

AURA SOLAR I PHOTOVOLTAIC PLANT- MEXICO



Figure 01: General photo of project / Source: Aura Solar, Línea de Tiempo, p. 4.

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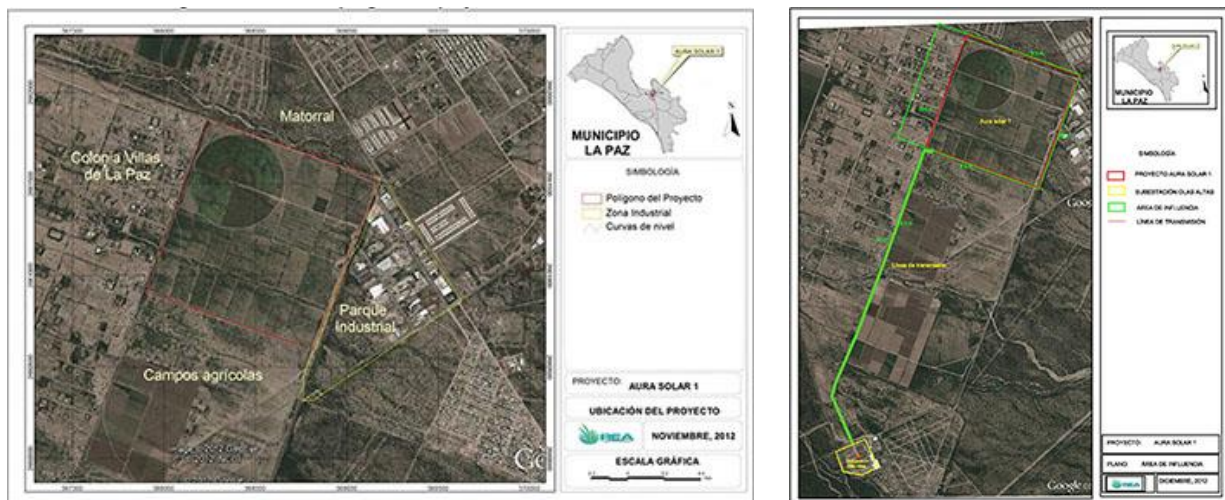
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1. PROJECT INTRODUCTION

This case study outlines the evaluation of the project Aura Solar I, a solar photovoltaic facility in La Paz, Mexico. The project is owned by Corporación Aura Solar, and is being developed by Gauss Energía, the largest photovoltaic plant in Mexico and the first one built as utility-scale. It is composed of a 100-hectares site with 132,000 polycrystalline photovoltaic single-axis panels, an administrative area, and an electrical substation. The project will be connected to the Mexican state-owned electric utility grid, the Comisión Federal de Electricidad (CFE), by a 2.9 km high tension cable of 115 kV. The plant will hold an installed capacity of 30 MW and will generate 81.5 GWh per year to the Olas Altas substation, the equivalent of powering 32,000 households, or 60% of La Paz. The project involves three phases: construction, operation, and dismantling, and has an expected lifespan of 25 years. Construction of the solar facility began in January 2013 and operations began in September 2013. The total project cost of US \$100 million was funded with \$25 million in equity from Corporación Aura Solar and \$75 million in debt through loans from the International Finance Corporation (IFC) and the Nacional Financiera of the Mexican Federal Government (NAFIN).

2. PROJECT DESCRIPTION & LOCATION

Aura Solar I is located in La Paz, Baja California Sur, in Lot 4 of the Predio Olas Altas. The project site surroundings are comprised of a combination of industry, agriculture, and residential communities. It borders on the west side with the residential community of Villas de La Paz, which is located at a 23 meter distance and has a population of 84 residents, on the east side with the Alberto Alvarado Arámbulo industrial park, which is located 14 meters away from the site and houses 7 residents, on the southern side with agricultural lands, and on the north side with open land, as seen in Figure 2.



Figures 02 and 03: General map of Aura Solar I location with surroundings/ Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 12, 25.

The 100 ha facility consists of 90% of photovoltaic park, which is constituted by photovoltaic solar modules of silicon polycarbonate, free of heavy metals. It is organized in twelve blocks and includes an

electrical substation and an administrative area. The project site land use is designated as farmland as demonstrated by the Certificado de Inafectabilidad Agrícola. It is located above the La Paz aquifer, the only source of water for the city, but the project will have a minimal environmental impact on surface and groundwater, only using 0.033% of the available water from the basin. According to the Environmental Impact Assessment report developed by REA Consultores, the site is assessed as having low ecological value due to the low diversity of flora and fauna present in it as well as the quality of its vegetation and soils, identified as characteristic of arid and saline soils.

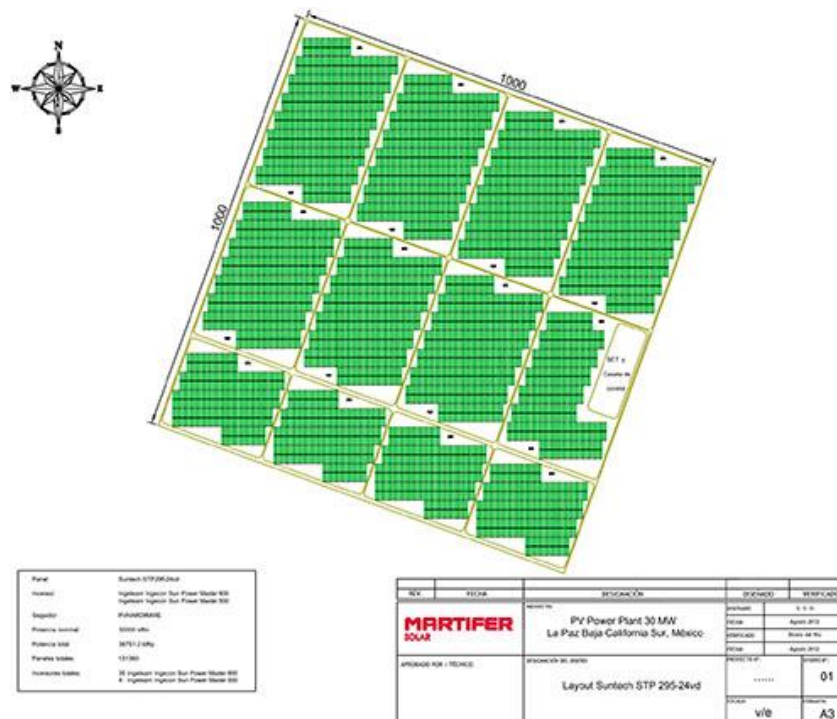


Figure 04: Photovoltaic Plant Layout / Source: Martifer Solar, Plan de Gestión Ambiental. January 2013, p. 48.

Mexico aims to generate 35% of its electricity demand from renewables by 2024.¹ In view of this, it has set itself to expand the renewable energy sector, continuing the promotion of wind projects, which are already commonplace in Mexico, while also promoting the development of solar and hydro projects. Amid this context, Aura Solar I was conceived by Corporación Aura Solar and will be the largest photovoltaic plant in Mexico and the first utility-scale photovoltaic plant in the country of Mexico. It is the first project of a larger initiative (the Aura Solar Initiative) that aims to become a platform to develop utility-scale photovoltaic facilities across Mexico, seeking to take advantage of the high level of solar radiation in the country's northeast region (above 5.8 kWh/m²/day on average) and seeing the long-term potential of solar energy in both the private and public sector.² The shareholders of the Aura Solar Initiative are comprised of a group of recognized Mexican businessmen that have demonstrated a commitment to sustainability efforts in their own companies, including Bimbo, Lala, and Grupo

¹ Schwartz, Karen. Mexican Renewables, "Into the Light," p. 42

² Aura Solar I, p. 1

Marhnos, which involve reforestation efforts, the use of biodegradable packaging, the monitoring of CO₂ emissions, as well as civic engagement.³

The development of Aura Solar I will generate many important benefits for the community of La Paz. Currently, Mexico's electrical system is interconnected and operated under the National Interconnected System (SIN), except for the Baja Peninsula, where La Paz is located, which operated in an isolated system through expensive diesel and high-sulfur heavy fuel oil. The implementation of the project will allow the substitution of the power sources, avoiding the burning of fossil fuels and mitigating greenhouse gas emissions by more than 55,000 tons of CO₂ annually. The project will be connected to the substation Olas Altas by a 2.9 km high tension line and will be generating 81.5 GWh/year, which will satisfy the electricity demand of 32,000 households in La Paz, improving the region's electrical infrastructure. During its early phase, the project conducted a series of technical, economic, environmental, and social analyses following the World Bank's International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability. 223 jobs will be generated between the construction and operational phases of the project, as well as the establishment of a close relationship with the surrounding community to ensure the mitigation of any negative impacts that the project development may have.

³ Gauss Energía. Aura Solar I Assessment Control Matrix, p. 6

3. APPLICATION OF THE ENVISION RATING SYSTEM⁴

The *Envision* rating system is a set of criteria that assess and evaluate any specific piece of infrastructure. In this case the infrastructure to be assessed is Aura Solar I, a photovoltaic plant located in La Paz, Mexico. The main intent of this rating is to evaluate the sustainability efforts as well as the sociocultural and environmental mitigation efforts during the design and construction process of the photovoltaic plant.

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 has been met for a particular credit. In each of the five categories there is a specific credit called “Innovative or exceed credit requirements”. This is an open window to reward exceptional performance or the application of innovative methods.

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 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 positive impact for the given credit criteria. 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 ISI⁵ and Zofnass Program⁶ websites.

Appendix C provides a table with the detailed project assessment, specifications for each of the credits, and recommendations for the Aura Solar I project.

⁴ Anthony Kane, Zofnass program research director, and Salmaan Khan, research assistant, wrote most parts of this section.

⁵ www.sustainableinfrastructure.org

⁶ www.zofnass.org

4. EVALUATION CATEGORIES

4.1. QUALITY OF LIFE

The first category of *Envision* rating system is Quality of Life. The assessment here mainly refers to the impact of the project on the surrounding communities and their well-being. As stated in the *Envision* manual, “Quality of Life particularly focuses on assessing whether infrastructure projects are in line with community goals, incorporated into existing community networks, and will benefit the community long term.”⁷ It also determines if the project is aligned with the community needs.

This category is divided into 3 subcategories and 12 credits: Purpose (QL 1.1, QL 1.2, QL 1.3, and QL 1.4), Community (QL 2.1, QL 2.2, QL 2.3, QL 2.4, QL 2.5, and QL 2.6) and Well-Being (QL 3.1, QL 3.2, QL 3.3).

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	

Figure 05: Quality of life category, credits distribution.

4.1.1. Purpose

In the **Purpose subcategory**, out of three credits, one was assessed as Conserving (QL 1.1 Improve Community Quality of Life), one was assessed as Enhanced (QL 1.3 Develop Local Skills and Capabilities), and one was assessed as Improved (QL 1.2 Stimulate Sustainable Growth & Development).

Aura Solar I has developed a holistic assessment of the community’s short and long-term requirements and needs, and has established a collaborative relationship with the community to mitigate any negative impacts that the project may create, especially throughout the construction phase. The project developed a series of environmental studies that determined that the main impacts affecting the quality of life in residential communities would be noise and dispersion. They developed an Environmental Management Plan including measures to mitigate these impacts such as the reduction of speed for vehicles, the pavement of streets, and the establishment of specific working hours for heavy machinery in accordance with the community working hours.⁸

Information sessions were organized for neighbors, municipal officers, and environmental agencies in the area. Meetings, telephone conversations, interviews, and surveys were also performed during construction phase to address any negative impacts that the community might have been experiencing.

⁷ *Envision* Guidance Manual, p.30

⁸ Martifer Solar, Plan de Gestión Ambiental. January 2013, p. 1-46

Two 2 km long streets were rehabilitated as a result of this collaboration, one with main access for the Villas de la Paz area, and one along the project's west side.



Figure 06: Rehabilitation of two 2 km streets with access to Villas de la Paz. / Source: Martifer Solar. Plan de Consulta y Relaciones Comunitarias, Proyecto Aura Solar I. p. 18.



Figure 07: Civic engagement for Aura Solar I
Source: Source: Martifer Solar. Plan de Consulta y Relaciones Comunitarias, Proyecto Aura Solar I. p. 13.



Figure 08: Distributed survey to residents of La Paz
Source: Martifer Solar. Plan de Consulta y Relaciones Comunitarias, Proyecto Aura Solar I. p. 14-5.

Aura Solar I will generate 219 jobs during the construction phase, 4 jobs during the operation phase, and 15 jobs during the dismantling phase. This will expand the training of local labor in advanced solar technology and infrastructure. However, no information was provided indicating the type or extent of

training that workers would be receiving to develop local skills and capabilities. Finally, as described by Gauss Energía's President and CEO Hector Ólea, the project seeks to drive social and economic development in the region by training local labor in advanced solar technology and infrastructure.⁹ This skilled labor will be needed not only for the Aura Solar I project but also for other solar projects developed in the region that seek to retain a local experienced labor force. No other improvements in job growth, capacity building, productivity, business attractiveness and livability were reported.

4.1.2. Community:

In the **Community subcategory**, out of six credits, two were assessed as Conserving (QL 2.2 Minimize Noise and Vibration and QL 2.4 Improve Community Mobility and Access), two were assessed as Enhanced (QL 2.3 Minimize Light Pollution and QL 2.6 Improve Site Accessibility, Safety & Wayfinding), one was assessed as Improved (QL 2.1 Enhance Public Health and Safety), and one was assessed as No Score (QL 2.5 Encourage Alternative Modes of Transportation).

Aura Solar I performed studies that indicate that noise levels within a 15m radius of the site are estimated to be within 80 and 88 dB as a result of the use of light and heavy machinery during the ten month construction phase of the project.¹⁰ In order to mitigate the impact of noise, the community agreed to specific hours in which certain equipment and operations with the highest noise levels can operate, sources of noise were relocated as far from the Villas de La Paz as possible, and traffic circulation near the residential community was reduced. Aura Solar I also worked to improve community mobility and access through the rehabilitation of surrounding streets and the prevention of major impacts on traffic flows during the construction phase.

The project has also taken measures to reduce light pollution. It will utilize energy efficient light sources that minimize heat transmission, it will implement measures to prevent reflection, and reduce and control radiation. The project's photovoltaic units, Suntech Power STP 295-24vd polycrystalline solar modules, achieve a higher efficiency (15.1%) than others in the market due to its anti-reflective, high-absorbing layer, higher light absorption and minimal surface dust.¹¹

Site accessibility and wayfinding will be improved through the development of internal access roads and the inclusion of an unpaved main perimeter thoroughfare over which vehicles can pass. Appropriate signage indicating different areas and surface materials will also be put in place to facilitate wayfinding within the property. As a means of security, a perimeter chain-link fence of 2.5 meter with barbed wire will surround the property. Furthermore, a monitoring and security system will be deployed throughout the project site.

No documentation was provided indicating the encouragement of alternative modes of transportation.

⁹ Hector Ólea. The Aura Solar Initiative Triggers New Energy Frontier in Mexico, p.3.

¹⁰ REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 34-5.

¹¹ Martifer Solar. Baja California Sur, Mexico, Photovoltaic Production Plant, Technical-economic bid for turn-key solution, p.11

4.1.3. Wellbeing:

In the **Wellbeing subcategory**, out of three credits, one was assessed as Conserving (QL 3.1 Preserve Historical and Cultural Resources), one was assessed as Superior (QL 3.2 Preserve Views and Local Character), and one was assessed as No Score (QL 3.3 Enhance Public Space).

The site and its immediate surroundings do not contain any objects or natural features that have historic or cultural value. According to studies performed by the Instituto Nacional de Antropología e Historia (INAH), no archaeological objects were found on the site.

Given the low height of on-site vegetation, there are open panoramas to the site from the southern and western limits. Because of this, the project may have an effect on views from the nearby residential community of Villas de la Paz. In order to limit the impact that the project will have on these views, the vegetation between the project and the complex will be preserved. In addition, open areas of native species will be designated within these limits to preserve the local character for the neighbors. Existing construction and vegetation will screen the site and limit its visibility impacts from other surrounding areas.



Figure 09: Views of site's limits and surroundings (A: North, B: South, C: East, D: West) / Source: Martifer Solar, Plan de Gestión Ambiental. January 2013, p. 22-3.

No plans or commitments to preserve, conserve, enhance, and/or restore defining elements of public space have been reported as part of the project.

4.1.4. Summary of results for the Quality of Life Category.

The table below (Figure 10) shows the distribution of credits, as well as the level of performance achieved in each credit. Opportunities for improvement are can be found in all three subcategories (Purpose, Community, and Wellbeing). Considering all credits and the maximum possible values for each indicator, the percentage of achievement adds to 39.2%, or 71 points out of 181.

AURA SOLAR I, MEXICO			PT.	Performance	% Total	max
1	PURPOSE	QL1.1 Improve Community Quality of Life	20	Conserving	80.0%	25
2		QL1.2 Stimulate Sustainable Growth & Development	1	Improved	6.3%	16
3		QL1.3 Develop Local Skills And Capabilities	2	Enhanced	13.3%	15
4	COMMUNITY	QL2.1 Enhance Public Health And Safety	2	Improved	12.5%	16
5		QL2.2 Minimize Noise And Vibration	8	Conserving	72.7%	11
6		QL2.3 Minimize Light Pollution	2	Enhanced	18.2%	11
7		QL2.4 Improve Community Mobility And Access	14	Conserving	100.0%	14
8		QL2.5 Encourage Alternative Modes of Transportation	0	No Score	0.0%	15
9		QL2.6 Improve Site Accessibility, Safety & Wayfinding	3	Enhanced	20.0%	15
10	WELLBEING	QL3.1 Preserve Historic And Cultural Resources	13	Conserving	81.3%	16
11		QL3.2 Preserve Views And Local Character	6	Superior	42.9%	14
12		QL3.3 Enhance Public Space	0	No Score	0.0%	13
QL0.0 Innovate Or Exceed Credit Requirements			0	N/A		
QL			71		39.2%	181

Figure 10: Summary of Results in Quality of Life Category

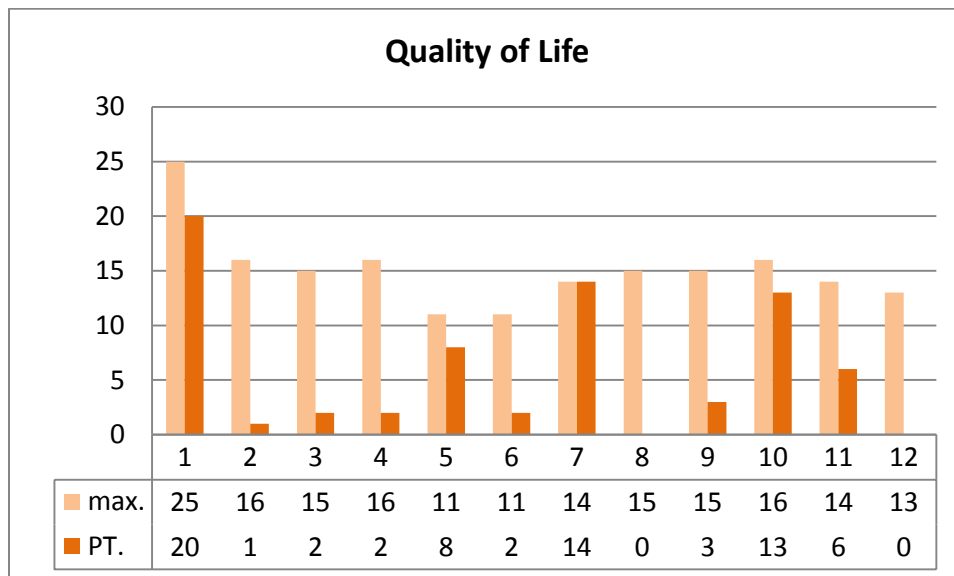


Figure 11: Summary of Results in Quality of Life Category

4.2. LEADERSHIP

Envision’s Leadership category evaluates the collaboration, management and planning of the project’s team, as well as its stakeholders. Envision states that “communicate and collaborate early on, involve a wide variety of people in creating ideas for the project, and understand the long-term, holistic view of the project and its life cycle.”¹²

The 12 credits in this category are: collaboration (LD 1.1, LD 1.2, LD 1.3, LD 1.4), management (LD 2.1, LD 2.2) and planning (LD 3.1, LD 3.2, LD 3.3).

CREDIT SCORING

			IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE	
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	LEADERSHIP	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	LEADERSHIP	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	

Figure 12: Leadership Category Credits Distribution.

4.2.1. Collaboration

In the **Collaboration subcategory**, out of four credits, three were assessed as “Conserving” (LD 1.1 Provide Effective Leadership and Commitment, LD 1.2 Establish a Sustainability Management System, and LD 1.4 Provide for Stakeholder Involvement), and one was assessed as “Enhanced” (LD 1.3 Foster Collaboration and Teamwork).

The Aura Solar Initiative, led by the owners of Aura Solar I, is focused on a renewable energy vision for Mexico based on the development of utility-scale photovoltaic projects to capitalize on the large solar resources existing in Mexico, beginning with Aura Solar I. Under this commitment to sustainability, the project Aura Solar I has developed a detailed Environmental Impact Assessment that accounts for environmental, economic and social aspects of the project, and sets specific goals and targets that are appropriate for the affected communities. The project follows the World Bank’s International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability, using these as guidelines for the project development and the construction of management plans.¹³

The project’s Environmental Impact Assessment accounts for environmental, economic and social aspects of the project, and sets specific goals and targets that are appropriate for the affected communities. Based on this assessment, an Environmental Management Plan (Plan de Gestión Ambiental) including procedures, stakeholders, management, and levels of impact, was developed by Martifer Solar.¹⁴ This plan expands on the overall project's delineation of roles and responsibilities for

¹² Envision Guidance Manual, p.60

¹³ REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 56.

¹⁴ Martifer Solar, Plan de Gestion Ambiental. January 2013, p. 1-46

long-term operation and management during its 25-year lifespan with a focus on sustainable practices spanning across the social and environmental aspects of the project.

As part of this Environmental Management Plan, collaboration between the different contractors and subcontractors of the project is outlined, seeking to optimize the distribution of tasks during the execution of the plan through periodic meetings for environmental coordination. Nonetheless, the documentation provided does not make mention of teamwork collaboration between the designer and the Construction Manager, or the contractual relationship between the two.

4.2.2. Management:

In the **Management subcategory**, out of two credits, one was assessed as “Conserving” (LD 2.2 Improve Infrastructure Integration) and one was assessed as “No Score” (LD 2.1 Pursue By-Product Synergy Opportunities).

Aura Solar I is being developed as a photovoltaic plant for utility-scale energy generation. The Plant is connected to the substation Olas Altas by a 2.9 km high-tension line and will be generating 82 GWh/year, which will move 32,000 households in La Paz away from electricity produced by fossil fuels and improve the regional’s electrical infrastructure. The project will also be improving transportation infrastructure with the development of new means of communication within the project site and the rehabilitation of streets and areas affected by runoff in its proximity, such as the two 2 km streets that it repaired for the residents of Villas de la Paz.

No documentation was provided indicating that reduction of waste, improvement of project performance or reduction of project costs could be gained by identifying and using unwanted byproducts or discarded materials from nearby locations or industries.

4.2.3. Planning:

In the **Planning subcategory**, out of three credits, one was assessed as “Conserving” (LD 3.1 Plan for Long-Term Monitoring & Maintenance), one was assessed as “Enhanced” (LD 3.3 Extend Useful Life), and one was assessed as “No Score” (LD 3.2 Address Conflicting Regulations & Policies).

Long-term monitoring has been planned over the 25-year operation period of Aura Solar I. Martifer Solar was hired by Gauss Energía to take care of operation and management of the project in order to ensure the continuous efficiency of the Plant. A detailed Plan of Preventive Maintenance was developed, which includes visual and physical inspections, testing of equipment and infrastructure in all installed systems, and a technical report of interventions and inspections.¹⁵ While no indication was made of any plans to extend the project's useful life, as a solar photovoltaic plant, with proper maintenance, the construction materials and panels of the plant can easily be replaced as needed to extend its useful life.

¹⁵ Martifer Solar. Baja California Sur, Mexico, Photovoltaic Production Plant, Technical-economic bid for turn-key solution.p. 60-93

The project does not report any work with officials to identify or address laws, standards, regulations, or policies that may unintentionally create barriers to the implementation of sustainable infrastructure.

4.2.4. Summary of results for the Leadership category.

The table below (Figure 13) shows the distribution of credits, as well as the level of performance achieved in each credit. The biggest opportunities for improvement are concentrated in the subcategory of Planning. Considering all credits and the maximum possible values for each indicator, the percentage of achievement adds to 62%, or 75 points out of 121.

		AURA SOLAR I, MEXICO		PT.	Performance	% Total	max
13	LEADERSHIP	COLLABORATION	LD1.1 Provide Effective Leadership And Commitment	17	Conserving	100.0%	17
14			LD1.2 Establish A Sustainability Management System	14	Conserving	100.0%	14
15			LD1.3 Foster Collaboration And Teamwork	4	Enhanced	26.7%	15
16			LD1.4 Provide For Stakeholder Involvement	14	Conserving	100.0%	14
17	MNGMT.	LD2.1 Pursue By-Product Synergy Opportunities	0	No Score	0.0%	15	
18		LD2.2 Improve Infrastructure Integration	13	Conserving	81.3%	16	
19	PLANNING	LD3.1 Plan For Long-Term Monitoring & Maintenance	10	Conserving	100.0%	10	
20		LD3.2 Address Conflicting Regulations & Policies	0	No Score	0.0%	8	
21		LD3.3 Extend Useful Life	3	Enhanced	25.0%	12	
			LD0.0 Innovate Or Exceed Credit Requirements	0	N/A		
			LD	75		62.0%	121

Figure 13: Leadership Credit Distribution

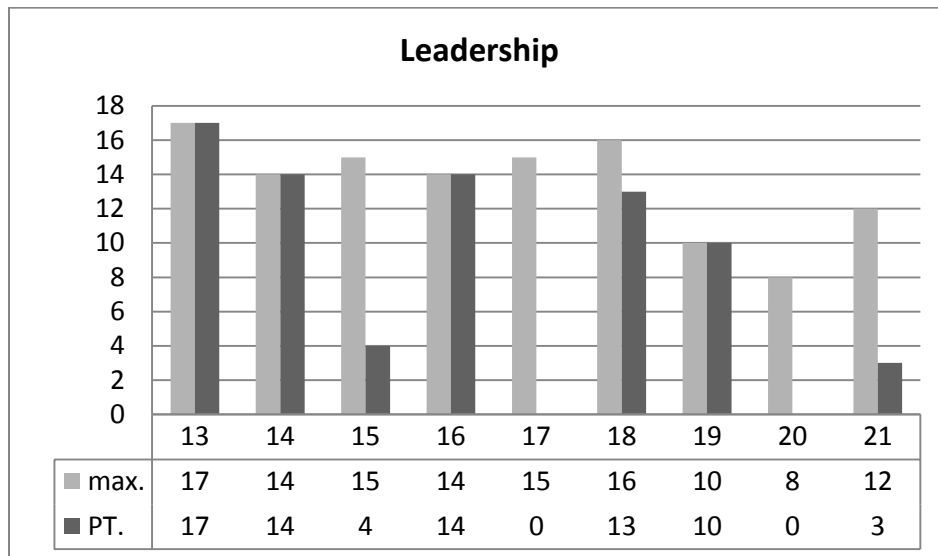


Figure 14: Leadership Credit Distribution

4.3 RESOURCE ALLOCATION

The Resource Allocation (RA) category deals with the quality and source of the materials used in the project during its construction and operation phases. Use and allocation of materials and other resources has a great impact on the overall sustainability of the project. The RA category is divided into 13 credits: materials (RA 1.1, RA 1.2, RA 1.3, RA 1.4, RA 1.5, RA 1.6, RA 1.7), energy (RA 2.1, RA 2.2, RA 2.3) and water (RA 3.1, RA 3.2, RA 3.3).

CREDIT SCORING

			IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE	
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	RESOURCE ALLOCATION	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	RESOURCE ALLOCATION	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	

Figure 15: Resource Allocation Category, Credits Distribution.

4.3.1. Materials:

In the **Materials subcategory**, out of seven credits, one was assessed as “Superior” (RA 1.7 Provide for Deconstruction & Recycling), one was assessed as “Enhanced (RA 1.5 Divert Waste From Landfills), two were assessed as “Improved” (RA 1.2 Support Sustainable procurement Practices, RA 1.6 Reduce Excavated Materials Taken off Site), and three were assessed as “No Score” (RA 1.1 Reduce Net Embodied Energy, RA 1.3 Use Recycled Materials, and RA 1.4 Use Regional Materials).

Aura Solar I has been designed to have a lifespan of 25 years, centering itself on an agenda of deconstruction and recycling. During the dismantling phase, Aura Solar I will separate waste and materials, classify them, and deliver them to an authorized recycling center that complies with corresponding environmental regulations. The project also developed a waste management plan for its construction and operational phases, as outlined in the *Plan de Gestión Ambiental*, with a focus on re-utilization, recycling, and reduction (3 R’s). The main goal is to reduce waste generation and find ways to recycle and reuse the waste that is already generated. Waste has been classified as hazardous and non-hazardous, and appropriate bins and management protocol has been put in place according to waste type. Biodegradable material resulting from the movement of soil from erosion and precipitation will be preserved to be re-utilized later on to regularize the terrain and build internal thoroughfares. Although the remaining waste and excavated material that is not able to be reused will be deposited in authorized, local landfills, the efforts on re-utilization, recycling, and reduction will minimize the amount of waste taken off site.



Figure 16: Sample Identification Sheet for non-hazardous waste / Source: Martifer Solar, Plan de Gestión Ambiental. January 2013, p. 48.

No information was provided indicating the use of recycled or regional materials in the project, as well as the performance of any calculation or reduction of net embodied energy materials used in the project.

4.3.2. Energy:

In the **Energy subcategory**, out of four credits, one was assessed as Restorative (RA 2.2 Use Renewable Energy), one was assessed as Conserving (RA 2.3 Commission & Monitor Energy Systems), and one was assessed as No Score (RA 2.1 Reduce Energy Consumption).

The Aura Solar I project is a photovoltaic plant with a 115 kV high tension line. The project will have an installed capacity of 30 MWh and will generate 81.5 GWh of renewable energy every year.¹⁶ The energy will be transmitted to the Olas Altas substation, which is part of CFE (Comisión Federal de Electricidad), the Mexican state power company. Long-term monitoring has been planned for the 25 years that the project will be in operation. Martifer Solar was hired by Gauss Energía to take care of the operation and management of the project in order to ensure the continuous efficiency of the photovoltaic plant. A detailed Plan of Preventive Maintenance was developed that includes visual and physical inspections, testing of equipment and infrastructure in all installed systems, and a technical report of interventions and inspections.

While the project will only consume energy to drive its operation and maintenance (O&M) systems (including energy meters, inverters, meteorological stations, an alarm system and a computing center for the four operating personnel), no documentation was provided to demonstrate any monitoring of energy consumption and reduction throughout the lifecycle of the project.

¹⁶ REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 1-2.

4.3.3. Water:

In the **Water subcategory**, out of three credits, one was assessed as Superior (RA 3.1 Protect Fresh Water Availability), and two were assessed as No Score (RA 3.2 Reduce Potable Water Consumption and RA 3.3 Monitor Water Systems).

The Aura Solar I site is located above the La Paz aquifer, the only source of water for the city. The project will have a minimal environmental impact on surface and groundwater. The operational phase of the project demands only 88.96m³ of water, representing 680 milliliters of water per photovoltaic module per year for construction phase and the cleaning of the photovoltaic units during the operational phase, which comprises just 0.033% of the available water within the basin.¹⁷ In order to minimize the use of fresh water, septic tanks will be utilized during the operational phase for sanitary uses, and portable toilets will be put in place during the construction phase.

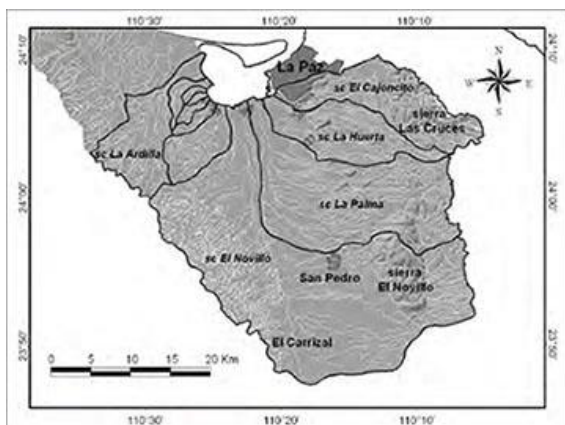


Figure 17: Subaquifers of La Paz Aquifer

Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 26.



Figure 18: Collection of residual water from portable toilets

Source: Martifer Solar. Reporte de Actividades de Manejo Ambiental y Social. March 2013, p. 8

No information was provided on strategies for reducing potable water consumption or the provision of systems of monitoring water on site.

¹⁷ REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 35-6.

4.3.4. Summary of results for the Resource Allocation category.

The table below (Figure 19) shows the distribution of credits, as well as the level of performance achieved in each credit. The biggest opportunities for improvement are concentrated in the subcategories Materials and Water. Considering all credits and the maximum possible values for each indicator, the percentage of achievement adds to 31.9%, or 58 points out of 182.

		AURA SOLAR I, MEXICO		PT.	Performance	% Total	max.
22	RESOURCE ALLOCATION	MATERIALS	RA1.1 Reduce Net Embodied Energy	0	No Score	0.0%	18
23			RA1.2 Support Sustainable Procurement Practices	2	Improved	22.2%	9
24			RA1.3 Used Recycled Materials	0	No Score	0.0%	14
25			RA1.4 Use Regional Materials	0	No Score	0.0%	10
26			RA1.5 Divert Waste From Landfills	6	Enhanced	54.5%	11
27			RA1.6 Reduce Excavated Materials Taken Off Site	2	Improved	33.3%	6
28			RA1.7 Provide for Deconstruction & Recycling	8	Superior	66.7%	12
29		ENERGY	RA2.1 Reduce Energy Consumption	0	No Score	0.0%	18
30			RA2.2 Reduce Pesticide and Fertilizer Impacts	20	Restorative	100.0%	20
31			RA2.3 Commission & Monitor Energy Systems	11	Conserving	100.0%	11
32		WATER	RA3.1 Protect Fresh Water Availability	9	Superior	42.9%	21
33			RA3.2 Reduce Potable Water Consumption	0	No Score	0.0%	21
34			RA3.3 Monitor Water Systems	0	No Score	0.0%	11
RA0.0 Innovate Or Exceed Credit Requirements			0	N/A			
RA				58		31.9%	182

Figure 19: Summary of Results in Resource Allocation Category

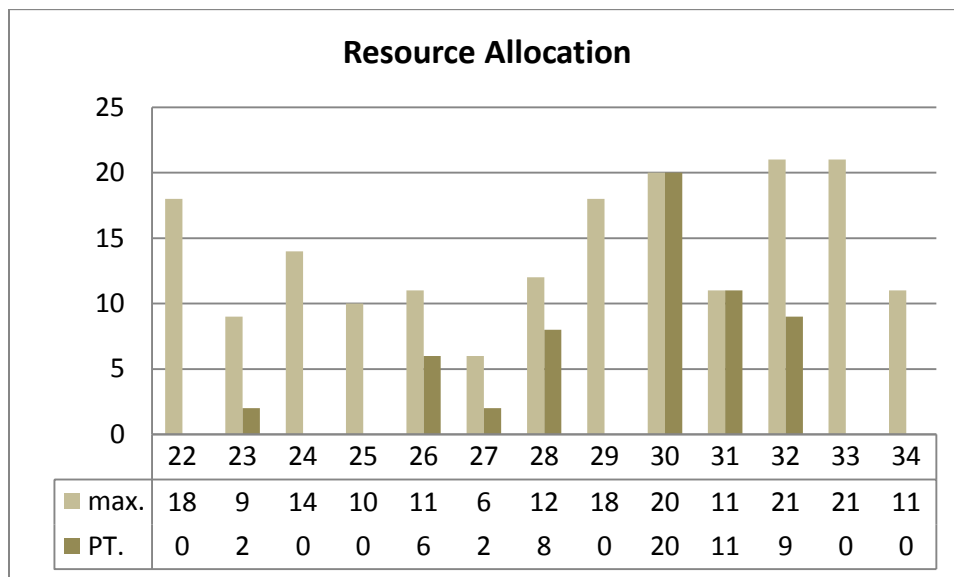


Figure 20: Summary of Results in Resource Allocation Category

4.4. NATURAL WORLD

The Natural World category addresses “how to understand and minimize negative impacts while considering ways in which the infrastructure can interact with natural systems in a synergistic, positive way.”¹⁸ The NW category is divided into 14 credits related to project siting (NW 1.1, NW 1.2, NW 1.3, NW 1.4, NW 1.5, NW 1.6, and NW 1.7), impacts on land and water (NW 2.1, NW 2.2, NW 2.3) and biodiversity (NW 3.1, NW 3.2, NW 3.3, NW 3.4).

CREDIT SCORING

			IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE	
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	NATURAL WORLD	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	NATURAL WORLD	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	

Figure 21: Natural World Credit Distribution

4.4.1. Siting:

In the **Siting subcategory**, out of seven credits, three were assessed as Conserving (NW 1.1 Preserve Prime Habitat, NW 1.3 Preserve Prime Farmland, and NW 1.6 Avoid Unsuitable Development on Steep Slopes), one was assessed as Superior (NW 1.4 Avoid Adverse Geology), one was assessed as Enhanced (NW 1.5 Preserve Floodplain Functions), and two were assessed as No Score (NW 1.2 Preserve Wetlands and Surface Water and NW 1.7 Preserve Greenfields).

The area in which Aura Solar I is located has low ecological value as it is mostly developed for residential, industrial, or agricultural purposes and has a low diversity of flora and fauna. No native species protected by Mexican law have been identified in the area. For the last 30 years, the project site was used as farmland, as indicated by various documentation including a Certificado de Inafectabilidad Agrícola from 1980, which specifies that the site area is of 100ha and serves for agricultural purposes. The Environmental Impact Assessment states that the site’s soils are classified as eutric regosol and have a thick texture and a composition that is more than 65% sand and less than 18% clay. The site’s dominant vegetation today is herbs from the *Chenopodiaceae*, *Amaranthaceae*, and *Poaceae* families. The first two are associated with salty soils characteristic of xerophytic environments where soil fertility is deteriorating over time, and is therefore not considered prime farmland.¹⁹ Considering the credit NW1.6, the concession area is not located on a hillsides or a steep slope site.

¹⁸ Envision Guidance Manual, p.116

¹⁹ REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 17-22.



Figure 22: Vegetation found in project site / Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 18.

Although the project site is located within the limits of the La Paz aquifer, the only source of water for the city, it does not interfere with the aquifer's process of recharging and conserves most of its water resource. According to the Servicio Sismológico Nacional, no epicenter has been reported in the area, therefore avoiding adverse geology in the development of the project.

A topographical study was performed for the development of a drainage system and a septic system for the project's operational phase. Construction of the project does not impact floodplain functions or effect water the aquifer water table. Infiltration and water quality are maintained. However, no information on the development of a floodplain analysis or the drainage system was provided.

The Aura Solar I project site does not contain any wetland areas or significant bodies of water. It is specifically situated in the La Paz Basin, where there are no types of permanent superficial bodies of water. The project is being developed on an agricultural land, and therefore, it is not preserving greenfields.

4.4.2. Land and Water:

In the **Land and Water subcategory**, out of three credits, one was assessed as "Conserving" (NW 2.2 Reduce Pesticides and Fertilizer Impacts), and two were assessed as Enhanced (NW 2.1 Manage Stormwater and NW 2.3 Prevent Surface and Groundwater Contamination).

On-site vegetation in Aura Solar I will be maintained twice a year using hoes and human labor, and no herbicides, pesticides or chemical products will be used on the site. The project will have a minimal environmental impact on surface water and groundwater. The operational phase of the project demands 88.96 m³ of water per year, which is only 0.033% of the water available to the project from the local aquifer. The project will generate wastewater from sanitation services, which will be mitigated by having portable toilets during the construction phase, and a septic tank during operational phase. Residual water from cleaning the photovoltaic modules will only be generated every two years and will consist of biodegradable detergents that can infiltrate the soil without fear of contamination. Finally, the natural project site drainage will be maintained when possible to minimize erosion, and a system of

stormwater drainage will be developed that accounts for the soil's natural drainage capacity. However, no details have been provided on the development of this stormwater management system.

4.4.3. Biodiversity:

In the **Biodiversity subcategory**, out of four credits, one was assessed as "Improved" (NW 3.1 Preserve Species Biodiversity) and three were assessed as "No Score" (NW 3.2 Control Invasive Species, NW 3.3 Restore Disturbed Soils, and NW 3.4 Maintain Wetland and Surface Water Functions).

The project site and its surroundings have been assessed as having a low diversity of flora and fauna and no species included in the NOM-059-SEMARNAT-2010, which protects native species of Mexican flora and fauna. During the last 30 years, the site's soils were used for agriculture, and the current on-site vegetation is composed of herbs in the *Chenopodiaceae*, *Amaranthaceae* and *Poaceae* families. The site is comprised mainly of generalist and opportunistic fauna, which are adaptable to current site conditions.



Figure 23: Vegetation found in project site (A: North, B: South, C: Northeast, D: Northwest) / Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 20.

Vegetation on site, which mainly consists of herbs and shrubs, will be removed in areas strictly necessary. In addition, a 10cm layer of topsoil will be removed in order to level the terrain in certain indispensable areas to level the ground. Canals and excavated areas will be covered with mulch or jute

mesh after the project is dismantled, these efforts will not restore 100% of the disturbed soils on site. Additionally, no information is available regarding the control or elimination of existing invasive plant species on the site nor the maintenance and restoration of ecosystems related to wetlands and surface waters present in the project.



Figure 24: Recollection of herbs and shrubs for site leveling

Source: Martifer Solar. Reporte de Actividades de Manejo Ambiental y Social. March 2013, p. 8.



Figure 25: Leveling of terrain in project site

Source: Aura Solar, Linea de Tiempo,, p. 4.

4.4.4. Summary of results, Natural World category:

The table below (Figure 26) shows the distribution of credits, as well as the level of performance achieved in each credit. Opportunities for improvement are can be found in all three sub-categories (Siting, Land and Water, and Biodiversity). Considering all credits and the maximum possible values for each indicator, the percentage of achievement adds to 21.9%, or 59 points out of 203.

		AURA SOLAR I, MEXICO		PT.	Performance	% Total	max.
35	NATURAL WORLD	SITING	NW1.1 Preserve Prime Habitat	14	Conserving	77.8%	18
36			NW1.2 Preserve Wetlands and Surface Water	0	No Score	0.0%	18
37			NW1.3 Preserve Prime Farmland	12	Conserving	80.0%	15
38			NW1.4 Avoid Adverse Geology	3	Superior	60.0%	5
39			NW1.5 Preserve Floodplain Functions	5	Enhanced	35.7%	14
40			NW1.6 Avoid Unsuitable Development on Steep Slopes	6	Conserving	100.0%	6
41			NW1.7 Preserve Greenfields	0	No Score	0.0%	23
42		L & W	NW2.1 Manage Stormwater	4	Enhanced	19.0%	21
43			NW2.2 Reduce Pesticides and Fertilizer Impacts	9	Conserving	100.0%	9
44			NW2.3 Prevent Surface and Groundwater Contamination	4	Enhanced	22.2%	18
45		BIODIVERSITY	NW3.1 Preserve Species Biodiversity	2	Improved	12.5%	16
46			NW3.2 Control Invasive Species	0	No Score	0.0%	11
47			NW3.3 Restore Disturbed Soils	0	No Score	0.0%	10
48			NW3.4 Maintain Wetland and Surface Water Functions	0	No Score	0.0%	19
		NW0.0 Innovate or Exceed Credit Requirements	0	N/A			
		NW	59		29.1%	203	

Figure 26: Summary of Results in Natural World Category

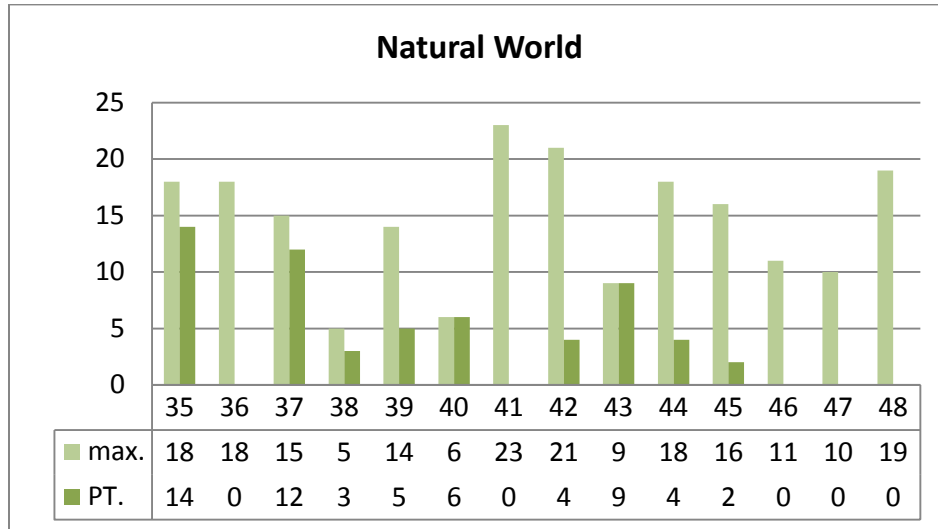


Figure 27: Summary of Results in Natural World Category

4.5. CLIMATE AND RISK

Envision’s Climate and Risk category is divided in two main sub-categories, emissions and resilience. The main goals of the category are to “minimize emissions that may contribute to increased short and long-term risks” and “to ensure infrastructure projects are resilient to short-term hazards or long-term altered future conditions.”²⁰ The credits are distributed as: Emissions (CR.1.1, CR. 1.2) Resilience (CR.2.1, CR. 2.2, CR.2.3, CR. 2.4, CR. 2.5).

CREDIT SCORING

			IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
49	CLIMATE & RISK	EMISSIONS					
50		CR1.1 Reduce greenhouse gas emissions	4	7	13	18	25
51		CR1.2 Reduce air pollutant emissions	2	6		12	15
52	RESILIENCE	CR2.1 Assess climate threat				15	
53		CR2.2 Avoid traps and vulnerabilities	2	6	12	16	20
54		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

Figure 28: Climate and Risk credit Distribution.

4.5.1 Emissions

Aura Solar I achieved an outstanding performance in the **Emissions subcategory**. Out of two credits one was assessed as “Restorative” (CR 1.1 Reduce Greenhouse Gas Emissions) and the other was assessed as “Conserving” (CR 1.2 Reduce Air Pollutant Emissions).

Aura Solar I will be reducing 60,000 tons of CO₂ emissions annually, offsetting the generated greenhouse gas emissions during its 10-month construction phase, in which the operation of 562 units of machinery and 42 transportation vehicles will be required. The CO₂ emissions from the transportation of the

²⁰ Envision Guidance Manual, p.150

photovoltaic modules are estimated to be between 10.64 and 14.84 tons per month, which represents less than 0.3% of the 60,000 tons of CO₂ emissions that the project is estimated to reduce annually.²¹

Aside from focusing on reducing greenhouse gas emissions, Aura Solar I also seeks to mitigate emissions from other contaminating particles such as NO_x and SO₂, which result from the generation of energy from burning fossil fuels in the thermoelectric plants present in the area. Due to the movement of soils and the transportation of construction materials, the project will generate dust not only within the site but also along the 770m unpaved segment between the site and the industrial park. In order to mitigate the impact of dust generation, the project seeks to reduce vehicle speeds by establishing maximum limits, use awnings and covers, apply water or non-toxic chemical products when appropriate, prevent the burning of solid waste in open air, establish a mechanical maintenance program for all vehicles, and utilize EPP (Equipo Protección Personal/Equipment for Personal Protection) guidelines for employee protection, which requires use of masks when dust levels are excessive.

4.5.2 Resilience

In the **Resilience subcategory**, out of five credits, one was assessed as “Superior” (CR 2.4 Prepare for Short-Term Hazards), and the remaining four credits were assessed as “No Score” (CR 1.1 Assess Climate Threat, CR 2.2 Avoid Traps and Vulnerabilities, CR 2.3 Prepare for Long-Term Adaptability, and CR 2.5 Manage Heat Island Effects).

The project team developed an analysis and risk mitigation study for hurricanes in Baja California del Sur. A comprehensive list of hurricanes that have affected the area since 1970 was developed, registering maximum levels of wind speeds. The study led to the optimization of the plant design to resist extreme wind loads higher than 250 km/h by reinforcing the structure of the photovoltaic frames to allow them to resist wind loads for 50 years. Likewise, a drainage system will be developed, which will mitigate any risks of flooding produced by short-term hazards.

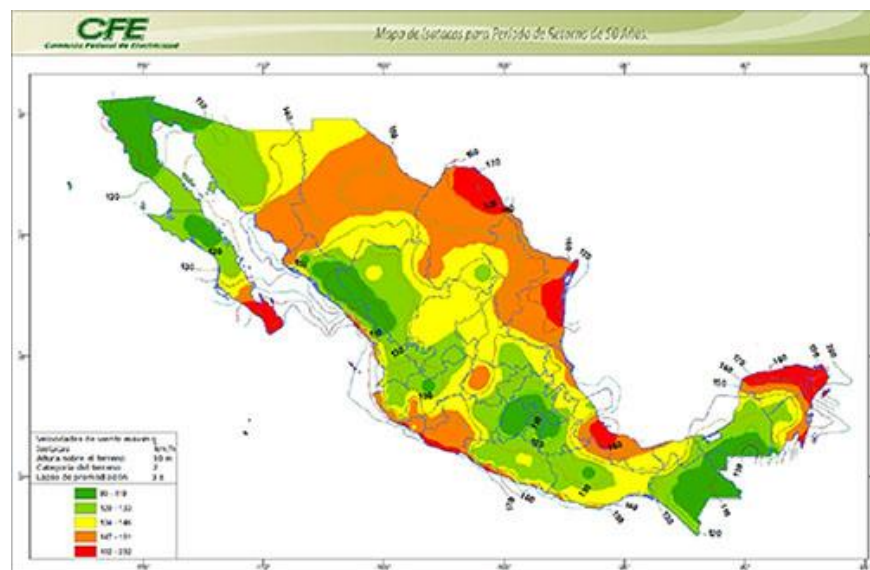


Figure 29: Wind speeds in Mexico during a 50-year return period. / Source: Gauss Energía. Huracanes en BCS, Análisis y Mitigación de Riesgos. November 2012, p. 7.

²¹ REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 34.

No documentation was provided demonstrating that a comprehensive Climate Impact Assessment and Adaptation Plan identifying climate change risks and possible responses were developed to prepare the project for climate variation and natural hazards. No documentation reflected the avoidance of traps and vulnerabilities that could create high, long-term costs and risks for affected communities, any plans or designs to prepare for long-term climate change, or any information indicating the reduction of localized heat accumulation and the management of microclimates.

4.5.3 Summary of results Climate and Risk category.

The table below (Figure 30) shows the distribution of credits, as well as the level of performance achieved in each credit. The biggest opportunities for improvement are concentrated in the Resilience subcategory. Considering all credits and the maximum possible values for each indicator, the percentage of achievement adds to 38.5%, or 47 points out of 122.

		AURA SOLAR I, MEXICO		PT.	Performance	% Total	max.
49	EMISSION	CR1.1 Reduce Greenhouse Gas Emissions		25	Restorative	100.0%	25
50		CR1.2 Reduce Air Pollutant Emissions		12	Conserving	80.0%	15
51	RESILIENCE	CR2.1 Assess Climate Threat		0	No Score	0.0%	15
52		CR2.2 Avoid Traps And Vulnerabilities		0	No Score	0.0%	20
53		CR2.3 Prepare For Long-Term Adaptability		0	No Score	0.0%	20
54		CR2.4 Prepare For Short-Term Hazards		10	Superior	47.6%	21
55		CR2.5 Manage Heat Island Effects		0	No Score	0.0%	6
		CR0.0 Innovate Or Exceed Credit Requirements		0	N/A		
		CR		47		38.5%	122

Figure 30: Summary of Results in Climate and Risk Category

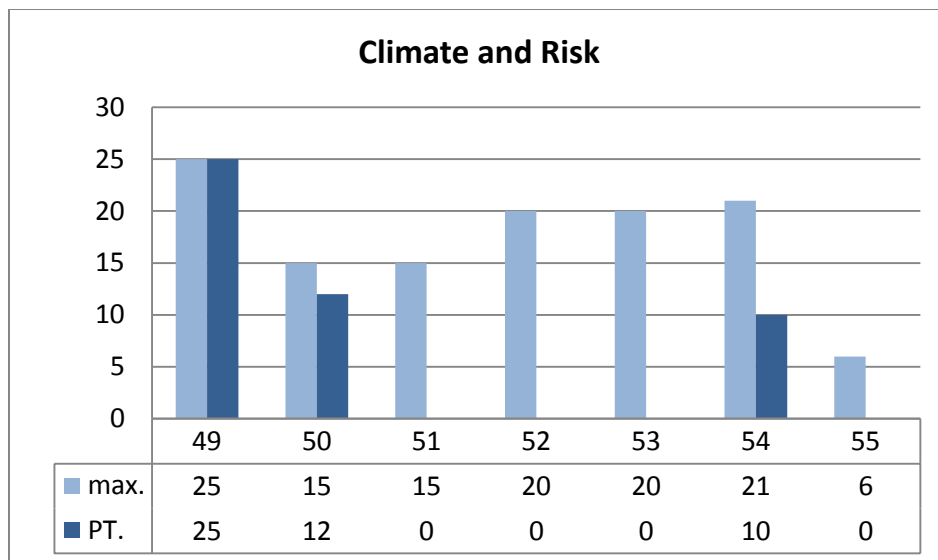


Figure 31: Summary of Results in Climate and Risk Category

5. RESULTS AND CONCLUSION

The evaluation of Aura Solar I has shown the strengths of the project and its significant contribution to Mexico's sustainable development. At the same time, it has also pointed out which categories of analysis provide great opportunities for improvement.

In the **Quality of Life category**, the project obtained 71 points out of 181, reaching a percentage of achievement of 39.2%. This is the second best performance of Aura Solar I in the five categories of *Envision's* rating system. The project was located in La Paz, Mexico due to the region's high level of solar radiance as well as its electrical infrastructure's isolation and reliance on expensive diesel and high-sulfur heavy fuel oil. Aura Solar I is expected to improve quality of life through the generation of clean energy, reducing greenhouse emissions and air pollutants, and providing electricity to 32,000 residents of La Paz. The project will also bring positive impacts in terms of technology transfer and creation of jobs, especially during the construction phase. The project will provide training to employees both in construction and in operation phases.

Impacts on the health and quality of life of the residential communities in proximity to the project were carefully evaluated and plans to mitigate negative impacts were devised with collaboration from the residents. Noise and dust generation during the 10-month construction phase were determined to be the main impacts affecting the quality of life of the residential communities of Villa La Paz and industrial park Alberto Alvarado Arámbulo. Information sessions were organized for neighbors, municipal officers, and environmental agencies in the area. Meetings, telephone conversations, interviews, and surveys were also performed during construction phase to address any negative impacts that the community might be experiencing. As a result of this collaborative effort, an Environmental Management Plan was developed including measures to mitigate negative impacts such as the reduction of speed for vehicles, the pavement of streets, and the establishment of specific working hours for heavy machinery in accordance with the community working hours.²² Two 2 km long streets were also rehabilitated as a result of this collaboration, one with main access for the Villas de la Paz area, and one along the project's west side.

In the **Leadership category**, the project obtained 75 out of 121 points, reaching a percentage of achievement of 62%, which represents the best performance of Aura Solar I in the five categories of *Envision's* rating system. The project has been developed with a focus on collaboration and communication as well as an understanding of the long-term view of the project and its life cycle. Aura Solar I is a photovoltaic plant developed for utility-scale energy generation, improving the regional electrical infrastructure of La Paz, Mexico, which currently relies on fossil fuels to operate in isolation of the rest of the country's electrical system. The project will also be improving transportation infrastructure with the development of new means of communication within the project site and the rehabilitation of streets and areas affected by runoff in its proximity, such as the two 2 km streets that it repaired for the residents of Villas de la Paz.

Martifer Solar has planned long-term monitoring over the 25-year operation period of Aura Solar I by focusing on the operation and management of the project, in order to ensure the continuous efficiency

²² Martifer Solar, Plan de Gestión Ambiental. January 2013, p. 1-46

of the Plant. Different aspects such as solid waste treatment, noise control and ground alteration are monitored in order to evaluate the level of performance in the construction phase. Contractors and sub-contractors are expected to work together to follow environmental goals, meeting regularly to coordinate efforts across the entire project.

Finally, pursuing by-product synergy opportunities, or industrial ecologies as well as addressing conflicting regulations and policies with sustainable development, are clear opportunities to improve the sustainability performance of Aura Solar I.

In the **Resource Allocation category**, the project obtained 58 of 182 points, reaching a percentage of achievement of 31.9%. This performance ranked fourth among the five categories for Aura Solar I in *Envision's* rating system.

Aura Solar I has been designed to have a lifespan of 25 years, centering itself on an agenda of deconstruction and recycling. During the dismantling phase, Aura Solar I will separate waste and materials, classify them, and deliver them to an authorized recycling center that complies with corresponding environmental regulations. The project also developed a waste management plan for its construction and operational phases, as outlined in the *Plan de Gestión Ambiental*, with a focus on re-utilization, recycling, and reduction (3 R's). The main goal is to reduce waste generation and find ways to recycle and reuse the waste that is already generated. Waste has been classified as hazardous and non-hazardous, and appropriate bins and management protocol has been put in place according to waste type. Biodegradable material resulting from the movement of soil from erosion and precipitation will be preserved to be re-utilized later on, to regularize the terrain and build internal thoroughfares, thus reducing the amount of excavated material taken off site.

The use of renewable energy and the monitoring of energy systems are other aspects where Aura Solar I excels. With 30 MW of total installed capacity, the project generates a significant amount of renewable energy, helping to diversify of Mexico's renewable energy matrix, which relies heavily on thermoelectric power plants that run on imported oil and fossil fuels. Martifer Solar, allowing for more efficient operation and energy production at the facility, has planned long term monitoring for the expected 25 years of operation of Aura Solar I.

The operational phase of the project demands only 88.96m³ of water annually, representing 680 milliliters of water per photovoltaic module per year, for the construction phase and the cleaning of the photovoltaic units during the operational phase, which comprises just 0.033% of the available water within the basin. In order to minimize the use of potable water, septic tanks will be utilized during the operational phase for sanitary uses, and portable toilets will be put in place during the construction phase.

The main opportunities for improvement pertain to the use of recycled and local materials in the project, as well as the reduction of net embodied energy. Reducing potable water consumption and monitoring water quality and systems also represent important opportunities to improve the performance of the project in this category.

In the **Natural World category**, the project obtained 59 out of 203 points, reaching a percentage of achievement of 29.1%. This represents the least efficient performance of Aura Solar I in the five categories of *Envision's* rating system. The area in which Aura Solar I is located has low ecological value

as it is mostly developed for residential, industrial, or agricultural purposes and has a low diversity of flora and fauna. No native species protected by Mexican law have been identified in the area.

For the last 30 years, the project site was used as farmland. There are no significant wetlands or surface water bodies within the concession, with the exception of some streams and natural drainage channels. The existing natural site drainage will be maintained when possible to minimize erosion, and a system of stormwater drainage will be developed to account for the soil's natural drainage capacity. The Aura Solar I project site does not contain any wetland areas or significant bodies of water. It is specifically situated in the La Paz Basin, where there are no types of permanent superficial bodies of water. The different species of flora and fauna have been accounted, and several studies were conducted in order to evaluate the impact of the project on the local biodiversity.

The main opportunities for improvement pertain to the Biodiversity subcategory and include the restoration of disturbed soils, the control of invasive species, and the maintenance of wetland and surface water functions.

In the **Climate and Risk category**, the project obtained 47 out of 122 points, reaching a percentage of achievement of 38.5%. This performance ranked third out of the five categories of *Envision's* rating system.

Excellent evaluations were achieved in the greenhouse gas emissions and air pollutants credits.

Aura Solar I is expected to reduce 60,000 tons of CO₂ emissions annually, and other pollutants such as SO₂, NO_x and particulate matter, produced by thermoelectric plants in the region.

Assessment of climatic threats and long-term adaptability projects related with climate change, as well as the management of heat island effects produced, are opportunities for improvement in this category.

The graphs below demonstrate the project's performance under the three Infrastructure 360^o Awards. The **People and Leadership Award** (figure 32) represents the QL and LD categories from the Envision™ Rating System. The project received a score of 146 points out of a total of 302 combined points within these categories, which equates to a 48.34% level of achievement. The **Climate and Environment Award** (figure 33) represents the RA, NW and CR categories within the Envision™ Rating System. The project received a score of 164 points out of a total of 507 combined points within these categories, which equates to a 32.35% level of achievement. Thus, the overall achievement of the Aura Solar I project under the **Infrastructure 360 Award** (figure 34) is 310 out of 809 points, or 38.3 % of the total score.

This report evaluates the sustainability performance of the Aura Solar I 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.

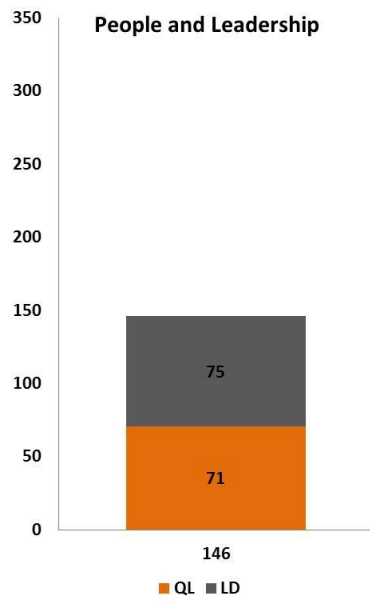


Figure 32: People and Leadership.
Score distribution

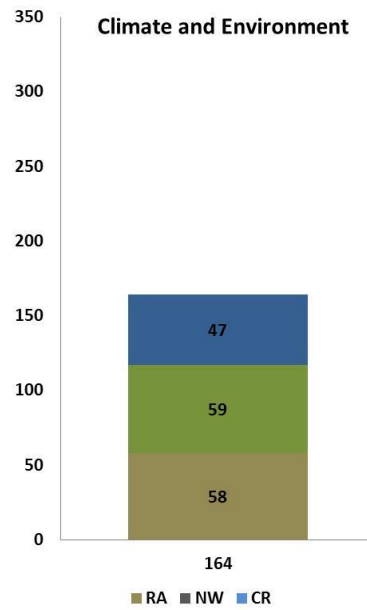


Figure 33: Climate and Environmental.
Score distribution

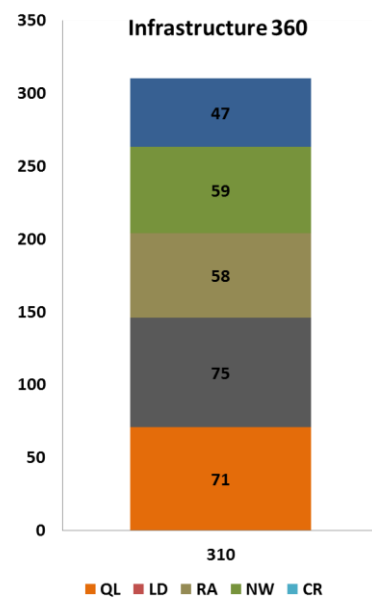


Figure 34: Infrastructure 360.
Score distribution



APPENDIX A: PROJECT PICTURES AND DRAWINGS

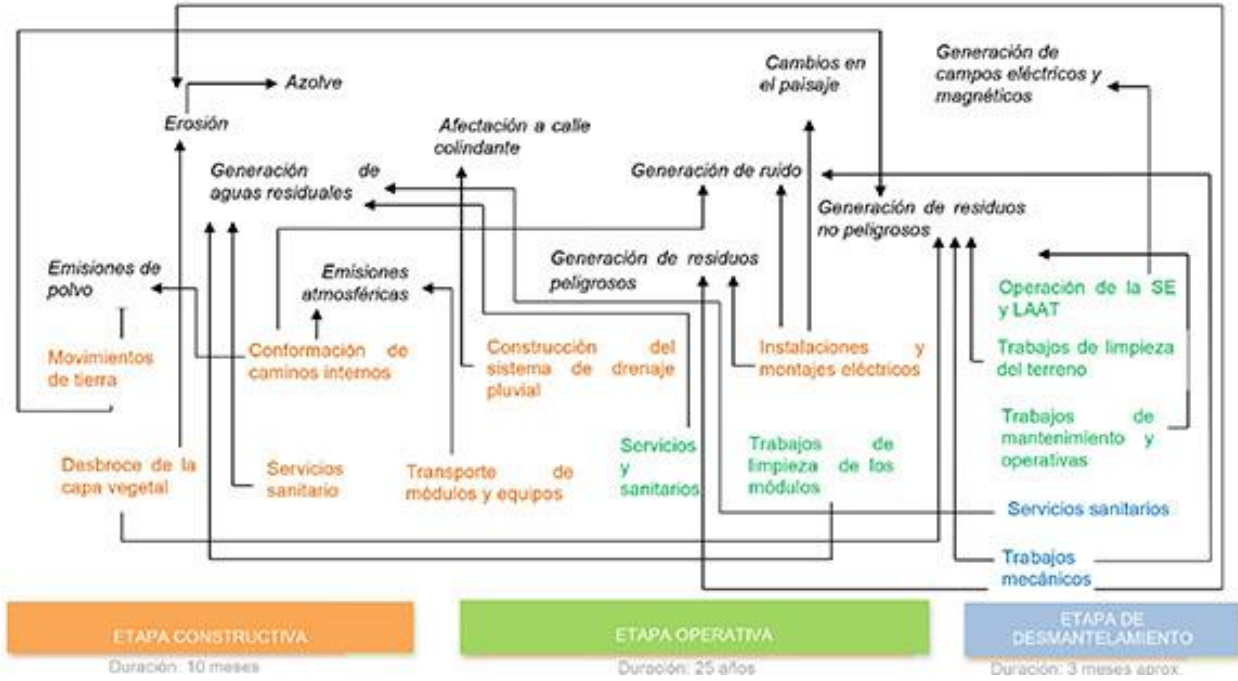


Figure 35: Diagram of social and environmental impacts of Aura Solar I / Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 37.



Figure 36 to 39 : Views of Project Site Surroundings (A: Shrubs and herbs on North, B: Solid Waste by intermittent canal, C: Farmlands on South, D: Colonia Villas de La Paz on West) / Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 23-4.



Figure 40: State of project site before development
Source: Aura Solar, Línea de Tiempo, p. 4.



Figure 41: Screw Foundations Set Up
Source: Martifer Solar. PV Aura Solar I 20MW Informe Quincenal, Semana 32-33. August 2013, p. 35.



Figure 42: Placement of Module Structure
Source: Martifer Solar. PV Aura Solar I 20MW Informe Quincenal, Semana 32-33. August 2013, p. 39.



Figure 43: Set Up of Modules on Structure
Source: Martifer Solar. PV Aura Solar I 20MW Informe Quincenal, Semana 32-33. August 2013, p. 41.



Figure 44: Photovoltaic Modules' Structure Installation
Source: Aura Solar, Línea de Tiempo, p. 6.



Figure 45: Photovoltaic Units' Set Up with High Tension Line
Source: Aura Solar, Línea de Tiempo, p. 7.

Aura Solar I photovoltaic plant, Mexico



Figure 46: Photovoltaic Module Installation
Source: Martifer Solar. PV Aura Solar I 20MW Informe Quincenal, Semana 32-33. August 2013, p. 42.



Figure 47: Photovoltaic Module Installation
Source: Martifer Solar. PV Aura Solar I 20MW Informe Quincenal, Semana 32-33. August 2013, p. 42.



Figure 48: Photovoltaic Module Installation
Source: Martifer Solar. PV Aura Solar I 20MW Informe Quincenal, Semana 32-33. August 2013, p. 47.



Figure 49 Aerial View of Photovoltaic Plant
Source: Aura Solar, Línea de Tiempo, p. 10.

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			LD3.1 Plan for long-term monitoring and maintenance	1	3		10	
20		PLANNING	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			CR2.1 Assess climate threat				15	
52		RESILIENCE	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: CREDIT DETAILS

CATEGORY I, PEOPLE AND LEADERSHIP (PL)			
SUB CATEGORY: QUALITY OF LIFE			
	AURA SOLAR I, MEXICO		RECOMMENDATIONS
QL1.1 Improve Community Quality of Life	20	Conserving	* Provide minutes of meetings letters and memoranda with key stakeholders, community leaders and decision- makers for obtaining input and agreement regarding the impact assessment and planned actions.
		<p>Aura Solar I has developed a holistic assessment of the community short and long term requirements and needs, establishing a relationship of collaboration with it to mitigate any negative impacts that the project may produce mainly throughout its construction phase. The closest developments to the site to be most affected are the residential community of Villas de La Paz, located 23 meters west and housing 84 residents, and the industrial park, Alberto Alvarado Arámbulo, located 14 meters northeast and housing a population of 7 residents. Through its implementation, Aura Solar I will be reducing carbon emissions in the area, conserving water from the limited water resource of La Paz aquifer, providing electricity to 60% of La Paz households, and providing employment in the area (223 positions, 219 during construction and 4 during the operational phase). Several environmental studies were developed that determined that the main environmental concerns affecting the quality of life of the residential communities are noise and dispersion of dust. The noise levels generated by heavy machinery are estimated at 60-65 dBA during two months of the construction phase and are expected to affect a 240m radius from the project, about 20% of the Villas de la Paz residents. In terms of dust generation, the project is estimated to affect the 8.5 meter radius limit beyond its perimeter. and along the LAAT (transmission line) connecting it to the Olas Altas Substation. Measures to reduce vehicle velocity and paving of streets have been set to mitigate these effects.</p> <p>Before the implementation of the project, Gauss Energia held an information session of the project details where they invited La Paz municipal officials, federal environmental officials, CFE energy officials, non-governmental environmental organizations, and neighbors. They reached out to residents in Villas de La Paz and the industrial park to collect their opinions on how the project might positively and negatively affect them as well as inquire about recommendations and suggestions. Two two kilometers long streets were rehabilitated as a result of this collaboration, one with main access for the Villas de la Paz area and a lateral one on its west side. Aura Solar I, through the services of Martifer Solar, developed a "Plan de Consulta y Relaciones Comunitarias," a plan seeking to maximize the adequate management of potential social and environmental impacts that the project could generate on the community quality of life. The services of consultants, Consultores Ambientales S. de R.L. de C.V., were used divulge information of the project around the community during its construction phase and monitor the project's effects on the population during this time through meetings, telephone conversations, as well as interviews and surveys. A system of monitoring and complaint reporting was also developed to facilitate communication with the community.</p>	

		<p><i>Source: Martifer Solar. Plan de Consulta y Relaciones Comunitarias, Proyecto Aura Solar I. p. 3-18 // REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 1-3 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 32-49</i></p>	
<p>QL1.2 Stimulate Sustainable Growth & Development</p>	<p>1</p>	<p>Improved</p> <p>Aura Solar I will generate 219 jobs during the construction phase, 4 jobs during the operation phase, and 15 jobs during the dismantling phase. Preference for these jobs will be given to local workers. As described by Gauss Energía's President and CEO Hector Ólea, the project seeks to drive social and economic development in the region by training local labor in advanced solar technology and infrastructure. This skilled labor will be needed not only for the Aura Solar I project but also for other solar projects developed in the region that seek to retain a local experienced labor force. No other improvements in job growth, capacity building, productivity, business attractiveness and livability were reported.</p>	<p>* Provide report showing how the delivered work expands the capacity or increases the quality of operating, recreational, or cultural capacity.</p> <p>* Generate analysis of the effects of the delivered work on local productivity.</p>
		<p><i>Source: Hector Ólea. The Aura Solar Initiative Triggers New Energy Frontier in Mexico, p.3 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 11, 40</i></p>	
<p>QL1.3 Develop Local Skills and Capabilities</p>	<p>2</p>	<p>Enhanced</p> <p>Aura Solar I will generate 219 jobs during its construction phase, 4 jobs during its operation phase, and 15 jobs during its dismantling phase. Job preference will be given to local workers. As described by Gauss Energía's President and CEO Hector Ólea, the project seeks to foster social and economic development in the region by training local labor in advanced solar technology and infrastructure. This training will be important not only for Aura Solar I but for other solar projects developed in the region that seek to retain a local experienced labor force. An Engineering, Procurement, and Construction (EPC) contractor was hired to provide regular training on occupational health and safety, and to develop an ESHS Practice Guide to be distributed to construction and operation workers. No specific documentation about the type of training and the extent of it were provided.</p>	<p>* Provide an explanation of how the project team identified community employment, training, and worker education needs.</p> <p>* Provide documentation of proposed education and training programs to be developed and implemented, and an explanation of the extent to which these programs will address identified community needs and improve community competitiveness, current and future.</p>
		<p><i>Source: Hector Ólea. The Aura Solar Initiative Triggers New Energy Frontier in Mexico, p.3 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 11, 40</i></p>	

<p>QL2.1 Enhance Public Health And Safety</p>	<p>2</p>	<p>Improved</p> <p>In accordance with Mexican law, as outlined in the Reglamento Federal de Seguridad, Higiene, y Medio Ambiente de Trabajo, the project has outlined health and safety risks and mitigation strategies across 12 different categories. These categories range from equipment to noise and vibration to preventive medical treatment and electrical installations, and were taken into account for both workers and residents in the surrounding community. Furthermore, the project follows the World Bank’s International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability. Employees will be provided with regular training on occupational health and safety matters, and will be provided with an Environmental, Social, Health, and Safety Practice Guide for the construction and operation of Aura Solar I. The project does not provide an analysis of the health and safety implications of using new materials, technologies, or methodologies, above and beyond that which is needed to meet minimum regulatory requirements as defined by the government of Mexico.</p>	<p>* Provide documentation demonstrating efforts to exceed normal health and safety requirements, taking into account additional risks in the application of new technologies, materials, and methodologies.</p> <p>* Provide documentation of the degree to which and specific locations where the project team changed the design of the project to better protect public health and safety.</p>
		<p><i>Source: Hector Ólea. The Aura Solar Initiative Triggers New Energy Frontier in Mexico, p.3 // REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 3 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 55-64</i></p>	
<p>QL2.2 Minimize Noise And Vibration</p>	<p>8</p>	<p>Conserving</p> <p>Aura Solar I will generate noise through the use of light and heavy machinery during the ten month construction phase of the project. Studies performed indicate that noise levels within a 15m radius of the site are estimated to be within 80 and 88 dB. Other equipment could reach 105dB at a shorter distance. At a distance of 340 meters, noise levels are estimated at 64dB, just under the 65dB limit for working hours established by the law NOM-0810SEMARNAT-1994. In order to mitigate the impact of noise, the surrounding community agreed to specific hours in which certain equipment and operations with the highest noise levels can occur. Moreover, the sources of noise were relocated as far from the Villas de La Paz as possible, and traffic circulation near the residential community was reduced.</p>	<p>* Provide a proposal for ambient noise and vibration monitoring.</p>
		<p><i>Source: REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 1 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 34-5, 41, 59-62</i></p>	

<p>QL2.3 Minimize Light Pollution</p>	<p>2</p>	<p>Enhanced</p> <p>The project will utilize energy efficient light sources that minimize heat transmission, will implement measures to prevent reflection, and will reduce and control radiation. Furthermore, the project will utilize anti-reflective, high-absorbing photovoltaic modules that will minimize light pollution. The project will utilize the Suntech Power STP 295-24vd polycrystalline solar module, which achieves a higher efficiency (15.1%) compared to other modules in the market due to its anti-reflective, hydrophobic layer, higher light absorption and minimal surface dust.</p> <p><i>Source: Martifer Solar. Baja California Sur, Mexico, Photovoltaic Production Plant, Technical-economic bid for turn-key solution, p.11 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 61</i></p>	<p>* Provide documentation of lighting assessments conducted for the project.</p> <p>* Provide plans, drawings, and specifications showing the use of energy-efficient lighting, removal of existing but unneeded lighting, use of automatic turnoff systems, application of non-lighting alternatives.</p>
<p>QL2.4 Improve Community Mobility And Access</p>	<p>14</p>	<p>Conserving</p> <p>Aura Solar I improves community mobility and access through the rehabilitation of surrounding streets and prevention of major impacts on traffic flows during the construction phase. The stream located within the project site continues beyond the project perimeter towards an unpaved street that borders the west side of the Villas de la Paz development. Due to runoff and the poor condition of the drainage system, this street was often impassable for vehicles. After working with the community, Aura Solar I rehabilitated this street and another two-kilometer street. The second street is the primary access road to Villas de la Paz. In addition, an adequate drainage system will be developed to prevent damage to streets around the project site. Furthermore, maneuverability of equipment during the construction phase is not expected to alter traffic along the main expressway between the port and the project site, as it only constitutes a maximum increase of 1-7 trucks per day for a period of 154 days. For these efforts, the project has achieved the highest level for this credit.</p> <p><i>Source: Martifer Solar. Plan de Consulta y Relaciones Comunitarias, Proyecto Aura Solar I. p. 6-7, 17-18 // REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 3</i></p>	<p>* Provide studies and documents showing the extent to which community transportation efficiency, walkability, and livability have been improved.</p> <p>* Provide reports, memoranda, minutes of meetings with managers and operators of facilities, amenities and transportation hubs, and local community officials.</p>
<p>QL2.5 Encourage Alternative Modes of Transportation</p>	<p>0</p>	<p>No Score</p> <p>The project is sited in a rural location with limited public transit options. During its operation, the plant will employ four workers, who will be transported to and from the site by the contracting company.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 11-12</i></p>	<p>* Provide location and design drawings showing proximity and accessibility to transportation facilities, parking availability, bicycle and pedestrian walkways and networks, and other modes of transportation.</p> <p>* Provide design drawings and specifications for upgrading and incorporating transportation elements into existing infrastructure.</p>

<p>QL2.6 Improve Site Accessibility, Safety & Wayfinding</p>	<p>3</p>	<p>Enhanced</p> <p>The project site periphery is bounded by unpaved access roads. Internal access roads will be developed and will include an unpaved main perimeter thoroughfare over which vehicles can pass. Appropriate signage indicating different areas and surface materials will also be put in place to facilitate wayfinding within the property. As a means of security, the property will be surrounded by a perimeter chain-link fence of 2.5 meter with barbed wire. Furthermore, a monitoring and security system will be deployed throughout the project site.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 7, 17, 60</i></p>	<p>* Provide design documents showing plans for access and egress and plans for signage showing how the design and signage is clear and intuitive to users.</p> <p>* Provide design documents showing plans for access and egress routes to emergency personnel, users, and occupants.</p> <p>* Provide design documents and plans showing how the project will impact public safety and security, as well as how it integrates with the local community and its environmental and cultural resources.</p>
<p>QL3.1 Preserve Historic and Cultural Resources</p>	<p>13</p>	<p>Conserving</p> <p>The site and its immediate surroundings do not contain any objects or natural features that have historic or cultural value. According to studies performed by the Instituto Nacional de Antropología e Historia (INAH), no archaeological objects were found on the site.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 58</i></p>	<p>* Provide reports, memoranda, and minutes of meetings with the community and required regulatory and resource agencies to identify historic and cultural resources.</p> <p>* Provide location and design drawings demonstrating that the site avoids impacting any cultural resource, or of efforts to mitigate impacts.</p>
<p>QL3.2 Preserve Views and Local Character</p>	<p>6</p>	<p>Superior</p> <p>As the project site and its surroundings are mainly agricultural and industrial, they have a slope of less than 15 degrees that is mainly covered by shrubbery. No cultural or historic landmarks were identified on or within the vicinity of the site. Given the low height of on-site vegetation, there are open panoramas to the site from the southern and western limits. Because of this, the project may have an effect on views from the nearby residential community of Villas de la Paz. In order to limit the impact that the project will have on these views, the vegetation between the project and the complex will be preserved. In addition, open areas of native species will be designated within these limits to preserve the local character for the neighbors. Existing construction and vegetation will screen the site and limit the impacts of site visibility for other surrounding areas. Natural parks and biological reserves with higher aesthetic value and local character are located 30km away from the project.</p> <p><i>Source: REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 3 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 22-24, 39-40 // Martifer Solar, Plan de Gestión Ambiental. January 2013, p. 22-3</i></p>	<p>* Provide plans, drawings, and reports identifying important elements of the site character including landforms or levels, views, natural landscape features, materials, planting, and landscape pattern.</p> <p>* Demonstrate how the final project design addresses each of the identified views, natural landscape features, and elements of local character.</p>

QL3.3 Enhance Public Space	0	No Score	* Provide studies and assessments of the impact of the project on existing public space. * Provide design documents describing any new public space developed as part of the project.
		No plans or commitments to preserve, conserve, enhance, and/or restore defining elements of public space have been reported as part of the project.	
		<i>Source: None.</i>	
QL0.0 Innovate Or Exceed Credit Requirements	0	N/A	
	71		

SUB CATEGORY:LEADERSHIP			
	AURA SOLAR I, MEXICO		RECOMMENDATIONS
LD1.1 Provide Effective Leadership And Commitment	17	Conserving	* Provide examples of published sustainability reports, and organizational principles and policies regarding sustainability.
		The Aura Solar Initiative, owners of Aura Solar I, is focused on a renewable energy vision for Mexico based on the development of utility-scale photovoltaic projects to capitalize on the large solar resources existing in Mexico, beginning with Aura Solar I.. The investor group is comprised of Mexican business leaders that, as indicated in the Aura Solar I Assessment Control Matrix, Annex 1: Shareholder’s Commitment, have demonstrated a thorough commitment to sustainability through diverse initiatives in their companies (Bimbo, Lala, and Grupo Marhnos), including the provision of wind-generated energy, the use of biodegradable packaging technology, reforestation efforts, water and energy efficiency initiatives, civic engagement, and clean air and water initiatives. Gauss Energía, the developer of Aura Solar I, has made sustainability a core value of its organization as well. Under this commitment to sustainability, the project Aura Solar I has developed a detailed Environmental Impact Assessment that accounts for environmental, economic and social aspects of the	

		<p>project, and sets specific goals and targets that are appropriate for the affected communities. The project follows the World Bank's International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability, using these as guidelines for the project development and the construction of management plans. Gauss Energía's CEO, Hector Ólea, indicates the positive environmental and social impact of the project in its community and how "due to the project's sustainable nature, the International Finance Corporation (IFC) and the Mexican development bank Nacional Financiera (NAFIN) have contributed with 75% of the total investment as debt, under an innovative project finance structuring" (Ólea, 10). Other public statements and articles support Aural Solar I as being the largest photovoltaic plant in Latin America, promoting the development of renewable energy projects in Mexico and focusing on sustainable factors of the project such as the reduction of greenhouse emissions and generation of electricity for residents of La Paz.</p> <p><i>Source: Gauss Energía. Aura Solar I Assessment Control Matrix, p. 6 // Schwarts, K (2013, July). Into the Light. LatinFinance, 42-44 // Hector Ólea. The Aura Solar Initiative Triggers New Energy Frontier in Mexico, p.1-3 // Aura Solar. (2013, June) Project Finance. Retrieved from www.projectfinancemagazine.com</i></p>	
<p>LD1.2 Establish A Sustainability Management System</p>	<p>14</p>	<p>Conserving</p> <p>Aura Solar I has developed a detailed Environmental Impact Assessment that accounts for environmental, economic and social aspects of the project, and sets specific goals and targets that are appropriate for the affected communities. Based on this assessment, an Environmental Management Plan (Plan de Gestión Ambiental) including procedures, stakeholders, management, and levels of impact, was developed by Martifer Solar. This plan expands on the overall project's delineation of roles and responsibilities for long-term operation and management during its 25-year lifespan. The Environmental Management Plan targets each of the environmental and social aspects of the project that fall under the operation and management system of Martifer Solar, such as fauna and flora, water management, noise, etc., and includes monitoring, measurement, and performance evaluations for each category.</p> <p><i>Source: Martifer Solar, Plan de Gestion Ambiental. January 2013, p. 1-46 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 1-78 // Martifer Solar. PV Aura Solar I 20MW Informe Quincenal, Semana 32-33. August 2013, p. 61</i></p>	<p>* Provide examples of published sustainability reports, and organizational principles and policies regarding sustainability.</p>

<p>LD1.3 Foster Collaboration And Teamwork</p>	<p>4</p>	<p>Enhanced</p> <p>Aura Solar I has developed an Environmental Management Plan for its operation and management system that fosters collaboration between the different contractors and subcontractors of the project. The collaboration efforts as outlined in the plan seek to optimize the distribution of tasks during the execution of the project. Periodic meetings for environmental coordination will be taking place according to the requirements of the plan. Page 32 of the Plan de Gestión Ambiental provides a breakdown of the organizational structure for the project, which highlights the hierarchy of project actors that respond to the project promoter. The documentation provides no mention of teamwork collaboration between the designer and Construction Manager, or the contractual relationship between the two.</p> <p><i>Source: Martifer Solar, Plan de Gestión Ambiental. January 2013, p. 1-46</i></p>	<p>* Register the multi-disciplinary project team's business processes and management controls in the form of flowcharts, checklists, and other documented control measures.</p> <p>* Demonstrate the existence of risk and reward sharing terms in project contract documents.</p>
<p>LD1.4 Provide For Stakeholder Involvement</p>	<p>14</p>	<p>Conserving</p> <p>Before implementation of the project, Gauss Energia held an information session about the project details for La Paz municipal officials, federal environmental officials, Comisión Federal de Electricidad (CFE) energy officials, non-governmental environmental organizations, and neighbors. The project team reached out to residents in Villas de La Paz and the industrial park to collect their opinions on how the project might positively and negatively affect them, as well as to inquire about recommendations and suggestions. The results show that the citizens in the industrial park reacted positively to the project due to its generation of employment and clean energy. Residents in Villas de La Paz also reacted positively but expressed concerns over disruption during the construction phase. Community members requested support to rehabilitate streets and areas impacted by runoff from the stream located within the project's perimeter. As a result, two 2 km streets were rehabilitated, one of which provides primary access to the Villas de la Paz area.</p> <p>Aura Solar I, through the services of Martifer Solar, developed a Plan de Consulta y Relaciones Comunitarias that seeks to maximize the management of the project's potential social and environmental impacts on the surrounding community's quality of life. The services of Consultores Ambientales S. de R.L. de C.V. were used to spread information about the project throughout the community during the construction phase and to monitor the project's effects on the population during this time. Additional communication with the community was facilitated through meetings, telephone conversations, interviews and surveys. A system of monitoring and complaint reporting was also developed to facilitate communication with the community.</p>	<p>* Provide letters, memoranda, notes, and minutes of meetings with stakeholder groups.</p>

		<p><i>Source: Martifer Solar. Plan de Consulta y Relaciones Comunitarias, Proyecto Aura Solar I. p. 3-18 // REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 3 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 32-49</i></p>	
<p>LD2.1 Pursue By-Product Synergy Opportunities</p>	<p>0</p>	<p>No Score</p> <p>No documentation was provided indicating that reduction of waste, improvement of project performance or reduction of project costs could be gained by identifying and using unwanted byproducts or discarded materials from nearby locations or industries.</p>	<p>* Provide documentation of investigations into potential reuse of byproducts from nearby facilities. Records of contacts and lists of facilities should be provided, as well as a total number of potential opportunities.</p> <p>* Provide documentation of successful byproduct synergy opportunity capture and application.</p>
		<p><i>Source: None.</i></p>	
<p>LD2.2 Improve Infrastructure Integration</p>	<p>13</p>	<p><i>Conserving</i></p>	<p>* Provide documentation of the extent to which the project design explicitly considered other community infrastructure designs and installations.</p>
		<p>Aura Solar I is being developed as a photovoltaic plant for utility-scale energy generation. The Plant is connected to the substation Olas Altas by a 2.9 km high tension line and will be generating 82 GWh/year, which will move 32,000 households in La Paz away from electricity produced by fossil fuels and improve the regional's electrical infrastructure. In terms of access and transportation, the documents indicated both the development of new means of communication and the rehabilitation of existing ones. Within the project site, new thoroughfares will be developed to facilitate communication between the different parts of the project. Off-site, the project has rehabilitated streets and areas affected by runoff from the stream located within the project's perimeter. Two 2km streets were repaired, one of which provides main access to the Villas de la Paz area (the residential community in the project's proximity).</p> <p><i>Source: REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 3 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 1-9</i></p>	

<p>LD3.1 Plan For Long-Term Monitoring & Maintenance</p>	<p>10</p>	<p>Conserving</p> <p>Long-term monitoring has been planned over the 25-year operation period of Aura Solar I. Martifer Solar was hired by Gauss Energía to take care of operation and management of the project in order to ensure the continuous efficiency of the Plant. A detailed Plan of Preventive Maintenance was developed that includes visual and physical inspections, testing of equipment and infrastructure in all installed systems, and a technical report of interventions and inspections. Other types of monitoring and management include operation and maintenance of inverters, corrective maintenance, acquisition and facilitation of warranties for replacements, performance rate measures, and predictive maintenance. The "Sol a Sol" system will operate 24/7, and incorporates a smart alarm system as well as visualization and monitoring in real time. Furthermore, the maintenance schedule includes module cleaning twice a year, landscaping once a year, and electrical studies once a year. In addition, an Environmental Management Plan was developed that includes monitoring and maintenance strategies according to specific environmental aspects of the project</p> <p><i>Source: Martifer Solar. Baja California Sur, Mexico, Photovoltaic Production Plant, Technical-economic bid for turn-key solution.p. 60-93 // Martifer Solar, Plan de Gestión Ambiental. January 2013, p. 1-46</i></p>	<p>None.</p>
<p>LD3.2 Address Conflicting Regulations & Policies</p>	<p>0</p>	<p>No Score</p> <p>The project does not report any work with officials to identify or address laws, standards, regulations, or policies that may unintentionally create barriers to the implementation of sustainable infrastructure.</p> <p><i>Source: None.</i></p>	<p>* Provide documentation on how the project team has analyzed existing local laws, standards, regulations, and/or policies and assessed whether they may hinder the project's sustainability performance.</p> <p>* Provide copies of letters, memoranda, or minutes of meetings with regulatory agencies set up to identify and resolve issues, and the results of those efforts.</p>
<p>LD3.3 Extend Useful Life</p>	<p>3</p>	<p>Enhanced</p> <p>The lifespan of the project is 25 years. While no indication was made of any plans to extend the project's useful life, the project did evaluate the long-term operation of the plant as well as implemented a long-term maintenance plan. As a solar photovoltaic plant, with proper maintenance, the construction materials and panels of the plant can easily be replaced as needed to extend its useful life.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 2</i></p>	<p>* Provide documentation of any elements intended to add durability, flexibility, and resilience throughout the useful life of the project that were incorporated into the design.</p> <p>* Indicate results of a feasibility study that identifies key areas where investments in extending the project's useful life will offer a reasonable payback.</p>
<p>LD0.0 Innovate Or Exceed Credit Requirements</p>	<p>0</p>	<p>N/A</p>	
<p>75</p>			

CATEGORY II: CLIMATE AND ENVIRONMENT (CE)			
RESOURCE ALLOCATION			
	AURA SOLAR I, MEXICO		RECOMMENDATIONS
RA1.1 Reduce Net Embodied Energy	0	<p>No Score</p> <p>No information has been provided regarding any calculation or reduction of the net embodied energy of materials used for development of the project.</p>	<p>* Provide documentation demonstrating that a life cycle energy assessment was performed in accordance with recognized and accepted methodologies, data sources, and software.</p> <p>* Provide a report on the selection of the life cycle energy assessment model used and/or databases referenced.</p> <p>* Develop narrative describing how strategies to reduce net embodied energy will not increase operational and maintenance energy use over the course of the project, or shorten its lifespan.</p> <p>* Provide design documents for elements that will reduce the net embodied energy of the project and the rationale for their selection including calculations showing overall reduction compared to industry norms.</p>
		<p><i>Source: None.</i></p>	
RA1.2 Support Sustainable Procurement Practices	2	<p>Improved</p> <p>No information was provided regarding the support of sustainable procurement practices or the selection of materials and equipment from manufacturers and suppliers who implement sustainable practices.</p>	<p>* Provide evidence of a sustainable procurement program consisting of policies and criteria for supplier identification and selection.* Provide documentation from the manufacturer or suppliers to demonstrate that sustainable practices are employed for percentage of purchased products.</p>
		<p><i>Source: None.</i></p>	

<p>RA1.3 Used Recycled Materials</p>	<p>0</p>	<p>No Score</p> <p>No materials, structures, or equipment were present on the site, at the time the site was purchased, for reuse or recycling. No information was provided on the use of off-site recycled materials in the project or the extent (at least 30%) to which the materials of the project were locally sourced.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p.9.</i></p>	<p>* Perform calculations of percentage of total project materials by weight or volume that are reused or recycled.* Provide inventory of specifications for materials seeking inclusion as containing recycling content.</p>
<p>RA1.4 Use Regional Materials</p>	<p>0</p>	<p>No Score</p> <p>The Aura Solar I project is comprised of photovoltaic panels, inverters, and other energy equipment provided by Martifer Solar, a multinational company based in Portugal that specializes in renewable energy. These components were imported to La Paz, Mexico from various locations and then brought to the site via ground transport. Materials and equipment for the construction phase, such as trucks, concrete, etc. were locally sourced; however, no documentation was provided specifying that 30% of the material used was locally sourced. For this reason, the project is considered not achieving under this credit.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 10.</i></p>	<p>* Minimize transportation costs and impacts and retain regional benefits through specifying the use of local sources.* Provide calculations of percentages of total project materials by cost that are sourced locally, including reused and recycled materials.</p>
<p>RA1.5 Divert Waste From Landfills</p>	<p>6</p>	<p>Enhanced</p> <p>Aura Solar I will generate both non-hazardous (99%) and hazardous (1%) material during its useful life, especially during its construction. Non-hazardous waste will consist of paper, cardboard, plastics, metals, wood, concrete, biodegradable waste (such as moved earth and herbs) and mixed waste resulting from construction and demolition. Appropriate containers will be designated for personnel to dispose of this waste by type. The waste management plan as outlined in the Plan de Gestión Ambiental indicates a focus on re-utilization, recycling, and reduction (3 R's). The main goal is to reduce waste generation and find ways to recycle and reuse the waste that is generated. Nonetheless, non-hazardous waste that is removed and won't be re-used in the future will be deposited in a landfill. The hazardous waste generated by the project will be comprised of chemical cleaners used to remove oil and grease. This type of waste will be sealed and appropriately labeled, as well as disposed of in authorized locations. While the project team notes an intent to reduce waste and diverting it from landfills, there is no indication of the extent to which waste will be recycled or reused.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 53-4, 59 // Martifer Solar, Plan de Gestión Ambiental. January 2013, p. 40-46.</i></p>	<p>* Develop waste management plans documenting the volume or weight of anticipated waste generation.* Provide calculations of the total waste reduction measures and percentage of materials diverted to recycling or reuse.</p>

<p>RA1.6 Reduce Excavated Materials Taken Off Site</p>	<p>2</p>	<p>Improved</p> <p>Vegetation on site, which mainly consists of herbs and shrubs, will be removed in areas strictly necessary. In addition, a 10cm layer of topsoil will be removed in order to level the terrain in certain indispensable areas to level the ground. Biodegradable material resulting from the movement of soil from erosion and precipitation will be preserved to be re-utilized later on to regularize the terrain and build internal thoroughfares, while the rest of the biodegradable material will be temporarily deposited in authorized, local landfills. However, no indication of the extent to which the excavated materials taken off site will be reduced.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 10 // Martifer Solar, Plan de Gestión Ambiental. January 2013, p. 20.</i></p>	<p>* Minimize the movement of soil and removal of excavated materials from the site, which will reduce transportation and environmental impacts and promote reuse and recycling.* Provide design documents demonstrating how the project was designed to balance cut and fill.</p>
<p>RA1.7 Provide for Deconstruction & Recycling</p>	<p>8</p>	<p>Superior</p> <p>Aura Solar I has a lifespan of 25 years and has an agenda for deconstruction and recycling. During the dismantling phase, Aura Solar I will separate waste and materials, classify them, and deliver them to an authorized recycling center that complies with corresponding environmental regulations. The photovoltaic units used in the project are composed of recyclable materials, and given their assemblage in a bolt fastening system, provide for an easy and rapid dismantling process. While all parts of the project can be disassembled, there is no indication of the extent to which the materials will be recycled.</p> <p><i>Source: Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 2 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 9-10, 11-12.</i></p>	<p>* Provide an inventory of materials incorporated into the design that retain some value for future use.* Provide general percentages of total materials by cost or weight or volume likely to be recycled at end of life.</p>
<p>RA2.1 Reduce Energy Consumption</p>	<p>0</p>	<p>No Score</p> <p>The project will only consume energy to drive its operation and maintenance (O&M) systems. These systems include energy meters, inverters, meteorological stations, an alarm system and a computing center for the four operating personnel. However, this system does not include any monitoring of energy consumption. Furthermore, no measures for the conservation or reduction of energy consumption have been identified throughout the lifecycle of the project.</p> <p><i>Source: Martifer Solar. Baja California Sur, Mexico, Photovoltaic Production Plant, Technical-economic bid for turn-key solution.p. 74-83.</i></p>	<p>* Provide reports, memoranda, minutes of meetings with project teams and owner, or other forms of documentation demonstrating energy reduction strategies.* Provide design documents demonstrating the incorporation of energy saving strategies into the design.* Perform calculations for the project's estimated annual energy consumption over the life of the project, taking into account the industry norm benchmark.</p>
<p>RA2.2 Use Renewable Energy</p>	<p>20</p>	<p>Restorative</p> <p>The Aura Solar I project is a photovoltaic plant with a 115 kV high tension line. The project will have an installed capacity of 30 MWh and will generate 81.5 GWh of renewable energy every year. The energy will be transmitted to the Olas Altas substation, which is part of CFE (Comisión Federal de Electricidad), the Mexican state power company.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 5-6 // Ólea, Hector. The Aura Solar Initiative Triggers New Energy Frontier in Mexico. p. 1 // Schwartz, Karen. Mexican Renewables, "Into the Light," p. 42.</i></p>	<p>None.</p>

<p>RA 2.3 Commission & Monitor Energy Systems</p>	<p>11</p>	<p>Conserving</p> <p>Long-term monitoring has been planned for the 25 years that the project will be in operation. Martifer Solar was hired by Gauss Energía to take care of the operation and management of the project in order to ensure the continuous efficiency of the photovoltaic plant. A detailed Plan of Preventive Maintenance was developed that includes visual and physical inspections, testing of equipment and infrastructure in all installed systems, and a technical report of interventions and inspections. The program also involves operation, monitoring and reporting, operation and maintenance of inverters, corrective maintenance, acquisition and facilitation of warranties for replacements, performance ratios, and predictive maintenance. The "Sol a Sol" system operates continuously and includes a smart alarm system as well as visualization and monitoring in real time. Furthermore, maintenance includes cleaning of the modules twice a year, cleaning the terrain once a year, and annual electrical studies.</p> <p><i>Source: Martifer Solar. Baja California Sur, Mexico, Photovoltaic Production Plant, Technical-economic bid for turn-key solution.p. 60-93.</i></p>	<p>None.</p>
<p>RA3.1 Protect Fresh Water Availability</p>	<p>9</p>	<p>Superior</p> <p>The Aura Solar I site is located above the La Paz aquifer, the only source of water for the city. The project will have a minimal environmental impact on surface and groundwater. The operational phase of the project demands only 88.96m³ of water, representing 680 milliliters of water per photovoltaic module per year for construction phase and the cleaning of the photovoltaic units during the operational phase, which comprises just 0.033% of the available water within the basin. This represents a significant reduction in water use from the previous agricultural use, which utilized about 30% of the basin's available water. The project complies with the NOM-006-CONAGUA-1997 and 2001 standards, which require the installation of prefabricated septic tanks as well as the installation of toilets for sanitary use, to prevent the use of the available groundwater for these purposes. Portable toilets will be obtained for the construction phase, while the septic tank will be used during the project's operational phase. Cleaning of the photovoltaic modules will be performed every two years with biodegradable detergents. This will prevent aquifer and soil contamination from residual water that infiltrates the soil.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 35-6, 41, 53.</i></p>	<p>* Develop a report of long-term availability and replenishment or recharge of fresh water supply.* Develop a strategy to determine how the integrated systems of the project will work together to mitigate overall negative impacts or achieve net positive recharge.* If achieving net positive impact, develop calculations demonstrating this net positive impact and how the project does not significantly alter natural fluctuation in flow in receiving waterway ecosystems.</p>

RA3.2 Reduce Potable Water Consumption	0	No Score	* Provide reports, memoranda, minutes of meetings with project teams and owner, or other forms of documentation demonstrating water reduction strategies regarding potable water.
		The Aura Solar I Water Management Strategy seeks to protect the availability of water within the La Paz aquifer, which rests beneath its site limits. Potable water for employees will be provided through the purchasing of water gallons. However, no information has been provided regarding measures to reduce potable water consumption. <i>Source: None.</i>	
RA3.3 Monitor Water Systems	0	Improved	* Commission a monitoring authority to check periodically the water systems performance and quality of water of aquifer.* Provide a rationale of how the integrated monitoring systems may be used to mitigate negative impacts of shifting water demand.
		Aura Solar I has a water management strategy that seeks to protect the available water from the La Paz aquifer, which lies beneath the site limits. However, no systems for monitoring water performance during operations or their impacts on water sources have been developed. <i>Source: None.</i>	
RA0.0 Innovate Or Exceed Credit Requirements	0	N/A	
58			

NATURAL WORLD			
	AURA SOLAR I, MEXICO		RECOMMENDATIONS
NW1.1 Preserve Prime Habitat	14	<p>Conserving</p> <p>The area in which the project is located is assessed as having low ecological value as it is mostly developed for residential, industrial, or agricultural purposes and has a low diversity of flora and fauna. No species have been identified in the area that are included in the NOM-059-SEMARNAT-2010 (NORMA Oficial Mexicana), which protects native species of Mexican flora and fauna. According to the Programa de Ordenamiento Ecológico Local del Municipio La Paz (2008), 78% of La Paz is covered by shrubbery, 15% by deciduous forest, 2% by pine-oak forest, 3% of other types of vegetation, 1% of farmland, and 0.3% by villages. Aura Solar I does not compromise fauna or flora protected under the NOM-059-SEMARNAT-2010 or other IUCN (International Union for the Protection of Nature) red lists, which outline species around the world that are at risk of extinction. There are no protected natural areas (ANP) in the project's vicinity; the nearest one is located 30km away from the site. During the last 30 years, the site's soils were used for agriculture. Current site vegetation is composed of herbs in the <i>Chenopodiaceae</i>, <i>Amaranthaceae</i> and <i>Poaceae</i> families. These species are generally present in dry and saline lands, which make good use of nitrogen but can lead to loss of soil fertility, preventing the site from use for agriculture. The site is comprised mainly of generalist and opportunistic fauna, which generally adapt well to the current site conditions. Birds comprise the most diverse category of organisms found on site (about 10 species), followed by 3 species of mammals (squirrel, rabbit, and gopher), and the dwarf toad in the amphibian category.</p> <p><i>Source: Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 1-3 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 13-26.</i></p>	* Develop a restoration plan outlining any efforts to restore prime habitat either in the project site or adjacent to the site.* Provide a site plan outlining locations of restoration, conservation and overall development within the site area.
	0	<p>No Score</p> <p>The Aura Solar I project site does not contain any wetland areas or significant bodies of water. The project is located within the limits of the La Paz aquifer, the only source of water for the city. It is specifically situated in the La Paz Basin, where there are no types of permanent superficial bodies of water.</p> <p><i>Source: REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 2 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 16-7.</i></p>	
NW1.2 Preserve Wetlands and Surface Water			

<p>NW1.3 Preserve Prime Farmland</p>	<p>12</p>	<p>Conserving</p> <p>For the last 30 years, the project site was used as farmland. Its soils are classified as eutric regosol and have a thick texture and a composition that is more than 65% sand and less than 18% clay. Its dominant vegetation today is herbs from the Chenopodiaceae, Amaranthaceae, and Poaceae families. The first two are associated with salty soils characteristic of xerophytic environments. Irrigation of these soils under such conditions can cause an increase in the level of salt in the soil would be a detriment to the soil's fertility. The project site counts with a Certificado de Inafectabilidad Agrícola since 1980, which specifies that the site area is of 100ha and serves for agricultural purposes. However, the Environmental Impact Assessment states that the site's soil fertility, given its conditions, is deteriorating over time, not being considered prime farmland.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 29-30, 44-5.</i></p>	<p>None.</p>
<p>NW1.4 Avoid Adverse Geology</p>	<p>3</p>	<p>Superior</p> <p>The project site is located within the limits of the La Paz aquifer, the only source of water for the city, and does not interfere with the aquifer's process of recharging. According to the Servicio Sismológico Nacional, no epicenter has been reported in the area. The closest one was registered in August 2010 11kms away from the site, having had a magnitude of 4 in the Richter scale.</p> <p><i>Source: REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p.2 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 15-7, 35-6.</i></p>	<p>* Demonstrate that geotechnical investigation has been conducted proving that there are no adverse geological issues affecting underlying aquifer.* Provide documentation of design of the project that illustrates strategies used to avoid damage to sensitive geology or damage from adverse geology.* Provide documentation showing hazardous areas and plans that illustrate buffers and runoff controls, and spill prevention and cleanup plans.</p>
<p>NW1.5 Preserve Floodplain Functions</p>	<p>5</p>	<p>Enhanced</p> <p>The Aura Solar I project is being developed on a site with no prominent elevations or depressions; rather the site is within an alluvial plain (llanura de tipo aluvial), which indicates that there could be adverse impacts from flooding. Construction of the project does not impact floodplain functions or effect water the aquifer water table. Infiltration and water quality are maintained. A septic system was developed and a topographical study was performed for the development of a drainage system. However, no information on the development of a floodplain analysis or the drainage system was provided.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Plan de Manejo de Agua y Suelo. December 2012, p. 1-6.</i></p>	<p>* Provide documentation showing the location of the project relative to the 100-year or design floodplain.* Provide documentation showing siting choices relative to floodplains and how impacts to the floodplain have been reduced.*Provide inventory of flood damaged infrastructure and plan/design to modify or remove flood-damaged infrastructure.</p>

<p>NW1.6 Avoid Unsuitable Development on Steep Slopes</p>	<p>6</p>	<p>Conserving</p> <p>The Aura Solar I project is being developed on a site with no prominent elevations or depressions. Rather, the site is within an alluvial plain (llanura de tipo aluvial), which indicates that fragmented, non-consolidated material has been transported and deposited in the area through water currents. The project site soil (regosol) is susceptible to erosion due to its low content of organic material. With the removal of existing vegetation and the superficial layer of soils, the land is more likely to experience erosion. During the construction and dismantling phases, the movement of soils and machinery is likely to cause erosion. Installation of the photovoltaic modules will help mitigate both hydric and wind erosion as they will provide resistance to impacts of rain and wind. Thus, erosion may primarily occur within walkways. In order to mitigate the impacts of erosion and sedimentation, Aura Solar will develop both an adequate drainage system and a circulation system of walkways. Canals and trenches will be developed for post-construction flows. When possible, the photovoltaic plant's activities will be modified during times of strong precipitation or wind. After the dismantling phase, the canals and excavated areas will be covered with mulch or jute mesh.</p> <p><i>Source: REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p.15, 36-8.</i></p>	<p>None.</p>
<p>NW1.7 Preserve Greenfields</p>	<p>0</p>	<p>No Score</p> <p>According to the Envision Manual Glossary (p.171), greenfields are undeveloped land in a city or rural area being considered for urban development. This land may contain natural landscape, natural amenities, or agricultural land. The project is being developed on an agricultural land, and therefore, it is not preserving greenfields.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 15-6, 29-30.</i></p>	<p>None.</p>
<p>NW2.1 Manage Stormwater</p>	<p>4</p>	<p>Enhanced</p> <p>The municipality of La Paz experiences 100-300mm of rainfall every year, with the driest areas oscillating between 50 and 10mm per year. According to the hydrology study provided (Cruz-Falcon et al, 2011), 80.5% of the total annual precipitation in La Paz undergoes evapotranspiration while 15.9% infiltrates the terrain. The natural project site drainage will be maintained when possible to minimize erosion, and a system of stormwater drainage will be developed that accounts for the soil's natural drainage capacity. However, no details have been provided on the development of this stormwater management system.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 35-6.</i></p>	<p>* Provide documentation of the initial, final post-development, and target water storage, infiltration, evaporation, water harvesting and/or cistern storage capacities and strategies for stormwater management in the site.</p>
<p>NW2.2 Reduce Pesticides and Fertilizer Impacts</p>	<p>9</p>	<p>Conserving</p> <p>On-site vegetation will be maintained twice a year using hoes and human labor. No herbicides, pesticides or chemical products will be used on the site.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p.9.</i></p>	<p>* Provide plans and drawings showing how runoff controls will be designed and installed.</p>

<p>NW2.3 Prevent Surface and Groundwater Contamination</p>	<p>4</p>	<p>Enhanced</p> <p>The project will have a minimal environmental impact on surface water and groundwater. The operational phase of the project demands 88.96 m³ of water per year, which is only 0.033% of the water available to the project from the local aquifer. This represents a significant reduction in water use from the previous agricultural activities of the site, which utilized about 30% of the available water. The project will generate wastewater from sanitation services and module cleaning. The LGEEPA (Ley General del Equilibrio Ecológico y la Protección al Ambiente) prohibits any discharge or infiltration of wastewater with contaminants into onsite bodies of water without previous treatment for contamination. The project will apply standard NOM-006-CONAGUA-1997 and 2001, which requires the installation of prefabricated septic tanks as well as the installation of toilets for sanitary use. Portable toilets will be obtained during construction, while the septic tank will be used during the project's operational phase. Residual water from cleaning the photovoltaic modules will only be generated every two years and will consist of biodegradable detergents that can infiltrate the soil without fear of contamination. Furthermore, a drainage system will be developed as a way to counteract erosion.</p> <p><i>Source: Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales. REA Consultores Ambientales, p. 2 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p.35-6, 53.</i></p>	<p>* Provide documentation of long-term surface water and groundwater quality monitoring programs.* Provide documentation on prevention and response plans for spills and leakages.</p>
<p>NW3.1 Preserve Species Biodiversity</p>	<p>2</p>	<p>Improved</p> <p>The project site and its surroundings have been assessed as having a low diversity of flora and fauna and no species included in the NOM-059-SEMARNAT-2010. According to the Programa de Ordenamiento Ecológico Local del Municipio La Paz (2008), 78% of La Paz is covered by shrubbery, 15% by deciduous forest, 2% by pine-oak forest, 3% of other types of vegetation, 1% of farmland, and 0.3% by villages. Aura Solar I does not compromise fauna or flora protected under the NOM-059-SEMARNAT-2010 or other IUCN (International Union for the Protection of Nature) red lists. There are no protected natural areas (ANP) in the project's vicinity; the nearest one is located 30km away from the site. During the last 30 years, the site's soils were used for agriculture, and the current on-site vegetation is composed of herbs in the Chenopodiaceae, Amaranthaceae and Poaceae families. These species are generally present in dry and saline lands, which make good use of nitrogen but can lead to loss of soil fertility, preventing the site from use for agriculture. The site is comprised mainly of generalist and</p>	<p>* Make efforts during the course of the project to not only protect existing habitats but upgrade them, improving and expanding wildlife corridors, and linking existing habitats.</p>

		<p>opportunistic fauna, which are adaptable to current site conditions. The most diverse organisms on site are birds (about 10 species). There are also 3 species of mammals (squirrel, rabbit, and gopher), and the dwarf toad in the amphibian category. It must be noted that while the presence of reptiles was not detected on the project site, their presence is not fully discarded given their wide distribution throughout the Baja California peninsula and their general ability to adapt. These reptiles could include species of lacertilians, serpents, and snakes, which could invade the terrain at any given time. Two species in these groups, the Urosaurus nigricaudus and the Crotalus are included in the NOM-059-SEMARNAT-2010 and require some degree of protection. If their presence is detected at any point, necessary measures for their protection will be implemented. Furthermore, personnel working during the operational phase of the project will be trained in the identification and management of potentially-present dangerous wildlife, and corresponding authorities will be contacted as needed.</p> <p><i>Source: Aura Solar I: Análisis de temas ambientales y sociales. December 2012. REA Consultores Ambientales. p. 17-22.</i></p>	
<p>NW 3.2 Control Invasive Species</p>	<p>0</p>	<p>No Score</p> <p>No information is available regarding the control or elimination of existing invasive plant species on the site.</p> <p><i>Source: None.</i></p>	<p>* Provide a list and map of all invasive species in the region found on or within 1000m of the site.* Present a management/maintenance plan outlining strategies for minimizing the potential for invasive species to re-appear or enter the site, as well as strategies of monitoring and removing invasive species in the future.</p>
<p>NW3.3 Restore Disturbed Soils</p>	<p>0</p>	<p>No Score</p>	<p>* Provide documentation of soil restoration activities, areas of disturbance, and areas restored. * Show calculations that prove that 100% of the disturbed soils have been restored.* Show documentation of soil reuse.</p>

		<p>Vegetation on site, which mainly consists of herbs and shrubs, will be removed in areas strictly necessary. In addition, a 10cm layer of topsoil will be removed in order to level the terrain in certain indispensable areas to level the ground. Biodegradable material resulting from the movement of soil from erosion and precipitation will be preserved to be re-utilized later on to regularize the terrain and build internal thoroughfares, while the rest of the biodegradable material will be temporarily deposited in authorized, local landfills. Due to the removal of soil and vegetation from the site, erosion will likely occur, which will be mitigated by the development of an adequate drainage system. Although canals and excavated areas will be covered with mulch or jute mesh after the project is dismantled, these efforts will not restore 100% of the disturbed soils on site. No information regarding the extent of soil restoration has been provided.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 41-2.</i></p>	
NW3.4 Maintain wetland and surface water functions.	0	<p>No Score</p> <p>The Aura Solar I project is located on a site that does not have wetlands or significant bodies of water. Specifically, it is situated in the La Paz Basin, where there are no permanent superficial bodies of water. No maintenance and restoration of ecosystems related to wetlands and surface waters is present in the project.</p> <p><i>Source: REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p. 16.</i></p>	<p>* For streams present on site, provide documentation showing how the waterway is connected or proposed to be connected to its riparian floodplain at a six-month to two-year frequency flow event.* Provide documentation showing the current source of the waterways' normal flow, the water quality of its source water, and how the water quality will be maintained or enhanced.</p>
	0	N/A	
	59		

CLIMATE AND RISK			
	AURA SOLAR I, MEXICO		RECOMMENDATIONS
CR1.1 Reduce Greenhouse Gas Emissions	25	<p>Restorative</p> <p>Aura Solar I will not generate greenhouse gas emissions during its operational phase. However, the project is anticipated to generate greenhouse gas emissions during its 10-month construction phase, in which the operation of 562 units of machinery and 42 transportation vehicles will be required. The CO2 emissions from the transportation of the photovoltaic modules are estimated to be between 10.64 and 14.84 tons per month, which represents less than 0.3% of the 60,000 tons of CO2 emissions that the project is estimated to reduce annually. It is important to note that the greenhouse gas emissions produced by the project during its construction phase fall within the limits allowed by the LGGEPA's Regulations in the Field of Prevention and Control of Atmospheric Pollution, and the Mexican Official Standards, which represent Mexican legislation for the prevention and control of air pollution.</p>	None.
		<p><i>Source: Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales. REA Consultores Ambientales, p. 1 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p.34-5, 41, 51-2, 59, 62-4</i></p>	
CR1.2 Reduce Air Pollutant Emissions	12	<p>Conserving</p> <p>Aside from focusing on reducing greenhouse gas emissions, Aura Solar I also seeks to mitigate emissions from other contaminating particles such as NOx and SO2, which result from the generation of energy from burning fossil fuels. Due to the movement of soils and the transportation of construction materials, the project will generate dust not only within the site but also along the 770m unpaved segment between the site and the industrial park. The dispersion of dust could extend 8.5m, possibly affecting the Colonia Villas de la Paz, a residential complex near the site. In order to mitigate the impact of dust generation, the project seeks to reduce vehicle speeds by establishing maximum limits, use awnings and covers, apply water or non-toxic chemical products when appropriate, prevent the burning of solid waste in open air, establish a mechanical maintenance program for all vehicles, and utilize EPP (Equipo Protección Personal/Equipment for Personal Protection) guidelines for employee protection, which requires use of masks when dust levels are excessive.</p>	* Provide documentation of expected emissions of the six criteria pollutants (carbon monoxide, lead, nitrogen dioxide, ozone, particle pollution, and sulfur dioxide) and strategies implemented to reduce air pollution to required levels.
		<p><i>Source: Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales, p. 1 // REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. December 2012, p.34-5, 41, 59, 62-4.</i></p>	
CR2.1 Assess	0	No Score	* Provide documentation that

<p>Climate Threat</p>		<p>No documentation was provided to demonstrate that a comprehensive Climate Impact Assessment and Adaptation Plan identifying climate change risks and possible responses were developed to prepare the project for climate variation and natural hazards.</p> <p><i>Source: No Score.</i></p>	<p>a plan has been completed which takes into account the impacts of a changing climate on the range of operating conditions assumed in the design of the project. These include sea rise, higher ambient temperatures, increased frequency and intensity of storms, flooding, extended droughts, etc. The plan should assess the risk of changing operating conditions on the efficient operation of the constructed works as well as on the operation of other related infrastructure. The plan should also address recovery from extreme events.</p>
<p>CR2.2 Avoid Traps And Vulnerabilities</p>	<p>0</p>	<p>No Score</p> <p>The Aura Solar I project team has not provided any documentation on the avoidance of traps and vulnerabilities that could create high, long-term costs and risks for affected communities.</p> <p><i>Source: None.</i></p>	<p>* Provide documentation of the work done to identify and assess changes in key engineering variables due to their impact on climate change, as in CR2.1.</p> <p>*Outline potential traps (resource, configuration, and standards traps) and vulnerabilities as well as associated potential costs and risks of these.</p>
<p>CR2.3 Prepare For Long-Term Adaptability</p>	<p>0</p>	<p>No Score</p> <p>The project team has not provided or mentioned any plans or designs to prepare for long-term climate change.</p> <p><i>Source: None.</i></p>	<p>* Identify specific measures taken to address the potential consequences of long-term climate change such as sea level rise, increased intensity and frequency of extreme weather events, extended droughts, heat waves, increased ambient temperatures, among others. Some of these strategies might include structural changes, decentralized systems, natural systems with green infrastructure solutions, alternative supply options, adaptive capabilities, and site selection.</p> <p>* Provide plans, designs, documents that show restoration and rehabilitation efforts.</p>

CR2.4 Prepare For Short-Term Hazards	10	Superior	<p>* Provide a list of anticipated natural hazards in the area and their predicted frequency and severity, including but not limited to wildfires, floods, tornadoes, hurricanes, earthquakes, tsunamis, and man-made hazards.</p> <p>* Explain the strategies in the project that are meant to cope with each event and how they surpass existing codes and regulations.</p> <p>* Provide documentation of strategies used and how they minimize the risk of future hazards using environmental restoration.</p>
		<p>The project team developed an analysis and risk mitigation study for hurricanes in Baja California del Sur. A comprehensive list of hurricanes that have affected the area since 1970 was developed, registering maximum levels of wind speeds. The study led to the optimization of the plant design to resist extreme wind loads higher than 250 km/h by reinforcing the structure of the photovoltaic frames to allow them to resist wind loads for 50 years. Likewise, a drainage system will be developed, which will mitigate any risks of flooding produced by short-term hazards.</p> <p><i>Source: Gauss Energía. Huracanes en BCS. Análisis y Mitigación de Riesgos. November 2012, p. 1-12.</i></p>	
CR2.5 Manage Heat Island Effects	0	No Score	<p>* Provide drawings showing all non-roof non-vegetated areas of the site and the surfacing material.</p> <p>* Provide documentation of all shaded areas, assumed at noon on summer solstice, and a list of species used and expected growth rates showing projected shading five years from planting.</p> <p>* Provide documentation of roof or surface areas, surface material, and corresponding solar reflectance index (SRI).</p>
		<p>No information was provided indicating the reduction of localized heat accumulation and the management of microclimates.</p> <p><i>Source: None.</i></p>	
CR0.0 Innovate Or Exceed Credit Requirements	0	N/A	
47			

OVERALL:	310	AURA SOLAR I, MEXICO
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APPENDIX D: SOURCE LIST

DOCUMENTATION PROVIDED. (ESPAÑOL)
General information
REA Consultores Ambientales. Aura Solar I: Análisis de temas ambientales y sociales. Diciembre 2012
Martifer Solar. PV Aura Solar I 20MW Informe Quincenal, Semana 32-33. Agosto 2013
AWSTruePower. Informe de Revisión Documentación Contrato EPC. Noviembre 2012
Martifer Solar. Anexo 10. Especificaciones de Monitorización y Seguridad. Octubre 2012
Martifer Solar. Plan de Consulta y Relaciones Comunitarias. Febrero 2013
Gauss Energía. Plan de Desarrollo.
REA Consultores Ambientales. Reporte Preliminar: Identificación de riesgos e impactos ambientales y sociales.
Aura Solar I. Ejemplos de Certificación.
Martifer Solar. Organización de Operación y Mantenimiento. Julio 2013
REA Consultores Ambientales. Plan de Manejo de Emisiones a la Atmósfera y Electromagnetismo. Diciembre 2012
Ayuntamiento de La Paz. Autoización de Uso de Suelo. Septiembre 2012
SAGARPA. Confirmación de Constancia Agrícola. Septiembre 2012
SAGARPA. Consulta de Constancia Agrícola. Septiembre 2012
Gauss Energía. Huracanes en BCS. Análisis y Mitigación de Riesgos. Noviembre 2012
REA Consultores Ambientales. Plan de Manejo Preventivo de Reptiles. Diciembre 2012
Martifer Solar. Reporte de Actividades de Planes de Manejo Ambiental y Social. Marzo 2013
Martifer Solar. Plan de Gestión Ambiental. Marzo 2013
REA Consultores Ambientales. Plan de Manejo de Agua y Suelo. Diciembre 2012

DOCUMENTATION PROVIDED. (ENGLISH)
General Information.
Gauss Energía. Aura Solar I Assessment Control Matrix
Aura Solar. Aura Profile
Hector Ólea. The Aura Solar Initiative Triggers New Energy Frontier in Mexico
Martifer Solar. Baja California Sur, Mexico, Photovoltaic Production Plant, Technical-economic bid for turn-key solution. August 2012
Negocios ProMéxico. Latin America's Biggest Solar Plant.
Schwartz, K (2013, July). Into the Light. LatinFinance, 42-44
Aura Solar. (2013, June) Project Finance. Retrieved from www.projectfinancemagazine.com