Energy Efficiency Approaches at KLIA/ Malaysia Airports Sepang Sdn Bhd

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Basics Facts on Malaysia Airports Sepang Sdn Bhd

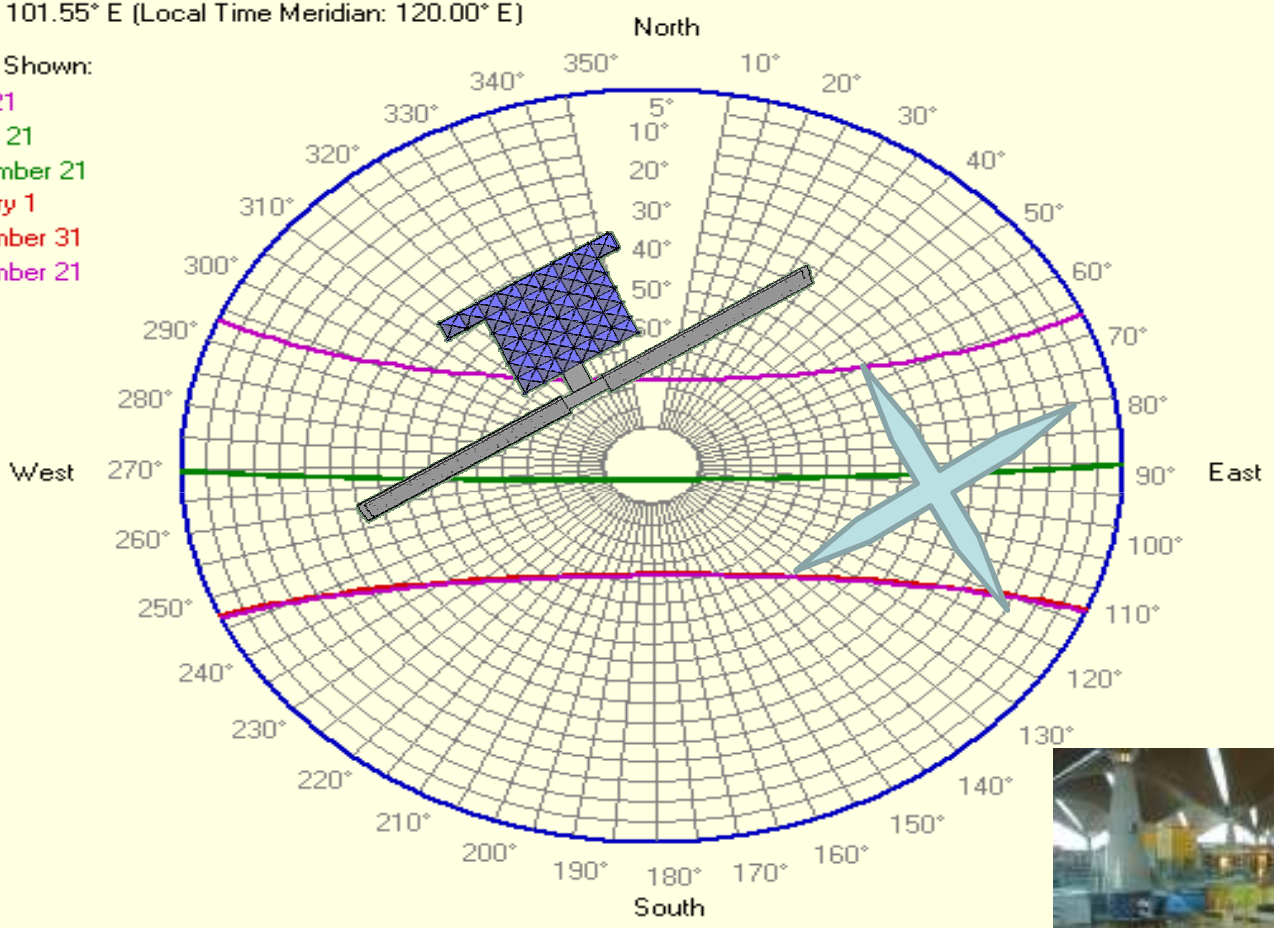
1. Subsidiary of Malaysia Airports Holdings
2. Distribution License 323 Holder including KLIA2
3. Energy overall usage > 20,000,000 kwh/month
4. 40 % energy are sold to customers.
5. 50% energy usage are in the buildings

KLIA Terminal Basic Facts

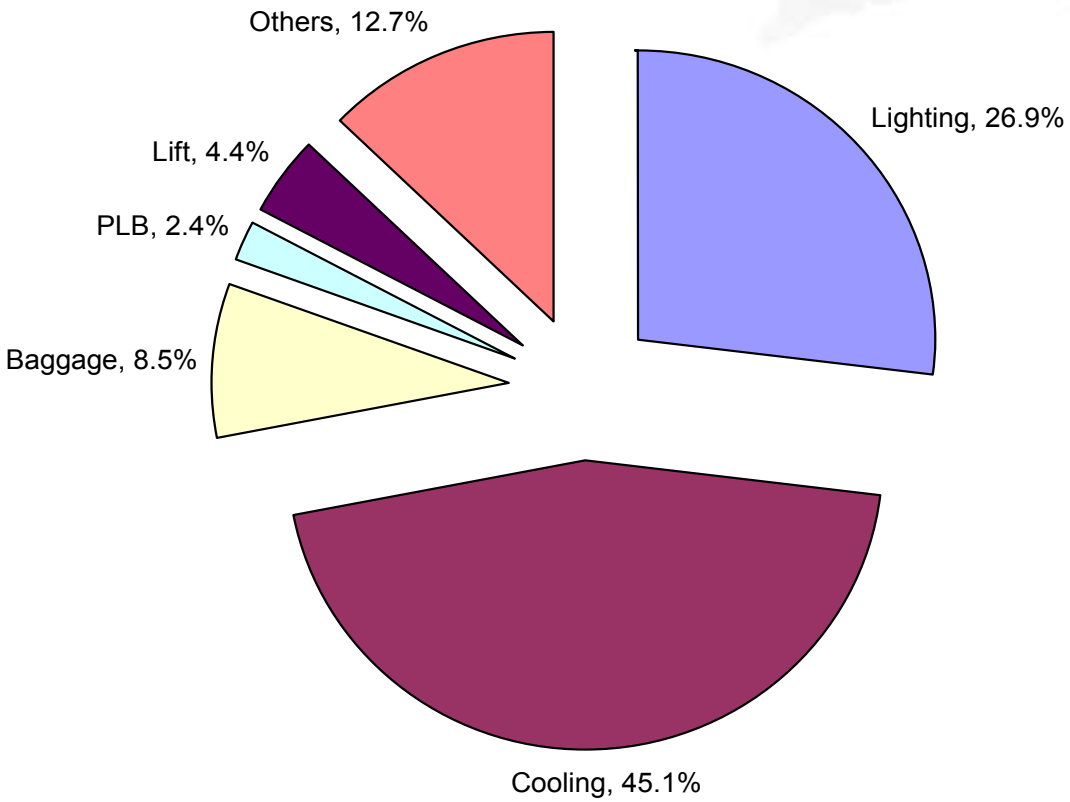
Passengers Capacity	**25 MPPA**
Total Gross Floor Area	336,016 meter^2
Overall heat transfer	Wall < 45 w/m^2 , Roof < 25w/ w/m^2
Lighting load	13W/m^2 (Average gross floor area)
Cooling Load	167W/m^2 (Average for 5 levels)
Peak Demand	15MW
Energy Usage Monthly	10,000MWh/Month (Average)
Energy Efficiency Index	AC area 230kwh/m^2/year (Based on 2000 operation hour/year
Maintenance Man Power	106,000 man-hr/year
Facility Operation	Utilization of BMS

Location: Kuala Lumpur/Subang
Latitude: 3.12° N
Longitude: 101.55° E (Local Time Meridian: 120.00° E)

Sun Paths Shown:
- June 21
- March 21
- September 21
- January 1
- December 31
- December 21



Load Balance For Malaysia Airports Sepang



Building Index

Energy Index based on occupied AC area and combination of the following Building type;

1. Office and library - 200kWh/m^2/year
2. Retail/Shopping Mall – 240kWh/m^2/year
3. Hotels - 300kWh/m^2/year
4. Hospital – 400kWh/m^2/year

Calculation and measurement 230kWh/m^2/year

Energy Management

The Team

Overall coordination:

Energy Management Unit MAHB

General Manager Of Engineering MA (Sepang)

Senior Manager Engineering MA (Sepang)

Resident Electrical Engineer MA (Sepang)

Manager Engineering MA (Sepang)

Auditing Team : REE MA(S) & EMU MAHB

Implementation Team: KLIA O&M Manager

Control & Monitoring Team: KLIA O&M Manager

Energy Management

Objective

To obtain clear understanding the energy profile, energy balance and KLIA Building Energy Index (on the operation of Air Conditioning and Mechanical Ventilation (ACMV), Lighting system, Passenger Loading Bridges (PLB), Baggage Handling System (BHS) in aspect of energy consumption.

To identify opportunity for energy saving of the audited system especially the no and low cost measures without compromising safety, operation and comfort level.

To Implement, Monitor and Further improvement on Energy Management Practices.

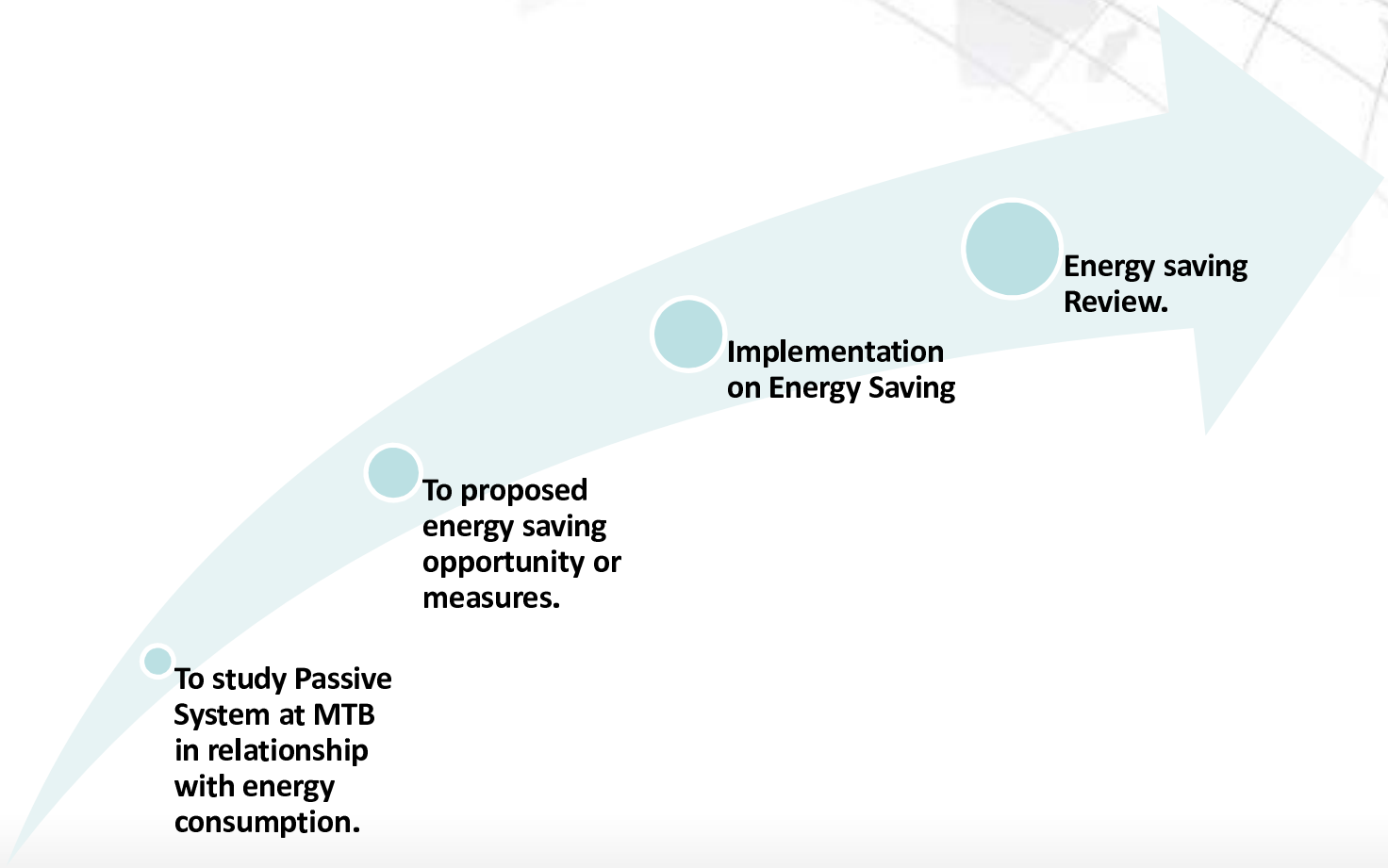
Energy Management

Scope of Work

- Determining Energy baseline and energy balance.
- Calculating Building Energy Index (BEI) for MTB and relevant services.
- Survey lighting and air conditioning comfort level at MTB.
- To study the lighting system level and usage as well as air conditioning system at Termnals and Anciliary Building.
- To study Electrical power trending or profile such as demand (kWh), power factor trending and ampere trending for motor at BHS and PHB.

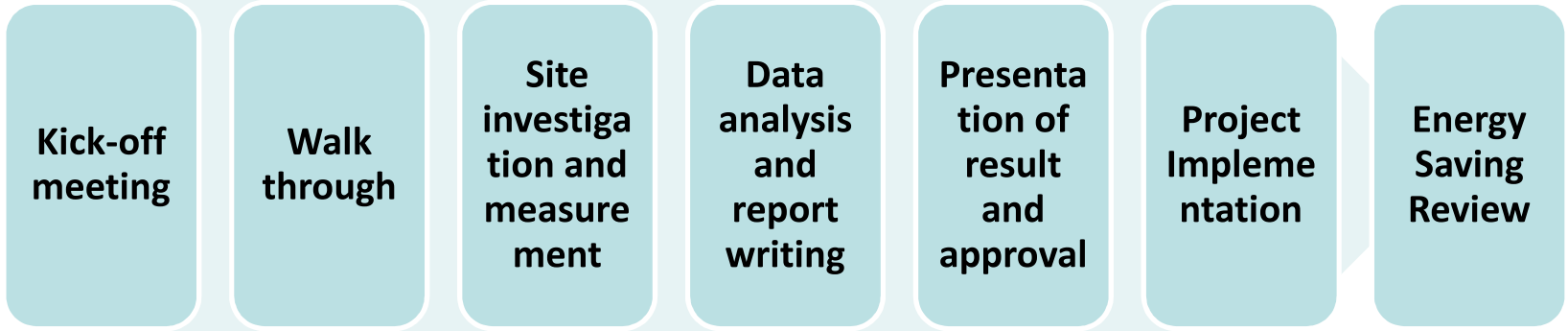
Energy Management

Scope of Work



Energy Management

Work Flow



Energy Management

The Load

KLIA/MA(S) uses more 100 million kWhr of energy every year.

This energy is used for a multi functions across the airport site including:

- **Cooling and ventilation (HVAC) of buildings**
- **Internal and external lighting including flood lighting**
- **Power supply to passenger related equipment such as PBB, BHS, escalators, lifts, check in system and information screens**
- **The track transit system (TTS) which transfers passengers between the MTB and satellite**
- **Approach, runway and taxiway lighting for runways**
- **Air traffic control related equipment**
- **Fixed ground power units to allow aircraft to plug into mains electricity rather than running their engines while on stand**
- **Engineering plant and equipment to support other utilities such as water supply pumps and fire hydrants**
- **IT equipment: computers, printers.**

Energy Management

Summary and Highlights

- The energy consumption has increased over the last 15 years since the main terminal was commissioned in 1998 and as passenger numbers have increased.

- In 2009, a study was conducted for energy consumption. This provided a breakdown of energy demand in key areas and buildings. We analysed energy consumption in 2007, 2008 and 2009, with 2008 being taken as reference.

- The major objective is to increase the efficiency of operations with the reduction of energy consumption . Therefore, delivering the efficient energy for growth of the airport is a challenge.

Energy Management

Energy Supply

- The majority of the energy supply to the airport is utilities feeding, which is transmitted via a distribution network. Other source of energy is solar.
- Energy consumption Electricity that mainly consumes at the terminal and satellites that contributing significant demand. Approximately 40% of electricity is consumed by our business partners who have premises and business in airport.
- Our previous study provided a breakdown of how energy is used in our main buildings. This showed that lighting and air-conditioning and cooling equipment were the main contributors to energy demand in the main public buildings . This study has helped us identify the areas of highest energy demand and supported the development of this strategy.

Energy Management

Energy Supply Behaviour

Energy consumption in the future will depend on a number of factors which we have to be considered in developing our strategy including:

- Increases in the number of passengers using the airport
- New infrastructure such as buildings, aircraft stands, car parks etc
- Efficiency measures and the implementation of effective controls

Energy Management

Metering System

All incoming and outgoing energy is metered through consumption meters and we use this information to monitor overall consumption as well as for financial tracking and forecasting. The tracking is on the monthly basis as per standard Energy management and control practices.

The best ways to control energy consumption is through our Building Management System (BMS). This controls equipment such as air handling units, air-conditioning temperature, and other cooling systems components and lighting in our main buildings.

Maintenance also plays a key part in ensuring that our assets operate effectively and efficiently. The scheduled maintenance programmes which will be regularly updated to ensure we are managing our assets effectively.

Energy Management

Activities in the pipeline

Replacement of assets with more energy efficient equipment.

Climate change (CO2) emissions as carbon dioxide is the primary contributor to climate change, we report on the CO2 emissions associated with our energy consumption on an annual basis.

Diesel is used in our standby generators which are only used in the event of disruption to our main electricity supply . Testing data is also recorded.

Energy Management

Mission Statement

We will review of our current and present engineering operation and maintenance, energy consumption across users in KLIA and an assessment of the potential for energy saving technologies and over the next five to ten years. This work has to work closely our present operation and maintenance approach to prioritising our strategy.

We will review and update this approaches to reflect developments in passengers movement, airport business and regulation, advances in technology and changes in airport infrastructure and operations. We will undertake a formal review of our strategy yearly.

This are the associated Action Plan with timelines for delivery and with key performance indicators to measure performance. We will regularly review our performance against these indicators and publish our progress in our monthly/ Annual Report.

Energy Management

Objective strategies

Our strategy for achieving this vision is to:

Reduce demand by energy efficient behaviours and optimising control of assets operation

• Invest in energy efficient and low carbon equipment and infrastructure: Where economically viable, we will invest in low carbon energy supply, energy saving technology, control techniques and building energy efficiency measures

• Implement effective monitoring and data management processes: Using accurate information on consumption and associated emissions to inform decision making and prioritisation

• Continually improve our performance: Taking account of best practice technologies and techniques, setting and tracking emission reduction targets, maintaining compliance and benchmarking our performance against national standards.

Energy Management

Reducing Demand

- Appointment of energy and environment champions for each unit and support them to identify and address inefficiencies and wastage.
- Deliver staff energy awareness campaigns and incorporate energy awareness into environmental training programmes.
- Devise and implement a targeted campaign to reduce 3rd party consumption across the airport (not metered)
- Proactively manage energy consuming equipment through our building energy management system and local controls that available
- Review our internal structures for energy management to ensure we have the right technical and management expertise in place
- Rationalise our IT infrastructure in order to maximise installation and use of built-in energy saving facilities

Energy Management

Investing in energy efficient and low carbon infrastructure

- Fully consider best practice energy saving technology and control techniques when replacing or refurbishing assets and when planning new buildings and refurbishment projects.
- Review opportunities for upgrading existing buildings and /or assets to establish whether energy saving technology could be installed to replace less efficient assets and equipment.
- Work with other airport companies to encourage the use of energy saving technology in their buildings
- Undertake a feasibility study into development of renewable energy supply infrastructure at KLIA/MA(S)

Energy Management

Implementing effective monitoring and data management

- Continue to implement plans for upgrading our metering infrastructure including installation of smart metering (AMRs) where appropriate.
- Commission or undertake more detailed analysis of consumption as required
-Proactively track and assess energy consumption
Continue to report energy consumption as part of our internal reporting processes to ensure we maintain our drive to reduce energy

Energy Management

Continually improving our performance

- Continue to monitor new legislation and energy policy and assess implications to the airport
- Continue to benchmark our energy performance against other airports and wider best practice standards
- Set annual consumption and emissions targets, Identify and work with partners, consultants, other airports and professional bodies to build our knowledge and expertise on energy and carbon saving technology
- Undertake a full review of our energy strategy 2016
- Continue to report externally on airport consumption and emissions and progress against this strategy in the annual Corporate Energy Saving Program 2013.xls

Thank you.