

## XINGÚ AND MACAPÁ HIGH TENSION LINES – BRAZIL



Figure 01: General view of the transmission line / Source: ISOLUX CORSÁN

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## 1. PROJECT INTRODUCTION

The present evaluation assesses the sustainability of a complex and extremely relevant infrastructural project: the High tension Lines of the System Tucuruí-Macapá-Manaus, located in the Brazilian Amazon. This analysis was based on the infrastructure sustainability assessment methodology developed by the Zofnass Program at Harvard University, using *Envision Rating System for Sustainable Infrastructure, Version 2.0*<sup>1</sup> as a framework.

Specifically, the scope of this work refers to the Xingú and Macapá High Tension Lines<sup>2</sup>, built by Isolux Corsán, a multinational company acting in the areas of energy, constructions and concessions. Isolux Corsán, through its local subsidiary company Ponte was also granted with the operation and maintenance of the infrastructure over a period of 30 years. The concession was framed by a contract signed in 2008, with the Brazilian Federal Agency ANEEL (Agência Nacional de Energia Elétrica, or National Agency for Electric Energy).

The System Tucuruí-Macapá-Manaus made possible the connection of the cities of Macapá and Manaus to the Tucuruí Hydroelectric Power Plant. Furthermore, the HT lines linked the aforementioned cities with the Brazilian National Interconnected System (Sistema Interligado Nacional). The infrastructure will also be used to extend fiber optic cables that will provide high-speed data services to Macapá and Manaus.

## 2. PROJECT DESCRIPTION & LOCATION

Xingú and Macapá High Tension Lines (HTL) are located entirely in the Brazilian Amazon. These strategic infrastructures were built in one of the most important and sensitive biomes of the planet. The High Tension Lines allow the connection of the cities of Manaus<sup>3</sup> and Macapá<sup>4</sup> with the Tucuruí Hydroelectric Dam, located on the Tocantins River, which have enabled the integration of this part of the Amazonia with the Brazilian National Interconnected energy System (Sistema Interligado Nacional). Thus, the aforementioned HTLs made possible the use of renewable energy produced at the Tucuruí Hydropower Plant, in the cities of Manaus and Macapá.

Tucuruí Dam, with an installed capacity of 8.370 MW and 24 turbines, is the biggest Hydropower Plant owned exclusively by Brazil.<sup>5</sup> Prior to the construction of these lines, Manaus and Macapá had isolated energy systems, which depended on fossil fuels for the generation of electricity. The EIA<sup>6</sup> states that

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<sup>1</sup> This study uses *Envision* as a framework to rate the project. The *Envision* system has been developed by the Zofnass Program at Harvard University, in collaboration with the Institute of Sustainable Infrastructure (ISI). *Envision* is available online for public use. However, this case study does not constitute an official certification or rating. The ISI as an organization oversees the official verification process in the United States for US infrastructure projects.

<sup>2</sup> The Xingú and Macapá High Tension Lines (lots A and B in the International Tender organized by ANEEL) represent 2/3 of the entire System Tucuruí-Macapá-Manaus.

<sup>3</sup> Capital city of the State of Amazonas, pop.: 1.8 Million in 2012

<sup>4</sup> Capital city of the State of Amapá, pop.: 0.36 Million in 2010

<sup>5</sup> The biggest Hydropower Plant in Brazil is Itaipú, a Bi-national infrastructure shared with Paraguay. With 14.000 MW of installed capacity and 20 turbines, Itaipú is still the largest hydroelectric energy producer in the world even when the Three Gorges Dam in China has an installed capacity of 22,500 MW. As a reference, Itaipú generated 94,7 TWh in the year of 2009, while Three Gorges produced 80.8 TWh on that same year.

<sup>6</sup> EIA - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ/ (May 2009) / Page 4.

currently in this Amazonian region, the electric energy supply based on diesel dependent thermoelectric, is isolated, low quality, unreliable, which inhibits regional development.

According to documentation presented by Isolux Corsán, the change from fossil fuels to hydroelectricity in the cities of Manaus and Macapá will result in an estimated reduction of emissions equivalent to 1,300,000 Tons of CO<sub>2</sub> per year.<sup>7</sup> The High tension Lines (HTL) of the System Tucuruí-Macapá-Manaus, are part of the Program for the Acceleration of Growth (Programa de Aceleração do Crescimento – PAC<sup>8</sup>), and are also included in the Brazilian Plan for the Increase of competitiveness called “Bigger Brazil” (Brazil Maior).<sup>9</sup> Counting with impressive figures, the HTL’s will have a transport capacity of 2,400 MW in double circuit. The project comprises 1,200 km of new 500 kv and 230 kv transmission lines, and 6 substations.<sup>10</sup> Its estimated construction budget is 1,3 billion US\$, for instance, at its peak the project demanded 3,500 workers from 8 subcontracting companies, working simultaneously at 13 construction sites. Engineering achievements are significant, with the first transposition of energy and data lines over the Amazon River, spanning a 2,000-meter gap with two 295-meter high towers.<sup>11</sup>

Isolux Corsán obtained this project through an international tender organized by the Brazilian Agency ANEEL (Agência Nacional de Energia Elétrica). As previously mentioned, the agreement involved not only the construction contract, but also a concession for the operation of the HTL’s, over a period of 30 years with an estimated annual offtake price of \$100 million USD.

A project of such a scale and complexity, inserted in a sensitive biome will produce negative impacts at some level. The conceptual challenge is to assess if those negative impacts were prevented, mitigated and/or properly compensated. Furthermore, it is necessary to evaluate holistically and consider if the project represent net positive impacts for the economy, the environment and local communities. Finally, suggestions<sup>12</sup> will be presented in the spirit of contributing with the continuous improvement of this infrastructural project over its lifespan.

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<sup>7</sup> Isolux Corsán – Project Presentation, slide 5.

<sup>8</sup> On this aspect, the EIA report states that: *“With the Programa de Aceleração do Crescimento (PAC), Brazil initiated in 2003 the deployment of a new model of social and economic development, which combines economic growth and distribution of incomes, promoting the reduction of poverty and the inclusion of millions of Brazilians in the formal labor market. The creation of the PAC, aims to focus the efforts, investing in four years a total of R\$ 503,9 Billions on infrastructural projects in the areas of transportation, energy, sanitation, public housing and hydric resources. The expansion of the investments in infrastructure is a fundamental condition to increase sustainable development, overcoming economic bottlenecks, stimulating productivity increases and reducing social and regional inequalities”*

EIA - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ/ (May 2009) / Page 33.

<sup>9</sup> This project is also part of an effort called GT Copa 2014, developed by the Brazilian government with the intention of guarantee the provision of electricity to all cities that will host games of the 2014 Soccer World Cup. Manaus is one of these cities.

<sup>10</sup> The total of 6 substation is composed of four 500 Kv substations (Tucuruí, Xingú, Jurupari and Oriximiná), and two 230 Kv substations (Laranjal do Jari, Macapá). This evaluation includes all of the aforementioned facilities, with the exception of the Tucuruí 500 Kv substation, which is not included in the scope of Isolux Corsán.

<sup>11</sup> The towers that made the transposition of the Amazon River possible are as tall as the Eiffel tower (300 m).

<sup>12</sup> The assessments that are made in the present report are based, essentially in documents presented by the project developer, ISOLUX CORSAN, in the form of documents required by environmental regulations (EIA, Basic Environmental Project, Permits, etc.) In an effort to contrast information, at some specific credits, data was gathered from other sources, such as Brazilian Environmental Public Institutions. The overall volume of information already produced is impressive and perhaps this brief analysis will only bring very specific and modest contributions to the table. Thus, the authors have formulated punctual suggestions whenever a potential for improvement was detected.



Figure 02: Location of the Project. The HTL's will connect the Tucuri Hydroelectric Dam with the cities of Manaus and Macapá.

Source: ISOLUX CORSÁN

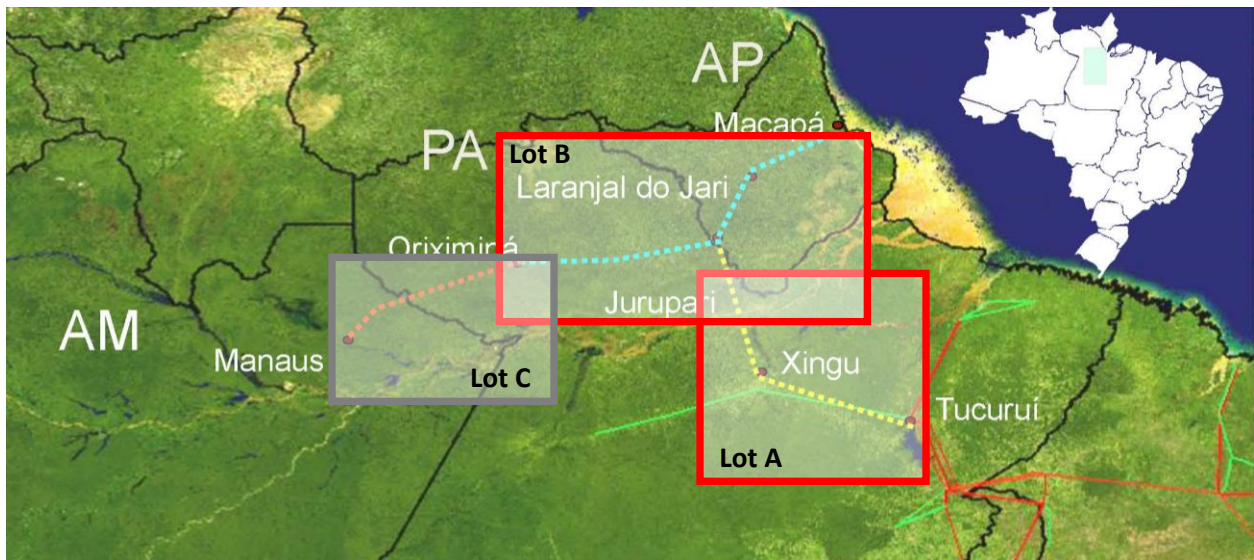


Figure 03: The project was divided in three Lots. ISOLUX CORSÁN was granted with Lots A and B. Lot C was granted to the consortium Manaus Transmissoras de Energia /Source: ISOLUX CORSÁN

It is important to highlight that Isolux Corsán, referring to both Lots A and B have provided a vast amount of documents. For instance, an Environmental Impact Assessment and a Projeto Básico ambiental (Basic Environmental Project), were developed for each of the lots. To avoid confusions and for clarity purposes, any assessment or study quoted in this report, would be referred to either Lot A (Xingú) or lot B (Macapá), as indicated in the figure 3 above.

### 3. APPLICATION OF THE ENVISION RATING SYSTEM<sup>13</sup>

The *Envision* rating system is a set of criteria that assess and evaluate any specific piece of infrastructure. In this case the infrastructures to be assessed are the Xingú and Macapá High Tension Lines. The main intent of this report is to assess the contributions towards sustainability derived of the deployment of this project, as well as the impacts on the environment associated with it.

*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 ISI<sup>14</sup> and Zofnass Program<sup>15</sup> websites.

*Appendix C* provides a table with the detailed project assessment, specifications for each of the credits, as well as recommendations for the project.

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<sup>13</sup> Anthony Kane, Zofnass program research director, and Salmaan Khan, research assistant, wrote most parts of this section.

<sup>14</sup> [www.sustainableinfrastructure.org](http://www.sustainableinfrastructure.org)

<sup>15</sup> [www.zofnass.org](http://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.”<sup>16</sup> 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 and QL 1.3), 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, and QL 3.3).

#### CREDIT SCORING

			IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
1	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:	<b>181</b>

Figure 04: Quality of life category, credits distribution.

#### 4.1.1. Purpose

In the **Purpose subcategory**, Xingú and Macapá HTL’s have a good performance, with one credit assessed as Improved (QL1.3 Develop local skills and capabilities), one credit qualified as Enhanced (QL1.1 Improve community quality of life), and one credit evaluated as Conserving (QL1.2 Stimulate sustainable growth and development).

An overall improvement in the quality of life of the citizens of Manaus and Macapá is expected as a result of the project,<sup>17</sup> based on two new conditions: a) hydroelectric power will replace electric energy dependent on fossil fuels, benefiting the environment by reducing CO2 emissions; and b) increased reliability in energy supply is expected to result in economic growth and in the creation of jobs in the region. Furthermore, a reduction in energy prices paid by consumers (both at industries and houses) is also expected.

Access to more effective and encompassing electrical power distribution, will result in improved functionality throughout the productive system, fostering sustainable growth and development.

<sup>16</sup> *Envision* Guidance Manual, p.30

<sup>17</sup> Estudo de Impacto Ambiental (E.I.A.), LT500 Kv Tucuruí, Xingú, Jurupari. - Justificativas Econômicas - Page 89. (Lot A granted to ISOLUX CORSAN).

According to the EIA developed for the Lot B, the sharing the operative reserves, the installed capacity, and avoiding additional generating infrastructure helps achieve scale economics,<sup>18</sup> resulting in reduced energy costs for Brazil's Northern Region.<sup>19</sup>

The towers built for the high-tension lines of Xingú and Macapá will also be used to deploy fiber optic cables. These cables, leased to a telecommunications company called TIM will be used for high-speed data transmission to the cities of Manaus and Macapá, contributing also with the competitiveness of the Region.<sup>20</sup>

Regarding the development of local skills and capabilities, documentation provided by the concessionaire leads us to conclude that relevant efforts to develop local skills were fostered by the project leaders. However, most of the training given to non-specialized workers is done on a need basis, focusing on their tasks, as well as in safety and environmental issues. The EIA developed for the Lot B states that 2500 workers, from which 65% are skilled workers, and 35% non-skilled workers, will be needed at the construction peak.<sup>21</sup> This peak, with the maximum number of employees working at the same time was expected to last approximately 6 months, according to the aforementioned EIA. Considering both Lots A and B, the total number of workers will be approximately 3,500.<sup>22</sup>

Priority was given to hire local workers for non-skilled positions, with aims to reduce the settlement of employees from outside the region, considering that construction and assembling companies bring their stable skilled workers to the work sites.<sup>23</sup>

#### 4.1.2. Community:

In the **Community subcategory**, there was a considerable dispersion in the results. One credit was qualified as Improved (QL2.1 Enhance Public Health and Safety). One was assessed as Enhanced (QL2.4 Improve Community Mobility and Access), and one credit was evaluated as Superior (QL2.6 Improve Site Accessibility, Safety and Wayfinding). Finally, three credits received a No Score (QL2.2 Minimize Noise and Vibration, QL2.3 Minimize Light Pollution, and QL 2.5 Encourage Alternative Modes of Transportation).

There are many challenges in the enhancement of safety of the workers and in public health associated with a project of the scale of the Xingú and Macapá HTL.<sup>24</sup> In broad terms, ISOLUX CORSAN assumed the

<sup>18</sup> EIA - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ/ (May 2009) / Page 33. (Lot B granted to ISOLUX CORSAN)

<sup>19</sup> EIA - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ/ (May 2009) / Page 35. (Lot B granted to ISOLUX CORSAN). The aforementioned Assessment states that: *“the connection of the Amazonian isolated systems to the SIN, will allow the provision of energy to that region with electricity produced by hydroelectric power plants already amortized, which in turn, will result in the reduction of energy costs”*

<sup>20</sup> AS CONCESSÕES DO SISTEMA TUCURUI – MACAPÁ – MANAUS. Presentation provided by Isolux Corsán - Slide 5.

<sup>21</sup> Estudo de Impacto Ambiental. (E.I.A) LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Jurupari, Oriximiná - p. 91, 92. (Lot B granted to ISOLUX CORSAN).

<sup>22</sup> AS CONCESSÕES DO SISTEMA TUCURUI – MACAPÁ – MANAUS. Presentation provided by Isolux Corsán - Slide 8.

<sup>23</sup> Estudo de Impacto Ambiental. (E.I.A) LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Jurupari, Oriximiná - p. 91. (Lot B granted to ISOLUX CORSAN).

<sup>24</sup> “Projeto Básico Ambiental” (PBA) - LT500 Kv Tucuruí, Xingú, Jurupari - P05 Programa de Segurança do Trabalho e Saúde Ocupacional durante a Construção. page 92. This document states that: *“[The construction of the HTL] include many tasks that represent risks to the safety and health of the workers. This diversity [of risks] is not only related with the work environment (flooded areas, the crossing of wide rivers, forests, steep hills), but with activities inherent to the construction of the HTL (earth*

responsibility of supervising health and safety conditions for all the workers, while the subcontractors assumed the responsibility of implementing the of Safety and Occupational Health Management procedures.

Regarding plans oriented to minimize noise and vibration, most of its impact is during the construction phase, while the operation phase should not pose a major impact. The EIA developed for Lot A presents a very precise description of the Brazilian regulatory frame regarding acceptable levels of noise, at Federal, State and Municipal levels.<sup>25</sup> However, any of the presented regulatory frameworks assesses how to deal with possible impacts of noise and vibration on natural ecosystems. Furthermore, there is a lack of documentation proving that baseline studies of existing levels of noise and vibration were performed, or that future levels of noise were predicted based on the project.

Project developers, state that during the construction phase, all works will be done during daytime, thus minimizing light pollution.<sup>26</sup> However, high-tension towers do require safety lights to prevent aircraft collisions.<sup>27</sup> Considering that the project runs 1,200 km of HTL across the Amazon, an environmental impact study in terms of light pollution is expected for the operation phase.<sup>28</sup> Any documents were found proving that an assessment of lighting needs has been done for the project, or that non-lighting alternatives or mitigation measures have been contemplated.

The project will improve community mobility and access by ameliorating the conditions of existing road networks in a number of locations. The Projeto Basico Ambiental (Basic Environmental Project) developed for Lot A states that rural roads *at the Tucuruí, Xingú, Jurupari 500 KV areas* will be improved to enable them mostly for truck traffic during construction, and will be maintained during and after rain periods,<sup>29</sup> for which the subprogram for the improvement of Road and Port Infrastructure was developed and implemented.

No Alternative Modes of Transportation have been encouraged. The scale of the project (1200 Km of HTL) and its remoteness makes it difficult to access multi-modal transportation. In general terms, ISOLUX and sub-contracted companies are responsible for the transportation of workers.<sup>30</sup>

Site accessibility, safety and wayfinding conditions were also improved with special measures deployed during construction phase. The EIA developed for Lot B states that to gain access to each tower, a key map was developed indicating the regional main roads, secondary and private roads, existing streets

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*moving; transport, storage and handling of materials; operation of machines and equipment; handling of hazardous substances; work at great heights; installations and electrical works, etc). [It was needed] to establish norms and procedures, aiming to preserve adequate conditions for the health and safety of all the workers directly involved in the implementation of this endeavor."*

<sup>25</sup> Estudo de Impacto Ambiental(E.I.A.). - LT500 Kv Tucuruí, Xingú, Jurupari. - Níveis de Ruído de Obra. Pages: 28, 29 (Lot A granted to ISOLUX CORSAN). The table presented at this document (page 29) describe maximum allowable values in dB(A), for different land uses (urban areas, ranches, mix used areas, etc.), during daytime and night time.

<sup>26</sup> Premios Infraestructura 360° - Hoja de Presentación de datos. - p. 6

<sup>27</sup> Obstruction Marking and Lighting - p. 13 (Federal Aviation Administration) - available at: [http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/b993dcdcf37fcdc486257251005c4e21/\\$FILE/AC70\\_7460\\_1K.pdf](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/b993dcdcf37fcdc486257251005c4e21/$FILE/AC70_7460_1K.pdf)

<sup>28</sup> Estudo de Impacto Ambiental (EIA), LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Jurupari, Oriximiná - page 80 (Lot B granted to ISOLUX CORSAN).

<sup>29</sup> "Projeto Básico Ambiental" (PBA) - LT500 Kv Tucuruí, Xingú, Jurupari – P12.1 Subprograma de Melhorias da Infraestrutura Viária e Portuária. Page 196

<sup>30</sup> Premios Infraestructura 360° - Hoja de Presentación de datos. - p. 9



and paths.<sup>31</sup> Due to the risks of endemic diseases such as malaria, dengue fever, and leishmaniasis, safety conditions were extended to all construction sites and adjacent areas.<sup>32</sup>

#### 4.1.3. Wellbeing:

At the **Wellbeing subcategory**, the project achieved good results and there are also opportunities for improvement. Two credits were assessed as Superior (QL3.1 Preserve Historic Character and Cultural Resources and QL3.3 Enhance Public Space), and one was qualified as No Score (QL3.2 Preserve Views and Local Character).

In the context to preserve historic and cultural resources, two specific programs<sup>33</sup> were developed within the Projeto Básico Ambiental (Basic Environmental Project): P13 - Program for prospection, rescue and preservation of the archeological, historical and cultural heritage, and P14 - Program for monitoring and saving paleontological sites.<sup>34</sup> As a result of these efforts, the final Report of the Project of Archaeological rescue (Projeto de Salvamento Arqueológico - Relatório Final), developed for Lot A states that 25 archeological sites were found, and that archaeological prospection were developed within the area of influence of the 500 KV HTL Tucuruí, Xingú, Jurupari.<sup>35</sup>

Although documentation evidence the many efforts deployed to minimize environmental impacts, there is no proof that preservation of views and local character were considered as guidelines for the conception and construction of the project, thus opening a clear opportunity for improvement.

Reports on Corporate Social Responsibility (CSR) describe several initiatives to **enhance public space**, in different cities in the area of influence of this project. As examples, it is possible to mention the construction of an open air gym for senior citizens in the city of Porto de Moz in partnership with *Municipal government of Porto de Moz, and Linhas de Xingu Transmissora de Energia (LXTE)*.<sup>36</sup> Through the CSR program, many other cultural activities that brought life to public spaces were developed on cities located in the project's area of influence.

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<sup>31</sup> Estudo de Impacto Ambiental.(E.I.A) LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Jurupari, Oriximiná - p. 97. (Lot B granted to ISOLUX CORSAN).

<sup>32</sup> "Projeto Básico Ambiental" (PBA) - LT500 Kv Tucuruí, Xingú, Jurupari - Pages 93, 102 - (Lot A granted to ISOLUX CORSAN)

<sup>33</sup> "Projeto Básico Ambiental." (PBA). - LT500 Kv Tucuruí, Xingú, Jurupari. - Page 4, Page 201-205 - *P13 Programa de Prospecção e Preservação do Patrimônio Arqueológico, Histórico e Cultural*. (Lot A granted to ISOLUX CORSAN). Preliminary studies pointed out that the territory crossed by the HTL is highly relevant in cultural and historical terms. Therefore, the possibility of finding archeological or paleontological sites was considered to be high. The aforementioned PBA states that: *"The evaluation of archaeological potential at the easement area for the 500 KV HTL Tucuruí - Xingú - Jurupari (...) proved a great potential for findings of archaeological and historical sites (...), considering that archaeological remains were found during the phase of exploration and extensive survey."*

<sup>34</sup> "Projeto Básico Ambiental." (PBA). - LT500 Kv Tucuruí, Xingú, Jurupari. - Page 206- 210 - *"P14 Programa de Monitoramento e Salvamento Paleontológico"* (Lot A granted to ISOLUX CORSAN)

<sup>35</sup> Projeto de salvamento arqueológico e educação patrimonial na área de influência da linha de transmissão 500 KV Tucuruí – Xingú – Jurupari (PA) relatório final. - page 21.

<sup>36</sup> "Ações de Responsabilidade Social" - LT500 Kv Tucuruí, Xingú, Jurupari - Pages 4-7



Figure 05: Improved Public Spaces./ Source: ISOLUX CORSÁN

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

The table below shows the distribution of credits as well as the level of achievement reached in each credit (figure 6).

AMAZON HIGH TENSION LINES- BRAZIL			PT.	Performance	% Total	max.
1	PURPOSE	QL1.1 Improve Community Quality of Life	5	Enhanced	20.0%	25
2		QL1.2 Stimulate Sustainable Growth & Development	13	Conserving	81.3%	16
3		QL1.3 Develop Local Skills And Capabilities	1	Improved.	6.7%	15
4	COMMUNITY	QL2.1 Enhance Public Health And Safety	2	Improved.	12.5%	16
5		QL2.2 Minimize Noise And Vibration	0	No Score.	0.0%	11
6		QL2.3 Minimize Light Pollution	0	No Score	0.0%	11
7		QL2.4 Improve Community Mobility And Access	4	Enhanced	28.6%	14
8		QL2.5 Encourage Alternative Modes of Transportation	0	No Score	0.0%	15
9		QL2.6 Improve Site Accessibility, Safety & Wayfinding	6	Superior	40.0%	15
10	WELLBEING	QL3.1 Preserve Historic And Cultural Resources	7	Superior	43.8%	16
11		QL3.2 Preserve Views And Local Character	0	No Score	0.0%	14
12		QL3.3 Enhance Public Space	6	Superior	46.2%	13
QL0.0 Innovate Or Exceed Credit Requirements			0	N/A		
QL			44		24.3%	181

Figure 06: Quality of Life Category – Summary of Results.

The biggest opportunities for improvement at this category can be found at the subcategories Community and Wellbeing. Considering all credits and the maximum possible values for each indicator, the percentage of achievement adds to 24.3%, or 44 points out of 181.

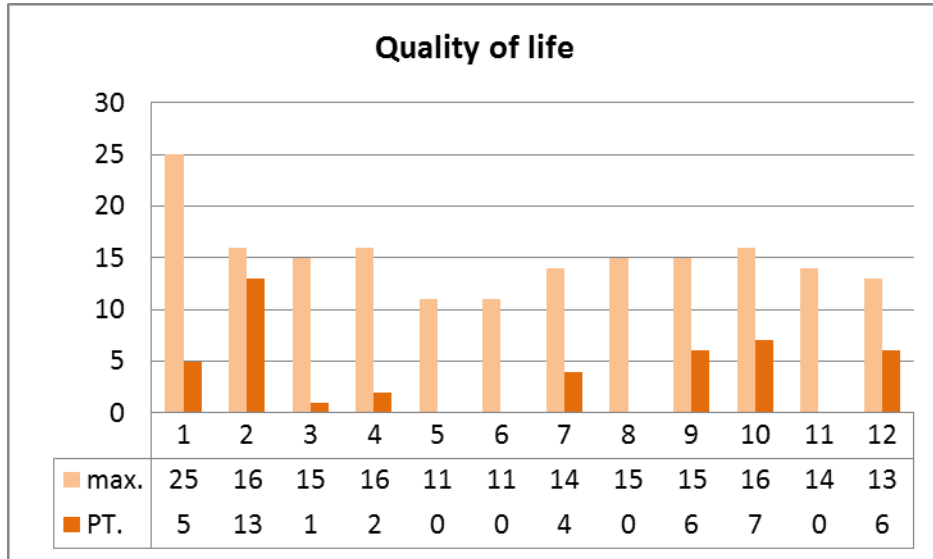


Figure 07: Quality of Life Category – Summary of Results.

#### 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.”<sup>37</sup>

The 12 credits in this category are divided in three subcategories: 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	MANAGEMENT	LD2.1 Pursue by-product synergy opportunities	1	3	6	12	15
18		LD2.2 Improve infrastructure integration	1	3	7	13	16
19	PLANNING	LD3.1 Plan for long-term monitoring and maintenance	1	3		10	
20		LD3.2 Address conflicting regulations and policies	1	2	4	8	
21		LD3.3 Extend useful life	1	3	6	12	
Maximum points possible:							<b>121</b>

Figure 08: Leadership category, credits distribution.

<sup>37</sup> Envision Guidance Manual, p.60

#### 4.2.1. Collaboration:

In the collaboration sub-category, the project achieved good results. Two credits were assessed as Enhanced (LD 1.3 Foster Collaboration and teamwork and LD 1.4 Provide for Stakeholder involvement), one was evaluated as Superior (LD 1.1 Provide effective leadership and commitment), and one was qualified as Conserving (LD 1.2 Establish a sustainability management system).

The project provides effective leadership with sustainability commitments done periodically and publicly, through a number of documents. For instance, annual reports include a section on Corporate Social Responsibility that incorporates an environmental dimension. The Isolux Corsan's 2011 annual report chapter "Commitment with the Environment" states that the company is committed to develop and implement environmental management systems suited to the organization, that follow the principles established in the ISO 14001 international standard, accordingly, adopting measures that allow for continuous improvement.<sup>38</sup>

Public commitments and obligations towards the environment are included in the project's environmental Licenses and authorizations issued by the Brazilian Environmental Institute (IBAMA). For instance the Authorization for Vegetation Suppression (Autorização para a supressão de vegetação – ASV), determines the obligation of developing a program of compensatory plantation of trees: for Lot A in a proportion of 25 specimens for each felled tree,<sup>39</sup> while in Lot B the compensatory value is 10 trees for each felled tree.<sup>40</sup>

According to what have been stated in the 2012 annual report, Isolux Corsán is committed to establish a sustainability management system, based on the ISO 9001, ISO 14001 and OHSAS 18001, international standards. The aforementioned management systems are to be implemented in all countries where Isolux Corsán develops activities.<sup>41</sup>

A consistent management system is in place for both the Tucuri, Xingu Jurupari HTL<sup>42</sup> (Lot A) and the Juruparí, Laranjal, Macapá HTL<sup>43</sup> (Lot B).

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<sup>38</sup> Isolux Corsán - Informe Anual, año 2011. Page 118. The aforementioned report (p. 90) also elaborates on the Pact signed with the United Nations, which includes specific commitments regarding sustainability: *"Apply preventive approaches that are helpful to the environment; Foster initiatives promoting broader environmental responsibility; Contribute to the development and dissemination of environment friendly technologies."*

<sup>39</sup> Autorização para a supressão de vegetação, Licença de Instalação, Licença de Operação - Projeto Linha Tucurui, Xingu, Jurupari (Lot A granted to ISOLUX CORSAN).

<sup>40</sup> Autorização para a supressão de vegetação, Licença de Instalação, Licença de Operação - Projeto Linha Jurupari, Laranjal, Macapá (Lot B granted to ISOLUX CORSAN).

<sup>41</sup> Isolux Corsán 2012 Annual Report - Chapter 07, Corporate Social Responsibility - Pages 108, 109.

<sup>42</sup> Projeto Básico Ambiental - Linha Tucurui, Xingu, Jurupari (Lot A granted to ISOLUX CORSAN). – Programa de planejamento e gestão ambiental da etapa construtiva e monitoramento ambiental das obras (page 68) The documents states that its objective is *"to guarantee that all construction services to be executed, either under direct control of the developer or through subcontracted construction companies, are done according to the best practices of environmental control, and complying to the standards determined by the authorities in the process of obtaining the Preliminary License and the Installation License"*

<sup>43</sup> Projeto Básico Ambiental - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) - Plano de Gestão Ambiental - Page 1/16. This plan states that: *"The implementation [of the Lot B] requires management structures organized by the developer, in order to guarantee that techniques for environmental protection, (...) and recovery are adequate to each specific construction condition, and furthermore, are implemented correctly."*

Collaboration and teamwork fostering efforts were also assessed. The management processes in place prove that the project's developer approached the project as a system or set of interconnected systems. The importance of addressing infrastructure projects in a broader regional and national context has been recognized. All construction activities are orchestrated through Environmental Construction Plans<sup>44</sup> (Planos Ambientais de Construção). Project and construction were granted to Isolux Corsán under EPC (Engineering, Procurement and Construction) contracts<sup>45</sup>.

The project provides for stakeholder involvement. Permanent channels of communication with community members, local governments, national environmental authorities and other relevant actors are established. A number of communication campaigns and educational programs<sup>46</sup> were developed.

The program for Social Communication (Programa de Comunicação Social - PCS) developed for Lot B<sup>47</sup> states that throughout 17 months different communication related activities were performed in various cities to establish a link between project developers and all relevant stakeholders. All actions had the objective. Lot A developed another PCS<sup>48</sup> as well.

#### 4.2.2. Management:

At the **Management Subcategory**, good performances and opportunities for improvement can be found. One credit was assessed as Conserving (LD 2.2 Improve Infrastructure Integration), while the second one was qualified as No Score (LD 2.1 Pursue by-product synergy opportunities).

The contribution of the Tucuruí, Macapá, Manaus High Tension Lines to the improvement of infrastructural integration in the Amazonian region will be significant. The entire project is a complex device for infrastructural integration, connecting energy production facilities with large urban centers.

Documentation presented by the project's developer states that in specific points of the HTL, preexisting infrastructures of high voltage electrical distribution were incorporated. In this case, the designers sought to reuse existing elements, in order to achieve synergy in the implementation process. Recycling elements also lead to savings in terms of energy and money. Several other examples were provided of

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<sup>44</sup> PAC - LXTE (Plano Ambiental de Construção - Linhas de Xingu - Lot A) / PAC - LMTE (Plano Ambiental de Construção - Linhas de Macapá - Lot B).

<sup>45</sup> Contrato EPC - LXTE (Linhas de Xingu, Lot A) / Contrato EPC - LMTE (Linhas de Macapá, Lot B)

<sup>46</sup> Projeto de Educação Ambiental (PEA). - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) / Projeto Básico ambiental (PBA) Linha Tucuruí, Xingu, Jurupari (Lot A granted to ISOLUX CORSAN)- P.19 - Programa de educação ambiental (page 252)

<sup>47</sup> Programa de Comunicação Social (PCS). - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN)

<sup>48</sup> Projeto Básico ambiental (PBA) Linha Tucuruí, Xingu, Jurupari (Lot A granted to ISOLUX CORSAN) P.18 - Programa de comunicação social (page 244) This Program "seeks to attend the need to keep population informed regarding the endeavor, highlighting possible disruptions that may occur in their quotidian lives and activities as a direct or indirect consequence of the project. (...) This will allow the communities to engage with the developers in order to discuss their demands and aspirations, enabling the reassessment of (...) performed and planned (...) actions whenever necessary." Another stated objective is "To establish channels of systematic communication between project developers and different segments of involved communities, local authorities and organized civil society representatives, in order to keep the company informed on the expectations and aspirations of the population"

how the project was adjusted to preexisting infrastructural facilities and large centers of economic activity.<sup>49</sup>

On pursuing by-product synergy opportunities, significant efforts to improve recycling and waste management<sup>50</sup> have been deployed by the project managers in all construction facilities. However, in the documentation provided there is no evidence of initiatives to identify and use effectively unwanted materials from nearby operations.

#### **4.2.3. Planning:**

In the **Planning Subcategory**, Xingú and Macapá High Tension Lines performed well. One credit was qualified as Enhanced (LD 3.3 Enhance Public space) while two were assessed as Conserving (LD 3.1 Plan for long term monitoring and maintenance, and LD 3.2 Address conflicting regulations and policies).

Documents presented prove that a comprehensive plan for long term monitoring and maintenance has been developed. The provisions for maintenance include the following aspects: a) maintenance of the characteristics and physical conditions of the infrastructure itself, b) maintenance of accessibility to the easement area by monitoring the growth of vegetation on the site. Preventive and corrective actions have also been contemplated.<sup>51</sup>

Furthermore, the Operation License (Licença de Operação - LO) establishes a number of mandatory processes of monitoring and environmental compensation as a pre-condition to run the HTL.<sup>52</sup> The LO<sup>53</sup> is a document issued by IBAMA, valid for 5 years, and renewable upon the fulfillment of the obligations included on it. Therefore, the monitoring process is a combined effort performed by the project developers and verified by Brazilian environmental authorities.

The project has addressed conflicting regulations and policies. An extensive assessment of the regulatory framework<sup>54</sup> and an intense dialogue with licensing authorities were developed to make the project possible. The path of the HTL was modified from the original provisions developed by ANEEL in the bid terms.<sup>55</sup> This modification was made with the goal of reducing environmental impacts, prioritizing areas already modified or altered by human settlements. The proximity to existing highways

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<sup>49</sup> Projeto Básico Ambiental (PBA) - HTL Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) - P.12 - Programa de Gestão de Interferências com Atividades Econômicas ou Infraestruturas (Direitos Minerários, Infraestrutura Viária E Planos Diretores). Page 186.

<sup>50</sup> Plano Ambiental da Construção PAC - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN). Chapter 3.2.9 - Subprograma de Gestão de Resíduos Sólidos, Efluentes, e Emissões Atmosféricas (page 66)

<sup>51</sup> Estudo de Impacto Ambiental. (EIA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN). Chapter 3.4.4.15 - Etapa de Operação e Manutenção. Page. 117

<sup>52</sup> The aforementioned processes include (among others) the following: Environmental Management Plan for the operation, Program for monitoring and controlling erosive processes, Program for waste management, Program to recover degraded areas, Program for monitoring Flora, Program for Monitoring Fauna, Program for monitoring water Quality, Program for Territorial management of the easement area, etc.

<sup>53</sup> Licença de Operação - HTL Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) / Licença de Operação - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN)

<sup>54</sup> Estudo de Impacto Ambiental (EIA) -HTL Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) - Volume I: 2.0. Instrumentos Legais e Normas Aplicáveis. Page 6. / Estudo de Impacto Ambiental (EIA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) - Chapter 3.4.1.2, Principais agentes do Setor Elétrico Brasileiro.

<sup>55</sup> Grupo Isolux Corsán - As concessões do sistema Tucuruí, Macapá, Manaus. Page 19.

such as the BR230 (Trans Amazonian) was considered as a desirable condition. Furthermore, the modification of the HTL path also allowed the reduction of forest suppression.

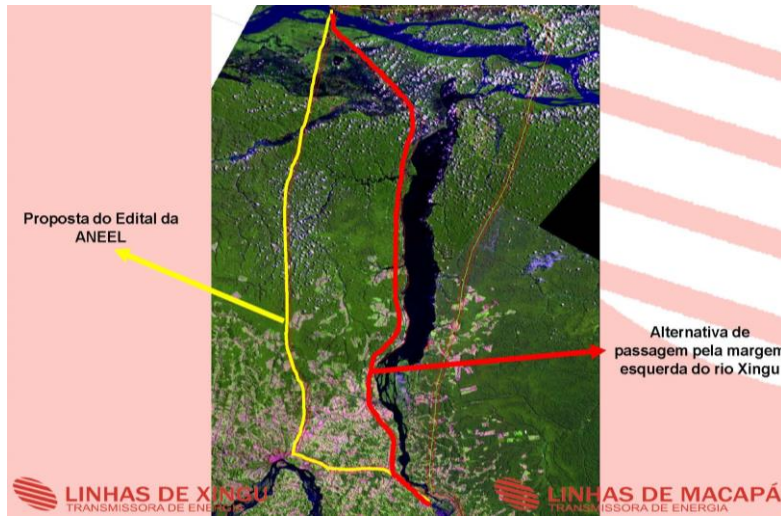


Figure 09: Assessment of alternatives.  
Source: Isolux Corsán

Efforts oriented to extend the project’s useful life were evaluated. In an environment as challenging as the Amazonia, adequate conditions of monitoring and maintenance are radically important to insure the extension of the infrastructure’s lifespan. Conscious efforts were developed to establish a path for the HTL’s near existing highways or other infrastructures of energy transmission.<sup>56</sup> Complex tradeoffs were made to balance a reduced impact on the forest, and a large enough easement area. Thanks to these adjustments in design, maintenance will be less difficult, contributing to a longer useful life for the Tucuruí, Manaus, Macapá High Tension Line system.

#### 4.2.4. Summary of results for the Leadership category.

The table below shows the distribution of credits as well as the level of achievement reached in each credit (figure 10)

AMAZON HIGH TENSION LINES- BRAZIL				PT.	Performance	% Total	max.
13	LEADERSHIP	COLLABORATION	LD1.1 Provide Effective Leadership And Commitment	9	Superior	52.9%	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	5	Enhanced	35.7%	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	8	Conserving	100.0%	8
21			LD3.3 Extend Useful Life	3	Enhanced	25.0%	12
			LD0.0 Innovate Or Exceed Credit Requirements	0	N/A		
		LD	66		54.5%	121	

Figure 10: Leadership Category – Summary of Results.

<sup>56</sup> Ibid.

The biggest opportunities for improvement at this category can be found at the subcategories Management and Collaboration. Considering all credits and the maximum possible values for each indicator, the percentage of achievement adds to 54.5%, or 66 points out of 121.

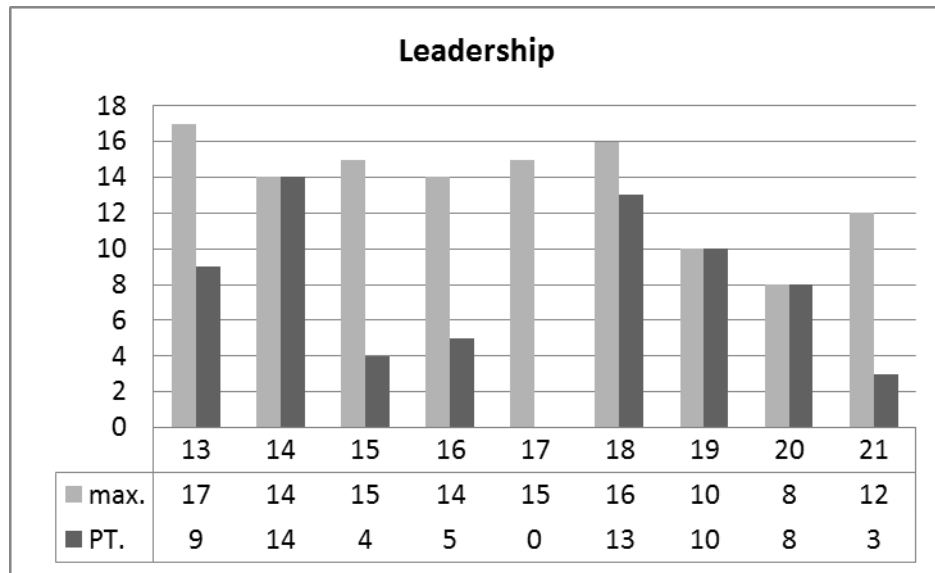


Figure 11: Leadership Category – Summary of Results.

### 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 have 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	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:	<b>182</b>

Figure 12: Resource Allocation category, credits distribution.



#### 4.3.1. Materials:

This subcategory presents a wide dispersion of results. Two Credits were assessed as Improved (RA 1.3 Use Recycled Materials and RA 1.6 Reduce Excavated Materials Taken off Site). One credit was evaluated as Enhanced (RA 1.4 Use Regional Materials) and two were qualified as Superior (RA 1.2 Support Sustainable procurement practices and RA 1.5 Divert Waste from Landfills). Finally, two credits were assessed as No Score (RA 1.1 Reduce Net Embodied Energy and RA 1.7 Provide for Deconstruction and Recycling).

The documents presented<sup>57</sup> by project developers, show no evidence that efforts to reduce net embodied energy of project materials were carried out.

Isolux Corsán has a well-defined program that supports sustainable procurement practices. The company website<sup>58</sup> states that in their identification and evaluation procedures, all current and potential suppliers must follow strategic requirements: transparency and equal opportunities; compliance with applicable quality standards; strict application of all legal regulations regarding corporate, employment, environmental and health & safety issues, or of any other applicable kind. Furthermore, Isolux Corsán follows an ethics code and best procurement practices to all purchases from global or local suppliers.

In regard to the use of recycled materials, a very consistent program for managing waste is included in the Construction Environmental Plan (Plano Ambiental da Construção- PAC). The PAC<sup>59</sup> aspires to insure waste reduction, proper waste collection, storage and disposal do not lead to the emission of gases, liquids or solids that may represent significant impacts on the environment during construction. Measures to encourage collective waste separation and recycling are also in place. However, no documentation was provided specifying reused materials for the project beyond those of using excavation materials for filling.

In the use of regional materials, the developers have estimated that 40% of materials are locally sourced.<sup>60</sup> The EIA developed for Lot B states that all raw materials such as sand, gravel, rolled pebbles and wood will be acquired from properly licensed local suppliers, and for lot A the EIA states that raw materials must be acquired from local suppliers.

Significant efforts were developed to divert waste from landfills. According to the EIA, for Lot B<sup>61</sup> excavated material is used primarily as filling material without the creation of dumping or excavation sites.

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<sup>57</sup> Hoja de Presentación de Datos - Page 22

<sup>58</sup> <http://www.isoluxcorsan.com/en/commitments-to-the-suppliers.html>

<sup>59</sup> Plano Ambiental da Construção (PAC) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN). Page 67

<sup>60</sup> Hoja de Presentación de Datos - Page 25

<sup>61</sup> Estudo de Impacto Ambiental (EIA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) Chapter 3.4.4.14.11.1 - Construção e Montagem da LT .Page 105

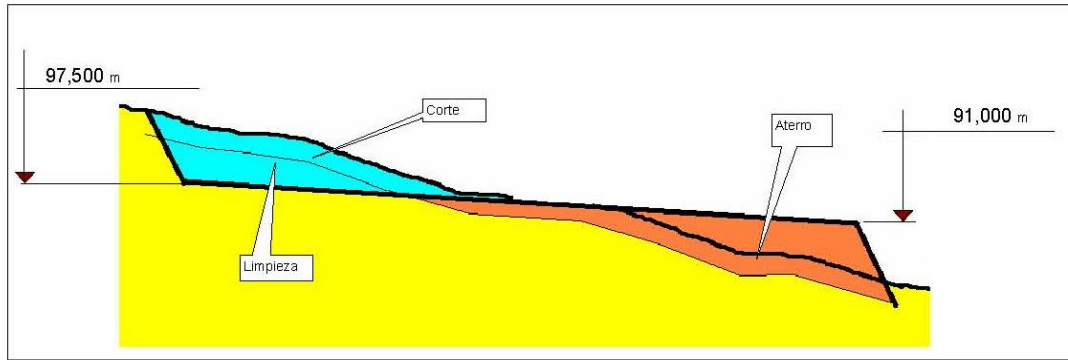


Figure 13: Excavation and filling. / Source: EIA Lot B.

Material unsuitable for filling will be disposed to licensed landfills. The project team has stated that at least 75% of all waste related to the project will be diverted from landfills, either by reuse or recycling.<sup>62</sup> This will also contribute to reduce excavated materials taken offsite. The project team has asserted that at least 40% of all excavated material will be beneficially reused on site.<sup>63</sup>

No evidence has been found that the developers assessed the potential of materials or parts of the HTL to be reused or recycled beyond the end of the project's lifespan.

#### 4.3.2. Energy:

This subcategory presents clear opportunities for improvement. All three credits in the subcategory (RA 2.1 Reduce Energy Consumption, RA 2.2 Use Renewable Energy and RA 2.3 Commission and monitor energy systems) were assessed as No Score.

In terms of reducing energy consumption, there are any strategies identified. The operation and maintenance of the project during its lifespan will, necessarily, demand energy. For instance, the trucks involved with maintenance, repairs and replacement parts will run on fossil fuels. In order to build strategies for reducing energy consumption, a calculation of the anticipated operation and maintenance energy consumption on an annual basis for the life of the project is necessary.<sup>64</sup> No evidence has been found that such an evaluation of yearly energy consumption has been done.

Documentation submitted by the developers proves that this project will contribute significantly to the use of renewable energy and the replacement of thermal generating units running on fossil fuels. However, no information was found regarding the percentage of the project's energy needs that is met through use of renewable energy sources. Actions oriented to commission and monitor energy systems are found in the mandatory long-term monitoring plan in place, which follows the guidelines of the Brazilian legal framework for the electricity sector. However, the focus of this monitoring system is to keep track of the quantities of energy that are produced, bought, sold and consumed. No evidence has been found to attest the monitoring system assesses the efficiency of the project's energy systems.

<sup>62</sup> Hoja de Presentación de Datos - Page 26

<sup>63</sup> Hoja de Presentación de Datos - Page 27

<sup>64</sup> Envision Manual, Page 100.

#### 4.3.3. Water:

The **Water** subcategory also provides with significant chances to improve performance. Two credits were assessed as Improved (RA 3.1 Protect Fresh Water Availability, and RA 3.3 Monitor Water Systems). One category was evaluated as No Score (RA 3.2 Reduce Potable Water Consumption).

Regarding efforts to **protect fresh water availability**, it is relevant to note that Tucuruí-Xingú-Jurupari HTL and the Jurupari, Laranjal, Macapa HTL do not consume water during operation, but during the construction process. However, construction processes can affect significantly water quality and quantity, and the project team has explicitly recognized this. The Basic Environmental Project for lot A includes a Program for Monitoring Water Quality (P10). Program 10 states that water quality will be assessed prior to construction, and will be monitored during execution of the project to identify any alterations. The Environmental Construction Plan (Plano Ambiental de Construção - PAC) developed for lot A describes several aspects that must be considered to avoid negative impacts to water quality.<sup>65</sup>

No information has been provided regarding measures to reduce in potable water sources consumption used during the construction process.

Regarding efforts to monitor water systems, the project has developed a program for monitoring water quality in the Basic Environmental Project, for lot A (Program for Monitoring Water Quality (P10)), and some provisions in the Environmental Construction Plan (PAC).

#### 4.3.4. Summary of results for the Resource Allocation category:

The table below shows the distribution of credits as well as the level of achievement reached in each credit (figure 14).

AMAZON HIGH TENSION LINES- BRAZIL				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	6	Superior	66.7%	9
24			RA1.3 Used Recycled Materials	2	Improved	14.3%	14
25			RA1.4 Use Regional Materials	6	Enhanced	60.0%	10
26			RA1.5 Divert Waste From Landfills	8	Superior	72.7%	11
27			RA1.6 Reduce Excavated Materials Taken Off Site	2	Improved	33.3%	6
28			RA1.7 Provide for Deconstruction & Recycling	0	No Score	0.0%	12
29		ENERGY	RA2.1 Reduce Energy Consumption	0	No Score	0.0%	18
30			RA2.2 Reduce Pesticide and Fertilizer Impacts	0	No Score	0.0%	20
31			RA2.3 Commission & Monitor Energy Systems	0	No Score	0.0%	11
32		WATER	RA3.1 Protect Fresh Water Availability	2	Improved	9.5%	21
33			RA3.2 Reduce Potable Water Consumption	0	No Score	0.0%	21
34			RA3.3 Monitor Water Systems	1	Improved	9.1%	11
			RA0.0 Innovate Or Exceed Credit Requirements	0	N/A		
		<b>RA</b>	<b>27</b>		<b>14.8%</b>	<b>182</b>	

Figure 14: Resource Allocation category – Summary of Results.

<sup>65</sup> Including: stock fuels and oils according to Brazilian regulations, properly handle and store hazardous substances such as paints and solvents, and create isolated areas for concrete mixing. As a result of these measures, a net neutral impact is expected.

The biggest opportunities for improvement at this category can be found at the subcategories Energy and Materials. Considering all credits and the maximum possible values for each indicator, the percentage of achievement adds to 14.8%, or 27 points out of 182.

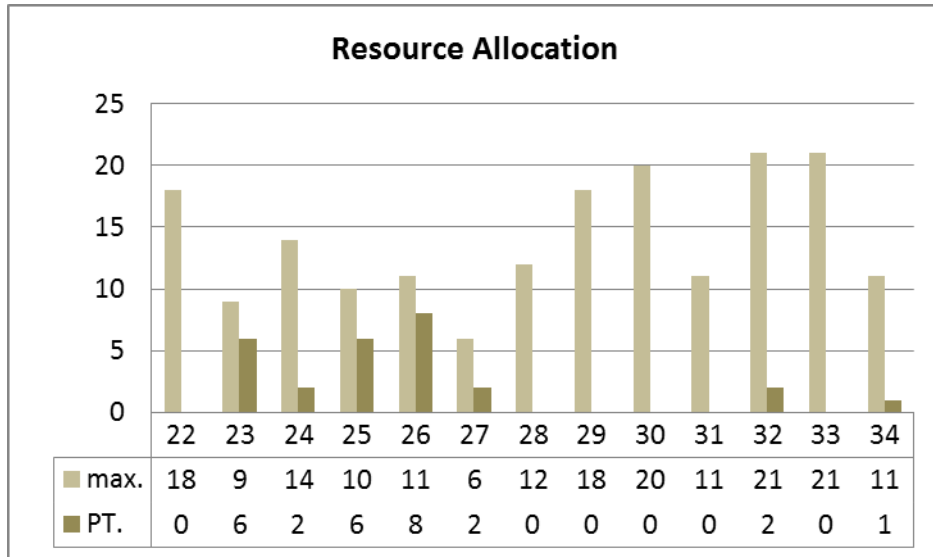


Figure 15: Resource Allocation category – Summary of Results.

#### 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.”<sup>66</sup> 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:							<b>203</b>	

Figure 16: Natural World credit distribution

<sup>66</sup> Envision Guidance Manual, p.116

#### 4.4.1. Siting:

In the Siting subcategory the project performed well in several credits, while others can be improved. One credit was assessed as Enhanced (NW 1.5 Divert Waste from Landfills), three were evaluated as Superior (NW 1.4 Avoid Adverse Geology, NW 1.6 Reduce Excavated material taken off Site, and NW 1.7 Provide for Deconstruction and Recycling), and one was acknowledged as Conserving (NW 1.3 Preserve Prime Farmland). The other two credits received No Score (NW 1.1 Preserve Prime Habitat, and NW 1.2 Preserve Wetlands and Surface Water).

Significant efforts were developed by the project team to minimize the impact of the HTL on the environment, preserving Prime habitat. As previously mentioned, the path of the High Tension Line (HTL) was modified from the original design developed by the National Agency of Electrical Energy (Agência Nacional de Energia Elétrica - ANEEL) for the bid terms. Also, a program for environmental improvement of the project was implemented.

Notwithstanding these efforts, several conservation areas of high ecological and ethnological value were affected, such as the Verde Para Sempre Extractive Reserve, and the Rio Cajarí Extractive Reserve.<sup>67</sup> The Tukurui, Xingu, Jurupari HTL will also have an indirect impact on the Trocará Native Land (Terra Indígena - TI - Trocará). At its closest point, the HTL will be only 4.5 kilometers south of the TI limits.<sup>68</sup>

In spite efforts to preserve wetlands and surface water, part of the HTL's path include towers built in buffer zones established by Brazilian legislation (APP - Areas de Proteção Permanente), lowlands and flooded areas. Specific procedures were established to regulate construction tasks in these sensitive locations such as the Environmental Control for Works in Flooded Areas (ICA 05 Controle Ambiental para Obras em Áreas Alagadas). It is worth mentioning that compensation, restoration and mitigation measures are properly established within the environmental license<sup>69</sup> and the program for the recovery of degraded areas (Programa de Recuperação de Áreas Degradadas - PRAD).



Figure 17: Deployment of Infrastructure in flooded areas./ Source: Isolux Corsán.

<sup>67</sup> An extractivist reserve is a specific type of conservation unit, oriented towards sustainable use, (EIA Lot A - page 181) that is part of the Brazilian National System of Conservation units (Sistema Nacional de Unidades de Conservação - SNUC).

<sup>68</sup> Grupo Isolux Corsán - As concessões do sistema Tukurui - Macapá - Manaus. Pages 10, 11, 12, 19,23

<sup>69</sup> Licença de Operação No. 1162/2013. - LT Tukurui - Xingu - Jurupari. Page 3.

No development took place in prime farmland nor the areas affected by the project have been described as relevant for agricultural purposes in any document presented by the developers.<sup>70</sup> A detailed analysis of agricultural suitability is included in the EIA developed for lot B, following a methodology established by the Brazilian Company for Agricultural and Livestock Research (Empresa Brasileira de Pesquisa Agropecuária - EMBRAPA).

The project took all required measures to avoid adverse geology. Geological, geomorphological, seismic and geotechnical studies were developed as part of the EIA, in order to ensure that areas with such conditions were avoided.<sup>71</sup>

Regarding seismic activity, the closest recorded event took place in Santarém (approximately 60 km south of the HTL, near Manaus) with a magnitude of 3.5 MM on the Richter scale, considered of small scale.<sup>72</sup>

The project team has also taken the necessary measures to preserve floodplain functions. The project will not create major impervious surfaces, and will not have a significant impact on water infiltration. A Program for the Recovery of Degraded Areas<sup>73</sup> (Programa de Recuperação de Áreas Degradadas - PRAD) is being implemented, with the intention of recovering all areas affected by the project, including floodplains. Based on the information provided, it can be concluded that infiltration and water quality will be maintained.

In avoiding unsuitable development on steep slopes, in the EIA developed for Lot B<sup>74</sup> the path goes through hills with reduced slopes, extending for long distances without crossing slopes greater than 15%, which pose very low risk conditions for erosive processes and landslides. However, measures to recover vegetation and monitor erosion must be developed and monitored on the long term.

The project team has assessed that at least 50% of the project will be implemented within previously developed areas.<sup>75</sup> There are relevant efforts to preserve greenfields, to minimize negative impacts on such areas. The Authorization for Vegetation Suppression<sup>76</sup> (Autorização para supressão de vegetação) has established the following narrow easement areas to reduce impacts: 7 meters within mature forests, 5 meters within areas of permanent protection, and 3 meters within areas of cerrado (savanna). The same authorization also determines the need for compensatory plantings using protected species, and the obligation for monitoring the growth of trees for a period of three years.

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<sup>70</sup> Estudo de Impacto Ambiental (EIA) - LT 230 KV JURUPARI – LARANJAL – MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ. 3.6.3.6.2.3 - Classes de Aptidão Agrícola das Terras - Aptidão Agrícola das Terras. Page 127

<sup>71</sup> Karstic areas were surveyed "(...) aiming to find speleological cavities (...) the surveys were done in a band of 2 km along each side of the HTL axis" (EIA meio físico, page 71). "Cavities already found and mapped in the area are 50 km away from the HTL axis (...) Along the path there are places where traces of the Monte Alegre formation are found (...) [but] in this location speleological formations that indicate subterranean caves were not found" (EIA meio físico page 72).

<sup>72</sup> Estudo de Impacto Ambiental -EIA- LT Jurupari-Laranjal-Macapá e LT Jurupari-Oriximiná. (Lot B granted to ISOLUX CORSAN) – Meio Físico. Page 81.

<sup>73</sup> Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de desativação de obra e recuperação de áreas degradadas. Page 177.

<sup>74</sup> Estudo de Impacto Ambiental -EIA- LT Jurupari-Laranjal-Macapá e LT Jurupari-Oriximiná. (Lot B granted to ISOLUX CORSAN) - Chapter 3.6.3.5.1.7 Declividade de encostas. Page 90.

<sup>75</sup> Hoja de Presentación de Datos - Page 41.

<sup>76</sup> Autorização de Supressão de Vegetação No. 480/2010 (LMTE - Lot B)

#### 4.4.2. Land and water:

A dispersion of results can be found at this subcategory. One credit was assessed as Improved (NW 2.3 Prevent surface and Groundwater contamination), one was evaluated as Superior (NW 2.1 Manage Stormwater), and one received No Score (NW 2.2 Reduce Pesticides and Fertilizers Impacts).

Significant efforts<sup>77</sup> have been put in place by project developers to manage stormwater to reduce the generation of stormwater runoff. A key aspect of these efforts is the process to restore vegetative cover using native species and preserve conditions of infiltration and evapotranspiration. Permanent impervious surfaces created by the project are considered negligible; and it is expected post-development stormwater runoff conditions will be equal to pre-development conditions.

With regards to efforts oriented to reduce pesticides and fertilizers impacts, performance can be improved. No evidence<sup>78</sup> has been found regarding operational policies or programs designed to control the application of pesticides and fertilizers.

Surface and groundwater contamination is prevented, as is in the case of the Tucuruí-Xingu-Jurupari and the Jurupari-Laranjal-Macapá HTLs, by spill prevention, spill and leak diversion systems, and cleanup plans. The Subprogram for the Management of Solid Waste, Effluents and Atmospheric Emissions<sup>79</sup> (Subprograma de Gestão de Resíduos Sólidos, Efluentes, e Emissões Atmosféricas) is in place.

#### 4.4.3. Biodiversity:

The project achieved good results at this subcategory. One credit was assessed as Improved (NW 3.1 Preserve Species Biodiversity), two were evaluated as Superior (NW 3.2 Control Invasive Species, NW 3.4 Maintain Wetland, and surface Water Functions), and a one was qualified as Conserving (NW 3.3 Restore Disturbed Soils).

The project team has worked through the extensive licensing process with several public entities at the federal, state and local levels in order to identify existing areas of special habitat relevance along the path of the HTL in order to preserve species biodiversity. This process is being developed under the supervision of the Brazilian Institute for the Environment (Instituto Brasileiro do Meio Ambiente - IBAMA). Notwithstanding these efforts, several reserved areas of high ecological value were affected, such as the Verde Para Sempre Extractive Reserve, and the Rio Cajarí Extractive Reserve.<sup>80</sup> Compensation measures are properly established in the environmental license and in the Program for the Recovery of Degraded Areas (Programa de Recuperação de áreas degradadas - PRAD). The project

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<sup>77</sup> See: Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de desativação de obra e recuperação de áreas degradadas. Page 177, and Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de prevenção, monitoramento e controle de processos erosivos. Page 167

<sup>78</sup> Hoja de Presentación de Datos - Page 42, 43.

<sup>79</sup> Plano Ambiental da Construção - PAC. LMTE: 3.2.9 - Subprograma de Gestão de Resíduos Sólidos, Efluentes, e Emissões Atmosféricas. Page 66. The subprogram contains clear guidelines to manage all categories of waste that will be produced during the construction phase, including those that could be potentially harmful to water, such as: oil from vehicles, cooking oil, hydraulic fluids, paint and solvents, and residues from the production of concrete. All temporary structures were also properly provided with sanitary facilities, including sewer and septic tanks.

<sup>80</sup> Both RESEX are managed by the Chico Mendes Institute for Biodiversity Conservation (Instituto Chico Mendes de conservação da Biodiversidade - ICMBio). The Extractivist Reserve (Reserva Extrativista - RESEX) Verde Para Sempre is affected by the Tucuruí, Xingu, Jurupari HTL (lot A), whilst the RESEX Rio Cajarí is affected by the 230 KV Jurupari – Laranjal - Macapá HTL (part of the lot B).

team has developed significant actions to control invasive species. All documents submitted by the project team, including the environmental licenses and authorizations issued by IBAMA, state that only appropriate native species will be used in the project.<sup>81</sup>

All disturbed soils will be restored through a number of efforts and programs that have been implemented. A Program for the Recovery of Degraded Areas<sup>82</sup> (Programa de Recuperação de Áreas Degradadas - PRAD), and a Program to Control and Monitor Erosive Processes (Programa de Controle e Monitoramento de Processos Erosivos) have been established.

Initiatives oriented to maintain wetland and surface water functions are geared to enhance and maintain three ecosystem functions: hydrologic connections, water quality and sediment transport. As for habitat function, all measures for compensation and restoration are properly described.<sup>83</sup> However, long-term monitoring will be required to properly assess impacts to habitats over time.

#### 4.4.4. Summary of results, Natural World category:

The table below shows the distribution of credits as well as the level of achievement reached in each credit (figure 18).

AMAZON HIGH TENSION LINES- BRAZIL			PT	Performance	% Total	max	
35	NATURAL WORLD	SITING	NW1.1 Preserve Prime Habitat	0	No Score	0.0%	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	4	Superior	66.7%	6
41			NW1.7 Preserve Greenfields	10	Superior	43.5%	23
42		L & W	NW2.1 Manage Stormwater	9	Superior	42.9%	21
43			NW2.2 Reduce Pesticides and Fertilizer Impacts	0	No Score	0.0%	9
44			NW2.3 Prevent Surface and Groundwater Contamination	1	Improved	5.6%	18
45		BIODIVERSITY	NW3.1 Preserve Species Biodiversity	2	Improved	12.5%	16
46			NW3.2 Control Invasive Species	5	Superior	45.5%	11
47			NW3.3 Restore Disturbed Soils	8	Conserving	80.0%	10
48			NW3.4 Maintain Wetland and Surface Water Functions	9	Superior	47.4%	19
		NW0.0 Innovate or Exceed Credit Requirements	0	N/A			
		<b>NW</b>	<b>68</b>		<b>33.5%</b>	<b>203</b>	

Figure 18: Natural World category – Summary of results.

<sup>81</sup> For the compensatory planting program, the replanting of trees must be at a proportion of 10:1 for Lot B and 25:1 for Lot A. Local species on the list of endangered species, such as the chestnut tree (castanheira), must be used in the compensatory planting program. A total of approximately 415 hectares of native species will be planted as compensation, following the terms of the environmental licenses. It has been properly documented that the project team has worked with government agencies to identify and use only locally appropriate plants. –For more details see: Licença de Operação (LO) . No. 1161-2013 (LMTE - Lot B), Licença de Operação (LO) . No. 1162-2013 (LXTE - Lot A).

<sup>82</sup> The PRAD developed for Lot A states that: “The restoration of impacted areas after the conclusion of construction is mandatory and of great relevance. Such restoration prevents erosive processes, allows for previous or alternative land uses to return, and avoids pollutants that (...) may affect the environment. (...) After the end of the construction phase (...) all tasks related to the de-activation of temporary structures and the restoration of degraded soils will be executed. These tasks are highly relevant and must be finished prior to energize the line (...) The developer will specify in all contracts with construction companies that final acceptance of the works will only take place after the conclusion of all de-activation [and restoration] procedures”

<sup>83</sup> Licença de Operação No. 1162/2013. - LT Tucuruí - Xingú - Jurupari. Page 3 / - Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de desativação de obra e recuperação de áreas degradadas. Page 177.



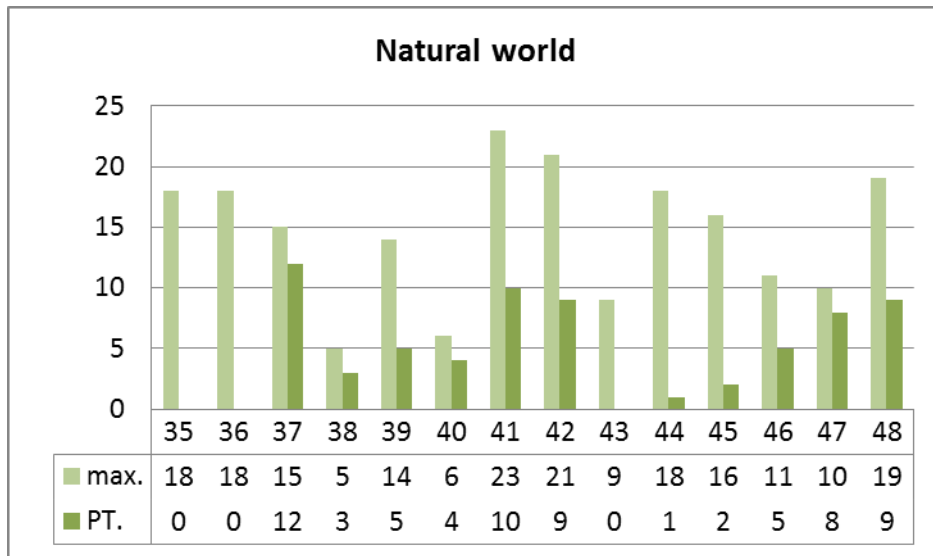


Figure 19: Natural World category – Summary of results.

The biggest opportunities for improvement in this category can be found at the Siting subcategory. Considering all credits and the maximum possible values for each indicator, the percentage of achievement adds to 33.5%, or 68 points out of 182.

#### 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.”<sup>84</sup> The credits are distributed as: Emissions (CR.1.1, CR. 1.2), and 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	CR1.1 Reduce greenhouse gas emissions	4	7	13	18	25
50		CR1.2 Reduce air pollutant emissions	2	6		12	15	
51	RESILIENCE	RESILIENCE	CR2.1 Assess climate threat				15	
52		CR2.2 Avoid traps and vulnerabilities	2	6	12	16	20	
53		CR2.3 Prepare for long-term adaptability				16	20	
54		CR2.4 Prepare for short-term hazards	3		10	17	21	
55		CR2.5 Manage heat islands effects	1	2	4	6		
Maximum points possible:							<b>116</b>	

Figure 20: Climate and Risk credit distribution.

<sup>84</sup> Envision Guidance Manual, p.150

#### 4.5.1 Emissions

In the **Subcategory Emissions**, the performance of the project was outstanding. One credit was assessed as Conserving (CR 1.2 Reduce air pollutant emissions) and one credit was qualified as Restorative (CR 1.1 Reduce greenhouse gas emissions).

Documentation provided by the project developers show that the construction of the Tucuruí-Xingú-Jurupari and the Jurupari-Laranjal-Macapá High Tension Lines will contribute significantly to reduce greenhouse gas Emissions, and that a net negative carbon balance will be achieved in the following years.

The EIA for the Tucuruí-Xingú-Jurupari HTL<sup>85</sup> states that the connection to the *isolated systems in the Amazonia Legal Region* will help reduce in the following 10 years, around 23,5 billion liters of light oil and 4,2 million tons of heavy oil. The connection of the system Tucuruí-Macapá-Manaus will result in a positive impact for 58% of all the isolated energy systems in the referred Amazonia Legal region.

The EIA for lot B<sup>86</sup> also presents an evaluation of reduction of GHG related with the project, asserting that a reduction of nearly 205,227 Tons of CO<sub>2</sub> per year is expected for the segment Tucuruí - Macapá, after the decommissioning of the thermoelectric plant of Santana and after the fifth year of operations due to the CO<sub>2</sub> released by the cut down forest.

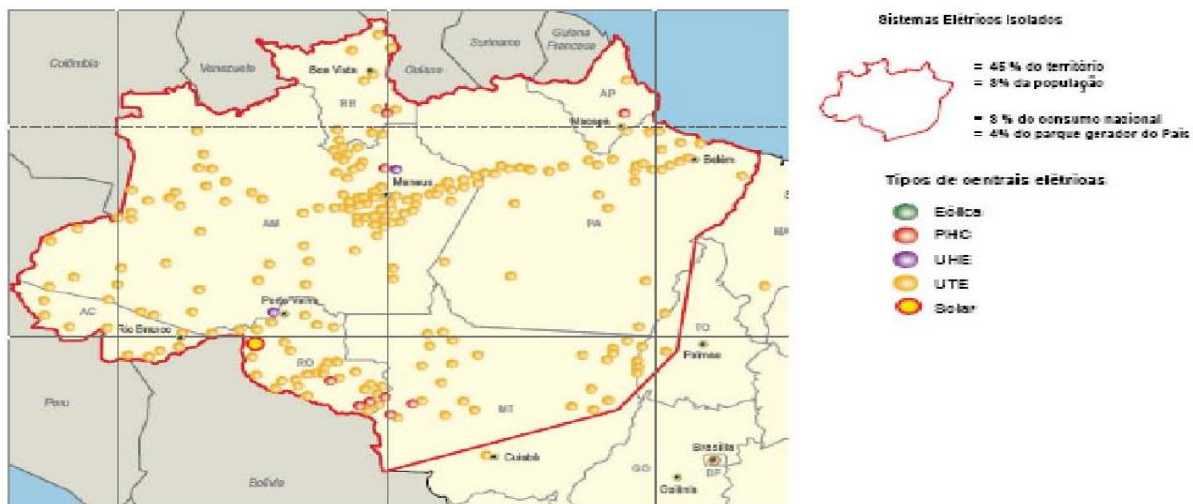


Figure 21: Isolated Energy systems in the Amazon.

According to the map key, the region comprises 45% of the Brazilian territory, 8% of its population and 8% of the national energy consumption. The generating capacity of the isolated systems represents the 4% of the total national generating capacity.

Source: Isolux Corsán.

<sup>85</sup> Estudo de Impacto Ambiental (E.I.A.), LT500 Kv Tucuruí, Xingú, Jurupari. - Redução de emissões de Gases Estufa - Pages 83-85. (Lot A granted to ISOLUX CORSAN). It is worth to mention that the assessments developed in this study present higher values on expected reductions of GHG, if compared with the numbers presented in the EIA of the Lot B. That difference seems to be related to the fact that the study on Lot B considered that the project will result in the suppression of forest, thus diminishing the expected reductions of GHG emissions. For the purpose of this report, we assumed the more conservative values presented at the EIA of the Lot B.

<sup>86</sup> Estudo de Impacto Ambiental.(E.I.A) LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Jurupari, Oriximiná - p. 42, 43. (Lot B granted to ISOLUX CORSAN). For the segment Jurupari Manaus, the same report state that a net negative balance will be achieved already in the present year, 2013. The connectivity of the segment Jurupari Manaus is expected to result in a reduction in the order of 1,055,685 Ton of CO<sub>2</sub> per year. Considering both segments (Tucuruí Macapa and Jurupari Manaus) a reduction in the order of 1,432,908 Tons of CO<sub>2</sub> per year is expected to take place since 2016. From that moment, the implementation of Clean Development Mechanism projects will be possible.

These assessments on the reduction of GHG emissions were made following the methodology outlined by the Intergovernmental Panel on Climate Change (IPCC).

Regarding efforts to reduce air pollutants, the High-Tension Lines of the system Tucuruí-Manaus-Macapá will contribute to reduce such impacts in a regional scale.<sup>87</sup> Since the emission of all criteria pollutants<sup>88</sup> - with the exception of lead - is related with the consumption of gasoil, the contribution of this project will be significant to reduce emission levels of Ozone, Carbon Monoxide, Sulfur Oxides, particulate matter and noxious odors.

However, there were local impacts during construction phase, related with the suppression of forest and fabrication processes (for instance, the concrete plant - See the reports on Air quality - Relatórios de qualidade do Ar<sup>89</sup>). In overall terms, negative impacts in terms of air pollutant emissions associated with this project are expected to be negligible.

#### **4.5.2 Resilience**

At the **Subcategory Resilience** several opportunities for improvement can be found. Four credits were assessed as No Score (CR 2.1 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) while one was assessed as Improved (CR 2.4 Prepare for short Term Hazards).

There is any evidence that a climate threat assessment or adaptation plans have been developed. Although the project does not produce GHG emissions, it is still exposed to risks related with climate change.<sup>90</sup> Similarly, there is any evidence on efforts taken to avoid traps and vulnerabilities or initiatives regarding long-term adaptability vis à vis the effects of climate change, were part of the conceptual frame of the designers.

For preparation for short-term hazards, the project team presented several documents<sup>91</sup> in order to prove that efforts are in place to face natural and man-made risks in the project area. Any of the aforementioned documents or plans is specific in pointing out the time frameworks of reference. In absence of any specific information the concession period of 30 years was assumed as a temporal reference.

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<sup>87</sup> Estudo de Impacto Ambiental.(E.I.A) LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Juruparí, Oriximiná - p. 42, 43. (Lot B granted to ISOLUX CORSAN). / Estudo de Impacto Ambiental (E.I.A.), LT500 Kv Tucuruí, Xingú, Juruparí. - Redução de emissões de Gases Estufa - Pages 83-85. (Lot A granted to ISOLUX CORSAN).

<sup>88</sup> Criteria pollutants include: particulate matter, ground level ozone, carbón monoxide, sulfur oxides, nitrogen oxides, lead and noxious odors.

<sup>89</sup> Relatório De Monitoramento da Qualidade Do Ar, 1, 2, e 3.

<sup>90</sup> PREMIOS INFRAESTRUCTURA 360° - HOJA DE PRESENTACIÓN DE DATOS, Page 51

<sup>91</sup> Plano de Ação de Emergência. / Procedimiento de Manutenção. / Programa de Gestão Territorial e monitoramento da faixa de servidão.

### 4.5.3 Summary of results Climate and Risk category.

The table below shows the distribution of credits as well as the level of achievement reached in each credit (figure 22)

AMAZON HIGH TENSION LINES- BRAZIL			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	3	Improved	14.3%	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			40		32.8%	122

Figure 22: Natural World category – Summary of results.

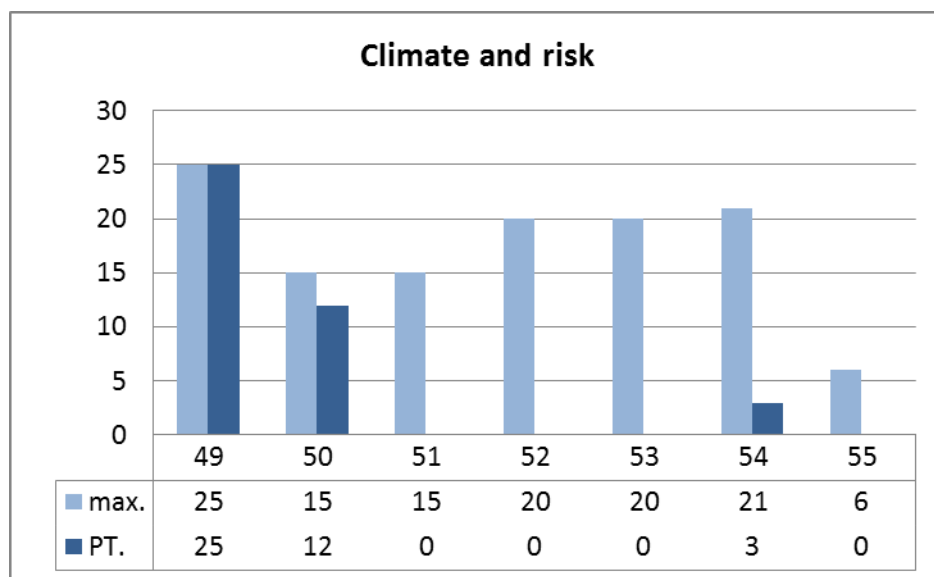


Figure 23: Natural World category – Summary of results.

The biggest opportunities for improvement at this category can be found at the Resilience subcategory. Considering all credits and the maximum possible values for each indicator, the percentage of achievement adds to 34.48%, or 40 points out of 122.

## 5 RESULTS AND CONCLUSION

The project has obtained a total of 245 points out of 809 possible. This represents a percentage of achievement of 30.3% according to the Envision Manual.

In the **Quality of Life category**, the project obtained 44 points out of 181, equivalent to 24.3% with most points related to the connection to the national grid and its contribution to improving overall communities' quality of life and stimulate sustainable growth and development. Most areas for improvements can be found at the subcategories Community and Wellbeing. This is the 4<sup>th</sup> best performance of the project considering the five categories of the *Envision* rating system.

The best performance achieved by the project in all five categories of *Envision* corresponds to the **Leadership category**, where the project received 66 points out of 121, equivalent to 54.5% with high scores regarding infrastructure integration, sustainable management, and long term monitoring and maintenance. The biggest opportunities for improvement at this category can be found at the subcategories of management and collaboration.

The **Resource allocation category** with 27 points out of 182 possible, the project achieved a performance of 14.8%. Most opportunities for improvement are found at the subcategories of energy and materials. The best scores are in diverting waste from landfills, supporting sustainable procurement practices and using regional materials.

The **Natural World category** is the 2<sup>nd</sup> best performance of the project, with 68 points out of 203, or 33.5%. Good performances obtained from preserving greenfields by changing the design of the HTLs paths closer to existing roads and managing stormwater by restoring the vegetative ground cover. The biggest opportunities for improvement in this category can be found at the Siting subcategory.

The last category **Climate and Risk** obtained 40 points out of 122, equals to the 32.8%, with outstanding performance in the emissions subcategory. This is the 3<sup>rd</sup> best performance of the project. The biggest opportunities for improvement at this category can be found at the Resilience subcategory.

Xingú and Macapá High Tension Lines (HTL) are located entirely in the Amazon, one of the most important and delicate ecosystems of the world. The High Tension Lines (HTL) allow for the connection of the cities of Manaus and Macapá with the Tucuruí Hydroelectric Dam. Furthermore, once completed, the project will help integrate this part of the Amazon with the Brazilian National Interconnected energy System (Sistema Interligado Nacional). The project has been assessed as a Clean Development Mechanism (CDM).

Prior to the construction of the HTLs, Manaus and Macapá had isolated energy systems, which relayed on fossil fuels for electricity generation done through isolated systems, based on a thermoelectric matrix of mostly diesel generators. The lack of connectivity between systems is one of the main factors contributing to the bad quality and low reliability of energy provision services, which has inhibited regional development. By providing cheaper and more reliable renewable energy, as well as high speed

data transmission through fiber optics, this project will contribute to an increase in attractiveness of the region for business and industries development. However, further investments will be necessary to deploy additional distribution lines or to provide renewable energies alternatives to the cities that have been by-passed or not considered in the scope of the project.

The process of obtaining environmental licenses in Brazil is long and thorough, and allows for democratic discussions with local governments and communities, with three licenses that must be obtained from the Brazilian Institute for the Environment (IBAMA): the Preliminary License (Licença Previa - LP) certifying the project's environmental feasibility; the Installation License (Licença de Instalação - LI) authorizing the beginning of construction; and the Operation License (Licença de Operação - LO) allowing energizing the lines and transmitting power and data.

The project developers have obtained all licenses, which will be monitored on long term basis, by IBAMA and other governmental institutions to insure all established obligations. It must be highlighted that the project has achieved compliance with all legal requirements, and has exceeded the threshold in several cases. For instance, the project team significantly improved the design of the path, in order to reduce impacts on sensitive areas, during the Bid Terms presented to Brazilian authorities.

Several areas of high ecological and ethnological value were affected, such as the Verde Para Sempre Extractive Reserve, and the Rio Cajari Extractive Reserve. The Tucuruí, Xingu, Jurupari HTL will also have an indirect impact on the Trocará Native Land (Terra Indígena - TI - Trocará) since the HTL will be only 4.5 kilometers south of the TI limits at its closest point.

It is worth mentioning that compensation measures have been properly established within the environmental licenses and in the program for the recovery of degraded areas (Programa de Recuperação de áreas degradadas – PRAD).

Several credits that received No Score are related to aspects which are not currently mandatory in the Brazilian environmental framework but that should be considered as indicated throughout this evaluation. Evaluation methodologies, as Envision, can contribute to bring awareness on topics that are many times not considered by communities, local authorities and developers. The project team must carefully analyze the credits that received No Score, since these topics provide with opportunities for improvement at the levels of project design, construction, operation and decommissioning. Significant challenges lies ahead, as IBAMA and the project developers have explicitly recognized the role of large infrastructural projects as *indirect inducers* of urban development. Possible solutions to these challenges may be connected –at least in part – with efforts to support local communities and local governments, in order to translate economic growth into sustainable development. For instance, support plans were already developed for the communities living in the Rio Cajari Extractive Reserve and at the Verde Para Sempre Extractive Reserve. Further strategies may include support to local governments of the cities along the path of the HTL, in planning and monitoring efforts to help preserve the environment and regulate urban expansion.

Based on all the documents presented it can be concluded that Amazon High Tension Lines (Lots A and B) will have a significant overall positive effect for the region, and for Brazil, provided that the efforts for long term monitoring and continuous performance improvement are sustained. This is a goal that can

only be achieved through concerted efforts of the project team, public officials, local communities and academic institutions.

The graphs below demonstrate the project’s performance under the three Infrastructure 360° Awards. The **People and Leadership Award** (figure 24) represents the QL and LD categories from the Envision™ Rating System. The project received a score of 110 points out of a total of 302 combined points within these categories, which equates to a 36.42% level of achievement. The **Climate and Environment Award** (figure 25) represents the RA, NW and CR categories within the Envision™ Rating System. The project received a score of 135 points out of a total of 507 combined points within these categories, which equates to a 26.63 % level of achievement. Thus, the overall achievement of the Xingú and Macapá High Tension Lines project under the **Infrastructure 360 Award** (figure 26) is 245 out of 809 points, or 30.28% of the total score.

This report evaluates the sustainability performance of the Xingú and Macapá High Tension Lines 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.

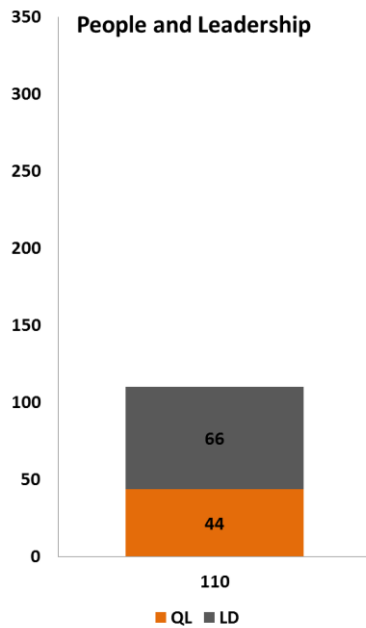


Figure 24: People and Leadership.

Score distribution

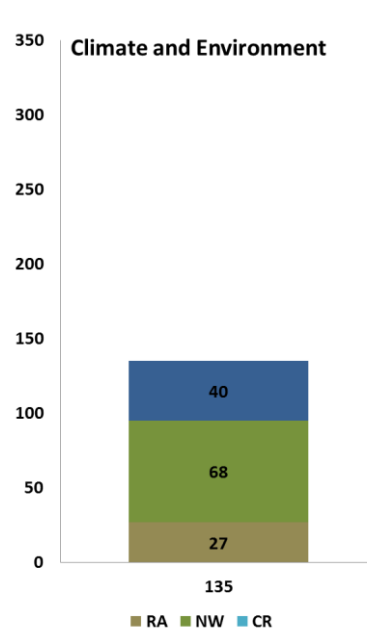


Figure 25: Climate and Environmental.

Score distribution

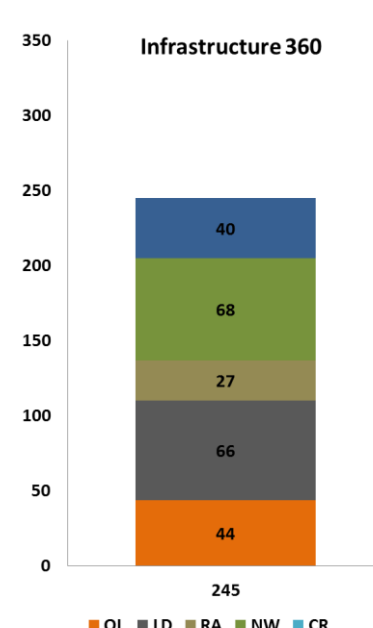


Figure 26: Infrastructure 360.

Score distribution



## APPENDIX A: PROJECT PICTURES AND DRAWINGS



**Figure 27:** Whenever possible the HTL was deployed on areas previously affected by man-made activities.  
Source: Isolux Corsán



**Figure 28:** view of the site /Source: Isolux Corsán



**Figure 29:** High Tension Towers at the Amazon River / Source: Isolux Corsán



*Xingú and Macapá High Tension Lines, Brazil.*



**Figure 30:** View of the Amazon River. Source: ISOLUX CORSÁN



**Figure 31:** General view of the transmission line / Source: Isolux Corsán

*Xingú and Macapá High Tension Lines, Brazil.*



**Figure 32:** High Tension Towers at the Amazon River /  
Source: Isolux Corsán



**Figure 33:** High Tension Towers at the Amazon River /  
Source: Isolux Corsán



**Figure 34:** General view of the transmission line through the jungle /. Source: Isolux Corsán



**Figure 35:** High Tension Towers / Source: Isolux Corsán



**Figure 36:** Surrounding communities/. Source: Isolux Corsán

*Xingú and Macapá High Tension Lines, Brazil.*



**Figure 37:** General view of the transmission line. /Source: Isolux Corsán



**Figure 38:** High Tension Towers during construction / Source: Isolux Corsán

*Xingú and Macapá High Tension Lines, Brazil.*



**Figure 39:** High Tension Towers during construction / Source: Isolux Corsán



**Figure 40:** General view of the high tension line / Source: Isolux Corsán

**APPENDIX B: ENVISION POINTS TABLE**

**CREDIT SCORING**

			IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE		
1	<b>QUALITY OF LIFE</b>	<b>PURPOSE</b>	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		<b>COMMUNITY</b>	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		<b>WELLBEING</b>	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:				<b>181</b>		
13	<b>LEADERSHIP</b>	<b>COLLABORATION</b>	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		<b>MANAGEMENT</b>	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		<b>PLANNING</b>	LD3.2 Address conflicting regulations and policies	1	2	4	8		
21			LD3.3 Extend useful life	1	3	6	12		
			Maximum points possible:				<b>121</b>		
22	<b>RESOURCE ALLOCATION</b>	<b>MATERIALS</b>	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		<b>ENERGY</b>	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		<b>WATER</b>	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:				<b>182</b>		
35	<b>NATURAL WORLD</b>		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	
39		<b>LAND &amp; WATER</b>	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			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			<b>BIODIVERSITY</b>	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:				<b>203</b>	
49		<b>CLIMATE &amp; RISK</b>	<b>EMISSIONS</b>	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	<b>RESILIENCE</b>		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:				<b>116</b>		
			*The five innovation credits are bonus points and not included in total point tallies				<b>803</b>		

**APPENDIX C: CREDIT DETAILS**

CATEGORY I, PEOPLE AND LEADERSHIP (PL)		
SUB CATEGORY: QUALITY OF LIFE		
	AMAZON HIGH TENSION LINES- BRAZIL	RECOMMENDATIONS
<p><b>PL1.1 Improve Community Quality of Life</b></p>	<p><b>Enhanced</b></p> <p>Overall improvement in the quality of life of the citizens of Manaus and Macapá is expected as a result of the project, for two main reasons: 1) hydroelectric power will replace electric energy generated from burning fossil fuels, and the subsequent reduction in CO2 emissions will benefit the environment, and 2) increased reliability in the energy supply is expected to result in economic growth and job creation in the region. Furthermore, a reduction in energy prices paid by consumers (both industries and residences) is also expected. There is clear support for the project from authorities at the Federal and State levels.</p>	<p>As most of the areas near Xingú and Macapá High Tension Lines are currently not occupied by urban areas, territorial and urban planning measures are required to guarantee that this scenario will continue, in order to guarantee the integrity of the environment, as well as the health and safety of the population. If negative effects of EMF over human health are proved, mitigation measures must be taken.</p>
	<p><b>5</b></p> <p>Public hearings were held in several cities in the path of the High Tension Lines. In the case of the Tucuruí, Xingu, Jurupari segment (lot A) the hearings took place in Pacajá, Vitória do Xingu, Porto de Moz and Almerim. In the case of the Jurupari, Oriximiná and Jurupari, Laranjal Macap segments (lot B) the hearings took place in Oriximiná and Macapá. It is worth mentioning that public hearings are mandatory in the framework of Brazilian environmental regulations.</p> <p>Local authorities of small cities that are crossed by the HTL are worried about not receiving the benefits of the project. Considering that this is a transmission project, is it true that initially only the capital cities of Manaus and Macapá will be directly benefited. Further investments to build substations and transmission networks will be required in the future, to incorporate all the cities that are crossed by the project into the National Interconnected System (Sistema Interligado Nacional).</p> <p>Another concern relates to possible negative impacts to the communities surrounding the High Tension Line (EIA page 121) from the effects of electromagnetic fields on the health of humans and animals. This subject is currently under debate. According to the World Health Organization “Potential health effects of exposure to static and time varying electric and magnetic fields need scientific clarification. Electromagnetic fields of all frequencies represent one of the most common and fastest growing environmental influences, about which there is anxiety and speculation is spreading. EMF exposure now occurs to varying degrees to all populations of the world, and the levels will continue to increase with advancing technology. Thus, even a small health consequence from EMF exposure could have a major public health impact.” Documentation provided by the concessionaire company states that maximum allowed values for magnetic fields, as determined by the Bid’s terms of reference, are not exceeded.</p>	

		<p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Estudo de Impacto Ambiental (E.I.A.), LT500 Kv Tucuruí, Xingú, Jurupari. - Justificativas Econômicas - Page 89. (Lot A granted to ISOLUX CORSAN).</li> <li>- Estudo de Impacto Ambiental (E.I.A.), LT500 Kv Tucuruí, Xingú, Jurupari. - Campo Magnético - Page 121. (Lot A granted to ISOLUX CORSAN).</li> <li>- “What is the International Electro Magnetic Field (EMF) project”, available at the World Health Organization Website:: <a href="http://www.who.int/peh-emf/project/EMF_Project/en/index.html">http://www.who.int/peh-emf/project/EMF_Project/en/index.html</a></li> <li>- Press publications on the reaction of local authorities. <a href="http://acritica.uol.com.br/noticias/Impactos-socio-ambientais-Linhao-Tucuruí-avaliados_0_478752288.html">http://acritica.uol.com.br/noticias/Impactos-socio-ambientais-Linhao-Tucuruí-avaliados_0_478752288.html</a></li> <li>- Audiência Pública LT 500 KV Tucuruí - Xingu-Jurupari - Page 4</li> <li>- Audiência Pública LT 500 KV Jurupari - Oriximiná and LT 230 KV Jurupari-Laranjal-Macapá. - Page 4</li> </ul>	
<p><b>PL1.2 Stimulate Sustainable Growth &amp; Development</b></p>	<p><b>13</b></p>	<p><b>Conserving</b></p> <p>The expansion of the energy distribution system and the connection of Manaus and Macapá with the Sistema Interligado Nacional - SIN - (National Interconnected System) fosters economic and social development by providing access to a more effective electrical power distribution system with improved functionality. According to the EIA developed for Lot B, this will allow for “(...) economies of scale, obtained by sharing operative reserves and installed capacity, avoiding additional investments in [generating] infrastructure” In turn, this will result in reduced energy costs for the northern region of Brazil. The aforementioned Assessment states that: “the connection of the Amazonian isolated systems to the SIN will allow the provision of energy to that region with electricity produced by hydroelectric power plants already amortized, which in turn, will result in the reduction of energy costs.”</p> <p>The towers built for the HTL of Xingú and Macapá will also be used to deploy fiber optic cables. These cables, rented to a telecommunications company called TIM, will be used for high speed data transmission to the cities of Manaus and Macapá, which will increase the competitiveness of the region. The combination of the aforementioned factors will very likely increase the attractiveness of Manaus and Macapá to business and industries.</p> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Estudo de Impacto Ambiental.(E.I.A) LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Jurupari, Oriximiná - p. 33, p 35 (Lot B granted to ISOLUX CORSAN).</li> <li>- <a href="http://www.amazonasenergia.gov.br/cms/novas-subestacoes-e-linhas-de-transmissao-chegam-para-reforcar-sistema-eletrico-de-manaus/">http://www.amazonasenergia.gov.br/cms/novas-subestacoes-e-linhas-de-transmissao-chegam-para-reforcar-sistema-eletrico-de-manaus/</a></li> </ul>	<p>The project's team could foster efforts to Identify existing community assets for restoration. Improve attractiveness through restoration of existing infrastructure: physical, knowledge and social assets.</p>



<p><b>PL1.3 Develop Local Skills and Capabilities</b></p>	<p><b>Improved.</b></p> <p>Documentation provided by the concessionaire leads us to conclude that no significant effort to develop local skills was fostered by the project leaders. Most of the training given to non-specialized workers is done on an as needed basis, focusing on their tasks, as well as in safety and environmental issues. The EIA developed for Lot B states that: “there will be 2500 workers at the peak of the construction. Of this total, 65% will be skilled workers, and 35% non-skilled workers.” This peak, which represents the maximum number of employees working at the same time, was expected to last approximately six months, according to the aforementioned assessment. Considering both Lots A and B, the total number of workers will be approximately 3,500.</p> <p><b>1</b> In general terms, local workers were oriented to non-skilled positions, considering that “Skilled workers are many times stable workers for construction and assembling companies, and are brought to the work sites, regardless of their places of origin” . The priority given to local workers in non-skilled positions aimed to reduce the settlement of employees from outside the region.</p> <p><u>Sources:</u>                  - Estudo de Impacto Ambiental.(E.I.A) LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Jurupari, Oriximiná - p. 91, 92. (Lot B granted to ISOLUX CORSAN).                  - AS CONCESSÕES DO SISTEMA TUCURUI – MACAPÁ – MANAUS. Presentation provided by Isolux Corsán - Slide 8.</p>	<p>Increasing levels of achievement involves a emphasis from a project focus only to a community focus, i.e., how can this project advance significantly local knowledge, skills and capabilities. Also, a shift from training done as needed to more affirmative actions.</p>
<p><b>PL2.1 Enhance Public Health And Safety</b></p>	<p><b>Improved.</b></p> <p>Many challenges to the safety of the workers and to public health are associated with a project of the scale of the Xingú and Macapá HTL. In this particular case, the specific environmental conditions and construction methods posed great challenges for the concessionaire company and the subcontractors. The Projeto Basico Ambiental (Basic Environmental Project) developed for Lot A states that:</p> <p>“[The construction of the HTL] includes many tasks that represent risks to the safety and health of the workers. This diversity [of risks] is not only related to the work environment (flooded areas, the crossing of wide rivers, forests, steep hills), but with activities inherent to the construction of the HTL (earth moving; transport , storage and handling of materials; operation of machines and equipment; handling of hazardous substances; work at great heights; installations and electrical works, etc).</p> <p>[It was necessary] to establish norms and procedures aimed at preserving adequate conditions for the health and safety of all the workers directly involved in the implementation of this endeavor.”</p> <p>In broad terms, ISOLUX CORSAN assumed the responsibility of supervising health and safety conditions for all the workers, while the subcontractors assumed the responsibility of “(...) implementing the procedures of Safety and Occupational Health Management (...)”</p>	<p>It should be a systematic identification and assessment of any new or non-standard technologies, materials and methodologies used by the project.</p>

		<p><u>Sources:</u>                  - “Projeto Básico Ambiental” - LT500 Kv Tucuruí, Xingú, Juruparí - .P05 Programa de Segurança do Trabalho e Saúde Ocupacional durante a Construção. page 92. (Lot A granted to ISOLUX CORSAN).</p>	
<p><b>PL2.2 Minimize Noise And Vibration</b></p>	<p><b>0</b></p>	<p><b>No Score.</b></p>	<p>Develop an assessment of noise and vibration levels produced by the project during operation phase. Explore possible mitigation measures of noises produced by operation phase, if applicable.</p>
		<p>A project such as this tends to have the greatest impact in terms of noise and vibration during the construction phase, while the operation phase does not cause major impacts. The EIA developed for Lot A presents a very precise description of the Brazilian regulatory framework regarding acceptable levels of noise at the Federal, State and Municipal levels. The table presented in the aforementioned EIA (page 29) describes the maximum allowable values in dB(A), for different land uses (urban areas, ranches, mix used areas, etc.), during the day and at night. However, none of the presented regulatory frameworks assess how to deal with possible impacts of noise and vibration on natural ecosystems. Furthermore, no documentation was provided indicating that baseline studies of existing levels of noise and vibration were performed, or that future levels of noise were predicted for the project.</p> <p><u>Sources:</u>                  - Estudo de Impacto Ambiental (E.I.A.). - LT500 Kv Tucuruí, Xingú, Juruparí. - Níveis de Ruído de Obra. Pages: 28, 29 (Lot A granted to ISOLUX CORSAN).                  - Envision Manual. Page:40</p>	
<p><b>PL2.3 Minimize Light Pollution</b></p>	<p><b>0</b></p>	<p><b>No Score</b></p>	<p>Develop assessment of lighting needs and possible mitigation measures, balancing safety requirements and environmental impacts.</p>
		<p>Documentation and answers provided by the project developers indicate that during the construction phase all work will be done during the daytime, therefore significantly reducing the impacts of light pollution. However, high tension towers do require safety lights to prevent aircraft collisions, and an Environmental Impact Statement for light pollution is expected during the operation phase considering the characteristics of the project (1,200 km of HTL across the Amazon). At this point, no documentation has been provided that indicates that an assessment of lighting needs has been done for the project, or that non-lighting alternatives or mitigation measures have been contemplated.</p> <p><u>Sources:</u>                  - Obstruction Marking and Lighting - p. 13 (Federal Aviation Administration) - available at:  <a href="http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/b993dcdcf37fcdc486257251005c4e21/\$FILE/AC70_7460_1K.pdf">http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/b993dcdcf37fcdc486257251005c4e21/\$FILE/AC70_7460_1K.pdf</a>                  - Premios Infraestructura 360° - Hoja de Presentación de datos. - p. 6                  - Estudo de Impacto Ambiental (EIA), LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Juruparí, Oriximiná - page 80 (Lot B granted to ISOLUX CORSAN)                  - Envision Manual. Page:42</p>	

<p><b>QL2.4</b>  <b>Improve Community Mobility And Access</b></p>	<p>4</p>	<p><b>Enhanced</b></p> <p>The project will improve the conditions of existing road networks in a number of locations. The Projeto Basico Ambiental (Basic Environmental Project) developed for Lot A states that: “During construction phase, road access to work areas at the Tucuruí, Xingú, Jurupari 500 KV HT will be made through existing road network, mainly using country roads. (...)The existing network of rural roads at the Area of Direct Influence (...) is not in the condition needed to enable use by trucks that will transport equipment and materials during construction. Those roads do not receive preventive or corrective maintenance and frequently are inadequate for traffic, especially during and after rain periods.” Thus, a Sub Program for the Improvement of Road and Port Infrastructure was developed and implemented with the following objectives: a) improve roads that will be used for access to construction sites; b) reduce negative impacts on local communities related to heavy vehicle traffic; c) guarantee that road and traffic conditions are improved in relation to the baseline scenario after the construction phase is finished; and d) improve port infrastructure if necessary for the project.</p> <p>Such improvements in port infrastructure did not occur because “At the commencement of work, it was confirmed that the river ports (...) had adequate conditions that made it possible to use them as logistical infrastructure for the project” Anexo 3 - Relatório Situacional da Infraestrutura Viária e Portuária. Page 4.</p> <p><u>Sources:</u>  PBA_LXTE: P.12.1 - Subprograma de Melhorias da Infraestrutura Viária e Portuária. Page 196  Anexo 03_ Relatório Situacional da Infraestrutura Viária e Portuária. Page 4  Envision Manual. Page:44</p>	<p>Project team should expand access considerations to expected traffic flows and volumes, as well as assessing preferred modes of access.</p>
<p><b>QL2.5</b>  <b>Encourage Alternative Modes of Transportation</b></p>	<p>0</p>	<p><b>No Score</b></p> <p>The nature of such a project, which is largely built in isolated rural areas and vast expanses of Amazonian Forest, renders alternative transportation policies nonviable. The scale of the project (1200 Km of HTL) also does not lend itself to notions such as “walking distance access to multi-modal transportation”. In general terms, ISOLUX and sub-contracted companies are responsible for the transportation of workers.</p> <p><u>Sources:</u>  - Premios Infraestructura 360° - Hoja de Presentación de datos. - p. 9  - Envision Manual. Page:46</p>	
<p><b>QL2.6</b>  <b>Improve Site Accessibility, Safety &amp; Wayfinding</b></p>	<p>6</p>	<p><b>Superior</b></p> <p>Site accessibility, safety and wayfinding conditions were improved by the project, with special measures deployed during the construction phase. The EIA developed for Lot B states that: “Before the commencement of work, a procedure for accessing construction sites and towers will be defined, presenting a key map with indications of the main roads in the region(...) identifying secondary and private roads, (...) existing streets and paths (...) that will be used to access each tower”. This level of care regarding safety conditions was extended to all construction sites and adjacent areas, due to the risk of endemic diseases such as malaria, dengue fever, and leishmaniasis.</p>	<p>In order to improve performance at this credit, the project team could develop plans assessing how the project will impact public safety.</p>

		<p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Estudo de Impacto Ambiental.(E.I.A) LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Jurupari, Oriximiná - p. 97. (Lot B granted to ISOLUX CORSAN).</li> <li>- “Projeto Básico Ambiental. Volume II” (PBA), - LT500 Kv Tucuruí, Xingú, Jurupari - Pages 93, 102 - (Lot A granted to ISOLUX CORSAN)</li> </ul>	
<p><b>QL3.1</b>  <b>Preserve</b>  <b>Historic And</b>  <b>Cultural</b>  <b>Resources</b></p>	<p><b>7</b></p>	<p><b>Superior</b></p> <p>Preliminary studies developed in the context of the EIA, and research into the Brazilian national database of Archaeological sites (Sistema de Gerenciamento de Patrimônio Arqueológico - SGPA), indicated that the territory crossed by the HTL has high cultural and historical relevance. Therefore, the possibility of finding archaeological or paleontological sites was considered to be high. The PBA developed for Lot A states that: “The evaluation of archaeological potential at the easement area for the 500 KV HTL Tucuruí - Xingú - Jurupari (...) proved great potential for findings of archaeological and historical sites (...), considering that archaeological remains were found during the exploration and extensive survey phase.”</p> <p>In this context, two specific programs were developed within the Projeto Basico Ambiental (Basic Environmental Project): P13 - Program for prospecting, rescue and preservation of the archaeological, historical and cultural heritage, and P14 - Program for monitoring and saving paleontological sites. It is worth mentioning that a specific goal of the aforementioned programs is to train members of local governments through heritage education courses.</p> <p>As a result of these efforts, the final Report of the Project of Archaeological rescue (Projeto de Salvamento Arqueológico - Relatório Final), states that: “Activities of archaeological prospecting were developed within the area of influence of the 500 KV HTL Tucuruí, Xingú, Jurupari, and 25 archaeological sites were found.”</p> <p>These programs were overseen by the Brazilian Environmental Institute (Instituto Brasileiro do Meio Ambiente - IBAMA) and the Institute for the Historic and Artistic National Heritage (Instituto do Patrimônio Histórico e Artístico Nacional - IPHAN).</p>	<p>Project team should aim for broader coordination with preservation interests. Identify resources that define the character of the community.</p>
		<p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Estudo de Impacto Ambiental(E.I.A.) - LT500 Kv Tucuruí, Xingú, Jurupari. - Page: 50 (Lot A granted to ISOLUX CORSAN).</li> <li>- “Projeto Básico Ambiental.” (PBA). - LT500 Kv Tucuruí, Xingú, Jurupari. - Page 4, Page 201-205 - P13 Programa de Prospecção e Preservação do Patrimônio Arqueológico, Histórico e Cultural.</li> <li>- “Projeto Básico Ambiental.” (PBA). - LT500 Kv Tucuruí, Xingú, Jurupari. - Page 206- 210 - “P14 Programa de Monitoramento e Salvamento Paleontológico”</li> <li>- PROJETO DE SALVAMENTO ARQUEOLÓGICO E EDUCAÇÃO PATRIMONIAL NA ÁREA DE INFLUÊNCIA DA LINHA DE TRANSMISSÃO 500 KV TUCURUÍ – XINGU – JURUPARI (PA) RELATÓRIO FINAL. - Page 21.</li> <li>- Envision Manual. Page:50</li> </ul>	
<p><b>QL3.2</b>  <b>Preserve</b>  <b>Views And</b>  <b>Local</b>  <b>Character</b></p>	<p><b>0</b></p>	<p><b>No Score</b></p> <p>Even though it is clearly documented that many efforts were deployed to minimize environmental impacts and optimize technical solutions, the documentation submitted does not provide proof that the preservation of views and local character was considered as a guideline for conception and construction of the project.</p> <p><u>Sources:</u>                  Not Found.</p>	<p>Present projects and or reports describing actions oriented to the preservation of views and local character.</p>

QL3.3 Enhance Public Space	6	<p><b>Superior</b></p> <p>The report on Corporate Social Responsibility (CSR) describes several initiatives taken to enhance public space in different cities within the area of influence of the project. One example is the construction of a gym for senior citizens in the city of Porto de Moz. The aforementioned report states that: “ Acting on a Partnership with the Municipal government of Porto de Moz, Linhas de Xingu Transmissora de Energia (LXTE) acquired equipment to improve a square, encouraging physical activities for senior citizens. Called the “Open Air Gym for the Best Age”, this initiative aims to facilitate the access of senior citizens to public spaces for sports and recreation (...).”</p> <p>Through the same CSR program, many other cultural activities that bring life to public spaces were developed in cities within the project’s area of influence.</p> <p><u>Sources:</u>                      - “Ações de Responsabilidade Social” - Pages 4-7                      - Envision Manual. Page:54</p>	Project team could assess the possibility of fostering efforts oriented to: create new public space, add recreational facilities to an existing public space, or improve access for current and future users.
		<p>QL0.0 Innovate Or Exceed Credit Requirements</p> <p>0</p> <p>N/A</p>	
		44	

SUB CATEGORY: LEADERSHIP			
	AMAZON HIGH TENSION LINES- BRAZIL		RECOMMENDATIONS
LD1.1 Provide Effective Leadership And Commitment	9	<p><b>Superior</b></p> <p>Isolux Corsán has stated their commitment to the environment in a number of the documents provided. Annual Reports include a section on Corporate Social Responsibility, which in turn incorporates an environmental dimension. The Isolux Corsan Annual Report for 2011 states that the company is committed to: “Develop and implement Environmental Management systems suited to the organization and following the principles established in the ISO 14001 international standard, thus adopting measures that allow for continuous improvement (...).” The aforementioned report also elaborates on the Pact signed with the United Nations, which includes specific commitments regarding sustainability: “Apply preventive approaches that are helpful to the environment; foster initiatives promoting broader environmental responsibility; contribute to the development and dissemination of environment friendly technologies.”</p> <p>Public commitments and obligations towards the environment are also included in the environmental licenses and authorizations issued by the Brazilian Environmental Institute (IBAMA). These documents include authorization for the suppression of vegetation (Autorização para a supressão de vegetação - ASV), the Installation License (Licença de Instalação - LI) and the Operation license (Licença de Operação - LO). For instance the ASV for Lot A establishes the obligation for compensatory planting of trees at a rate of 25 trees per each tree cut down, while the ASV of Lot B sets the compensatory value at 10 trees per each one cut down.</p>	The commitment of the organization towards the environment is clear and consistent. In order to improve in this specific credit, the project team could consider providing more specific evidence of performance vis à vis the goals that have been assumed.

		<p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Envision Manual, Page 62.</li> <li>- Isolux Corsán - Informe Anual, año 2011. Page 90, Page 118.</li> <li>- Autorização para a supressão de vegetação, Licença de Instalação, Licença de Operação - Projeto Linha Tucurui, Xingu, Jurupari (Lot A granted to ISOLUX CORSAN).</li> <li>- Autorização para a supressão de vegetação, Licença de Instalação, Licença de Operação - Projeto Linha Jurupari, Laranjal, Macapa (Lot B granted to ISOLUX CORSAN).</li> </ul>	
<p><b>LD1.2 Establish A Sustainability Management System</b></p>	<p><b>14</b></p>	<p><b>Conserving</b></p> <p>According to the Isolux Corsán Annual Report for 2012, the company is committed to implementing a management system based on the international standards set forth in ISO 9001, ISO 14001 and OHSAS 18001. Such management systems are to be implemented in all countries where Isolux Corsán does development projects. A complex management system is in place for both the Tucuri, Xingu, Jurupari HTL (Lot A) and the Jurupari, Laranjal, Macapá HTL (Lot B).</p> <p>The Planning and Environmental Management Program for the Tucurui, Xingu, Jurupari HTL states that its objective is: “to guarantee that all construction services to be executed, either under direct control of the developer or through subcontracted construction companies, are done according to the best practices of environmental control, and comply with standards determined by the authorities in the process of obtaining the Preliminary License and the Installation License”</p> <p>An Environmental Management Plan has also been developed for the Jurupari, Laranjal, Macapá Project. This plan states that: “The implementation [of Lot B] requires a management structure organized by the developer, in order to guarantee that techniques for environmental protection, (...) and recovery are adequate to each specific construction condition, and furthermore, are implemented correctly.”</p> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Isolux Corsán 2012 Annual Report - Chapter 07, Corporate Social Responsibility - Pages 108, 109</li> <li>- Projeto Básico Ambiental - Linha Tucurui, Xingu, Jurupari (Lot A granted to ISOLUX CORSAN). – Programa de planejamento e gestão ambiental da etapa construtiva e monitoramento ambiental das obras (page 68)</li> <li>- Projeto Básico Ambiental - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) - Plano de Gestão Ambiental - Page 1/16.</li> <li>- Envision Manual, Page 64</li> </ul>	
		<p><b>Enhanced</b></p> <p>Both the documentation presented and the management processes that are in place demonstrate that project developers approach the project as a set of interconnected systems. The importance of addressing infrastructure projects in a broader regional and national context is recognized. All construction activities are orchestrated through Environmental Construction Plans (Planos Ambientais de Construção). The project and construction were granted to Isolux Corsán under an EPC (Engineering, Procurement and Construction) contract.</p> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Envision Manual, Page 66.</li> <li>- Contrato EPC - LXTE (Linhas de Xingu, Lot A)</li> <li>- Contrato EPC - LMTE (Linhas de Macapá, Lot B)</li> <li>- PAC - LXTE (Plano Ambiental de Construção - Linhas de Xingu - Lot A)</li> <li>- PAC - LMTE (Plano Ambiental de Construção - Linhas de Macapá - Lot B).</li> </ul>	
<p><b>LD1.3 Foster Collaboration And Teamwork</b></p>	<p><b>4</b></p>		<p>Whole systems design processes, procedures and methodologies are incorporated into the overall project delivery process.</p>

<p><b>LD1.4 Provide For Stakeholder Involvement</b></p>	<p>5</p>	<p><b>Enhanced</b></p> <p>Permanent channels of communication with community members, local governments, national environmental authorities and other relevant stakeholders are established. A number of communication campaigns and educational programs have been developed.</p> <p>The program for Social Communication (Programa de Comunicação Social - PCS) developed for Lot B states that: “Throughout 17 months of the program, different communication-related activities were performed in the cities of Macapá, Santana, Mazagão and Laranjal do Jari, in the state of Amapá; and Almeirim, Prainha, Monte Alegre, Alenquer, Curuá, Óbidos e Oriximiná, in the state of Pará. All actions had the objective to establish a link between project developers and all relevant stakeholders (...)”</p> <p>Lot A developed another PCS. This Program “seeks to attend to the need to keep the population informed regarding the endeavor, highlighting possible disruptions that may occur in their daily lives as a direct or indirect consequence of the project. (...) This will allow the communities to engage with the developers in order to discuss their demands and aspirations, enabling the reassessment of (...) performed and planned (...) actions whenever necessary.” Another stated objective is “To establish channels of systematic communication between project developers and different segments of involved communities, local authorities and organized civil society representatives, in order to keep the company informed of the expectations and aspirations of the population.”</p> <p><u>Sources:</u>          - Projeto Básico ambiental (PBA) Linha Tucuruí, Xingu, Jurupari (Lot A granted to ISOLUX CORSAN) P.18 - Programa de comunicação social (page 244); P.19 - Programa de educação ambiental (page 252)          - Programa de Comunicação Social (PCS). - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN)          - Projeto de Educação Ambiental (PEA). - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN)</p>	<p>In order to improve the assessment of this credit Project developers can demonstrate specific and significant case(s) where changes on the endeavor were made based on stakeholders’ feedback.</p>
<p><b>LD2.1 Pursue By- Product Synergy Opportunities</b></p>	<p>0</p>	<p><b>No Score</b></p> <p>Significant efforts to improve recycling and waste management have been deployed by the project managers in all construction facilities. However, after analyzing the documentation provided, no evidence of initiatives to identify and cost-effectively use unwanted materials from nearby operations has been found.</p> <p><u>Sources:</u>          - Plano Ambiental da Construção PAC - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN). Chapter 3.2.9 - Subprograma de Gestão de Resíduos Sólidos, Efluentes, e Emissões Atmosféricas (page 66)          - Envision Manual, Page 70.</p>	<p>Project developers may consider assess the feasibility of improvement in this credit, engaging in active discussions with managers of nearby facilities to pursue by-product synergy opportunities.</p>

<p><b>LD2.2 Improve Infrastructure Integration</b></p>	<p>13</p>	<p><b>Conserving</b></p> <p>The contribution of the Tucuruí, Macapá, Manaus High Tension Lines to the improvement of infrastructural integration in the Amazonian region will be significant. The entire project is unto itself a complex device for infrastructural integration, connecting energy production facilities with large urban centers.</p> <p>Documentation presented by the project developers states that at specific points of the HTL, pre-existing infrastructure for high voltage electrical distribution was incorporated into the project. In these situations, the designers sought to reuse existing elements, thus achieving synergy in the implementation process, as well as savings in terms of energy and money.</p> <p>Several other examples were provided of how the project was adjusted to include pre-existing infrastructural facilities and incorporate large centers of economic activity.</p> <p>At existing mining sites: the path of the HTL had to be diverted from current mining sites and further exploitation projects were banned from within the easement area.</p> <p>In areas of potential urban expansion: project developers must support municipalities in the development of urban plans, in order to incorporate the HTL project into the future growth of the aforementioned urban centers.</p> <p>Interaction of the HTL with airports and airfields: these spots were carefully designed in order to locate the towers strategically, without affecting aerial routes, and with adequate safety signage.</p> <p><u>Sources:</u>          - Projeto Básico Ambiental (PBA) - HTL Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) - P.12 - PROGRAMA DE GESTÃO DE INTERFERÊNCIAS COM ATIVIDADES ECONÔMICAS OU INFRAESTUTURAS (DIREITOS MINERÁRIOS, INFRAESTRUTURA VIÁRIA E PLANOS DIRETORES). Page 186.          - Envision Manual, Page 72</p>	<p>Project team may foster efforts to consider other related community infrastructure elements, sustaining and/or restoring community assets in a way that enhances overall community efficiencies and effectiveness.</p>
<p><b>LD3.1 Plan For Long- Term Monitoring &amp; Maintenance</b></p>	<p>10</p>	<p><b>Conserving</b></p> <p>Documents presented prove that a comprehensive long-term plan for monitoring and maintenance has been developed. Provisions for maintenance include the following: a) maintenance of the characteristics and physical conditions of the infrastructure itself, and b) maintenance of accessibility to the easement area by monitoring the growth of vegetation on the site. Preventive and corrective actions are contemplated.</p> <p>Furthermore, the Operation License (Licença de Operação - LO) establishes a number of mandatory processes for monitoring and environmental compensation as a pre-condition to running the HTL. These processes include, among others, the following: an Environmental Management Plan for operations; a Program for Monitoring and Controlling Erosive Processes; a Program for Waste Management; a Program to Recover Degraded Areas; a Program for Monitoring Flora, a Program for Monitoring Fauna, a Program for Monitoring Water Quality, a Program for Territorial Management of the Easement Area, etc.</p> <p>The LO is a document issued by IBAMA, is valid for 5 years, and is renewable upon the fulfillment of the obligations included within it. Therefore, the monitoring process is a combined effort performed by the project developers and verified by Brazilian environmental authorities.</p>	



		<p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Estudo de Impacto Ambiental. (EIA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN). Chapter 3.4.4.15 - Etapa de Operação e Manutenção. Page. 117</li> <li>- Licença de Operação - HTL Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN)</li> <li>- Licença de Operação - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN)</li> <li>- Envision Manual, Page 74.</li> </ul>	
<p><b>LD3.2</b> Address Conflicting Regulations &amp; Policies</p>	<p>8</p>	<p><b>Conserving</b></p> <p>An extensive assessment of the regulatory framework and an intense dialogue with licensing authorities were developed to make the project possible. The path of the High Tension Line (HTL) was modified from the original design developed by ANEEL in the bid terms. This modification was made with the goal of reducing environmental impacts, prioritizing areas already modified or altered by human settlements. Proximity to existing highways such as the BR230 (Trans Amazonian) was considered as a desirable condition. Furthermore, the modification of the HTL path also allowed a reduction in forest disruption.</p>	
		<p><u>Sources:</u></p> <p>Estudo de Impacto Ambiental (EIA) -HTL Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) - Volume I: 2.0. Instrumentos Legais e Normas Aplicáveis. Page 6.</p> <p>Estudo de Impacto Ambiental (EIA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) - Chapter 3.4.1.2, Principais agentes do Setor Elétrico Brasileiro. Grupo Isolux Corsán - As concessões do sistema Tucuruí, Macapá, Manaus. Page 19.</p> <p>Envision Manual, page 76.</p>	
<p><b>LD3.3</b> Extend Useful Life</p>	<p>3</p>	<p><b>Enhanced</b></p> <p>This credit recognizes efforts to enhance durability and resilience through design. In an environment as challenging as the Amazon, adequate conditions for monitoring and maintenance are very important to insure that the infrastructure achieves its intended lifespan. Conscious efforts were developed to establish paths for the HTL’s near existing highways or other energy transmission infrastructure. Complex tradeoffs were made to balance the needs for a reduced impact on the forest and a sufficiently large easement area. Due to these adjustments, maintenance will be less difficult, thus contributing to a longer useful life for the Tucuruí, Manaus, Macapá High Tension Line system.</p>	<p>Project developers could foster feasibility studies in order to identify key areas where increasing investment in extending useful life will offer a reasonable payback.</p>
		<p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Grupo Isolux Corsán - As concessões do sistema Tucuruí, Macapá, Manaus. Page 19.</li> <li>- Envision Manual, page 78.</li> </ul>	
<p><b>LD0.0</b> Innovate Or Exceed Credit Requirements</p>	<p>0</p>	<p>N/A</p>	
	<p>66</p>		

CATEGORY II: CLIMATE AND ENVIRONMENT (CE)			
RESOURCE ALLOCATION			
	AMAZON HIGH TENSION LINES- BRAZIL		RECOMMENDATIONS
RA1.1 Reduce Net Embodied Energy	0	<p><b>No Score</b></p> <p>After analyzing answers provided and documents presented by project developers, no evidence could be found that efforts to reduce net embodied energy of project materials were carried out.</p>	<p>An estimate of the net embodied energy of project materials is required, carried out by means of a life cycle assessment (LCA). Considering that the project is in the advanced construction phase, project developers should give special consideration to the assessment of embodied energy of replacement parts. An infrastructural project like a High Tension Line has a relatively long lifespan, and improvements in the selection of replacement parts/ materials may result in relevant energy savings.</p>
		<p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Envision Manual, Page 86.</li> <li>- Hoja de Presentación de Datos - Page 22</li> </ul>	
RA1.2 Support Sustainable Procurement Practices	6	<p><b>Superior</b></p> <p>Isolux Corsán has a well-defined program for sustainable procurement. The company website states that: "Pursuant to the Group's Corporate Responsibility principles, Isolux Corsán applies its identification and evaluation procedures to all its current and potential suppliers, based on their degree of compliance with the following strategic requirements: transparency and equal opportunities; compliance with applicable quality standards; strict application of all legal regulations regarding corporate, employment, environmental and health &amp; safety issues, or of any other kind, that may be applied at any time."</p> <p>"These practices enable the selection of certified suppliers not just on the basis of monetary, technical or logistical benefits in their bids, but also with respect to their records of compliance in social, labour relations, environmental and health &amp; safety matters. The certification process means that Isolux Corsán can be sure that it is optimising its relationship with the best suppliers of the goods and services it needs. This adds value to the final product that is delivered to our customers and benefits society as a whole."</p> <p>Furthermore, Isolux Corsán has an ethics code in place. The aforementioned "(...) code of ethics and best procurement practices (...) is applied to all purchases, whether they are from global or local suppliers. All contracts with the Group make it mandatory for the contractor to uphold the company's ethical principles."</p> <p>Referring specifically to the project under evaluation, documents presented state that all "(...) raw materials such as sand, gravel, rolled pebbles and wood will be acquired from local suppliers properly licenced."</p>	<p>At this point, it is not clear what percentage of materials came from suppliers committed to sustainable practices. Only indirect information was found. Provide documentation of the percentages of materials purchased from suppliers that have implemented sustainable policies and practices.</p>

		<p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Envision Manual, Page 88</li> <li>- <a href="http://www.isoluxcorsan.com/en/commitments-to-the-suppliers.html">http://www.isoluxcorsan.com/en/commitments-to-the-suppliers.html</a></li> <li>- Estudo de Impacto Ambiental (EIA) LMTE (Lot B granted to ISOLUX CORSAN) Caracterização do Empreendimento. Chapter: Construção e montagem da LT. Page 104</li> </ul>	
RA1.3 Used Recycled Materials	2	<p><b>Improved</b></p> <p>A very consistent program for managing waste is included in the Construction Environmental Plan (Plano Ambiental da Construção- PAC). The PAC aspires to: “(...) insure that the smallest quantity of waste is generated during the construction of the HTL, and that the aforementioned waste is properly collected, stocked and disposed of in a way that does not lead to the emission of gases, liquids or solids that may represent significant impacts on the environment” Measures to encourage collective selection of waste and recycling are in place.</p> <p>However, no documentation was provided specifying reused materials for the project beyond the excavation materials that will be used for filling.</p>	<p>To improve performance, the project team should provide design documents showing the source location and weight or volume of reused structures or materials. In determining weight or volume, the project teams may refer to standard equivalents.</p>
		<p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Envision Manual, Page 90</li> <li>- Plano Ambiental da Construção (PAC) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN). Page 67</li> <li>- Estudo de Impacto Ambiental (EIA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) - Chapter 3.4.4.14.11.1 - Construção e Montagem da LT .Page 105</li> </ul>	
RA1.4 Use Regional Materials	6	<p><b>Enhanced</b></p> <p>The EIA developed for Lot B states that all “(...) Raw materials such as sand, gravel, rolled pebbles and wood will be acquired from local suppliers properly licenced,” and the EIA for lot A states that: “Raw materials (...) must be acquired from local suppliers”</p> <p>The developers have estimated that 40% of materials are locally sourced.</p>	<p>The following parameters can be considered to assess what is locally sourced: soils and mulches within 80 km; aggregates and sand within 80 km; concrete within 160 km; plants within 400 km; other materials within 800 km.</p>
		<p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Envision Manual, Page 92.</li> <li>- Estudo de Impacto Ambiental (EIA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) - Chapter 3.4.4.14.11.1 - Construção e Montagem da LT .Page 104</li> <li>- Estudo de Impacto Ambiental (EIA) -HTL Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) - Insumos - Page 164.</li> <li>- Hoja de Presentación de Datos - Page 25</li> </ul>	

<p><b>RA1.5 Divert Waste From Landfills</b></p>	<p>8</p>	<p><b>Superior</b></p> <p>According to the EIA for Lot B “(...) Material excavated in order to build foundations for the structures will be used primarily as filling material, nearby the towers. (...) It is worth highlighting that considering the methodologies currently in place for this type of project, the creation of dumping or excavation sites will not be required.” Material unsuitable for filling will be disposed of in licensed landfills.</p> <p>A very consistent program for managing waste is included in the Construction Environmental Plan (Plano Ambiental da Construção- PAC). The PAC aspires to: “(...) insure that the smallest quantity of waste is generated during the construction of the HTL, and that the aforementioned waste is properly collected, stocked and disposed of in a way that does not lead to the emission of gases, liquids or solids that may represent significant impacts on the environment.” Measures to encourage collection of waste and recycling are in place.</p> <p>The project team has stated that at least 75% of all waste related to the project will be diverted from landfills.</p> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Envision Manual, Page 94</li> <li>- Plano Ambiental da Construção (PAC) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN). Page 67</li> <li>- Estudo de Impacto Ambiental (EIA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) Chapter 3.4.4.14.11.1 - Construção e Montagem da LT .Page 105</li> <li>- Estudo de Impacto Ambiental (EIA) -HTL Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) - Reaterro - Page 132</li> <li>- Hoja de Presentación de Datos - Page 26</li> </ul>	<p>Provide more accurate data and evidence regarding percentages of total waste reduction, and percentage of materials diverted from landfills through recycling or reuse. Calculations may be done by weight or volume but must remain consistent.</p>
<p><b>RA1.6 Reduce Excavated Materials Taken Off Site</b></p>	<p>2</p>	<p><b>Improved</b></p> <p>The EIA for Lot B states that: “(...) Material excavated in order to build foundations for the structures will be used primarily as filling material, nearby the towers. (...) It is worth highlighting that considering the methodologies currently in place for this type of project, the creation of dumping or excavation sites will not be required.” Material unsuitable for filling will be disposed of in licensed landfills.</p> <p>The project team has asserted that at least 40% of all excavated material will be beneficially reused on site.</p> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Envision Manual, Page 196.</li> <li>- Estudo de Impacto Ambiental (EIA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) Chapter 3.4.4.14.11.1 - Construção e Montagem da LT .Page 105</li> <li>- Estudo de Impacto Ambiental (EIA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) - Reaterro - Page 132</li> <li>- Hoja de Presentación de Datos - Page 27</li> </ul>	<p>Provide evidence and more accurate estimations of the excavated material removed from or reused on the site.</p>

<p><b>RA1.7 Provide for Deconstructi on &amp; Recycling</b></p>	<p>0</p>	<p><b>No Score</b></p> <p>After analyzing all documents submitted, no evidence has been found that the developers assessed the potential of materials or parts of the HTL to be reused or recycled beyond the end of the project’s lifespan.</p> <p><u>Sources:</u> - Envision Manual, Page 98.</p>	<p>Plans and arrangements need to be made to identify, keep track of and communicate at the appropriate time the components and prefabricated units that have been designed for disassembly and/or deconstruction.</p>
<p><b>RA2.1 Reduce Energy Consumptio n</b></p>	<p>0</p>	<p><b>No Score</b></p> <p>The project team has self-assessed this credit as non-applicable likely due to the nature of this infrastructure as a device for energy transmission rather than a source of energy consumption.</p> <p>However, considering the broader perspective, operation and maintenance of the project during its lifespan will, necessarily, demand energy. For instance, the trucks involved with maintenance, repairs and replacement parts will run on fossil fuels. In order to build strategies for reducing energy consumption, the first step is to “calculate the anticipated operation and maintenance energy consumption on an annual basis for the life of the project.”</p> <p>After analyzing all documents submitted, no evidence has been found that such an evaluation of yearly energy consumption has been done.</p> <p><u>Sources:</u> - Envision Manual, Page 100.</p>	<p>The project team should take a “whole systems design” approach when considering options for reducing energy consumption. The team should not only look for obvious single energy and emissions savings, but should also consider what multiple benefits might be achieved from a single investment. All energy sources should be converted into BTU.</p>
<p><b>RA2.2 Use Renewable Energy</b></p>	<p>0</p>	<p><b>No Score</b></p> <p>Documentation submitted by the developers proves that this project will contribute significantly to the use of renewable energy and the replacement of thermal generating units running on fossil fuels. However, this credit is concerned with efforts to use renewable energy sources for operational demands. No information was found regarding the percentage of the project’s energy needs that is met through use of renewable energy sources.</p> <p><u>Sources:</u> - Envision Manual, Page 102. - Estudo de Impacto Ambiental (EIA) -HTL Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). Page 80</p>	<p>Provide documentation of the annual percentage of renewable energy used to meet operational energy needs.</p>
<p><b>RA 2.3 Commission &amp; Monitor Energy Systems</b></p>	<p>0</p>	<p><b>No Score</b></p> <p>Long-term monitoring developed by independent authorities or third parties can help significantly improve the performance of energy systems. The project team has stated that Brazilian regulatory institutions will be in charge of project monitoring.</p> <p>Projects such as the Tucuruí-Xingú-Jurupari HTL and the Jurupari, Laranjal, Macapa HTL will be part of the Brazilian National Interconnected System (Sistema Interligado Nacional). The operation of the lines will be monitored on a long-term basis, by the institutions established in the legal framework of the New Model for the Electric Sector (Novo Modelo do Setor Elétrico - Brazilian Federal Laws Nº 10.847/2004 e Nº 10.848/2004).</p> <p>The two main governmental institutions involved in long-term monitoring are the National Agency of Electrical Energy (Agência Nacional de Energia Elétrica - ANEEL), and the Chamber of Commerce for Electrical Energy (Câmara de Comercialização de Energia Elétrica - CCEE). The CCEE website states that: “(...) regarding operations, one of the main activities at CCEE is accounting for buying and selling of operations, assessing monthly differences between quantities of electricity that were acquired and the amounts effectively generated and consumed by agents in the market. To do so, [CCEE] keeps records of the contracts signed between buyers and sellers, and measures the physical</p>	<p>The project team could assess the feasibility of engaging in an independent commissioning of the project, to monitor the efficiency of energy systems.</p>

		<p>amounts of energy that are moved by the agents.” Based on the aforementioned information we reach the conclusion that mandatory long-term monitoring is in place, following the guidelines of the Brazilian legal framework for the electricity sector. However, the focus of this monitoring system is to keep track of the quantities of energy that are produced, bought, sold and consumed. The monitoring system does not assess the efficiency of the project’s energy systems. Therefore, no evidence has been found that a monitoring process, focused on the efficiency of the project’s energy systems, is in place.</p> <p><u>Sources:</u> - Envision Manual, Page 104. - Estudo de Impacto Ambiental (EIA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN) - Chapter 3.4.1.2 - Principais Agentes do Setor Elétrico Brasileiro. Page 9 - CCEE website: <a href="http://www.ccee.org.br/portal/faces/pages_publico/o-que-fazemos?_afLoop=1049341239486000#%40%3F_afLoop%3D1049341239486000%26_adf.ctrl-state%3Dpmaazlb0l_46">http://www.ccee.org.br/portal/faces/pages_publico/o-que-fazemos?_afLoop=1049341239486000#%40%3F_afLoop%3D1049341239486000%26_adf.ctrl-state%3Dpmaazlb0l_46</a> - Hoja de Presentación de Datos - Pages 30, 31.</p>	
<b>RA3.1 Protect Fresh Water Availability</b>	<b>2</b>	<p><b>Improved</b></p> <p>Projects such as the Tucuruí-Xingú-Jurupari HTL and the Jurupari, Laranjal, Macapa HTL do not consume water, other than during the construction process. Furthermore, construction processes can also affect water quality, and this has been explicitly recognized by the project team. The Basic Environmental Project for lot A includes a Program for Monitoring Water Quality (P10). Program 10 states that: “water quality will be assessed prior to construction, and will be monitored during execution of the project. Any alterations will be quickly identified.”</p> <p>The Environmental Construction Plan (Plano Ambiental de Construção - PAC) developed for lot A describes several aspects that must be considered to avoid negative impacts to water quality, including: stock fuels and oils according to Brazilian regulations, properly handle and store hazardous substances such as paints and solvents, and create isolated areas for concrete mixing. As a result of these measures, a net neutral impact is expected.</p> <p><u>Sources:</u> - Envision Manual, Page 106. - Projeto Básico Ambiental (PBA) – LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) P10 - Programa de Monitoramento da Qualidade da Água. Page 171 - Plano Ambiental de Construção (PAC) – LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). Page 45 - Hoja de Presentación de Datos - Pages 31, 32.</p>	The project team could consider a more comprehensive assessment of long-term needs or possible impacts related to the maintenance of the HTL or substations.
<b>RA3.2 Reduce Potable Water Consumption</b>	<b>0</b>	<p><b>No Score</b></p> <p>No information has been provided regarding water sources used during the construction process. Furthermore, no evidence was found regarding measures to reduce potable water consumption during the construction phase.</p> <p><u>Sources:</u> - Envision Manual, Page 108. - Projeto Básico Ambiental (PBA) P.10 – LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) P10 - Programa de Monitoramento da Qualidade da Água. Page 171 - Hoja de Presentación de Datos - Page 32.</p>	The project team could assess strategies such as recycling gray water for construction purposes.

<b>RA3.3 Monitor Water Systems</b>	<b>1</b>	<b>Improved</b>	Increasing extent and comprehensiveness of long term monitoring activities.
		<p>Projects such as the Tucuruí-Xingú-Jurupari HTL and the Jurupari, Laranjal, Macapa HTL do not consume water, other than during the construction process. Furthermore, construction processes can also affect water quality, and this has been explicitly recognized by the project team. The Basic Environmental Project for lot A includes a Program for Monitoring Water Quality (P10). Program 10 states that: “water quality will be assessed prior to construction, and will be monitored during execution of the project. Any alterations will be quickly identified.</p> <p><u>Sources:</u>                      - Envision Manual, Page 110.                      - Projeto Básico Ambiental (PBA) P.10 – LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN) P10 - Programa de Monitoramento da Qualidade da Água. Page 171                      - Hoja de Presentación de Datos - Page 33.</p>	
<b>RA0.0 Innovate Or Exceed Credit Requirements</b>	<b>0</b>	N/A	
			<b>27</b>

<b>NATURAL WORLD</b>			
	<b>AMAZON HIGH TENSION LINES- BRAZIL</b>		<b>RECOMMENDATIONS</b>
<b>NW1.1 Preserve Prime Habitat</b>	<b>0</b>	<b>No Score</b>	<p>In order to mitigate impacts related to the construction of the lines, compensatory planting of trees and adequate monitoring must be implemented, following the terms of the environmental licenses.</p>
		<p>Significant efforts were developed by the project team to minimize the impact of the HTL on the environment. The path of the High Tension Line (HTL) was modified from the original design developed by the National Agency of Electrical Energy (Agência Nacional de Energia Elétrica - ANEEL) for the bid terms. A program for the environmental improvement of the project was implemented.</p> <p>The modification of the HTL path was made with the goal of reducing environmental impacts and prioritizing areas already altered by human settlements. Proximity to existing highways such as the BR230 (Trans Amazonian) was considered a desirable condition. Furthermore, the modification of the HTL path also allowed a reduction in forest disruption. Notwithstanding these efforts, several areas of high ecological and ethnological value were affected, such as the Extractivista Verde Para Sempre, and the Extractivista Reserve Rio Cajari. An extractivist reserve is a specific type of conservation unit, oriented towards sustainable use, (EIA page 181) that is part of the Brazilian National System of Conservation units (Sistema Nacional de Unidades de Conservação - SNUC).</p> <p>The Extractivist Reserve (Reserva Extrativista - RESEX) Verde Para Sempre is affected by the Tucuruí, Xingú, Jurupari HTL (lot A), while the RESEX Rio Cajari is affected by the 230 KV Jurupari – Laranjal - Macapá HTL (part of the lot B). Both RESEX are managed by the Chico Mendes Institute for Biodiversity Conservation (Instituto Chico Mendes de conservação da Biodiversidade - ICMBio).</p> <p>The Tucuruí, Xingú, Jurupari HTL will also have an indirect impact on the Trocará Native Land (Terra Indígena - TI - Trocará). At its closest point, the HTL will be only 4.5 kilometers south of the TI limits.</p> <p>It is worth mentioning that compensation, restoration and mitigation measures are properly established within the environmental license and the program for</p>	

		<p>the recovery of degraded areas (Programa de Recuperação de áreas degradadas - PRAD).</p> <p><u>Sources:</u>                      - Envision Manual, Page 118.                      - Licença de Operação No. 1162/2013. - LT Tucuruí - Xingu - Jurupari. Page 3.                      - Grupo Isolux Corsán - As concessões do sistema Tucuruí - Macapá - Manaus. Pages 10, 11, 12, 19,23                      - Estudo de impacto Ambiental (EIA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). 3.5.1.3 Comparação Ambiental das Alternativas de Corredor - Page 172                      - Programa de Otimização Ambiental do Projeto Executivo - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN).</p>	
<b>NW1.2 Preserve Wetlands and Surface Water</b>	<b>0</b>	<p><b>No Score</b></p> <p>Significant efforts were developed by the project team to minimize the impact of the HTL on the environment. The path of the High Tension Line (HTL) was modified from the original design developed by the National Agency of Electrical Energy (Agência Nacional de Energia Elétrica - ANEEL) for the bid terms. A program for the environmental improvement of the project was implemented.</p> <p>Notwithstanding these efforts, several points of the HTL's path include towers built in buffer zones established by Brazilian legislation (APP - Areas de proteção Permanente), lowlands and flooded areas. Specific procedures were established (ICA 05 Controle Ambiental Para Obras em áreas Alagadas, Environmental Control for works in flooded areas) to regulate construction tasks in these sensitive locations.</p> <p>It is worth mentioning that compensation, restoration and mitigation measures are properly established within the environmental license and the program for the recovery of degraded areas (Programa de Recuperação de áreas degradadas - PRAD).</p> <p><u>Sources:</u>                      - Envision Manual, Page 120.                      - Hoja de Presentación de Datos - Page 41.                      - Plano Ambiental para a Construção (PAC) - LXTE. (Lot A granted to ISOLUX CORSAN). Page 44                      - Plano Ambiental para a Construção (PAC) - LMTE. (Lot B granted to ISOLUX CORSAN). Page 15</p>	<p>Monitor correct deployment of measures contemplated in the PRAD</p>
<b>NW1.3</b>	<b>12</b>	<b>Conserving</b>	



<p><b>Preserve Prime Farmland</b></p>	<p>Prime Farmland is a designation established by the Soil Conservation Service, part of the United States Department of Agriculture (USDA-SCS). Prime Farmland “ is land which has the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed, including water management, according to current farming methods.”</p> <p>Presently, Brazil has no equivalent designation within its environmental or agricultural frameworks. Regardless, none of the areas affected by the project have been described as highly relevant for agricultural purposes in any document presented by the developers.</p> <p>A detailed analysis of agricultural suitability is included in the EIA developed for lot B, following a methodology established by the Brazilian Company for Agricultural and Livestock Research (Empresa Brasileira de Pesquisa Agropecuária - EMBRAPA). The results of the analysis are: a) 53.4% of the analyzed soils were considered to be of regular or fair productivity for agricultural purposes., b) 20.2% were considered to be of regular productivity for natural livestock breeding, c) 17.5% were considered to be adequate for artificial pastures and d) 8.9% were considered unsuitable for agricultural purposes.</p> <p>Based on this evidence, it can be concluded that no development took place on prime agricultural land. Thus, this credit has been assessed as conserving.</p> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Definition of Prime Farmland available at: <a href="http://soils.usda.gov/technical/handbook/contents/part622.html">http://soils.usda.gov/technical/handbook/contents/part622.html</a></li> <li>- Envision Manual, Page 122.</li> <li>- Estudo de Impacto Ambiental (EIA) - LT 230 KV JURUPARI – LARANJAL – MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ. 3.6.3.6.2.3 - Classes de Aptidão Agrícola das Terras - Aptidão Agrícola das Terras. Page 127</li> </ul>	
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<p><b>NW1.4 Avoid Adverse Geology</b></p>	<p><b>Superior</b></p> <p>Based on the documents provided by the project team, it is clear that a comprehensive effort was undertaken to delineate the route of the project. The path of the High Tension Line (HTL) was modified from the original design developed by the National Agency of Electrical Energy (Agência Nacional de Energia Elétrica - ANEEL) for the bid terms. As previously mentioned, aspects that were considered to define the path of the HTL included proximity to existing highways or HTLs, and preference for areas already transformed by man-made activities. These considerations aimed to reduce the impact of the HTL on forests and environmental preservation areas. These adjustments were made in a program for the environmental improvement of the project (Otimização Ambiental do Projeto).</p> <p>Subsequently, Geological, geomorphological, seismic and geotechnical studies were developed as part of the EIA, in order to ensure that adverse geology was avoided. Karstic areas were surveyed “(...) aiming to find speleological cavities (...) the surveys were done in a band of 2 km along each side of the HTL axis” (EIA meio físico, page 71). Cavities already found and mapped in the area are 50 km away from the HTL axis (...) Along the path there are places where traces of the Monte Alegre formation are found (...) [but] in this location speleological formations that indicate subterranean caves were not found” (EIA meio físico page 72).</p> <p>Regarding seismic activity, the closest recorded event took place in Santarém (approximately 60 km south of the HTL, near Manaus). This event “ (...) had a magnitude of 3.5 MM on the Richter scale. According to this scale, events between 3.0 and 3.9 MM are described as small (...) Usually only seismographs record events on this level” (EIA meio físico page 81). “From the information available, it can be concluded that seismicity in the analyzed area is not relevant for civil engineering projects (hydroelectric dams, thermoelectric, pipelines, transmission lines, etc.” (EIA meio físico page 82). Further studies indicated that “ (...) the shapes of the relief that can be found in most of the project’s area of indirect influence are considered to be stable from a geomorphological standpoint.”</p>	<p>Provide more information on strategies used to avoid damage to sensitive geology or damage from adverse geology, as shown in operating plans and monitoring plans.</p>
	<p><b>3</b></p> <p><u>Sources:</u>          - Envision Manual, page 124.          - Otimização Ambiental do Projeto Executivo.          - Estudo de Impacto Ambiental - EIA - LT 230 KV JURUPARI – LARANJAL – MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to Isolux Corsán). - Chapter 3.6.3.2. Geologia. Page 29; - Chapter 3.6.3.5. Geomorfologia Page 78; Geotecnia, Page 91.</p>	

<p><b>NW1.5 Preserve Floodplain Functions</b></p>	<p>5</p>	<p><b>Enhanced</b></p> <p>The project will not create major impervious surfaces, and will not have a significant impact on water infiltration. A Program for the Recovery of Degraded Areas (Programa de Recuperação de Áreas Degradadas - PRAD) is being implemented, with the intention of recovering all areas affected by the project, including floodplains.</p> <p>The project has taken into consideration habitat connectivity. Furthermore, a Program for Prevention, Monitoring and Control of Erosive Processes (Programa de prevenção, monitoramento e controle de Processos Erosivos), is in place. Based on the information provided, it can be concluded that infiltration and water quality will be maintained.</p> <p><u>Sources:</u> Envision Manual, Page 128. Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de desativação de obra e recuperação de áreas degradadas. Page 177. Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de prevenção, monitoramento e controle de processos erosivos. Page 167</p>	<p>In order to improve performance on this credit, the project team could provide estimates of pre-development floodplain infiltration capacity and estimates of post-development floodplain infiltration capacity.</p>
<p><b>NW1.6 Avoid Unsuitable Development on Steep Slopes</b></p>	<p>4</p>	<p><b>Superior</b></p> <p>The EIA developed for Lot B states that “(...) the path of the analyzed HTL goes through hills with reduced slopes. Analyzing the map of hillside slopes (...) it is possible to see that the path of the HTL extends for long distances without crossing slopes greater than 15%. (...) Such slopes have very low risk conditions for erosive processes and landslides.”</p> <p>However, measures to recover vegetation and monitor erosion must be developed. A Program for the Recovery of Degraded Areas (Programa de Recuperação de Áreas Degradadas - PRAD) is being implemented, along with a Program for Prevention, Monitoring and Control of Erosive Processes (Programa de prevenção, monitoramento e controle de Processos Erosivos).</p> <p><u>Sources:</u> - Envision Manual, Page 128. - Estudo de Impacto Ambiental -EIA- LT Jurupari-Laranjal-Macapá e LT Jurupari-Oriximiná. (Lot B granted to ISOLUX CORSAN) - Chapter 3.6.3.5.1.7 Declividade de encostas. Page 90.</p>	<p>Besides the avoidance of steep slopes, the project team should follow best management practices to minimize erosion and prevent landslides.</p>
<p><b>NW1.7 Preserve Greenfields</b></p>	<p>10</p>	<p><b>Superior</b></p> <p>The project team has developed significant efforts to preserve greenfields. The path of the High Tension Line (HTL) was modified from the original design developed by the National Agency of Electrical Energy (Agência Nacional de Energia Elétrica - ANEEL) for the bid terms. A program for the environmental improvement of the project was implemented</p> <p>The modification to the HTL path was made with the goal of reducing environmental impacts, and prioritizing areas already modified or altered by human settlements. Proximity to existing highways such as the BR230 (Trans Amazonian) was considered a desirable condition. Furthermore, the modification of the HTL path also allowed a reduction in forest disruption. The Authority for Vegetation Suppression (Autorização para supressão de vegetação) has established narrow easement areas, thus reducing impacts. These easement areas are 7 meters within mature forests, 5 meters within areas of permanent protection, and 3 meters within areas of cerrado (savanna). The same authorization also determines the need for compensatory plantings using protected species, and the obligation for monitoring the growth of trees for a period of three years.</p>	<p>Provide more detailed information about the conditions of the greyfields that are used for the deployment of the project. Evidence of the use of brownfields provides a chance to improve performance.</p>

		<p>The project team has assessed that at least 50% of the project will be implemented within previously developed areas.</p> <p><u>Sources:</u>                      - Envision Manual, Page 130.                      - Autorização de Supressão de Vegetação No. 480/2010 (LMTE - Lot B) .                      - Hoja de Presentación de Datos - Page 41.                      - Estudo de impacto Ambiental (EIA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). 3.5.1.3 Comparação Ambiental das Alternativas de Corredor - Page 172</p>	
<p><b>NW2.1 Manage Stormwater</b></p>	<p><b>9</b></p>	<p><b>Superior</b></p> <p>Significant efforts have been put in place by project developers to manage stormwater and reduce the generation of stormwater runoff. A Program for the Recovery of Degraded Areas (Programa de Recuperação de Áreas Degradadas - PRAD) and a Program to Prevent, Monitor and Control Erosive Processes (Programa de prevenção, monitoramento e controle de processos erosivos) are in place. A key aspect of both these programs is the process to restore vegetative cover using native species, thus preserving conditions of infiltration and evapotranspiration.</p>	<p>In order to improve performance on this credit, the project team could assess strategies to increase storage capacity in greenfields, greyfields or brownfields in the adjacencies of the HTL.</p>
		<p>Permanent impervious surfaces created by the project are negligible. It is expected post-development stormwater runoff conditions will be equal to pre-development conditions.</p>	
		<p><u>Sources:</u>                      Envision Manual, 132.                      Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de desativação de obra e recuperação de áreas degradadas. Page 177.                      Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de prevenção, monitoramento e controle de processos erosivos. Page 167                      Licença de Operação (LO) . No. 1161-2013 (LMTE - Lot B). Page 2</p>	
<p><b>NW2.2 Reduce Pesticides and Fertilizer Impacts</b></p>	<p><b>0</b></p>	<p><b>No Score</b></p> <p>At this point, no evidence has been found regarding operational policies or programs designed to control the application of pesticides and fertilizers.</p>	<p>Project developers should present evidence of policies or procedures for pesticides and fertilizers.</p>
		<p><u>Sources:</u>                      Envision Manual, page 134.                      Hoja de Presentación de Datos - Page 42, 43.</p>	
<p><b>NW2.3 Prevent Surface and Groundwater Contaminatio n</b></p>	<p><b>1</b></p>	<p><b>Improved</b></p> <p>In the case of the Tucuruí-Xingú-Jurupari and the Jurupari-Laranjal-Macapá HTLs, spill prevention is achieved by spill and leak diversion systems, spill prevention and cleanup plans. A Subprogram for the Management of Solid Waste, Effluents and Atmospheric Emissions (Subprograma de Gestão de Resíduos Sólidos, Efluentes, e Emissões Atmosféricas) is in place.</p>	<p>Designers should assess ways to recycle potentially polluting substances, keeping them within the operation or sending them off-site for use in other applications.</p>
		<p>The subprogram contains clear guidelines to manage all categories of waste that will be produced during the construction phase, including those that could be potentially harmful to water, such as: oil from vehicles, cooking oil, hydraulic fluids, paint and solvents, and residues from the production of concrete. All temporary structures were also properly provided with sanitary facilities, including sewer and septic tanks.</p>	

	<p><u>Sources:</u>          - Envision Manual, page 136.          - Plano Ambiental da Construção - PAC. LMTE: 3.2.9 - Subprograma de Gestão de Resíduos Sólidos, Efluentes, e Emissões Atmosféricas. Page 66.          - Plano Ambiental da Construção - PAC. LMTE: 3.2.7.1 - Requisitos Básicos para a Construção da LT 230 kV Jurupari – Laranjal – Macapá e LT 500 kV Jurupari – Oriximiná. Page 34.</p>	
<p><b>NW3.1          Preserve          Species          Biodiversity</b></p>	<p><b>Improved</b></p> <p>The project team has worked through the extensive licensing process with several public entities at the federal, state and local levels in order to identify existing areas of special habitat relevance along the path of the HTL. As previously explained, this process is being developed under the supervision of the Brazilian Institute for the Environment (Instituto Brasileiro do Meio Ambiente - IBAMA).</p> <p>The path of the High Tension Line (HTL) was modified from the original design developed by the National Agency of Electrical Energy (Agência Nacional de Energia Elétrica - ANEEL) for the bid terms. Also, a program for the environmental improvement of the project was implemented. The modification was made with the goal of reducing environmental impacts, and prioritizing areas already modified or altered by human settlements. Proximity to existing highways such as the BR230 (Trans Amazonian) was considered a desirable condition. Furthermore, the modification of the HTL path also allowed a reduction in forest disruption.</p> <p>Notwithstanding these efforts, several areas of high ecological value were affected, such as the Extractivista Verde Para Sempre, and the Extractivist Reserve Rio Cajari. An extractivist reserve is a specific type of conservation unit, oriented towards sustainable use, (EIA page 181) part of the Brazilian National System of Conservation units (Sistema Nacional de Unidades de Conservação - SNUC). Both RESEX are managed by the Chico Mendes Institute for Biodiversity Conservation (Instituto Chico Mendes de conservação da Biodiversidade - ICMBio). The Extractivist Reserve (Reserva Extrativista - RESEX) Verde Para Sempre is affected by the Tucuruí, Xingu, Jurupari HTL (lot A), whilst the RESEX Rio Cajari is affected by the 230 KV Jurupari – Laranjal - Macapá HTL (part of the lot B).</p> <p>It is worth mentioning that compensation measures are properly established in the environmental license and in the Program for the Recovery of Degraded Areas (Programa de Recuperação de áreas degradadas - PRAD). Based on information available at this point, it can be concluded that net habitat quality will be maintained.</p> <p><u>Sources:</u>          - Licença de Operação No. 1162/2013. - LT Tucuruí - Xingu - Jurupari. Page 3.          - Grupo Isolux Corsán - As concessões do sistema Tucuruí - Macapá - Manaus. Pages 10, 11, 12, 19,23          - Estudo de impacto Ambiental (EIA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). 3.5.1.3 Comparação Ambiental das Alternativas de Corredor - Page 172          - Programa de Otimização Ambiental do Projeto Executivo - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN).</p>	<p>Efforts should be made to reinstate appropriate vegetation as part of the compensation measures. This is a clear opportunity to improve and expand wildlife corridors, and link existing habitats.</p>

<p><b>NW 3.2 Control Invasive Species</b></p>	<p><b>Superior</b></p> <p>All documents submitted by the project team, including the environmental licences and authorizations issued by the Brazilian Institute for the Environment (Instituto Brasileiro do Meio Ambiente - IBAMA), state that only appropriate native species will be used in the project.</p> <p>For the compensatory planting program, the replanting of trees must be at a proportion of 10:1 for Lot B and 25:1 for Lot A. Local species on the list of endangered species, such as the chestnut tree (castanheira), must be used in the compensatory planting program. A total of approximately 415 hectares of native species will be planted as compensation, following the terms of the environmental licenses. It has been properly documented that the project team has worked with government agencies to identify and use only locally appropriate plants.</p> <p><u>Sources:</u>          - Envision Manual, Page 140.          - Autorização de Supressão de Vegetação No. 480/2010 (LMTE - Lot B) .          - Autorização de Supressão de Vegetação No. 495/2010 (LXTE - Lot A) .          - Licença de Operação (LO) . No. 1161-2013 (LMTE - Lot B).          - Licença de Operação (LO) . No. 1162-2013 (LXTE - Lot A).</p>	<p>The project team could assess the need for developing measures oriented towards the control or progressive elimination of invasive species, if required.</p>
<p><b>NW3.3 Restore Disturbed Soils</b></p>	<p><b>Conserving</b></p> <p>A number of efforts have been implemented to restore disturbed soils. A Program for the Recovery of Degraded Areas (Programa de Recuperação de Áreas Degradadas - PRAD) and a Program to Control and Monitor Erosive Processes (Programa de Controle e Monitoramento de Processos Erosivos) are in place.</p> <p>The PRAD developed for Lot A states that: “The restoration of impacted areas after the conclusion of construction is mandatory and of great relevance. Such restoration prevents erosive processes, allows for previous or alternative land uses to return, and avoids pollutants that (...) may affect the environment. (...) After the end of the construction phase (...) all tasks related to the de-activation of temporary structures and the restoration of degraded soils will be executed. These tasks are highly relevant and must be finished prior to energization of the line (...) The developer will specify in all contracts with construction companies that final acceptance of the works will only take place after the conclusion of all de-activation [and restoration] procedures”</p> <p>After analyzing the documents presented (including the License issued by IBAMA), it is clear that all soils disturbed as a result of the project will be restored.</p> <p><u>Sources:</u>          Envision Manual, Page 142          Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de desativação de obra e recuperação de áreas degradadas. Page 177          Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de prevenção, monitoramento e controle de processos erosivos.. Page 167          Licença de Operação (LO) . No. 1161-2013 (LMTE - Lot B). Page 2</p>	<p>Soils must be reused for functions comparable to their original function (i.e., topsoil is used as topsoil, subsoil as subsoil, or subsoil is amended to become functional topsoil).</p>

<p><b>NW3.4</b>  <b>Maintain wetland and surface water functions.</b></p>	<p><b>9</b></p>	<p><b>Superior</b></p> <p>With respect to wetlands and surface waters, the project team has developed detailed guidelines to conduct and regulate construction works and procedures in these locations.</p> <p>The guidelines are described in several documents provided by the company and are detailed in the Basic Environmental Projects (Projeto Básico Ambiental, PBA) document developed for the two large sections that this project comprises, which are: the Tucuruí, Xingú, Jurupari HTL (Lot A), and Jurupari, Laranjal, Macapá - Jurupari, Oriximiná (Lot B).</p> <p>These plans include procedures and measures to avoid to the greatest extent possible harmful impacts on wetlands and surface waters. To the extent water or wetland areas are altered, restoration procedures are specified.</p> <p>Based on the documents presented, we conclude that three ecosystem functions will be enhanced or maintained: hydrologic connections, water quality and sediment transport. As for habitat function, all measures for compensation and restoration are properly described in the Program for the Recovery of Degraded Areas (Programa de Recuperação de Áreas Degradadas - PRAD) and in the Environmental Licenses. However, long-term monitoring will be required to properly assess impacts to habitats over time.</p> <p><u>Sources:</u>                      - Projeto Básico Ambiental (PBA) - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN). P.11 – Programa de desativação de obra e recuperação de áreas degradadas. Page 177.                      - Envision Manual, Page 144.                      - Licença de Operação No. 1162/2013. - LT Tucuruí - Xingu - Jurupari. Page 3.                      - Projeto Básico Ambiental (PBA) - LT Jurupari, Laranjal, Macapá - Jurupari, Oriximiná (Lot B).</p>	<p>The project team should provide more information regarding new strategies for restoring and maintaining habitat functions, including the results of long-term monitoring of fauna.</p>
	<p><b>0</b></p>	<p>N/A</p>	
<p><b>68</b></p>			

CLIMATE AND RISK		
	AMAZON HIGH TENSION LINES- BRAZIL	RECOMMENDATIONS
CR1.1 Reduce Greenhouse Gas Emissions	<p><b>Restorative</b></p> <p>Documentation provided by the project developers indicates that the Tucuruí-Xingú-Jurupari and the Jurupari-Laranjal-Macapá HTLs will contribute significantly to reducing greenhouse gas emissions, and that a net negative carbon balance will be achieved in the following years. Currently, electricity in Amapá and Manaus is produced by means of thermal power stations that run on fossil fuels.</p> <p>The EIA for the Tucuruí-Xingú-Jurupari HTL states that: “If the isolated system of the Amazonia is not modified, the assessment is that in the following 10 years, 23.5 billion liters of light oil and 4.2 million tons of heavy oil will be used just for the systems attended by Eletronorte.” Eletronorte is the company that provides energy to all the states of the Amazonia Legal Region. The connection of the Tucuruí-Macapá-Manaus system will result in a positive impact for 58% of all the isolated energy systems in the Amazonia Legal Region.</p> <p>The EIA for Lot B also presents an evaluation of reduction of GHGs associated with the project, asserting that: “For the segment Tucuruí - Macapá, a reduction of nearly 205,227 tons of CO2 per year is expected after the decommissioning of the Thermoelectric plant of Santana. However, since CO2 will be released by the suppression of forest during construction (...) only after the fifth year of operations of the LT (2016) will [a net negative] be achieved.” For the segment Jurupari Manaus, the same report states that a net negative balance will be achieved in the present year, 2013. The connectivity of the segment Jurupari Manaus is expected to result in a reduction on the order of 1,055,685 tons of CO2 per year. Considering both segments (Tucuruí Macapá and Jurupari Manaus), a reduction on the order of 1,432,908 tons of CO2 per year is expected to take place starting in 2016. At that point, the implementation of a Clean Development Mechanism projects will be possible.</p> <p>These assessments on the reduction of GHG emissions were made following the methodology outlined by the Intergovernmental Panel on Climate Change (IPCC).</p>	
	25	



<p><b>CR1.2 Reduce Air Pollutant Emissions</b></p>	<p><b>12</b></p>	<p><b>Conserving</b></p> <p>The High Tension Lines of the Tucuruí-Manaus-Macapá system will contribute to reducing emissions of air pollutants on a regional scale. Since emissions of all criteria pollutants - with the exception of lead - are related to the consumption of gasoline, it can be concluded that this project will significantly reduce emission levels of Ozone, Carbon Monoxide, Sulfur Oxides, particulate matter and noxious odors. However, local impacts during the construction phase related to the suppression of forest and fabrication processes (for instance, the concrete plant - See the reports on Air quality - Relatórios de qualidade do Ar), cannot be overlooked.</p> <p>In overall terms, negative impacts in terms of air pollutant emissions associated with this project are expected to be negligible.</p> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Estudo de Impacto Ambiental.(E.I.A) LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Jurupari, Oriximiná - p. 42, 43. (Lot B granted to ISOLUX CORSAN).</li> <li>- Estudo de Impacto Ambiental (E.I.A.), LT500 Kv Tucuruí, Xingú, Jurupari. - Redução de emissões de Gases Estufa - Pages 83-85. (Lot A granted to ISOLUX CORSAN)</li> <li>- Relatório De Monitoramento da Qualidade Do Ar, 1, 2, e 3.</li> <li>- Envision Manual, Page 154.</li> </ul>	<p>The project team could consider the following reference as a standard for air quality: US National Ambient Air Quality Standards (NAAQS), set by the Environmental Protection Agency, under the Clean Air Act.</p>
<p><b>CR2.1 Assess Climate Threat</b></p>	<p><b>0</b></p>	<p><b>No Score</b></p> <p>For the purposes of this credit, the assessment of climate threat refers to “a comprehensive climate impact assessment and adaptation plan [already] developed.” This study should include a vulnerability assessment, a risk assessment, and an adaptation assessment.</p> <p>The documents provided do not indicate whether a climate impact assessment and adaptation plan has been developed. However, it is important to note that even when a project does not produce GHG emissions, it is still exposed to risks associated with climate change.</p> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Resumen de Documentos de la LT Amazonas.</li> <li>- PREMIOS INFRAESTRUCTURA 360° - HOJA DE PRESENTACIÓN DE DATOS, Page 51</li> <li>- Envision Manual, page 156</li> </ul>	<p>An assessment on climate threat impacts exceed current obligations under the extensive Brazilian environmental legislation. However, to foster efforts in this direction is specially relevant in the context of climate change, and in relationship with relevant infrastructures of long lifespan as in the of the HTL of the system Tucuruí-Manaus-Amapá. A plan has such as this, should meet the following requirements:</p> <ul style="list-style-type: none"> <li>- Calculates or locates expected changes in flood elevations,</li> <li>- develop inventories of structures in the areas of possible inundation that are important to successful operation of proposed project,</li> <li>- Plans for proposed project to address expected changes in inundation, including the adaptation required because of the impact on other critical existing infrastructure in the area.</li> </ul>

<p><b>CR2.2 Avoid Traps And Vulnerabilities</b></p>	<p>0</p>	<p><b>No Score</b></p> <p>The documents and answers provided by the project team do not prove that efforts to avoid possible vulnerabilities related with climate change were considered by the project designers.</p> <hr/> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- PREMIOS INFRAESTRUCTURA 360° - HOJA DE PRESENTACIÓN DE DATOS, Page 51,52.</li> <li>- Envision Manual, Page 158</li> </ul>	<p>Designers should assess the effect of the project on the community infrastructure as a whole. Considerations could include the assessment of possible vulnerabilities such as:</p> <ul style="list-style-type: none"> <li>- Configuration traps: infrastructure projects that create configurations highly vulnerable to extreme weather events and natural disasters, or:</li> <li>- Standards traps: infrastructure projects delivered according to design standards and methodologies that are not in alignment with changing environmental or operating conditions.</li> </ul>
<p><b>CR2.3 Prepare For Long-Term Adaptability</b></p>	<p>0</p>	<p><b>No Score</b></p> <p>The documents provided by the project team do not indicate whether initiatives regarding long-term adaptability vis à vis the effects of climate change were considered. It is worth noting that even when a project does not produce GHG emissions, it is still exposed to risks associated with climate change.</p> <hr/> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Envision Manual, Page 160.</li> <li>- PREMIOS INFRAESTRUCTURA 360° - HOJA DE PRESENTACIÓN DE DATOS, Page 52, 53.</li> </ul>	<p>Analyze possible strategies to deal with long term changes. Such strategies may include: Structural changes, which expand the range of conditions in which the system can function or develop adaptive capabilities – including ways for the system to “learn” or change over time to be more prepared to deal with altered weather conditions.</p>
<p><b>CR2.4 Prepare For Short-Term Hazards</b></p>	<p>3</p>	<p><b>Improved</b></p> <p>Several documents were provided by the project team in order to prove that efforts are in place to combat natural and man-made hazards within the project area. Potential hazards include fires related to agriculture - especially sugarcane crops and animal husbandry - which are fairly common in the region. “Fires (...) have been one of the main causes of disconnection of HTL’s, causing detriment to both the environment and energy companies. (...) The presence of smut originated in fires modifies dielectric air conditions increasing the risk of electrical discharges, thus creating hazards for people within the easement area.” Another possible source of risks is caused by habitation within the easement areas and the use of explosives in mining activities nearby the HTL. The plans and procedures presented by project developers will be implemented during the entire concession period of 30 years.</p> <hr/> <p><u>Sources:</u></p> <ul style="list-style-type: none"> <li>- Plano de Ação de Emergência.</li> <li>- Procedimiento de Manutenção.</li> <li>- Programa de Gestão Territorial e monitoramento da faixa de servidão. - Page 2,3,4</li> <li>- Envision Manual, Page 162.</li> </ul>	<p>Many hazards may be worsened by degraded environments. Restore and rehabilitate natural systems is a valid strategy to minimize natural risks. Provide documents stating which are the strategies used and how they minimize the risk of future hazards using environmental restoration.</p>

CR2.5 Manage Heat Island Effects	0	<b>No Score</b>	
		<p>This credit is not applicable to the project due to the specific conditions of the High Tension Lines, which are located in an area almost entirely void of consolidated urban settlements, large areas of rooftops and pavement. Furthermore, the towers have negligible surfaces for heat capture.</p> <p><u>Sources:</u></p> <p>- Envision Manual, Page 164</p>	
CR0.0 Innovate Or Exceed Credit Requirements	0	N/A	
	40		
<b>OVERALL:</b>	<b>245</b>	AMAZON HIGH TENSION LINES- BRAZIL	

## APPENDIX D: SOURCES

DOCUMENTATION PROVIDED. (Português / Español)
<b>General information.</b>
Estudo de Impacto Ambiental (E.I.A.), LT500 Kv Tucuruí, Xingú, Jurupari. (Lot A Granted to ISOLUX CORSAN)
Press publications on the reaction of local authorities. <a href="http://acritica.uol.com.br/noticias/Impactos-socio-ambientais-Linhao-Tucurui-avaliados_0_478752288.html">http://acritica.uol.com.br/noticias/Impactos-socio-ambientais-Linhao-Tucurui-avaliados_0_478752288.html</a>
Audiência Pública LT 500 KV Tucurui - Xingu-Jurupari
Audiência Pública LT 500 KV Jurupari - Oriximiná and LT 230 KV Jurupari-Laranjal-Macapá.
Estudo de Impacto Ambiental.(E.I.A) LT 230 KV Jurupari, Laranjal, Macapa e LT 500 KV Jurupari, Oriximiná. (Lot B granted to ISOLUX CORSAN)
<a href="http://www.amazonasenergia.gov.br/cms/novas-subestacoes-e-linhas-de-transmissao-chegam-para-reforcar-sistema-eletrico-de-manaus/">http://www.amazonasenergia.gov.br/cms/novas-subestacoes-e-linhas-de-transmissao-chegam-para-reforcar-sistema-eletrico-de-manaus/</a>
AS CONCESSÕES DO SISTEMA TUCURUI – MACAPÁ – MANAUS
Projeto Básico Ambiental (PBA) - LT500 Kv Tucuruí, Xingú, Jurupari (Lot A Granted to ISOLUX CORSAN)
Envision Manual
Premios Infraestructura 360° - Hoja de Presentación de datos
Anexo 03_Relatório Situacional da Infraestrutura Viária e Portuária.
Projeto Básico Ambiental (PBA) - Volume II - LT500 Kv Tucuruí, Xingú, Jurupari (Lot A Granted to ISOLUX CORSAN)
PROJETO DE SALVAMENTO ARQUEOLÓGICO E EDUCAÇÃO PATRIMONIAL NA ÁREA DE INFLUÊNCIA DA LINHA DE TRANSMISSÃO 500 KV TUCURUÍ – XINGU – JURUPARI (PA) RELATÓRIO FINAL
Ações de Responsabilidade Social
Isolux Corsán - Informe Anual, año 2011
Autorização para a supressão de vegetação. No. 495/2010 Projeto Linha Tucurui, Xingu, Jurupari (Lot A granted to ISOLUX CORSAN)
Autorização para a supressão de vegetação, Licença de Instalação, Licença de Operação - Projeto Linha Jurupari, Laranjal, Macapa (Lot B granted to ISOLUX CORSAN).
Projeto Básico Ambiental (PBA) - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN)
Contrato EPC - LXTE (Linhas de Xingu, Lot A)
Contrato EPC - LMTE (Linhas de Macapá, Lot B)
PAC - LXTE (Plano Ambiental de Construção - Linhas de Xingu - Lot A)
PAC - LMTE (Plano Ambiental de Construção - Linhas de Macapá - Lot B).
Programa de Comunicação Social (PCS). - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN)

Projeto de Educação Ambiental (PEA). - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN)
Licença de Operação - HTL Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN)
Licença de Operação - LT 230 KV JURUPARI – LARANJAL - MACAPÁ E LT 500 KV JURUPARI – ORIXIMINÁ (Lot B granted to ISOLUX CORSAN)
CCEE website: <a href="http://www.ccee.org.br/portal/faces/pages_publico/o-que-fazemos?_afLoop=1049341239486000#%40%3F_afLoop%3D1049341239486000%26_adf.ctrl-state%3Dpmaazlb0l_46">http://www.ccee.org.br/portal/faces/pages_publico/o-que-fazemos?_afLoop=1049341239486000#%40%3F_afLoop%3D1049341239486000%26_adf.ctrl-state%3Dpmaazlb0l_46</a>
Programa de Otimização Ambiental do Projeto Executivo - LT Tucuruí, Xingú, Jurupari. (Lot A granted to ISOLUX CORSAN).
Licença de Operação No. 1162/2013. - LT Tucuruí - Xingu - Jurupari. (Lot A)
Autorização de Supressão de Vegetação No. 480/2010 (LMTE - Lot B)
Licença de Operação (LO) . No. 1161-2013 (LMTE - Lot B)
Autorização de Supressão de Vegetação No. 480/2010 (LMTE - Lot B)
Relatórios De Monitoramento da Qualidade Do Ar, 1, 2, e 3
Resumen de Documentos
Plano de Ação de Emergência.
Procedimento de Manutenção.
Programa de Gestão Territorial e monitoramento da faixa de servidão
<b>DOCUMENTATION PROVIDED. (ENGLISH )</b>
<b>General information.</b>
“What is the International Electro Magnetic Field (EMF) project”, available at the World Health Organization Website: <a href="http://www.who.int/peh-emf/project/EMF_Project/en/index.html">http://www.who.int/peh-emf/project/EMF_Project/en/index.html</a>
Obstruction Marking and Lighting - p. 13 (Federal Aviation Administration) - available at: <a href="http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/b993dcdcf37fcdc486257251005c4e21/\$FILE/AC70_7460_1K.pdf">http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/b993dcdcf37fcdc486257251005c4e21/\$FILE/AC70_7460_1K.pdf</a>
Isolux Corsán 2012 Annual Report
<a href="http://www.isoluxcorsan.com/en/commitments-to-the-suppliers.html">http://www.isoluxcorsan.com/en/commitments-to-the-suppliers.html</a>
Definition of Prime Farmland available at: <a href="http://soils.usda.gov/technical/handbook/contents/part622.html">http://soils.usda.gov/technical/handbook/contents/part622.html</a>