GRUPO AEROPORTUARIO
DE LA CIUDAD DE MÉXICO

Report 2

31.March.2017

Mexico City Airport Trust
NAICM Green Bond Reporting

NAICM
AIRPORT PROGRAM
PARSONS PROJECT MANAGEMENT OFFICE

1. Introduction

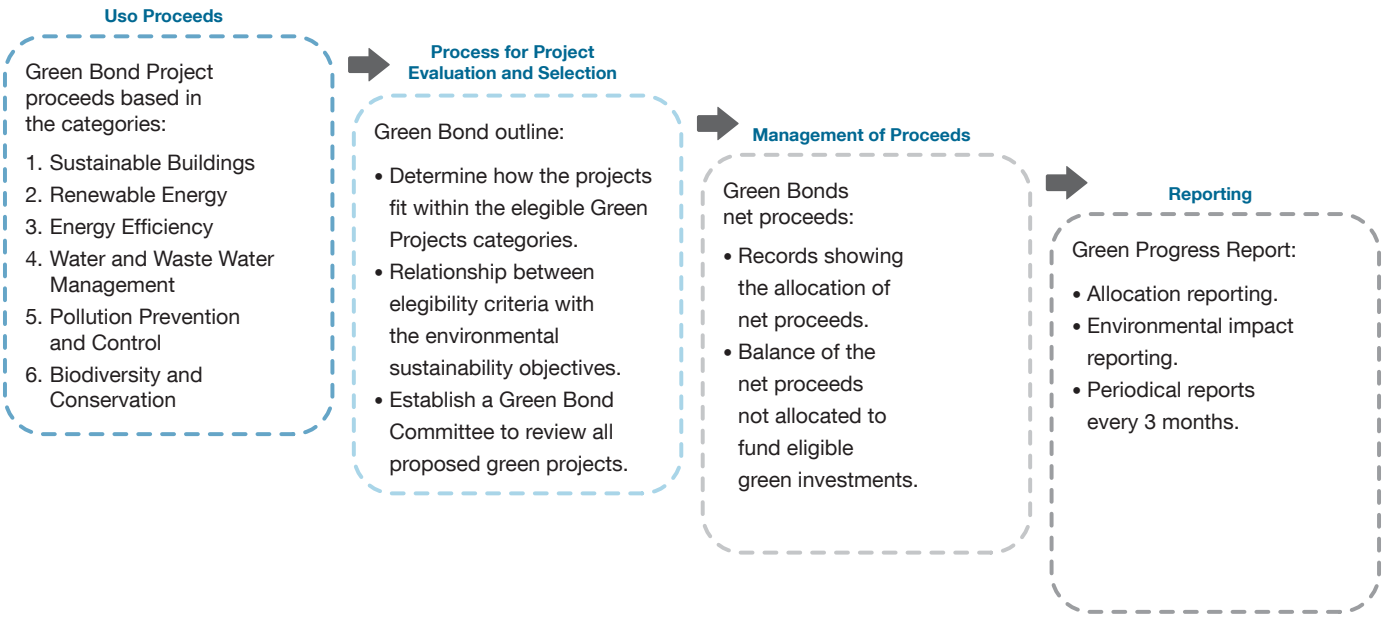
Grupo Aeroportuario de la Ciudad de México, S.A. de C.V. (GACM) is responsible for the preparation and providing a fair representation of this Green Bond Framework as of September, 6th 2016, which will cover the issuance of Green Bond from Mexico City Airport Trust.

For each Green Bond issued by the Mexico City Airport Trust, GACM management asserts that it will adopt the use of the proceeds eligibility criteria and processes and policies as set out in the Mexico City New International Airport (NAICM by its Spanish acronym) Green Bond Framework as outlined in Figure 1.

This report describes an outline of the green works that are currently underway for the Airport program development paying particular attention to currently designed elements and the initial construction and site preparation activities.

This report will be updated quarterly to report on specific activities which have occurred in the report time-frame and to show development of the performance indicators.

Figure 1 - NAICM Green Bond Framework



2. Green Bond Eligibility Categories

The eligibility categories are focused in the planning, design and construction of the NAICM project according to green building & environmental best practices standards.

Six categories were selected to describe the different areas of sustainability focus for the project scope. These are described below:

- **Eligibility Categories**

1. Sustainable Buildings
2. Renewable Energy
3. Energy Efficiency
4. Water and Wastewater Management
5. Pollution Prevention and Control
6. Conservation and Biodiversity

The project is utilizing the rating system Leadership in Energy and Environmental Design version 4 (LEED v4). The rating system seeks to enhance architectural and engineering designs and construction processes to reduce the environmental impacts of the building and its occupants, improve the indoor environmental quality and minimize changes to natural systems. Four of the airport buildings on the site are being designed and constructed to meet these LEED requirements, in particular the 743,000 m^2 Passenger Terminal Building.

The project undertook Environmental Impact Assessment, commonly known in Spanish as *Manifestación de Impacto Ambiental* (MIA), as it is required for all new major projects in line with SEMARNAT (*Secretaría del Medio Ambiente y Recursos Naturales*) requirements. The MIA is an instrument of environmental policy that is required to present all information about the environmental conditions of the site and analyze and outline requirements for the works and activities that could cause environmental or ecological imbalance.

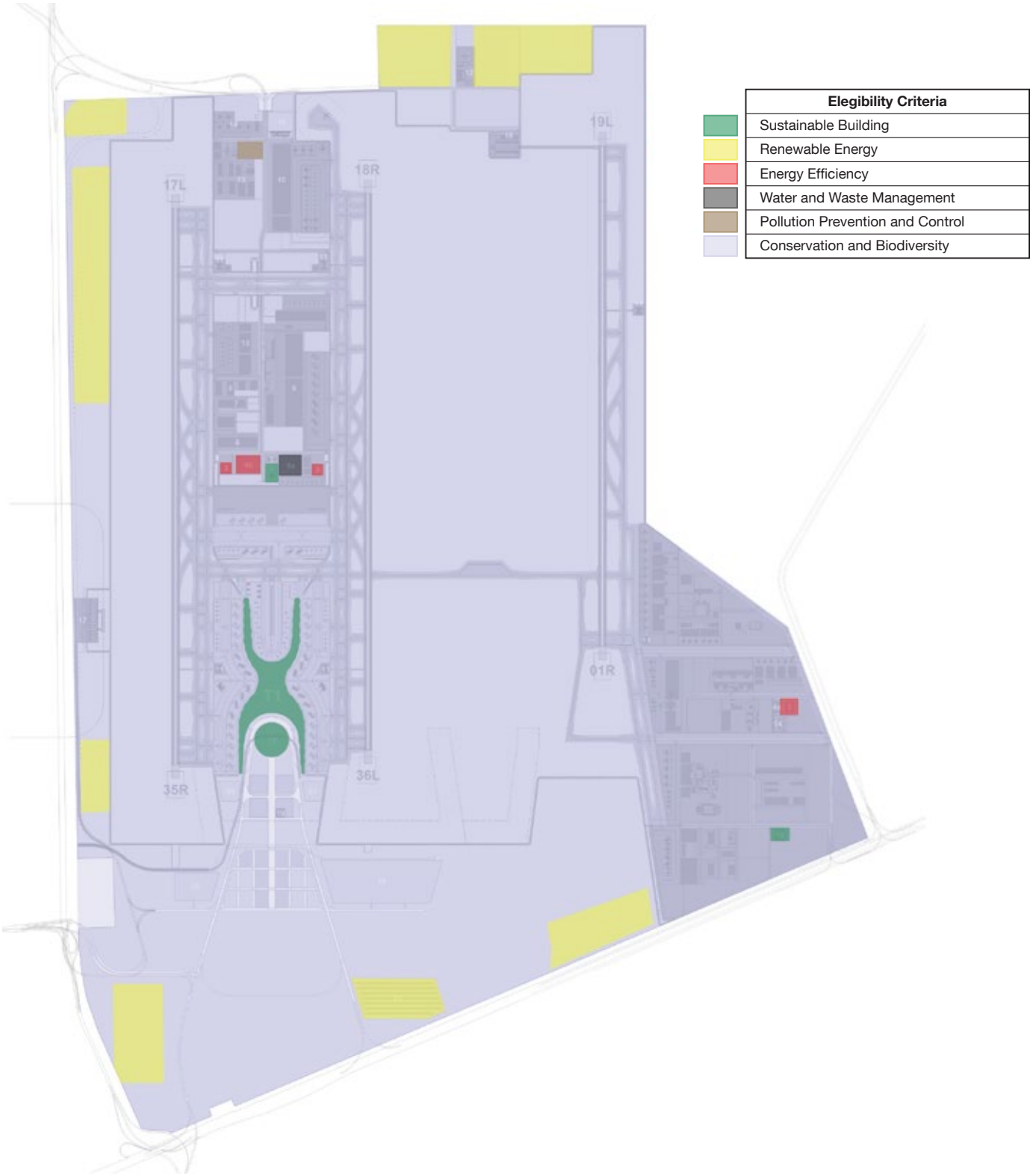


Figure 2 - Site polygon showing location of main program elements per eligibility criteria.

Categories Description

The project must meet one or more of the following eligibility criteria:

1. Sustainable Buildings:

Any project for an existing or new building;

(i) that has received, or expects to receive based on its design, construction and operational plans, rating according to third party verified green building standards such as LEED Silver or higher, or an equivalent rating scheme; and

(ii) that has achieved, based on third-party assessment, a reduction in energy consumption of at least 15% relative to industry standards and benchmarks such as ASHRAE 90.1 or equivalent.

2. Renewable Energy:

Development, construction, installation, operation and upgrades of;

(i) equipment or facilities wholly dedicated to renewable energy generation; or

(ii) wholly dedicated transmission infrastructure for renewable energy generation sources.

The projects must meet the definitions of renewable energy outlined in Mexico's Energy Transition Law (Ley de Transición Energética) and may include wind, solar, tidal, geothermal, biomass and run-of-river hydro projects.

3. Energy Efficiency:

Development, construction, installation, operations and upgrades of any projects (products or technology) that reduce energy consumption or improve resource efficiency in airport management and operations, including but not limited to;

(i) projects that enable energy performance monitoring and modelling such as design and installation of computer controls, sensors, or building information systems; or

(ii) projects that optimize the amount and timing of energy consumption and minimize peak loads such as design and installation of metering, peak load shedding, or fuel switching systems;

(iii) projects that involve installation, maintenance or replacement of energy efficient heating, ventilation, air-conditioning, cooling, lighting and electrical equipment.

4. Water and Wastewater Management:

Development, construction, installation, operations and upgrades of any projects (products or technology) that reduce water consumption or improve resource efficiency in airport management and operations, including but not limited to;

(i) new or existing facilities that are used for the collection, treatment, recycling, or re-use of water, rainwater, wastewater or sewage; or

(ii) infrastructure for flood prevention, flood defense or storm-water management such as wetlands, retention berms, reservoirs, lagoons, sluice gates, drainage systems, tunnels and channels.

5. Pollution Prevention and Control:

Development, construction, installation, operations and upgrades of any projects (products or technology) that reduce and manage waste generated in airport management and operations, including but not limited to:

(i) new or existing facilities, systems and equipment that are used for the collection, treatment, recycling or re-use of solid waste, hazardous waste or contaminated soil; or

(ii) new or existing facilities, systems and equipment that are used to divert waste from landfills and reduce emissions from transport of waste.

6. Conservation and Biodiversity:

Any projects for;

(i) reforestation and ecological restoration;

(ii) creation and protection of forests and wetlands; or

(iii) monitoring and mitigation of adverse impacts on flora and fauna such as potential impacts from construction and noise pollution.

3. Use of Proceeds Summary

Description	Amount USD
Net Proceeds from Green Bonds	**$1,914,264,909**

Allocated Amount to each Eligible Category (USD)						
Category	1	2	3	4	5	6
USD	**Sustainable Buildings**	**Renewable Energy**	**Energy Efficiency**	**Water and Waste Water Management**	**Pollution Prevention and Control**	**Conservation and Biodiversity**
Disburse Amount	**$170,119,849**	**$418,043**	**$13,264**	**$11,292,320**	**$665,466**	**$14,080,045**
Total	**$196,588,988**					

Description	Amount
Amount Available for Allocation	**$1,717,675,920**

The amount of categories 4, 5 and 6 reported in the summary of *Allocated Amount to each Eligible Category* is lower than the December 2016 report. The higher values reported in the December report correspond to contracts that were qualified as green-related projects for the overall program. However, due to their existing financing framework, it is not possible to assign any funds from the green bonds to these contracts and as such have been removed from the total.

Note: Values are shown in dollars. The exchange rate used from MXN to USD is the applicable rate at the time for each disbursement being paid.

4. Case study on the use of renewable energies during construction of the NAICM Project

Specific performance indicators are presently under development with the aim to follow up on the reports, in line with the Green Bonds framework. This case study focuses on the eligible category of *Renewable Energies*; therefore, this section introduces the lighting project, designed to maximize the use of solar energy and contribute to the sustainability of the airport project. It is important to emphasize that the lighting installation was done with the goal of safekeeping and lighting the site during the construction stage, thus maintaining proper security conditions at the polygon.

Lighting with Photovoltaic Panels

The NAICM Project lighting is designed for energy consumption savings during the execution of the airport construction works. This is achieved by using low consumption LED luminaires with photovoltaic panels. Photovoltaic panels also help reduce infrastructure costs, as bringing power to the site is difficult and costly.

The photovoltaic lighting equipment proposed for the project are made up of three basic parts:

- Metal pole and foundation: its role is to support one or two LED type luminaires and a photovoltaic panel;
- Luminaires: LED (Light-emitting diode) type with low energy consumption, may be single or double arm;
- Photovoltaic panel: made up by one or several photovoltaic solar modules, oriented to the south, with an estimated tilt angle of 20 degrees to capture the largest quantity of sun rays, thus having the maximum energy utilization.

Mainly, there are two types of photovoltaic lighting system:

1) *Interconnected to the grid*, qwhich is characterized by providing power through a bidirectional meter, and;
2) *Autonomous*, which is independent from the grid and has the capacity to store energy through a battery bank in each pole.

Areas with Photovoltaic Luminaires

Currently, the project provides lighting to different areas of the polygon (see fig. 3). To describe the features of the systems installed, this report presents information based on the following areas:

1) Perimetral fence and roads:

   Made up by 31 linear km of fence, required to outline the perimeter of the polygon and provide security during construction works. It is divided in 4 areas for the installation of luminaires:

   - North junction
   - South
   - East
   - West

2) Internal roads and entrances

   These are the roads and entrances that are to be used during project construction. Adequate lighting is required, as these roads will be heavily used; for example: heavy equipment, traffic of vehicles, for workers safety, among others.

3) Camp, entrances and internal communications

   The camp is the location where contractors and those in charge of the project have their field offices to carry out their operations.

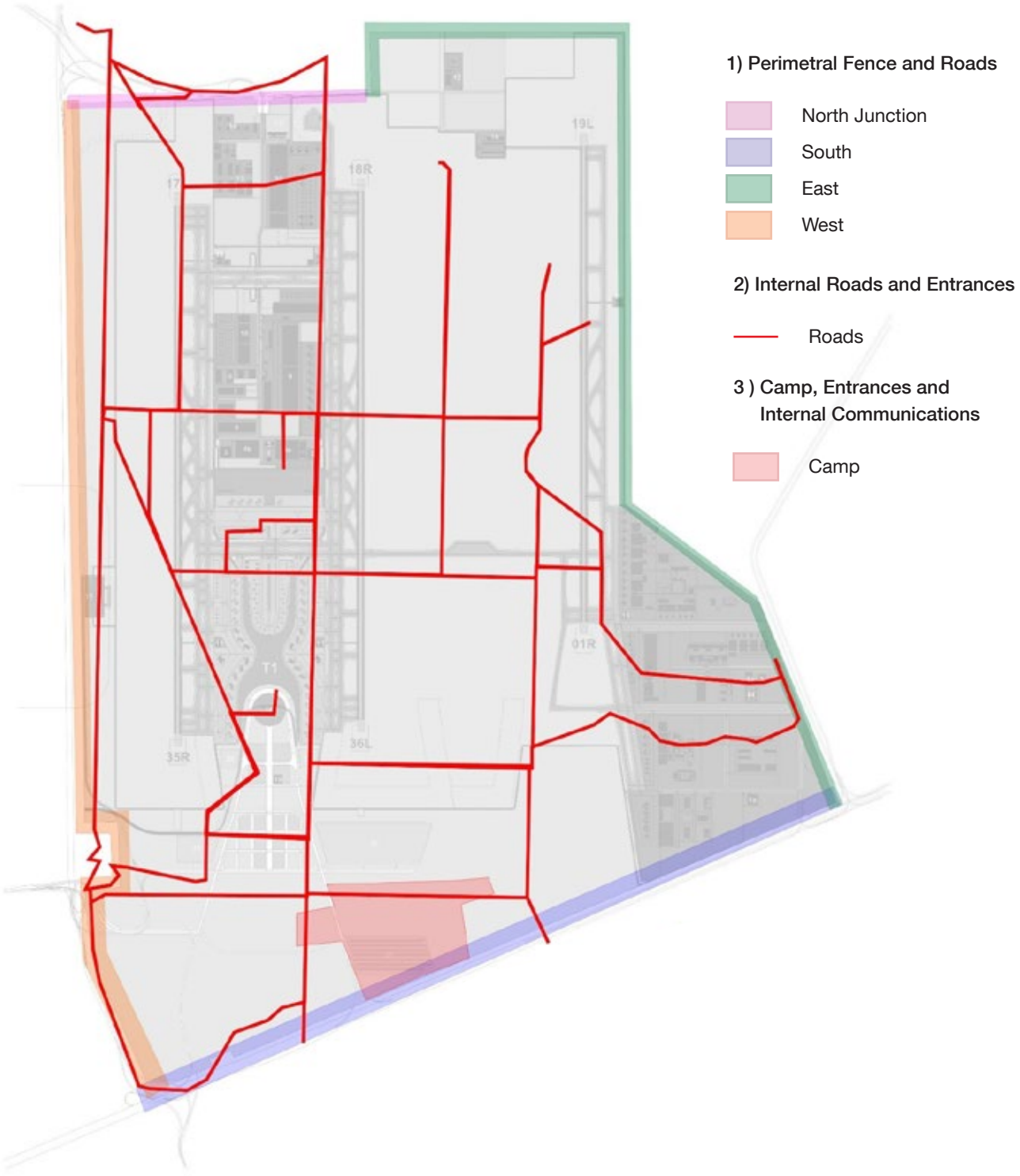


Figure 3 - Zoning

1) Perimetral Fence and Roads

To fulfill the perimetral fence and roads lighting requirements in sections north, south, east and west, it was proposed to install two types of lighting. These two systems were designed to light internal roads, green areas located only within the perimeter of the polygon and the outer perimetral fence, with the aim to fulfill security CCTV operation needs, which require a minimum of 30 luxes to work properly. The lighting levels are in compliance with provisions on Mexican Official Standard NOM-013-ENER-014. The specific features of the system installed in the above mentioned areas are described below.

North Junction or North Area

The north area was designed with the system interconnected to the grid, which consists of a LED type double arm pole. Each arm consumes 139 watts and is connected to 3 photovoltaic modules, each one generating 250 watts.

Table 1 - Lighting generation and consumption

Area	Number of Poles*	Photovoltaic Capacity Installed (kW)	Luminaires Daily Total Consumption** (kWh)
North section or North junction	142	106.5	477.12***

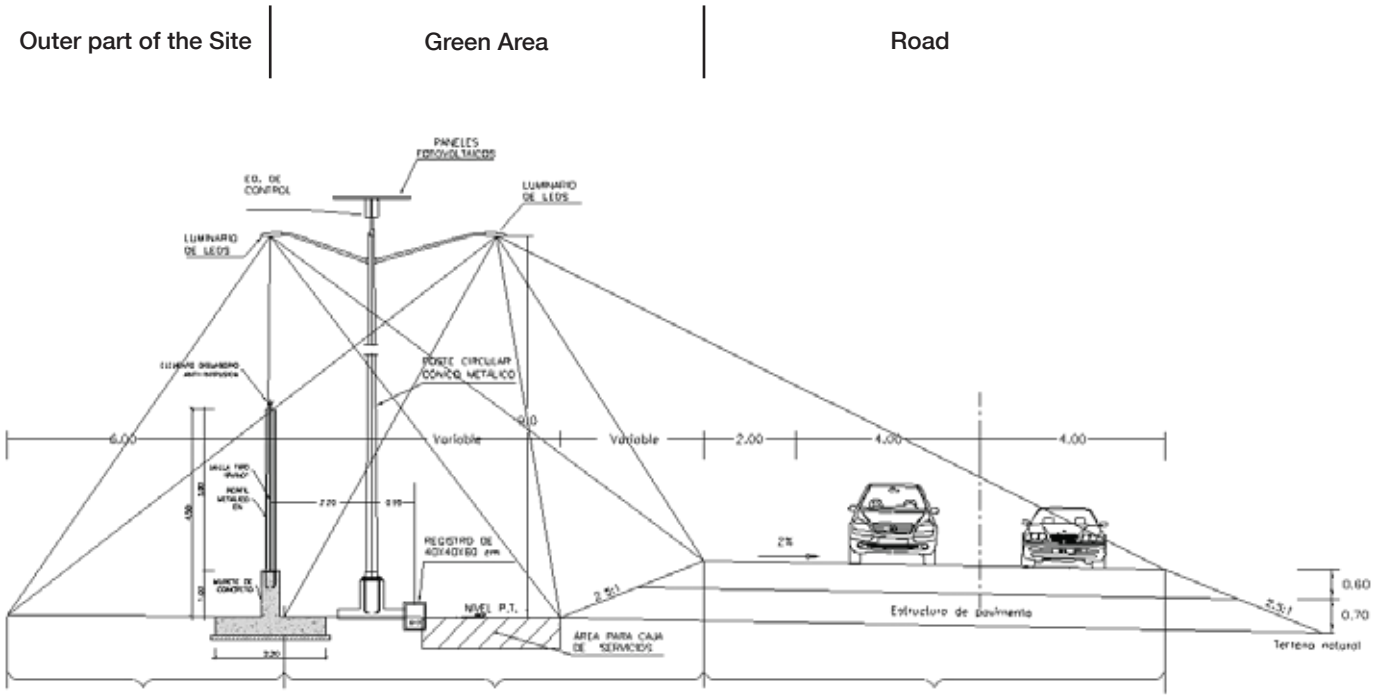
* 2 luminaires per pole.
** Considering 12 hours of use, according to CFE data.
*** Consumption is estimated as of end of construction.

Figure 4 - North Junction

Figure 5 - Erection of luminaires North Junction

These photovoltaic modules installed in the poles feed a microinverter from direct current to alternating current, which injects energy to the NAICM internal grid during daytime; at night, when the modules cease to work, the internal grid supplies energy to the luminaires. Currently, the system is at construction stage. It hast been planned to install 142 luminaires with a pole to pole distance of 25m, and height of 9m, with double arm luminaires; one oriented outside the perimetral wall, emitting an average of 31 luxes, and the other oriented towards the green area, emitting and average of 26 and 12 luxes towards the road (see Figure 6).

Figure 6 - Cross section of the interconnected system



Area with average of 31 Luxes

Area with average of 26 Luxes

Area with average of 12 Luxes

South, East and West

In the south, east and west areas, an autonomous system with similar features to the previous one was proposed. Each pole has four solar panels, producing a total of 520 Watts which feed two LED type luminaires with 90 Watt consumptions; energy is collected by lithium ion batteries storing the energy collected by the solar panels. These batteries have a life cycle of at least 6 years without need for maintenance.

Table 2 - Lighting generation and consumption

Area	Number of Poles*	Photovoltaic Capacity Installed (kW)	Luminaires Daily Total Consumption** (kWh)
South	315	163.80	680.40
West	503	261.56	1,086.48
East	131	68.12	133.62

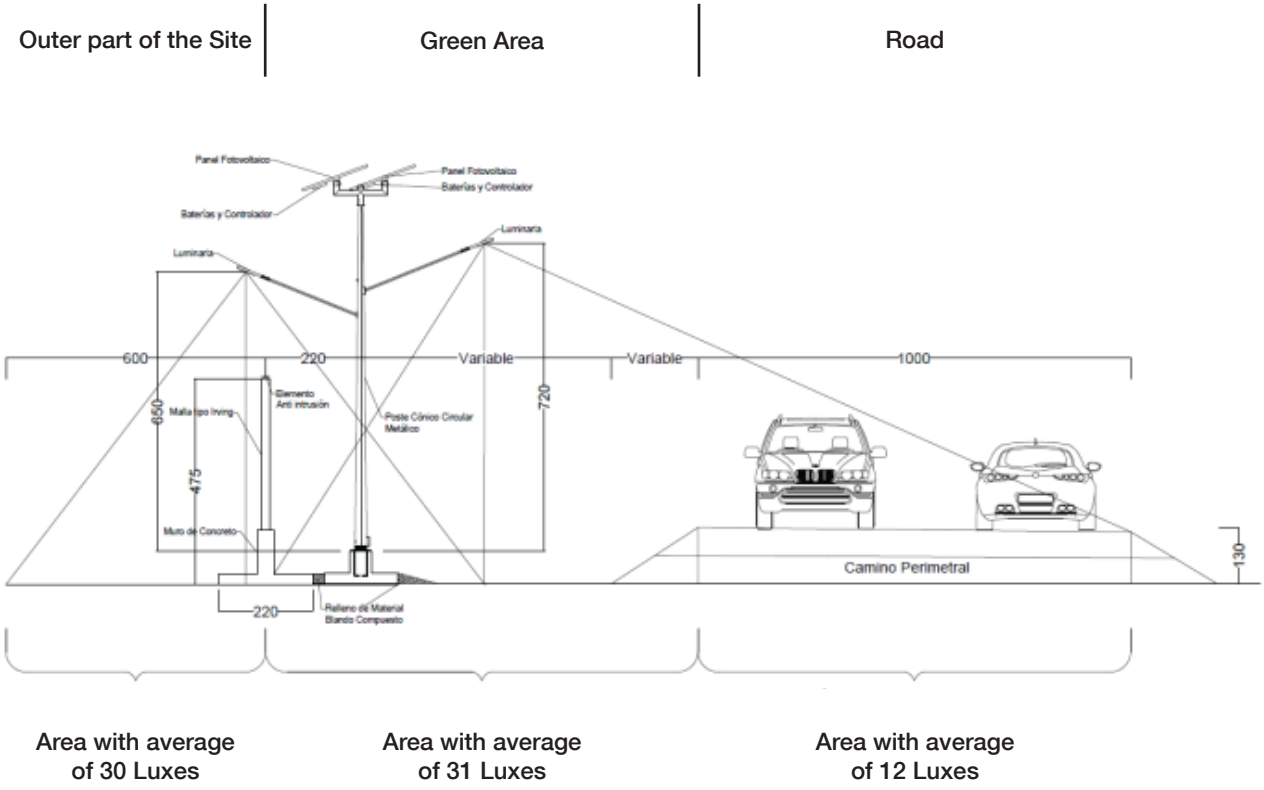
* 2 luminaires per pole.
** Considering 12 hours of use, according to CFE data.

Figure 7 - South Area

Figure 8 - East Area

Currently, the system is at the construction stage. It hast been planned to install 949 luminaires with a pole to pole distance of 25m, and height of 8m, with double arm luminaires; one oriented outside the perimetral wall emitting an average of 30 luxes, and the other oriented towards the green area, emitting an average of 31 and 12 luxes towards the road (see Figure 9).

Figure 9 - Autonomous system cross section



Both lighting systems have switch on controls activated when the panel does not detect natural light; besides, this system may report activity in real time through a monitoring equipment.

2) Internal Roads and Entrances

A minimum level of 8 luxes was requested for the design of internal roads, based on NOM-013-ENER-2013. Nevertheless, a minimum average of 10 luxes was obtained with the configuration proposed, providing uniformity of 4 to 10, thus achieving prevention of the zebra effect.

The lighting poles for internal roads and entrances are of the autonomous type, i.e., they have photovoltaic modules, each of which generates 1020 Wh, with 315W of power and a LED type luminaire consuming 85 Watts. The panel works as a light sensor guaranteeing the lighting device is switched on in winter and summer times, with 36 hours of autonomy.

Table 3 - Generation and consumption of lighting

Area	Number of Poles*	Photovoltaic Capacity Installed (kW)	Luminaires Daily Total Consumption** (kWh)
Internal roads and entrances	379	119.40	386.60

* 1 luminaire per pole.
** Considering 12 hours of use, according to CFE data.

Figure 10 - Roads

Figure 11 - Roads

Figure 12 - Current Luminaires

Figure 13 - Projected Roads

Figure 12 shows the current location of the luminaires on site (blue), which are approximately 379. It is planned that by the end of 2017, the total number of installed luminaires will be 705. Figure 13 shows the projection of temporary roads in which there is great potential for the installation of this system.

3) Camp, entrances and internal communications

Based in NOM-013-ENER-2013, it was also requested to design lighting for the camps and entrances, with lighting levels of 8 luxes minimum average.

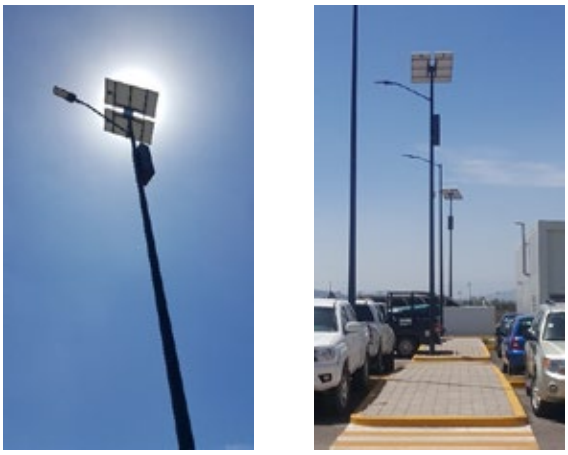
In the camp area, the poles providing lighting to the parking lot and pedestrian roads are also autonomous; yet, these only have a LED type single air luminaire consuming 85 Watts. Currently, the camp has 95 light units with a height of 9 meters, distributed every 45 meters, providing 10 luxes at the floor level with estimated power production per day of 136.5 kWh.

Besides the camp, the project master plan considers construction of an area allotted for entrances and internal communications, where 14 lighting units with an estimated power production of 59.5 kWh are to be installed.

Table 4 - Lighting generation and consumption

Zona	Number of Poles*	Installed Photovoltaic Capacity (kW)	Luminaires Daily Total Consumption** (kWh)
Camp, Entrances and Internal Communications	95	29.93	96.90

* 1 luminaire per pole.
** Considering 12 hours of use, according to CFE data.



Figures 14 and 15 - Luminaires at camp

Maintenance

Systems do not require maintenance, since the angle allows for panel self-cleaning through air and rain. There is a preventive and corrective maintenance plan in place; besides, regular supervisions are conducted. No failures of any type have occurred so far; they work adequately without need for maintenance.

Benefits of the Generation System

International Agencies such as the United Nations Organization (UN), have voiced their concern regarding the impact of climate change on human societies and on the planet. Because of this, several studies have been conducted to estimate the emission of greenhouse gases (GHG) caused by human activities, involving burning of fossil fuels. Among them, the national government agency SEMARNAT, developed an instrument to estimate the four gases (carbon dioxide, methane, nitrous oxide and black carbon) which absorb and emit infrared radiation, also known as GHG. To estimate the benefits of the lighting system proposed for NAICM, this report is based in the National Emissions Register (RENE, for its name in Spanish), which allows to calculate fixed and mobile sources, depending on the type of activity and sector.

In this case, the airport lighting project corresponds to the energy sector and the sub-sector of generation, transmission and distribution of power, which is one of the main sources for carbon dioxide (CO_2) emission. It must be noted that, before estimating GHG emissions by the lighting system, the total amount of energy consumed by the total luminaires and the total quantity generated by the luminaires interconnected were calculated. Once the consumption and generation variables were calculated, this data was entered into the RENE instrument to estimate GHG emissions. To conclude, the photovoltaic system was compared to a conventional system with the information obtained.

The methodological procedure to estimate CO_2 emissions generated by airport lighting was conducted through the following steps:

1) Estimation of tons of CO_2 reduction.
2) Calculation of tons of CO_2 produced by a conventional lighting system.

The data presented in Table 5 correspond to luminaires installed in the period from 2016 to 2017.

Table 5 - Mitigation of GHG from LED photovoltaic luminaires

Type of Luminaire	Photovoltaic Capacity Installed (kW)	Total Annual Consumption per Luminaire* (MWh)	Tons of CO_2 avoided
North Section or North Junction	106.5	174	80
South, East, West	493.5	748	343
Camp and Internal Roads	149.4	176	81
TOTAL	749.4	1,099	504

* Considering 12 hours of use, according to CFE data.

A total of **504** tons of CO_2 is reduced with the use of this system.

A calculation for the case a conventional non-LED system were to be installed is shown next.

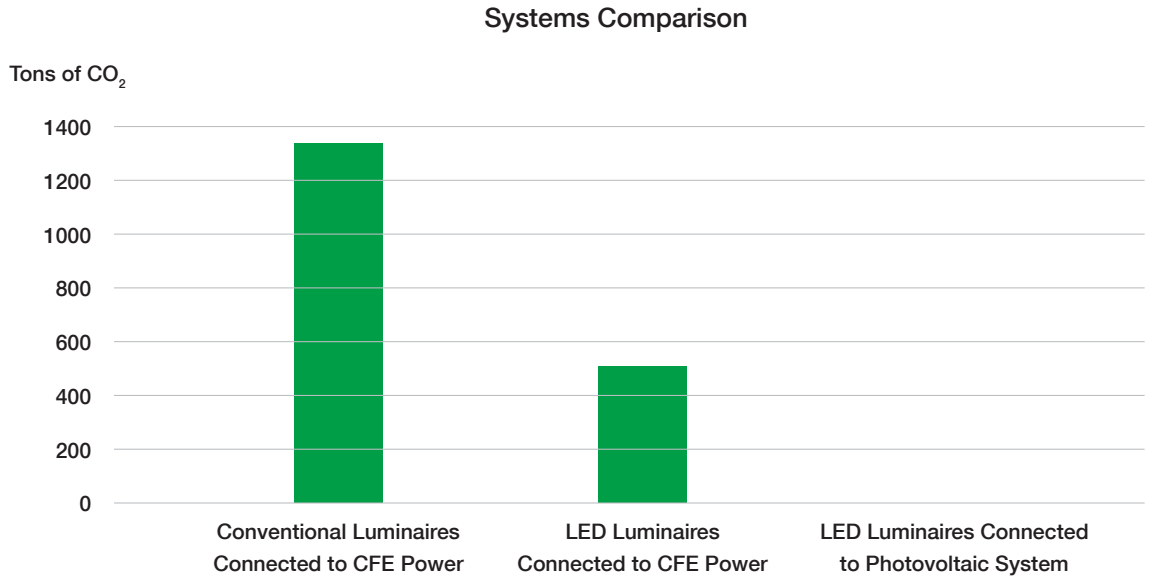
Table 6 - Conventional system GHG generation

Type of Luminaire	Average Consumption per Luminaire (Watts)*	Average Total Annual Consumption (MWh)**	Tons of CO_2 generated
Conventional	*250-500	2,910	1,333

* Range of consumption of conventional luminaires.
** Considering 12 hours of use, according to CFE data.

Table 7 - Comparison of CO_2 emissions between systems

Type of System	Conventional Luminaires Connected to CFE Power	LED Luminaires Connected to CFE Power	LED Luminaires Connected to Photovoltaic System
Tons of CO_2	1,333	504	0



Which indicates that a conventional system produces **264%** more emissions than a LED system. The LED system with photovoltaic panels generates no CO_2 emissions, and the generation of additional energy produced by the interconnected system, which will return to the grid and be used in other areas when installed, must be considered. It is important to speak in terms of CO_2, since it is a gas impacting climate change.

Projection of the current lighting system to 2020

The lighting project is designed to address requirements based on the progress of the airport project throughout construction phase. A project time line from the planning stage to the installation of the luminaires projected for 2020 follows.

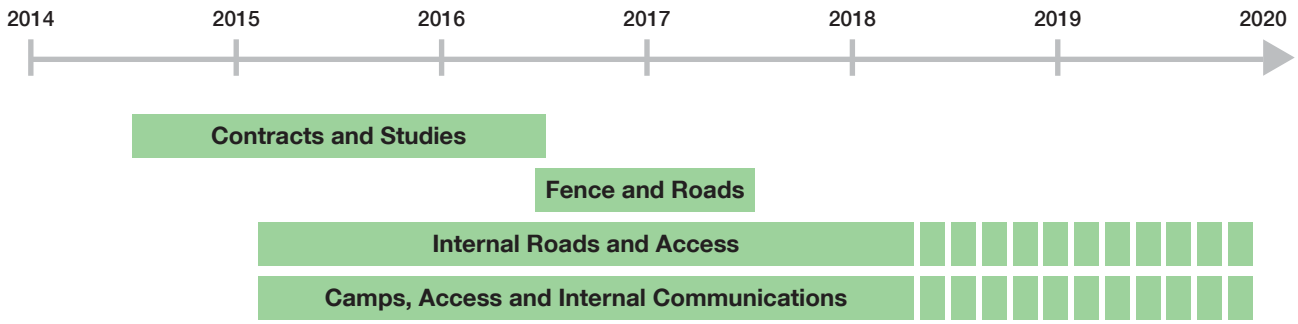


Figure 16 - Time Line

Benefits and Conclusions

- The use of LED luminaires is beneficial for the environment, as these are low consumption and long lasting luminaires, reducing the environmental impact resulting from energy consumption and waste generation.

- Photovoltaic luminaires require minimum routine maintenance, as these are elements designed for exposure to aggressive climate, resulting in very low maintenance costs.

- Since the luminaires have an autonomous energy system (batteries), these provide greater resiliency against electrical failures or adverse situations, when compared with a conventional system.

- The choice of this system supports the environment by mitigating carbon emissions generated, since it is fed by clean energy and provides a safe and efficient solution for the project lighting needs.

- By using a photovoltaic luminaire system infrastructure costs are cut down, as these do not require a wiring network to be fed; conversely, they provide a benefit, because they can be interconnected to the grid.

5. Performance Indicators

Specific performance indicators are being developed for tracking through the on-going reporting in line with the Green Bonds framework.

• **Eligible Buildings**

The Airport program is currently developing designs for LEED v4 ratings for the following buildings.

Building	LEED v4 Rating Target
Passenger Terminal Building	**Platinum**
Ground Transportation Center	**Gold**
Air Traffic Control Center	**Gold**
Area Control Center	**Gold**

In addition to the specific buildings undergoing the LEED rating process, there are impacts for other ancillary buildings and systems to achieve these targets.

The Central Utility Plants A & B (CUPs) are located in the West airfield and supply chilled water for cooling the Passenger Terminal Building (PTB) and Air Traffic Control Tower (ATCT), as well as facilities to the North within the Midfield area. The cooling systems are being designed to a high level of energy efficient performance.

The Ground Transportation Center will include a bus station and a metro rail station. A further bus station will be located to the North of the site for employees of the Midfield areas. Connectivity for the airport workers as well as passengers is critical for successful opening of the project and reducing car travel.

The project includes a dedicated Waste Water Treatment Plant. All black water from the initial phase of development will be treated to a high level to meet California Building Code requirements to provide a supply of treated water to airport buildings for lavatory flushing, irrigation and cleaning needs.

• Energy and Water Consumption and Reduction Strategies

The MIA reviewed the currently observed values of water and energy consumption at the existing airport; based on these usages the new airport is targeting a reduction of around 70% in its use of potable water and 40% for energy usage.

All the buildings seeking a LEED rating are currently targeting a 50% energy cost reduction to meet the full points available. This 50% cost reduction is being designed through the following strategies:

- Implementation of Energy Conservation Measures (ECM's) within the building.
- Connection to a High Efficiency Campus Central Utility Plant.
- Power sourced from renewable energy sources.

Water consumption is being reduced through the following strategies:

- Dedicated on-site Waste Water Treatment Plant to provide a supply of treated water.
- Use of low flow fixtures for toilet flushing using treated water in buildings seeking a LEED rating.
- Use of low flow fixtures for lavatory fixtures using potable water in buildings seeking a LEED rating.

• Greenhouse Gas Emissions

As laid out in the MIA the proposed building designs, boilers and power plants will reduce the Greenhous Gas emission by 50% compared to the current Mexico City Airport.

Reduction in Greenhouse Gas emissions aligns with the energy reduction strategies noted above for energy consumption.

Other opportunities which are being implemented or investigated at this time are as follows:

- Use of photovoltaic panels to provide site lighting and perimeter protection during construction.
- Provision of sufficient infrastructure to allow electric Ground Source Equipment (eGSE) for airlines and ground handlers to reduce non-aircraft airside air pollution.
- Identification of locations of natural resources and products to reduce pollution from transportation to the site.

• Waste Reduction and Diversion from Landfill

LThe MIA outlines a range of reduction and recycling targets. Overall the new airport seeks a reduction of 10% to 30% in waste generation and an improvement of 10 to 30% in the amount to waste diverted to recycling facilities.

• Energy Purchased or Generated On-site from Renewable Energies

The use of photovoltaics is currently being utilized for site lighting.

An extensive feasibility study is also currently in progress. This is to determine the best cost solution to meet the LEED demands of the project.