Airport Apron High-Pole Lighting Project

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Inno Energy Group Pty Ltd / PCI Green Technologies Pty Ltd

PCI Green Technologies, a subsidiary of Inno Energy Group, was established in Sydney, Australia in 2019. It offers innovative LED Airport Apron Lighting using thermal resonance heat transfer technology and advanced materials. PCI Green Technologies is a participant in ARENA (Australian Renewable Energy Agency) and a R&D partner of the University of NSW for an ARC project. The result of using our World Leading Technology is higher energy efficiency, brightness, safety, reduced maintenance costs, and longer service life for our LED lights.

Introduction

Airport operators worldwide are facing challenging economic conditions but need to find ways to bounce back and operate more efficiently and sustainably. Upgrading Airport Apron lighting technology is one solution that has been adopted by many airports. Investing in efficient airport lighting equipment can bring numerous benefits, such as cost savings from longer maintenance cycles and reducing carbon footprint. Inno Energy, with its world class LED Lighting technology, can support airport operators in their transition towards a Greener future by providing effective energy conservation solutions that not only help the environment but also lower Airport operating costs.

Project Experience

Inno Energy Pty Ltd aims to offer state of the art energy solutions using our Patented thermal resonance heat transfer technology. In partnership with the University of New South Wales, the company has secured various patents in the lighting sector that outperform traditional LED lamps in terms of technical performance.

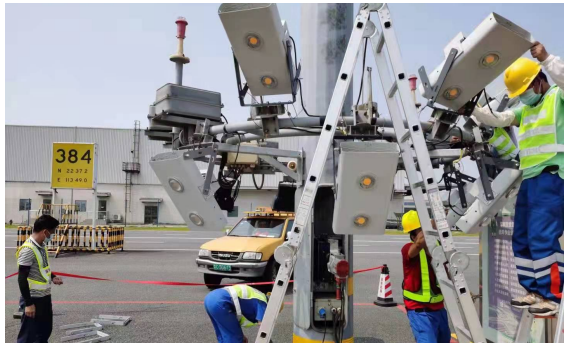
Key benefits of this technology include Reduced Energy Consumption, Decreased Light Decay, Enhanced Ground Penetration, Improved Safety, Reduced Maintenance Cost, and Extended Service Life.

2019

Our Airport Lighting are currently being used in the airport apron area of Beijing Capital International Airport.

2020

Shenzhen Bao'an International Airport are using our LED technology in their airport apron area to help them reduce energy consumption and cost.



2022

Haikou Meilan International Airport are currently testing our LED technology in their airport apron area.

InnoEnergy
Airport Apron Lamps

Technical Specifications

Power: 300 - 400 W
Material: PCI
IP Rating: IP67
IK Rating: IK10
Dimensions: 600 x 320 x 240 mm
Weight: 13kg

Optical Parameters

Color Temperature: 2200 - 5000K
Irradiation Angle: 60° / 90°
Color Rendering Index:> 65
Luminaire Efficacy: 148 lm / w (4000K)

Lamp Features

Superior Energy Saving

70% more Energy Efficient than Traditional Sodium Lamps.

20% more Energy Efficient than ordinary LED Lamps.

30% more Energy Efficient than LED Lamps under 2,500K Colour Temperature.

World Class Safety

Light Weight (1/2 to 1/3 of weight of Traditional LED)

30% smaller in volume – Less Wind Resistance

Reduced stress on bearing of pole

Long Service Life

Our LED Lamps have a service life of 10 Years

Low Maintenance Cost

Long Maintenance Interval

Rated at 100,000 hours

Superior Light Penetration

Superior light penetration in rainy & foggy weather conditions

Low Light Decay

Annual light decay less than 2% and no more than 20% in 10 Years

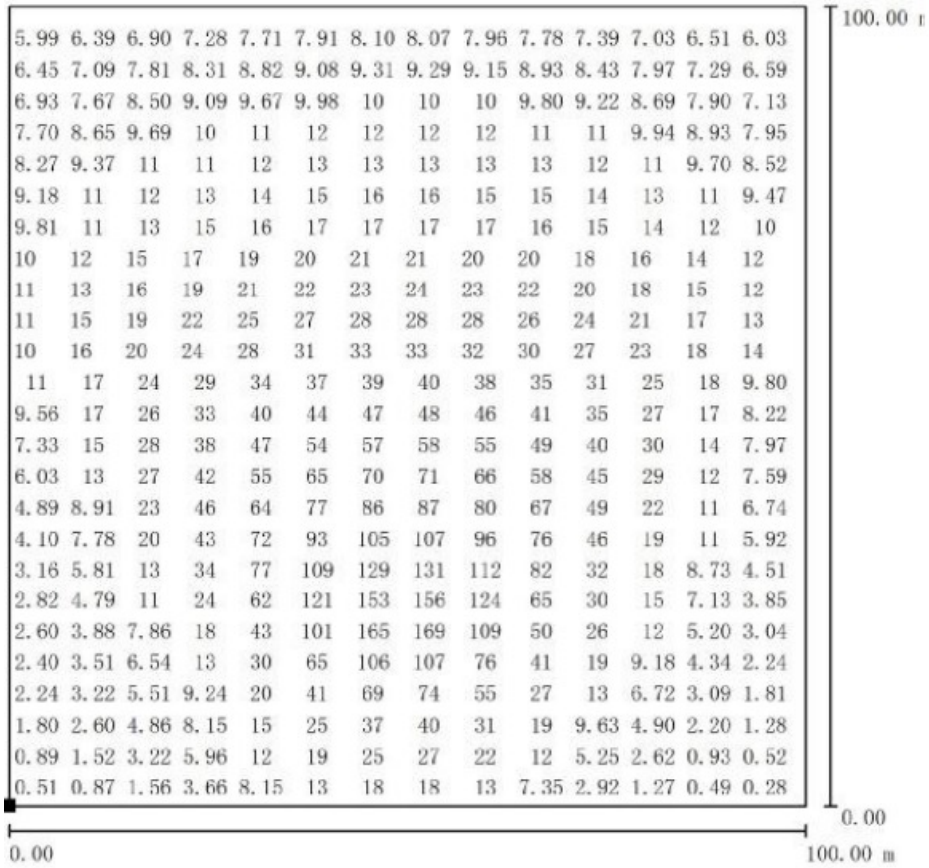
Lamp Comparison

Class C Apron Lighting	Inno Energy Lamp 350 W	Traditional LED 600 W	Sodium light 1,000 W (100 W Driver)
Colour Temperature (K)	2,500	2,700	2,500
Power (W)	350	600	1,100
First-year ground illumination (LX)	98.6	84	70
Second year ground illumination (LX)	95.6	60	Most lamps to be replaced
Third-year ground illumination (LX)	92.6	Some lamps to be replaced	Most lamps to be replaced
Maintenance (Replacement)	5 to 10 years	2 to 3 years	Annual Replacement of accessories

Note: Statistics are based on Class C Airport Apron under the same illumination requirements.
Inno Energy lamps save up to 70% electricity when compared to traditional sodium lamps, and 30% when compared to traditional LED lamps.
The service life is longer, whilst operation and maintenance costs are greatly reduced.

Ground Flux Distribution

Ground Flux (100 x 100 m) :



Configuration

Setup: 6 x 350W LED Lamp at 90 degrees

Colour Temp: 2,700K

Installation Angle: 75 degrees

Results

At 90m (Type F Parking) – 12 lx

At 70m (Type E Parking) - 21 lx

At 50m (Type C Parking) – 39 lx

The average illumination of Class C and Class E Parking is observed to be a minimum of 30 lx.

Shenzhen Airport Case Study: LED High Pole Retrofit Test Data

Comparative data has been gathered to measure the difference before and after retrofitting the Shenzhen Airport Apron Lighting with Inno Energy lamps. The results demonstrate that the new LED lamps (post-retrofit) significantly enhance the ground illuminance, meeting the airport's minimum 30 Lx requirement and surpassing the previous high-pressure sodium lamp (pre-retrofit). The installation of Inno Energy LED Lighting delivers benefits such as lower energy usage, increased brightness, and reduced glare.

Pre-Retrofit Sodium Lamps

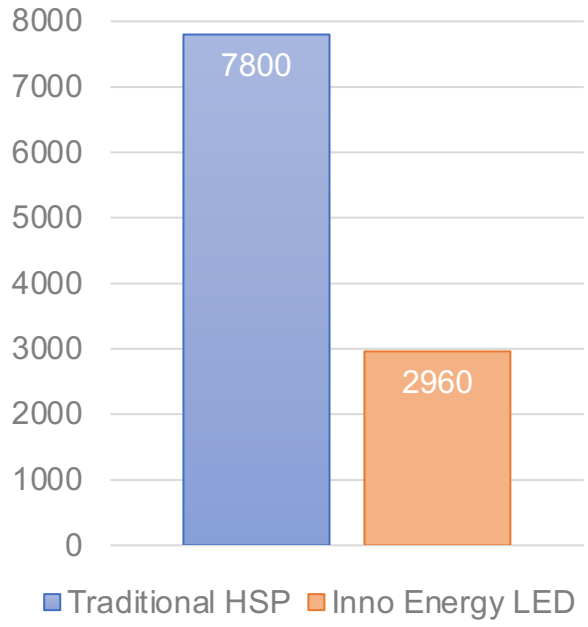
Parking Lot			# 384	
Vertical	50.4	37.8	30	88
Horizontal	37.5	35.9	33.9	63.5
Vertical	62	49	40	104.9
Horizontal	42.8	41	38	85.6
Vertical	63.3	65	60	58
Horizontal	45.8	45.4	43.1	42.4
Vertical	53.4	58	58	39.2
Horizontal	35.2	37.9	35.5	26
Vertical	42.3	45.2	47	28.9
Horizontal	25.1	27.1	28.8	17.5
Vertical AVG	50.8			
Horizontal AVG	36.9			
Recorder	Mr. Li Mr. Lv 2017.8.15 20:00			

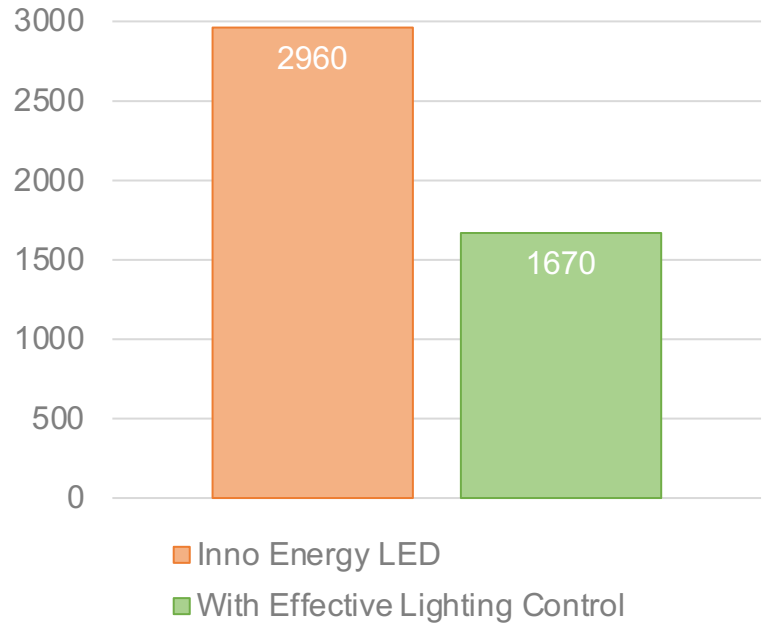
Post-Retrofit Inno Energy LED Lamps

Parking Lot			# 384		
Vertical	58	68	120	138	123
Horizontal	81	115	168	244	184
Vertical	70	89	141	180	118
Horizontal	76	105	149	190	162
Vertical	64	80	122	120	108
Horizontal	63	76	103	121	105
Vertical	57	70	84	93	83
Horizontal	50	55	60	73	66
Vertical	46	54	61	64	59
Horizontal	43	40	44	48	45
Vertical AVG	91.3				
Horizontal AVG	98.6				
Recorder	Mr. Li Mr. Lv 2021.11.29 20:00				

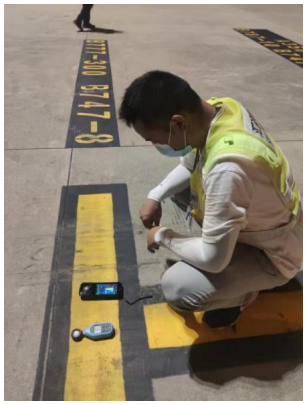
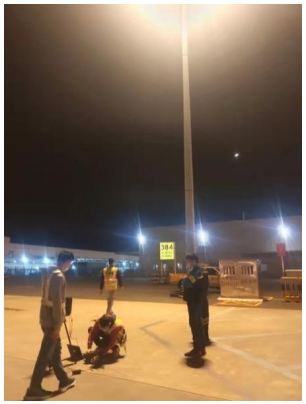
Shenzhen Airport Case Study: Reduction in Energy Consumption

The left diagram depicts the replacement of the current high-pole sodium lights (7,800 W) with more efficient 2,960 W Inno Energy LED lamps, resulting in improved ground illuminance (LX) performance. The right diagram illustrates how effective airport lighting control can further decrease power usage to 1,670 W.





Shenzhen Airport Case Study:
Real World Test Data

As per the Technical Requirements for Airport Apron Lighting Design, the average ground illumination must not fall below 30Lx. Inno Energy Lamps achieved an Average Vertical Illumination of 91.3 lx and a Horizontal Illumination of 78.6 lx.

In addition, Inno Energy Lamps received a maximum glare rating (GR) of 21, satisfying the Airport outdoor field lighting standard that requires a GR score within 50.

Shenzhen Airport Case Study: Emission Reduction

As an example, Shenzhen Airport, which handles over 50 million passengers annually, has 2 runways and 200 parking lots, has achieved the following benefits after installing Inno Energy LED lamps:

- Savings of 3.1 million kWh of electricity per year
- Reduction of Carbon Emissions by approximately 2,700 tons annually.

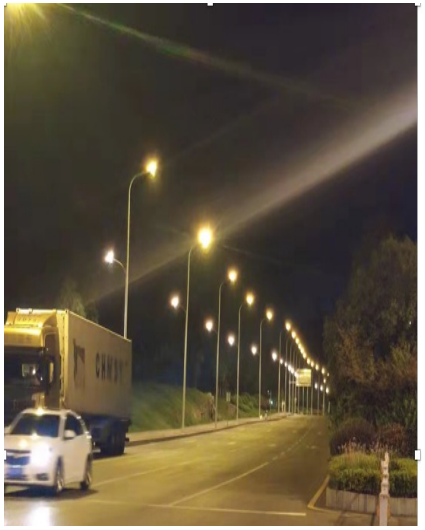
Other Applications

Airport Lighting

Reduction in Maintenance costs

Improved safety during operation

Contribution towards building environmentally friendly, "Green Airports" of the future.



Street Lighting

Decreased energy consumption and CO_2 emissions

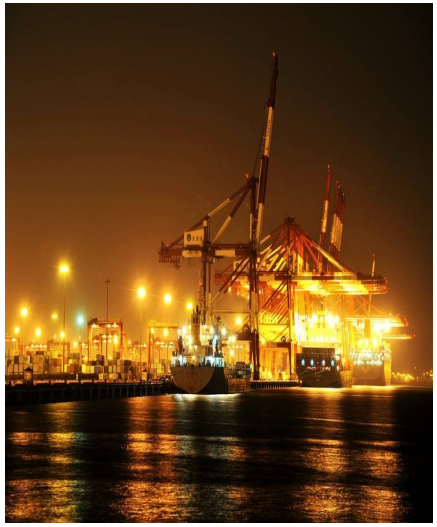
Promotion of a greener, more sustainable urban environment.

Port Wharf Lighting

2,700K Colour Temperature

Superior light penetration in rainy and foggy weather conditions

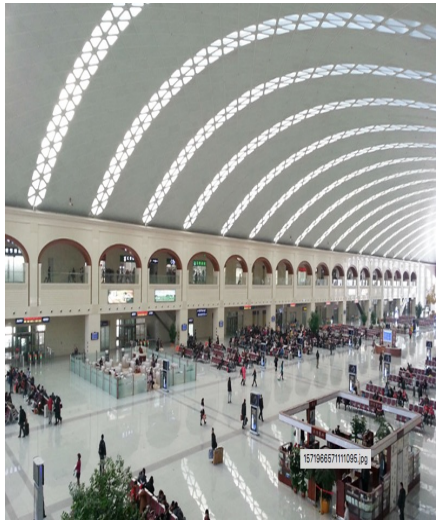
Reduced impact of weather on business operations.



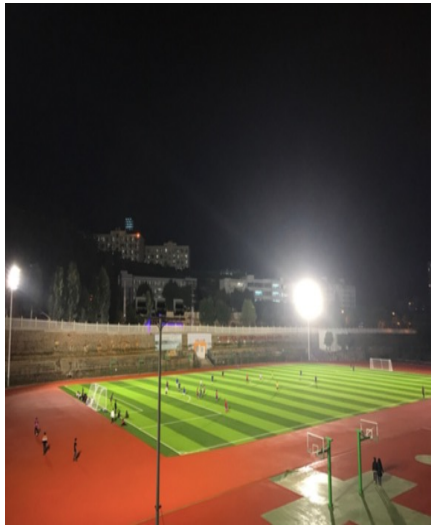
Railway Lighting

20% more Energy efficient than conventional LED lamps

Provision of a safe and comfortable lighting environment.



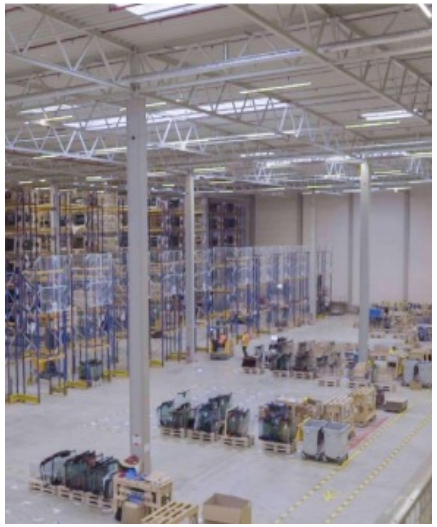
Other Applications



Stadium Lighting

Minimize light pollution

Direct light where it's needed, resulting in targeted and efficient lighting.



Enterprise Lighting

Lightweight design, which reduces the load on the roof and minimizes safety hazards.

Petrochemical Enterprise Lighting

Improves production efficiency by allowing for 24-hour operation

Decreases maintenance costs through reduced lamp replacements.

Combat Readiness Emergency Lighting

High Performance and Energy Efficiency

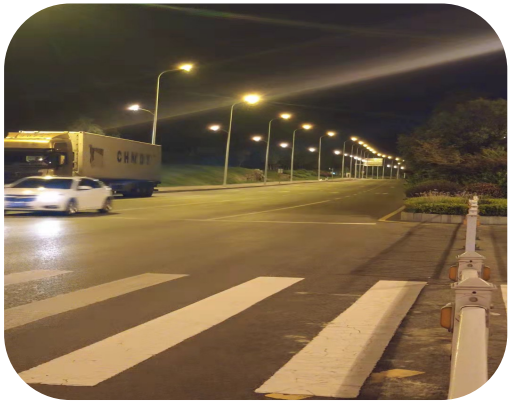
Lightweight and Small Volume

Long service life

Other Applications

Xiamen Cosco
Wharf

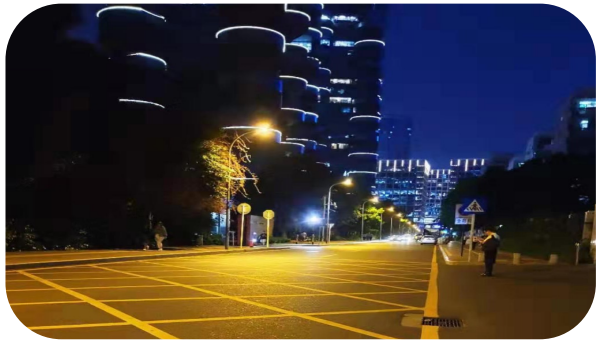
Shanghai Port Group
Baiyang Wharf



Guizhou
Bonded Area

American Tennis
Court

South Jiangsu
International Wharf



Nanshan District,
Shenzhen Province

Real World Application

No.	Location	Lighting Class
1	Tangqi Town, Hangzhou City, Zhejiang Province, Street Lighting	Road Lighting
2	Hongze County, Jiangsu Province, Street Lighting	Road Lighting
3	Zhejiang Province, Lin'an City Street Lighting	Road Lighting
4	Ruyang County, Henan Province, Street Lighting	Road Lighting
5	Fujian Province Qingkou Town Street Lighting	Road Lighting
6	Fujian Province Street Town Street Lighting	Road Lighting
7	Zhejiang Province Yaozhuang Town Street Lighting	Road Lighting
8	Shenzhen Longgang District Street Lighting	Road Lighting
9	Shenzhen Nanshan District Street Lighting	Road Lighting

Real World Application

No.	Location	Lighting Class
10	Guiyang Comprehensive Bonded Zone Street Lamp Energy-saving Renovation	Road Lighting
11	Huizhou City Boluo County Rongxi Road Street Lighting	Road Lighting
12	Chongqing Wharf Street Lamp Energy-saving Renovation	Road Lighting
13	Changqing Oilfield Plant Plant Lighting	Factory Lighting
14	Shanghai Port, Yichang, Baiyang Port	Wharf Lighting
15	Yichang Yunchi Port (Equipment Lamp)	Wharf Lighting
16	Ningxia Autonomous Region, Pingluo County Street Lighting	Road Lighting
17	Beijing Future Science City Park Street Lamp Renovation	Road Lighting
18	Luzhou National High-tech Zone Jiugu Avenue Street Lamp Energy-saving Transformation	Road Lighting

Inno Energy

Building a Greener Tomorrow.

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