	**Enhanced**
		A working plan for the long-term maintenance and monitoring of the wind farm was developed by the project team. Proof of this is to be found on the agreement signed by project owners and operators with the members of the neighboring communities. In this agreement the project owners agree on holding two-month maintenance periods every year, commit to keeping population around the wind farm informed, and maintaining access roads such that they are fully functioning. For all of 2014, a thorough maintenance plan was developed by the wind farm team defining four different groups of action but no specific personnel members were assigned any of those responsibilities. A document addressing a plan to measure and follow-up the original sustainability goals of the project and an organizational chart where specific team members are assigned specific tasks was also provided by the project team.
		Source: *Carol D. Zelaya, Plan de Gestión Ambiental (Honduras: Iberdrola, 2014), 10-11.* *Energía Eólica de Honduras, Proyecto Eólico Cerro de Hula: Acuerdo de Vecinos (Honduras: EEHSA, 2010, 2013), 6.* *Energía Eólica de Honduras, Parque Eólico Cerro de Hula: Plan de Mantenimiento Principal 2014 (Honduras: EEHSA, 2014), 1-13.*
		RECOMMENDATIONS *The project owners and operators should endeavor to confirm that the resources for the different maintenance plans are available when needed and that specific members of the personnel are assigned to the different responsibilities. This should then be reported in some specific document.*
LD3.2 Address Conflicting Regulations & Policies	**0**	**No score**
		There is no information available related to this credit.
		Source: *No sources available.*
		RECOMMENDATIONS *The project team should create an assessment to identify if there are any national laws, standards, regulations, or policies in Honduras that may unintentionally be creating barriers for the wind farm to achieve its sustainability goals, objectives, and practices.*
LD3.3 Extend Useful Life	**1**	**Improved**
		Few documents were provided by the owner where the importance of design addressing the flexibility, durability, and resilience of elements composing the wind farm could be identified. Such documents address the project owner's maintenance plans and take place every two years. Apart from the Civil Works Parameters' Quality Control and Safety Assurance section, addressing the quality standards for the concrete being used in the site during the construction

		phase, no document could be found proving that any other decisions were made in the design process to endeavour to extend its future useful life. The Civil Works Parameters is the only document that could be found proving the interest of the owners in designing a durable and resilient project. No documents could be found showing the wind farm designers' intentions to make a flexible project in order to enable an easy reconfiguration or refurbishment in the future.
		Source: *Energía Eólica de Honduras, Parque Eólico Cerro de Hula: Plan de Mantenimiento Principal 2014 (Honduras: EEHSA, 2014), 1-13.* *Energía Eólica de Honduras, Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement, Exhibit A7 (Honduras: EEHSA), 18-19.*
		RECOMMENDATIONS *The project team should consider making a feasibility study to determine which areas of the project are potentially long-term cost saving in regards to future expansions or reconfigurations of the wind farm. They should later use that study to develop a plan with alternative actions for those specific areas of the project.*
LD0.0 Innovate Or Exceed Credit Requirements		*N/A*
	33	

CATEGORY II: CLIMATE AND ENVIRONMENT		
RESOURCE ALLOCATION		
	Score	**CERRO DE HULLA WINDFARM, HONDURAS**
RA1.1 Reduce Net Embodied Energy	**0**	**No score**
		Before the start of the construction phase of the wind farm, the project team considered the quality and durability of the concrete used which helped in reducing the net embodied energy and will do so over the entire project life. This is the only material used in the construction or maintenance of the wind farm project for which a document was made. A document stating the importance of the rational use of materials during the construction and maintenance phases of the project was provided by the project team, but no document could be found addressing the importance in the extraction, processing, manufacturing, and transport of these materials from local suppliers. Therefore, since no documentation was provided confirming that the project team carried out a life cycle assessment prior to the construction of the wind farm, no points can be given in this credit. In order to receive this credit, the team would have had to estimate the net embodied energy of each of the materials used in its construction.
		Source: *Energía Eólica de Honduras, Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement, Exhibit A7 (Honduras: EEHSA), 18-19.*

		Scarleth Núñez, Uso Racional de Recursos y su Conservación (Honduras: EEHSA, 2013), 1-9.
		RECOMMENDATIONS *Considering that the wind farm has already been built, the project owners and operators should consider implementing these strategies to reduce the net embodied energy of the materials being used during the maintenance periods that take place every two years.*
RA1.2 Support Sustainable Procurement Practices	**2**	**Improved**
		Even though the project team proved to have procurement policies and criteria for the use of suppliers that implemented sustainable practices, no proof was found addressing the targets set by the project team or the percentage of materials obtained from these sources. As stated in the environmental management plan provided by the project team, both the contractor and the material suppliers were provided all documents concerning the legal environmental policies to be implemented while working in the site. It was also stated that both contractors and suppliers collaborating on the construction of the wind farm would be trained on these matters. On the EHS requirements document provided to the contractor, the owner establishes that the contractor is responsible for ensuring that all soil materials required for construction are sourced from reputable suppliers with valid licenses and permits to extract and sell soil materials. It is not stated on this document that other kinds of construction materials such as wood or metal need to comply with these requirements.
		Source: *Carol D. Zelaya, Plan de Gestión Ambiental (Honduras: Iberdrola, 2014), 9.* *Energía Eólica de Honduras, Owner's EHS Requirements, Exhibit B-11 (Honduras: EEHSA), 6.*
		RECOMMENDATIONS *For the future maintenance of the wind farm, the project team should consider using a larger amount of materials and supplies provided by local suppliers whose products meet the required sustainable procurement policies that the wind farm team has set.*
RA1.3 Used Recycled Materials	**2**	**Improved**
		The percentage of recycled materials being reused in the construction and operation of the wind farm is below 20% of the total volume of materials used. The project team provided several documents with inventories designating the different types of materials that could potentially be reused and determining the best and safest way to make use of them. Some of the materials identified were stone, wood, metal, and industrial water. Nonetheless, no document provided by the project team specifically addressed the amount of recycled materials that have been used during the construction and operation phases of the wind farm.
		Source: *Scarleth Núñez, Uso Racional de Recursos y su Conservación (Honduras: EEHSA, 2013), 3-6.* *Scarleth Núñez, Manejo de Residuos No Peligrosos (Honduras:EEHSA, 2013), 10.* *Scarleth Núñez, Manejo de Residuos Peligrosos (Honduras:EEHSA, 2013), 8-9.*
		RECOMMENDATIONS *The project team should consider increasing the percentage of recycled materials being reused in the daily operation of the wind farm. It is important to remember that all materials being reused should meet the necessary quality and performance criteria required for their intended application.*

RA1.4 Use Regional Materials	**0**	**No score**
		No documentation was found identifying that the materials used in the construction and operation of the wind farm come from regional suppliers or the place of provenance and exact amount of the materials used. In accordance with the environmental objectives mentioned in the environmental management plan document, the project owners and project contractors opened, operated, and shut down their own material extraction site and concrete plant during the construction phase. This contributed to the obtaining of soils, aggregate, cement, and other materials through local sources. This was due to the scale, location of the project, and the scarcity of material suppliers around the wind farm.
		Source: *Carol D. Zelaya, Plan de Gestión Ambiental (Honduras: Iberdrola, 2014), 6.*
		RECOMMENDATIONS *Considering that the wind farm has already been built and is in operation, the project team should work towards increasing the use of regional materials for the maintenance and repair phases of the project in the future. In order to achieve this goal, the project team should consider making an inventory of locally sourced materials.*
RA1.5 Divert Waste From Landfills	**0**	**No score**
		Even though the project team did have plans to reduce the quantity of waste generated during construction, no detailed information addressing the procedures that were actually implemented could be found and will thus the team will not receive any score in this category. Nonetheless, the project team has made a great effort to put together a document to address the requirements for the management of dangerous and non-dangerous residual materials and their possible reuse during the operation and maintenance phases. As explained in this document, dangerous residual materials are all solid, liquid, or gas materials that given their chemical reactivity or their toxic, explosive, corrosive, radioactive, biological, or flammable quality could potentially be a hazard to human health or to the environment. On the other hand, non-dangerous materials are defined in this document as all residual materials that are produced at houses or during any commercial, service, or industrial activity. However, no information could be found identifying the member of the project team who would was responsible for the implementation of these measures and where the end destination for the different types of waste was located.
		Source: *Scarleth Núñez, Manejo de Residuos No Peligrosos (Honduras: EEHSA, 2013), 10-11.* *Scarleth Núñez, Manejo de Residuos Peligrosos (Honduras: EEHSA, 2013), 9-10.*
		RECOMMENDATIONS *The project owners and operators should implement plans and strategies to minimize the generation of waste on the wind farm. Having minimized the amount of waste produced, the project team should identify and evaluate the possible options for recycling and reuse of the waste being produced, both inside and outside the wind farm.*
RA1.6 Reduce Excavated Materials Taken Off Site	**0**	**No score**
		From the design stages of the project and due to its scale and location in relation to urban centers in Honduras, the project team decided to open, operate, and later shut down dumps where they could deposit excavated materials from the construction works in order to reduce

		the transportation of excavated materials off site. However, no document provided by the project team confirmed whether these dumps were located inside the wind farm or on the outskirts of its premises. The reuse of general fill is addressed on the civil works parameters document provided by the project team, where it is stated that this material will be reused for backfill in trenches for electrical ductwork and drainage pipes. However, no other document could be found where the project owner addresses the reuse of any other material.
		Source: *Carol D. Zelaya, Acciones de Apertura, Operación y Abandono en "Escombrera 13-2" (Honduras: Iberdrola, 2014) 9-19.* *Energía Eólica de Honduras, Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement, Exhibit A7 (Honduras: EEHSA), 8-9.*
		RECOMMENDATIONS *During the planning and design of the wind farm, the project team should have identified whether a portion of the excavated materials were suitable for reuse in the construction works. Considering that the wind farm is already in operation, the project team should implement a strategic reuse plan for the materials excavated during maintenance and renovation works.*
RA1.7 Provide for Deconstruction & Recycling	**0**	**No score**
		No documents provided by the project team confirmed that from the beginning the project it was designed to consider the future recycling, up-cycling, and reuse of the elements that compose it. The project team has made some efforts to reuse some of the materials extracted during the construction and recycle some of the waste produced by the operation of the wind farm. However, no documents were provided by the project team addressing the potential deconstructability of the wind farm's built work in order to enable its materials and equipment to be reused and up-cycled.
		Source: *Energía Eólica de Honduras, Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement, Exhibit A7 (Honduras: EEHSA), 8-9.*
		RECOMMENDATIONS *The project team should consider making an inventory to identify which are the materials that could potentially be disassembled and reused in the case of deconstruction of the wind farm. A document containing a plan and arrangements to identify and track those materials throughout the wind farm should be made.*
RA2.1 Reduce Energy Consumption	**3**	**Improved**
		The project team provided one document concerning the planned reduction in energy consumption during the operation and maintenance of the wind farm, but no other references were provided for the planning and design phases of the project. Apart from the document addressing the parameters for the use of resources provided by the project team, no other document could be found where the project team attempted to reduce the energy consumed by the operation and maintenance of the wind farm. None of the energy needed for the operation of the project is provided by renewable energy yet. However, it is expected that by the end of 2014 the project's main energy source will be produced by one of the 2MW turbines on the wind farm, even though the project team did not provide specific documentation confirming whether this plan has already been implemented.

		Source: *Scarleth Núñez, Uso Racional de Recursos y su Conservación (Honduras: EEHSA, 2013), 3.*
		RECOMMENDATIONS *The document addressing the rational use of resources in the construction and operation of the wind farm should be more detailed and explicit about the measures to reduce energy consumption and consider providing incentives for those who comply with these requirements.*
RA2.2 Use Renewable Energy	**20**	**Restorative**
		As mentioned in one of the documents provided by the project team by the end of 2014 the energy needs for the operation of the wind farm will be met by using the energy produced by one of the turbines on the wind farm. Although the project team did not provide any documentation confirming that this plan is already being implemented, the project's efforts on this category will be considered restorative, as the amount of renewable energy produced by the wind farm's turbines is certainly much bigger than the non-renewable energy being used for the operation of the project.
		Source: *United Nations Framework Convention on Climate Change, Project Design Document Form for CDM Project Activities (United Nations Clean Development Mechanism, 2012), 1.*
		RECOMMENDATIONS *It should be the goal of the project team to entirely cover the energy needs for the operation of the wind farm through the use of the energy produced by the wind turbines inside the farm.*
RA 2.3 Commission & Monitor Energy Systems	**3**	**Enhanced**
		The project team provided several documents confirming their periodical monitoring of the performance of the wind farm in order to achieve the most efficient functioning energy levels possible. According to these documents, the periodical monitoring of the energy systems of the wind farm would be done by a designated member of the project team and is not planned to be commissioned to a third party. There would also be a member of the internal team of the project in charge of verifying that the environmental management plan is followed, although it isn't clear if this plan considers the periodical monitoring of the energy systems throughout the wind farm. However, the project team did not provide any documentation confirming any performance improvements derived from the implementation of these measures.
		Source: *Carol D. Zelaya, Plan de Gestión Ambiental (Honduras: Iberdrola, 2014), 5.* *Scarleth Núñez, Informe de Cumplimiento de Medidas Ambientales ICMA (Honduras: EEHSA), 46-49.*
		RECOMMENDATIONS *Even though the interest in periodically monitoring the energy systems of the wind farm is briefly mentioned throughout different documents provided by the project owner, the project team should consider creating a document specifically for this purpose and consider commissioning an external monitoring team to ensure that the project will achieve and maintain high levels of energy efficiency.*
RA3.1 Protect	**4**	**Enhanced**

Fresh Water Availability		According to several documents provided by the project team, the wind farm was designed considering a rational water usage both during the construction phase and later during its operation. One of the documents provided by the project owner addressed the measures to be undertaken by the project team in order to avoid polluting fresh water reservoirs, and the different methods with which grey and recycled water would be treated for its reuse. According to the information provided by the project team, there is almost no superficial fresh water available in the area; thus, in order to obtain it the project owner is required to drill deep water wells. However, no documentation provided by the project team confirmed that these wells were indeed drilled, addressing their location or their water capacity. The project team has also developed a thorough plan to manage waste and residues that could potentially pollute the immediate environment, in this case freshwater reservoirs.
		Source: *Scarleth Núñez, Uso Racional de Recursos y su Conservación (Honduras: EEHSA, 2014), 4.* *Scarleth Núñez, Control de Vertidos al Agua (Honduras: EEHSA, 2014), 1-5.* *Scarleth Núñez, Manejo de Residuos Peligrosos (Honduras: EEHSA, 2014), 1-18.*
		RECOMMENDATIONS *The project team should conduct a water availability assessment in the area to have a better understanding of the location of all available fresh water sources and make sure the project is having no negative impact on them.*
RA3.2 Reduce Potable Water Consumption	**4**	**Improved**
		Several documents provided by the project team addressed their commitment to reduce potable water consumption and to encourage the use of grey and recycled water during the construction and the operation phases of the wind farm. From the onset of project design, the owners made it an objective to implement procedures for the rational use of resources, emphasizing the use of potable water. On a later document created specifically for the operation phase of the wind farm, the project owners insisted on the reasoned use of this resource, while also advising the operating team to be diligent informing authorities about leaks. However, no documentation provided by the project team confirmed whether these measures are being implemented and whether the percentage in the reduction of potable water consumption has been positively impacted by these measures.
		Source: *Energía Eólica de Honduras, Objetivos, Metas y Programas (Ambiente) (Honduras: EEHSA, 2013), 5.* *Scarleth Núñez, Uso Racional de Recursos y su Conservación (Honduras: EEHSA, 2014), 4.*
		RECOMMENDATIONS *Even though the project owners have made sure that all people involved in the construction and operation of the wind farm are informed of their use of water policies, they should be more specific about the measures that operators can easily implement everyday at work.*
RA3.3 Monitor Water Systems	**1**	**Improved**
		As part of the operation requirements addressed on the rational use of resources in the wind farm, the project owners listed that all wells from which water was extracted needed to not only comply with national legislations and regulations, but their use and performance needed to be monitored to meet sustainability goals as well. As explained by the project team on the document addressing the control measures to avoid spills to water bodies, an environmental

		coordinator was needed to monitor the success of the implementation of these measures at least every 12 months. There were no documents to be found proving that these monitoring of the water systems are happening.
		Source: *Scarleth Núñez, Uso Racional de Recursos y su Conservación (Honduras: EEHSA, 2014), 4.* *Scarleth Núñez, Control de Vertidos al Agua (Honduras: EEHSA, 2014), 5.*
		RECOMMENDATIONS *The project team should make sure reports are made after the monitoring of flows and usage of the water systems is done every 12 months in order to make sure that the project is meeting its environmental goals.*
RA 0.0 Innovate Or Exceed Credit Requirements		*N/A*
	39	
NATURAL WORLD		
	Score	**CERRO DE HULLA WINDFARM, HONDURAS**
NW1.1 Preserve Prime Habitat	**18**	**Restorative**
		According to the Honduran law for forests, protected areas, and wildlife, which the project has been designed to align with, all projects designed to be within natural environments should be placed at least 100 meters (around 328 feet) away from water reservoirs, protected forests, and/or wildlife preserves. However, no document was found confirming whether the project was designed considering these buffer zones. There was also no document to be found that would address whether the area where the project's site is located was considered a prime habitat area by law before the construction of the wind farm. Due to the location of the wind farm in a rural setting, the cutting down of a significant number of trees during the construction phase of the project was unavoidable. However and to balance this negative impact on the surrounding forests, the project team together with environmental authorities worked on an extensive reforestation program named 10:1, for its premise to plant 10 trees for each tree cut down during the construction of the wind farm. As such, this program more than only preserving the natural habitat around the wind farm, it restores it. The decision for the location of these new trees and the different types of species —such as, ornamental, fruit, and timber-yielding species— was made through an assessment of the state of the natural habitat around the wind farm and together with different members of the communities and with authorities from the Ministry of Natural Resources and Environment (SERNA). Both entities also agreed on creating a yearly report to monitor the progress of the works of this plan.
		Source: *Congreso Nacional República de Honduras, Ley Forestal, Áreas Protegidas y Vida Silvestre (Honduras: Congreso Nacional República de Honduras, 2007), Art. 122, Art. 123, Art. 124.* *Rudy Hernández, Plan de Reforestación (Honduras: EEHSA, 2014), 7.*

		Rudy Hernandez, Informe Anual de Avance en el Cumplimiento de Medida de Compensación Forestal 10:1, Etapa 2013 (Honduras: EEHSA, 2013), 1-24.
		RECOMMENDATIONS *The project team should consider getting involved in the restoration of habitat in or around the site of the project as determined by a qualified professional.*
NW1.2 Preserve Wetlands and Surface Water	**14**	**Conserving**
		According to the documents provided by the project team, there are no wetlands or significant water bodies inside or around the site of the wind farm which currently consists mainly of low lying shrubs and trees. Given the fact that there are no significant water bodies within the area of the project, there were no mentions of the implementation of a buffer zone between the wind farm's infrastructure and the existing wetlands. Nonetheless, the project team did address the need for the creation of a 150-meter (490 feet) buffer zone of this kind for the scenario in which infrastructure was to be built near a water body.
		Source: *Scarleth Núñez, Informe del Cumplimiento de Medidas Ambientales ICMA (Honduras: EEHSA), 43, 45.*
		RECOMMENDATIONS *Not applicable.*
NW1.3 Preserve Prime Farmland	**0**	**No score**
		No document provided by the project team addressed whether the wind farm occupied any type of farmland or whether before its construction the site's soil had been classified by legal instances as prime farmland, unique farmland, or farmland of statewide importance.
		Source: *No sources available.*
		RECOMMENDATIONS *Not applicable.*
NW1.4 Avoid Adverse Geology	**5**	**Conserving**
		An assessment of the geology of the site where the project is located was developed by a consultant and it determined that since the rocky substrate is very shallow the type of foundations that the turbines would have to have would be superficial. It's also mentioned that above the rocky substrate there is a 2 to 3 meters high substrate composed mostly of grubbed and organic material —not suitable to bare any loads— and that in neither of the tests made to the soil was there found any groundwater. No adverse geologic formations or natural hazards to the construction or operation of the wind farm were to be found, therefore the project is considered to be located in a safe area.
		Source: *Raúl Flores Peñalba, Informe Geológico - Geotécnico "PE Cerro de Hula 2" (Tegucigalpa: GeoConsult S.A. de C.V., 2012), 28-31.*
		RECOMMENDATIONS *Not applicable.*

NW1.5 Preserve Floodplain Functions	**0**	**No score**
		The project was built on land that was classified as shrubby and agrarian. Even though the project team claims that the structures built on the site do not alter floodplains for waterways, on a photographic report of the drainage built works, it is evident how the waterways are not draining properly and thus causing small floods around the premises of wind turbines. Nonetheless, the project team has listed "flooding" as one of the possible dangers to the wind farm.
		Source: *Luis Rivera, Identificación de Peligros, Evaluación de Riesgos y Determinación de Controles (Honduras: EEHSA, 2013), 14.*
		RECOMMENDATIONS *The project team should make sure that all built works inside the wind farm are preserving floodplain functions.*
NW1.6 Avoid Unsuitable Development on Steep Slopes	**1**	**Improved**
		The project team has been careful to avoid excessive erosion of the ground on the site, proof of this can be found on the erosion control document provided by the project team. In this document the team goes into detail about the correcting measures and procedures to be taken in the case that the soil of the wind farm experiences any kind of erosion. However, these are measures that are being implemented post-completion of the construction works and no assessment on these matters for the selection of the site was made during the design stages of the project.
		Source: *Carol D. Zelaya, Control de Erosión (Honduras: Iberdrola, 2014), 1-22.*
		RECOMMENDATIONS *The project team should have considered the possible effects of erosion to the ground occasioned by the project to the ground right from its design phase in order to choose an appropriate location for it and not only as a response to possible erosion caused by the construction works.*
NW1.7 Preserve Greenfields	**0**	**No score**
		As stated on the general report for occupied areas the building footprint of the project is small, around 40 hectares, which represents less than 11% of the total surface of the property. However, the project did not get built on any greyfield or brownfield sites. Instead, the wind farm was entirely built on a greenfield. The Ministry of Natural Resources and Environment (SERNA) ratified that the land where the project is located is not a part of the protected areas integrated to SINAPH (Sistema Nacional de Áreas Protegidas de Honduras), the Honduran National System of Protected Areas.
		Source: *Rudy Hernández, Informe General de las Áreas Ocupadas las Estructuras del Parque Eólico Cerro de Hula (Honduras: EEHSA, 2013), 1.* *Secretaria de Recursos Naturales y Ambiente (SERNA), Resolución SERNA 1330-2012 (Tegucigalpa: SERNA, 2012), 1.*

		RECOMMENDATIONS *Not applicable.*
NW2.1 Manage Stormwater	**0**	**No score**
		According to the documents provided by the project team, the project was not designed to restore stormwater runoff nor has it lead to an improvement in water storage capacity. However, the finished project does not significantly alter local drainage patterns.
		Source: *No sources available.*
		RECOMMENDATIONS *The project team should implement a stormwater management program designed to capture and repurpose stormwater on-site as part of the overall water management regime.*
NW2.2 Reduce Pesticides and Fertilizer Impacts	**5**	**Superior**
		Pesticides and fertilizers are scarcely used inside the wind farm as part of the 10:1 reforestation plan currently being implemented by the project team on an extended area of the wind farm's site. This plan is intended to compensate for the project's negative impact on the trees on the site. By implementing this plan, the project team agreed on planting 10 trees for each tree being cut down due to construction work, thus, in order to be able to grow this number of trees the project owners decided to start a nursery where they would grow local species of trees that would later be planted throughout the wind farm. It is only for this purpose that the project team makes use of fertilizers, although they state on a document provided by themselves that due to the quick adaptation of local tree species to the type of ground of the wind farm the use of fertilizers is unnecessary.
		Source: *Rudy Hernández, Plan de Reforestación (Honduras: EEHSA, 2014), 9,13,16.*
		RECOMMENDATIONS *The project team should consider reducing the amount of pesticides and fertilizers inside the wind farm by instead trying to increase the use of composting.*
NW2.3 Prevent Surface and Groundwater Contamination	**1**	**Improved**
		The project team's interest in protecting surface water systems through the implementation of different plans and measures is reaffirmed by a series of documents in which they identified and extensively described a number of plans to detect, handle, and transport different types of dangerous and non-dangerous residues on site, to plans of action for the case of an environmental emergency caused by the spills and leaking.
		Source: *Scarleth Núñez y Luis Rivera, Plan de Respuesta a Emergencias (SIstema Integrado de Gestión) (Honduras: EEHSA, 2013), 24, 35-37.* *Scarleth Núñez, Manejo de Productos Peligrosos (Honduras: EEHSA, 2013), 1-14.* *Scarleth Núñez, Manejo de Residuos Peligrosos (Honduras: EEHSA, 2014), 1-18.* *Scarleth Núñez, Manejo de Residuos No Peligrosos (Honduras: EEHSA, 2014), 1-13.* *Scarleth Núñez, Control de Vertidos al Agua (Honduras: EEHSA, 2013), 1-5.*

		RECOMMENDATIONS *The project team should extend their protection plans to also implementing measures to clean up natural environments that might have potentially been contaminated in and around the wind farm before the wind farm was built. They should also consider instituting more descriptive land use controls to protect the area from future contamination sources.*
NW3.1 Preserve Species Biodiversity	**13**	**Conserving**
		The project team has made an effort to identify existing habitats in and around the project site and protect them from possible damages caused by this new infrastructure. Proof of this can be found in the documents provided by the team listing the different native flora and fauna they identified, planned to preserve, and, if possible, restore. The native species to be protected are identified in the ecosystems conservation document with a list of animals that range from flying species to terrestrial fauna. The species that concern the project owners the most are evidently flying species such as birds and bats due to the danger of the turning of the blades of the wind turbines represent to them. The project team's plans for the preservation of habitats such as forests is addressed on the reforestation document, which when fully implemented, will have restored the largest natural habitat inside the wind farm. Both of these approaches to the preservation and restoration of the species and habitats in and around the wind farm will be monitored by an expert who will create a report at least every 12 months as expressed by the project team.
		Source: *Scarleth Núñez, Conservación de Ecosistemas (Sistema Integrado de Gestión) (Honduras: EEHSA, 2013), 1-6.* *Rudy Hernández, Plan de Reforestación (Honduras: EEHSA, 2014), 1-18.* *Rudy Hernandez, Informe Anual de Avance en el Cumplimiento de Medida de Compensación Forestal 10:1, Etapa 2013 (Honduras: EEHSA, 2013), 1-24.*
		RECOMMENDATIONS *The project team should consider collaborating on these plans with the state and the local agencies in order to identify all species and habitats in and around the project site. They should also consider not only protecting and/or upgrading existing habitats, but also restoring and even creating new habitats.*
NW 3.2 Control Invasive Species	**5**	**Superior**
		The project team has shown a commitment to implementing reforestation plans where only locally appropriate and non-invasive plants are used. Thorough studies of local and native species were developed by the project owners and can be found in the reforestation plan document that addresses aspects that range from the selection of species, their production in the nursery, the selection of their location, and the design of their arrangement on the site. Included was also the species maintenance and protection once planted. To monitor the works done for this long-term plan, the project team developed the first of several annual reports in the year 2013 to report on the progress made to date. The project owners have no plans of implementing a project to identify, control, and/or eliminate the potential invasive species around the site, claiming that the majority of the species used in the implementation of the plan are indigenous or non-invasive.
		Source: *Rudy Hernández, Plan de Reforestación (Honduras: EEHSA, 2014), 6-8.* *Rudy Hernandez, Informe Anual de Avance en el Cumplimiento de Medida de Compensación*

		Forestal 10:1, Etapa 2013 (Honduras: EEHSA, 2013), 1-24.
		RECOMMENDATIONS *The project team should consider developing an assessment of the current state of the habitat in and around the wind farm in order to determine whether any future potential invasive flora and fauna species can be found. If found, the team should implement a plan to eradicate them.*
NW3.3 Restore Disturbed Soils	**8**	**Conserving**
		As described in the civil works parameters document provided by the project team, all soils disturbed during the construction phase of the wind farm were planned to be restored. More than simply explaining that all excavated material was to be reused during the construction of the project, this document explains in greater detail which parts of this material were suitable for certain procedures and which were not. For example, the top layer of soil containing the grubbed and organic material was listed as a part of the excavated materials not suitable for the covering of foundations after concrete was poured, but instead are suitable for the landscaping and restoration of the topsoil of other affected areas. Other specifications regarding the spreading of excavated materials and proper compaction of the soil in order to avoid erosion is also addressed on this document.
		Source: *Energía Eólica de Honduras, Civil Works Parameters: To Turnkey Engineering, Procurement, and Construction Agreement (Honduras: EEHSA), 5-11.*
		RECOMMENDATIONS *The project team should consider not only restoring soils that were disturbed during construction works in the site but also restoring soils that might have been disturbed by development before the construction of the wind farm.*
NW3.4 Maintain wetland and surface water functions.	**0**	**No score**
		Given the fact that wind farm activities will be concentrated on approximately 11% of the total surface of the site; ecosystem functions of streams, wetlands, water bodies, and their riparian areas will not be affected by the project. However, there is no specific documentation provided by the project team identifying that these ecosystem functions have indeed not been impacted by the construction and operation of the wind farm.
		Source: *Rudy Hernández, Informe General de las Áreas Ocupadas las Estructuras del Parque Eólico Cerro de Hula (Honduras: EEHSA, 2013), 1.*
		RECOMMENDATIONS *A document should be created where the project team addresses the existing streams, wetlands, water bodies, and their riparian areas located around the wind farm and their state before and after the construction of the project.*
NW 0.0 Innovate Or Exceed Credit Requirements		*N/A*
	70	

CLIMATE AND RISK		
	Score	**CERRO DE HULLA WINDFARM, HONDURAS**
CR1.1 Reduce Greenhouse Gas Emissions	**25**	**Restorative**
		According to the Project Design Document Form issued by the United Nations Framework Convention on Climate Change, the Cerro de Hula wind farm will have an emission reduction of 262,688 of CO2 equivalency (CO2e) to the atmosphere every year. Apart from that, carbon sequestration —in which CO2 is removed from the atmosphere and deposited in a reservoir, typically deep within the earth where it cannot reach the atmosphere— will also come in the form of planting new forests as part of the 10:1 reforestation plan, which will help absorb and use the CO2 for their growth.
		Source: *United Nations Framework Convention on Climate Change, Project Design Document Form for CDM Project Activities (United Nations Clean Development Mechanism, 2012), 1.* *Rudy Hernández, Plan de Reforestación (Honduras: EEHSA, 2014), 7.*
		RECOMMENDATIONS *In the control of emissions to air document the project team briefly addresses their plans to identify and reduce the wind farm's emission of gasses to the atmosphere that enhance the greenhouse effect during the operation phase of the project. Since no other documents could be found where these issues were addressed with more detail, the project owners should consider developing a comprehensive life-carbon analysis to estimate the carbon emissions generated by the operation of the wind farm, and later using this assessment to create a plan to minimize the project's emissions to reduce the wind farm's contribution to climate change.*
CR1.2 Reduce Air Pollutant Emissions	**2**	**Improved**
		The project team has made an effort to identify and reduce the emission of a number of air pollutants during the operation and maintenance of the wind farm. Proof of this is in the "control of emissions to air" document in which they have listed the different air pollutants that might potentially be released into the atmosphere by different activities inside the wind farm. Identified are particulate matter or dust, liquid and gas particles coming from vapor, emissions from fire prevention systems, gas emissions from vehicles, emissions from the burning of vegetation and residues, etc. The progress against the commitments made through some of these plans has been measured through assessment evaluations that are sometimes accompanied by photographic evidence.
		Source: *Scarleth Núñez, Control de Emisiones al Aire (Honduras: EEHSA, 2014), 3-6.*
		RECOMMENDATIONS *In addition to identifying and implementing measures in order to minimize the emission of air pollutants, this document also addresses the need for a periodical assessment of the implementation of these procedures to make sure these measures are having a positive impact.*
CR2.1 Assess	**0**	**No score**

Climate Threat		No information has been provided addressing climate change threats.
		Source: *No sources available.*
		RECOMMENDATIONS *The project team should take into consideration the risks that climate change poses to any infrastructure project and therefore create a comprehensive climate impact assessment in order to develop a response plan in the case of an abrupt change in climate in the area around the wind farm.*
CR2.2 Avoid Traps And Vulnerabilities	**0**	**No score**
		No information has been provided on the kind of vulnerabilities that could affect the project area or the long-term cost associated with it.
		Source: *No sources available.*
		RECOMMENDATIONS *All vulnerabilities that have been looked at thus far by the project team that could cause a potential impact the project in the future are all short-term risks that do not take into account potential climate threats and/or infrastructure traps such as long-term operational costs. Therefore, the project team together with the surrounding community should consider creating a comprehensive assessment of the traps and vulnerabilities of the wind farm's infrastructure and the resources demands and supplies.*
CR2.3 Prepare For Long-Term Adaptability	**0**	**No score**
		No information has been provided addressing the creation of a more resilient infrastructure as a strategy to fight climate change.
		Source: *No sources available.*
		RECOMMENDATIONS *In the documentation provided by the project team there was no information to be found where they address how, during the design process of the wind farm, the project team considered the resiliency of the infrastructure of the project in response to climate change. Thus, the project team should make an assessment to evaluate the parts of this infrastructure that may not be able to function adequately under altered climate condition. They should do this by considering possible structural changes, the incorporation of different infrastructural systems to the existing system such as "green infrastructure" systems, and finding alternative resource supply options.*
CR2.4 Prepare For Short-Term Hazards	**0**	**No score**
		Even though short-term environmental hazards such as earthquakes, flooding, fires, and man-made hazards such as material spills are identified by the project team as potential threats to the wind farm and the communities around it; no preparation or response plan could be found addressing the procedures to be undertaken in the case that these threats would occur. No information has been provided according to the improvement in protection measures to prevent natural and short-term hazards beyond regulations.

		Source: *GAMESA, CERRO DE HULA II: Wind Farm Environmental Emergency Response Plan (Honduras: GAMESA), 1-7.*
		RECOMMENDATIONS *The project team should consider creating a document where they not only identify these threats, but thoroughly explain how operators and the community at large should prepare and adapt to the potential impacts of these hazards.*
CR2.5 Manage Heat Island Effects	**0**	**No score**
		Heat island effect is caused by asphalt on streets and concrete on building walls and roofs absorbing heat and later emitting it. The wind farm will not be set in a paved urban setting, nor will a considerable amount of its site be covered in paving material. The wind farm is set in a rural field planted with low vegetation and no heat island effect could be produced there, the credit is thus not applicable.
		Source: *No sources available.*
		RECOMMENDATIONS *Not applicable.*
CR0.0 Innovate Or Exceed Credit Requirements		*N/A*
	27	
OVERALL:	**220**	**CERRO DE HULA WIND FARM**

APPENDIX E: SOURCES

DOCUMENTATION PROVIDED
General Information.
Alana Paul, Procedimiento de Resolución de Inconformidades (Honduras: EEHSA, 2011).
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Energía Eólica de Honduras, Donaciones 2013: Ecofogones (Honduras: EEHSA, 2013).
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Energía Eólica de Honduras, Proyecto Eólico Cerro de Hula: Plan de Desarrollo Comunitario (Honduras: EEHSA, 2011).
Luis Rivera, Identificación de Peligros, Evaluación de Riesgos y Determinación de Controles (Honduras: EEHSA, 2013).
Energía Eólica de Honduras, Expansión of the Cerro de Hula Wind Plant: Exhibit B-11, Owner's EHS Requirements (Honduras: EEHSA).
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Energía Eólica de Honduras, Informe Fotográfico Comportamiento Obras de Drenaje (Honduras: EEHSA).
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Rudy S. Hernandez, Informe Anual de Avance en el Cumplimiento de Medida de Compensación Forestal 10:1, Etapa 2013 (Honduras: EEHSA, 2013).
Energía Eólica de Honduras, Objetivos, Metas y Programas (Ambiente) (Honduras: EEHSA, 2013).
Scarleth Núñez, Informe de Cumplimiento de Medidas Ambientales ICMA (Honduras: EEHSA).
Scarleth Núñez, Manejo de Residuos No Peligrosos (Honduras: EEHSA, 2014).
Mauricio Almendarez, Reporte de Avance Mejoramiento de Cuneta Viviendas en Cofradia Acceso 13.0 Existente (Honduras: 2014).
Energía Eólica de Honduras, Estudio y Diseño para el Mejoramiento del Callejón Peatonal de 3.00m de Ancho que Conduce de Aldea la Bodega a Cerritos Ayasta (Honduras: EEHSA, 2014).
Carol D. Zelaya, Plan de Gestión Ambiental (Honduras: Iberdrola, 2014).
Scarleth Núñez, Uso Racional de Recursos y su Conservación (Honduras: EEHSA, 2013).
Energía Eólica de Honduras, Owner's EHS Requirements, Exhibit B-11 (Honduras: EEHSA).
Scarleth Núñez, Manejo de Residuos Peligrosos (Honduras:EEHSA, 2013).

Carol D. Zelaya, Acciones de Apertura, Operación y Abandono en “Escombrera 13-2” (Honduras: Iberdrola, 2014).
United Nations Framework Convention on Climate Change, Project Design Document Form for CDM Project Activities (United Nations Clean Development Mechanism, 2012).
Scarleth Núñez, Control de Vertidos al Agua (Honduras: EEHSA, 2014).
Congreso Nacional República de Honduras, Ley Forestal, Áreas Protegidas y Vida Silvestre (Honduras: Congreso Nacional República de Honduras, 2007).
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Secretaria de Recursos Naturales y Ambiente (SERNA), Resolución SERNA 1330-2012 (Tegucigalpa: SERNA, 2012).
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Scarleth Núñez, Control de Emisiones al Aire (Honduras: EEHSA, 2014).
GAMESA, CERRO DE HULA II: Wind Farm Environmental Emergency Response Plan (Honduras: GAMESA).