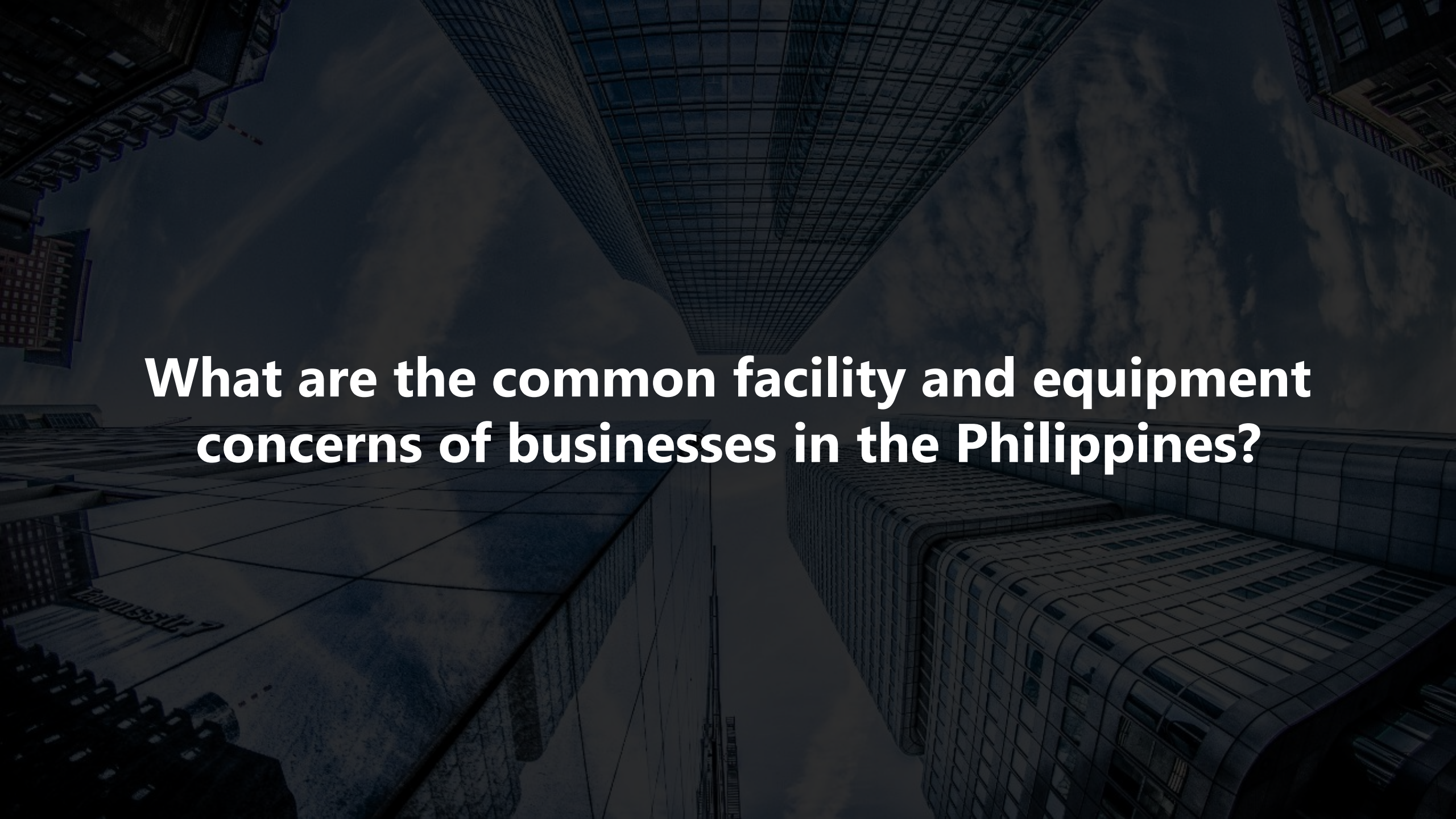




MERALCO
***M*SERV**

GEARING UP FOR
ENERGY EFFICIENCY
& CONSERVATION



What are the common facility and equipment concerns of businesses in the Philippines?



Businesses are facing multiple challenges in the built environment:

Underutilized facility equipment due to design

High energy consumption

Manual facility and equipment monitoring

Poorly maintained facility

Underutilized facility equipment due to design



**3 OF 4 BUSINESSES HAVE
UNDERUTILIZED
ELECTRICAL FACILITIES**

Source: Meralco

Operating at <70% Efficiency

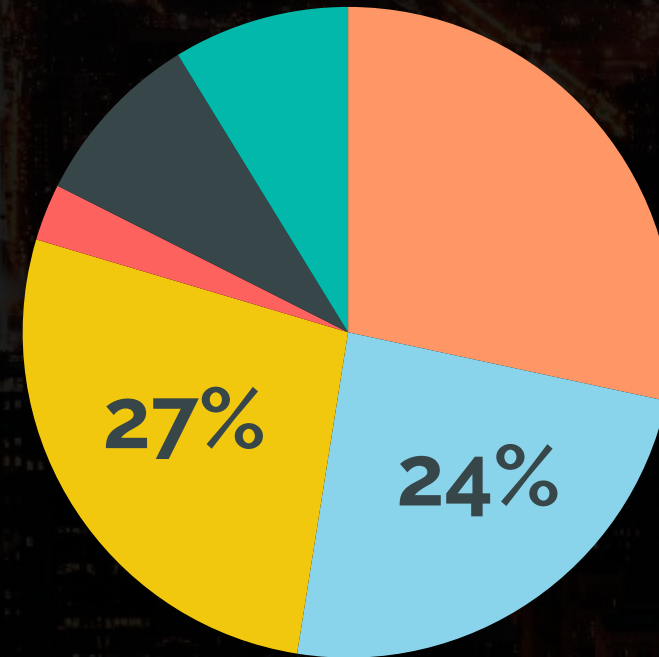
High energy consumption

Philippine Energy Market

The commercial and industrial sector account for 51% of the electricity consumption in the country, about 53,669 GWh in 2019

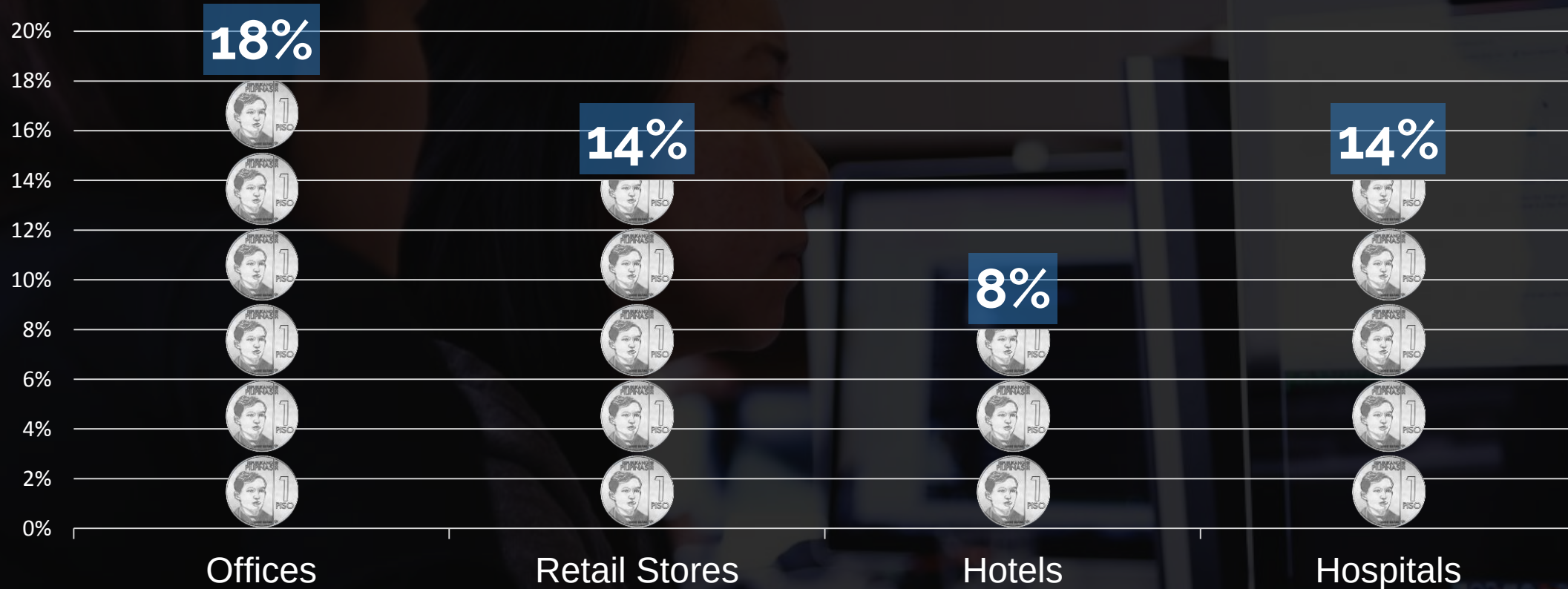
2019 Philippine Electricity Consumption

Category	Consumption (GWh)
Residential	30,551,604
Commercial	25,475,860
Industrial	28,193,978
Own-Use	8,929,107
Systems Loss	9,994,347
Others	2,896,602



Manual facility and equipment monitoring

AVERAGE POTENTIAL SAVINGS LOST WITHOUT BUILDING AUTOMATION



Source: American Council for an Energy-Efficient Economy

Poorly maintained facility

“Electrical equipment deterioration is normal, but equipment failure is not inevitable.”

“Dependability can be engineered and built into equipment, but effective maintenance is required to keep it that way.”

Source: National Fire Protection Association 70B



**The Energy Efficiency & Conservation (EE&C) Act or R.A. 11285
has been approved and the first submission is due by
April 2021.**

BREAKING NEWS

What's the latest news in Energy Efficiency?



In summary, the EE&C Act...

Requires



OBLIGATION

Enforces



MANAGEMENT

Provides



INCENTIVES

A low-angle, upward-looking perspective of several tall skyscrapers in a city, creating a sense of height and scale. The sky is filled with soft, white clouds. The image has a dark, moody color palette with a blue tint. In the bottom right corner, there is a stylized graphic element consisting of overlapping blue and white geometric shapes.

Are you ready for the EE&C Law implementation?

Compliance with the EE&C Law



Certified
Energy Manager or
Energy Conservation
Officer



Energy Management
Framework

Regular Monitoring,
Reports and
Compliance Audits



5 year Record
Consumption Data



Projects to improve
efficiency and
achieve targets



ENERGY EFFICIENCY SERVICES



AUDIT & ADVISORY

Energy Audit

Investment Grade Audit

Equipment Reliability Audit



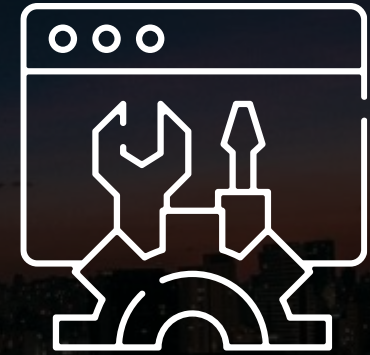
DESIGN & BUILD

Electrical

HVAC

Lighting

Automation



ENERGY MANAGEMENT

Retainer

Preventive Maintenance

Managed Services

Full ESCO



AUDIT & ADVISORY

ENERGY AUDIT

Baseline measurements for Energy Audit compliance and identification of energy conservation measures

INVESTMENT GRADE AUDIT (IGA)

Thorough and detailed assessment of all individual building equipment as feasibility of ESCO project implementation

SYSTEM / EQUIPMENT RELIABILITY AUDIT

Testing for equipment performance and power supply parameters including power quality and equipment functionality



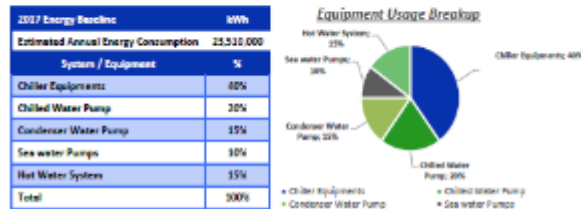
AUDIT & ADVISORY

Introduction

Energenc has performed a preliminary energy assessment at the central plant on 14 February 2018. The purpose of this assessment is to understand the system operation with the sight of identifying energy saving potentials in order to assist Klu Lok Plant achieve saving targets.

Energy Baseline

Energenc was not provided with electricity utility bills as requested; however, based on the information gathered during the walkthrough assessment and provided by the facility staff, an energy baseline was developed. An estimated breakdown of different energy use for major equipments is presented below:



Energy Saving Potentials

The summary table below illustrates the cost saving potentials identified. Detailed assessment is required to further improve the accuracy of the figures before proceeding to implementation.

EMO	System	EMO Description	kWh Saving	Cost Saving (HKD)	% Site Electricity savings	Total Project Cost (HKD)	SPB
1	HVAC WaterSide	CHW Pump Speed Optimization	481,000	\$541,000	2.1%	\$800,000	1.8
2	HVAC WaterSide	CDW Pump Speed Optimization	368,000	\$405,000	1.6%	\$750,000	1.8
3	HVAC WaterSide	Sea Water Pump Speed Optimization	184,000	\$101,000	0.7%	\$570,000	2.0
4	HVAC WaterSide	Automatic Chiller Staging	573,000	\$631,000	2.4%	\$1,080,000	1.7
Custom			Utilization of Monitoring based				

Energy Baseline

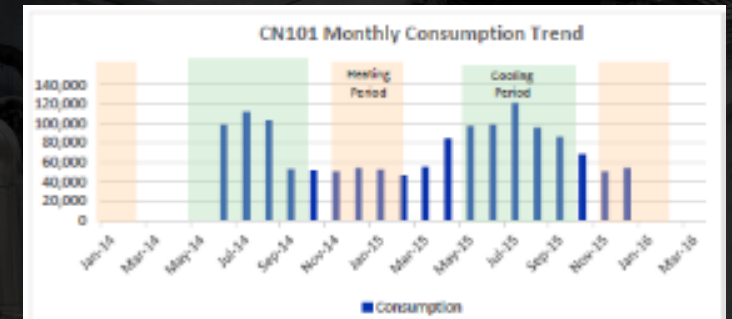
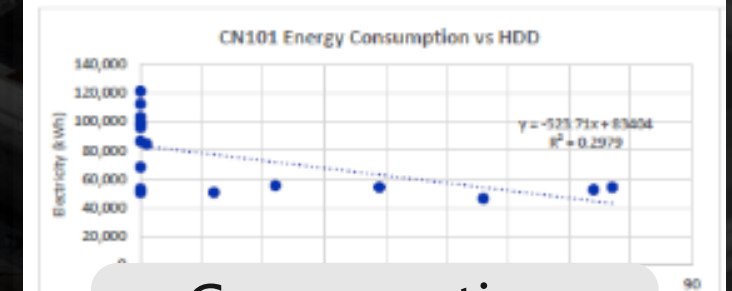
Table 9. Chillers summary						
Model	Qty	Make	Rated Cooling Capacity	Condenser Cooling	Refrigerant	Rated Input Power
YKDESQ65CKGS	3	York	1,407 kW	Fresh Water-Cooled	R134a	247 kW
YEW5100HA50E	1	York	352 kW	Fresh Water-Cooled	R134a	72 kW
Plant Total	4		4,573 kW			813 kW

Table 10. CHWP summary						
Equip. Code	Make and Model	Quantity	Motor Drive	Rated Input Power	Rated Flow Rate	Performance (W per L/s)
CHWP-T-1 to 4	Paco 29-4015-7 KP	4	Fixed speed	37 kW	67 L/s	552
CHWP-T-5	Paco 29-3014-5/6 KP	1	Fixed speed	15 kW	17 L/s	882
Total		5		163 kW	285 L/s	578 *

Table 11. Condensing water pump summary						
Equip. Code	Make and Model	Quantity	Motor Drive	Rated Input Power	Rated Flow Rate	Performance (W per L/s)
CWP-T-1 to 4	Paco 29-5015-9/0 KP	4	Fixed speed	37 kW	79 L/s	468.3
CWP-T-5	Paco 29-3014-5/6 KP	1	Fixed speed	15 kW	21 L/s	714.3
Total		5		163 kW	337 L/s	483.7 *

Table 12. Cooling towers summary						
Equip. Code	Make and Model	Qty	Motor Drive	Rated Input Power (Electrical kW)	Rated Heat Rejection Capacity (Thermal kW)	Cooling Tower rated performance (Thermal kW / Electrical kW)
CT-T-1 to 3	Marley NCB403RAN1	3	2 Speed	19.5/5 kW	1,652 kW	84.7/330.4
CT-T-4						700
Total						191

Equipment/
System Summary



Consumption
Trends



AUDIT & ADVISORY

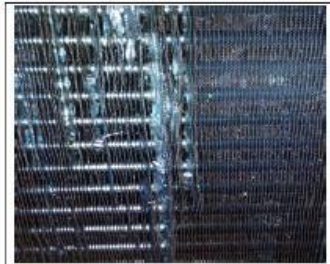
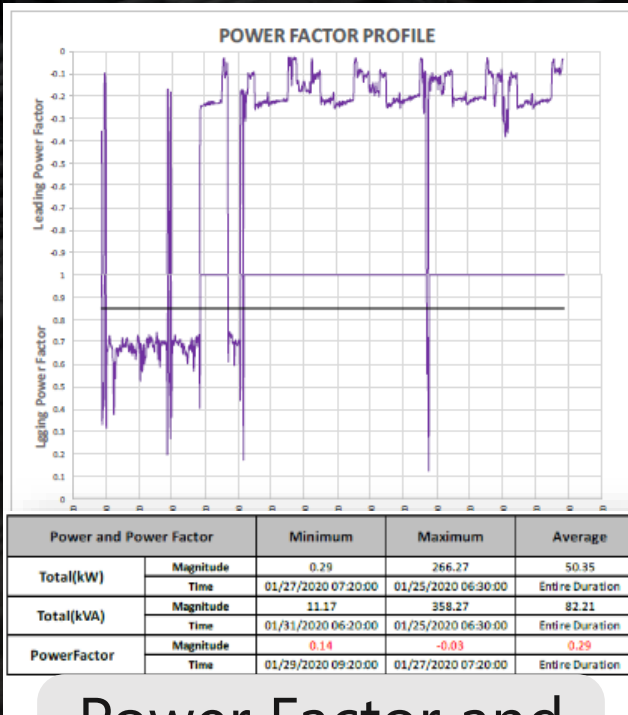


Photo No. 0036
Location Hallway
Caption Dilapidated Fins (Discharge Side)



Photo No. 0037
Location Hallway
Caption Fair Condition Fan Belt

Equipment
Condition



Power Factor and
Harmonics

Table 2. Summary of Energy Management Opportunities for HBM 228 Stores

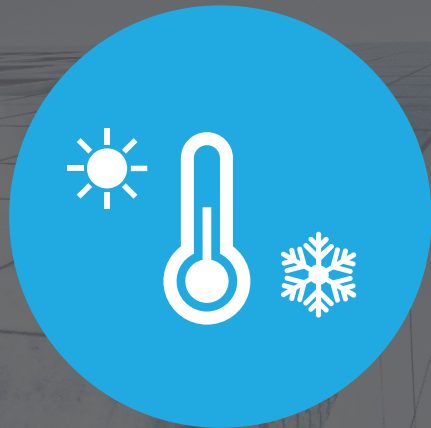
System	Description	Total Energy Savings (kWh)	Total Cost Savings (\$/yr)	Portfolio Savings (%)	Estimated Total Project Cost (\$/yr)	Average Simple Payback (yr)	Category by Simple Payback Year
Lighting	De-lamping sales area lighting	6,004,119	8,264,400	8.2%	257,000	Less than one year	Short-term
Lighting	Replace metal halide light with LED at sales area	5,619,065	7,866,800	7.7%	57,857,900	12.4	Long-term
Lighting	Replace halogens at BOH	114,471	265,700	0.2%	116,100	2.0	Short-term
Lighting	Replace T8 tubes with LED at BOH	850,307	1,181,300	1.3%	965,300	0.8	Short-term
Lighting	Replace T8 tubes with LED Sales Area	2,866,476	3,425,400	3.5%	5,480,300	1.6	Medium-term
Lighting	Apply occupancy control for stock room and office	96,176	115,600	0.1%	517,600	3.8	Long-term
Lighting	Apply dimming control for window side lighting	8,425	13,100	0.01%	117,600	9.0	Long-term
Lighting	Re-wiring 70% lighting circuit for separate control	1,307,744	1,673,900	1.8%	162,400	0.1	Short-term
HVAC	Replace AC fan with EC fan on FCU/CAU	1,302,879	1,713,500	1.6%	9,967,900	5.8	Long-term
HVAC	Review the temperature setting of VAV	158,710	286,400	0.2%	6,500	Less than one year	Short-term
HVAC	Review the operation time of FCU/VAV	177,814	306,100	0.2%	29,800	0.1	Short-term
HVAC	Fine-tune the temperature setting of A/C unit in IT Room	59,005	78,000	0.1%	33,900	0.4	Short-term
HVAC	Apply Demand Control Ventilation	264,446	510,100	0.4%	1,170,400	2.5	Medium-term
HVAC	Apply Variable Frequency Drive (VFD) control on AHU/PAU	124,839	172,900	0.2%	283,800	2.2	Medium-term

Energy Management
Opportunities

DESIGN & BUILD



ELECTRICAL



MECHANICAL



LIGHTING



AUTOMATION



ELECTRICAL

SOLUTIONS

High Efficiency Motors

Better built motors that consume less power and can adjust to variable load conditions

Sag Correctors

Protective devices that takes care of voltage fluctuations and momentary outages

Capacitor Banks

Electrical equipment used to counteract or correct the effects of inductive loads in the power factor

Harmonic Filters

Electrical equipment that limit harmonics that cause significant distortions in the system





MECHANICAL

SOLUTIONS

HVAC System

Energy efficient design of Chillers, AHU, FCU, Pumps, Cooling Towers including Oil-free Magnetic Chillers, VRF and VFD systems

District Cooling System

Central chiller plant and piping network to buildings

Inverter System

Energy efficient inverter technology AC units

Heat Recovery System

Utilization of waste heat to generate energy





LIGHTING

SOLUTIONS

LED Lighting

Latest lighting technology for improved energy efficiency

LED Streetlights

LED streetlights with dimming capabilities for maximum efficiency

Smart Lighting

Energy saving features such as automatic on/off, dimming and occupancy sensors





AUTOMATION

SOLUTIONS

MSERV Energy Management System

Detailed monitoring of energy consumption with alarms and notifications for errors of unusual consumptions

Building & Facility Management System

Integration of different systems of a building or multiple facilities into one Management Software for easy Monitoring and Control

Chiller Management System

Optimizes operation of plant room to improve energy efficiency performance

Lighting Management System

Automated Monitoring and Controlling Lighting fixtures





MSERV ENERGY MANAGEMENT SYSTEM (EMS)

Features & Benefits

Real-time data on consumption and equipment status

Management and analysis of data for proper actions and interventions

Automatic alarms and notification for unusual equipment performance

Centralized monitoring for multiple sites

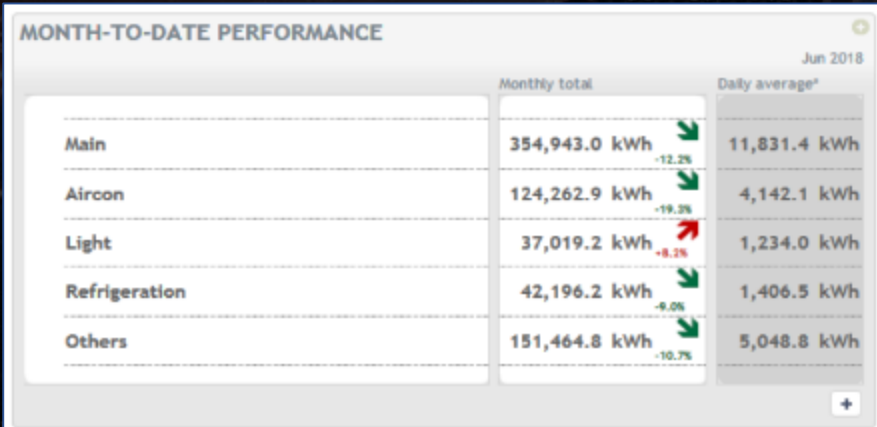
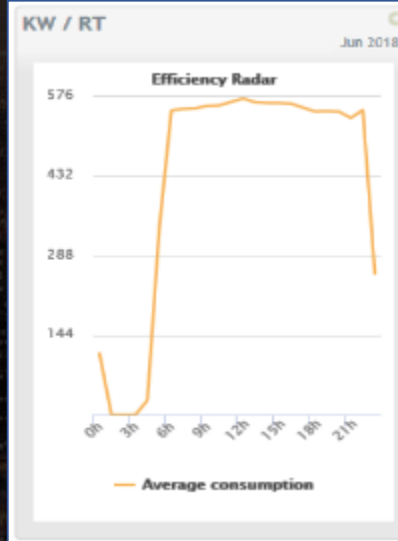
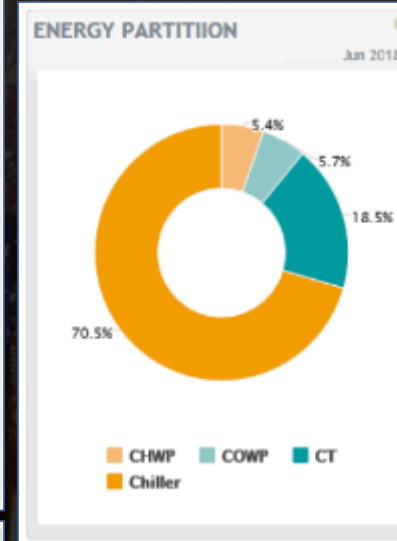
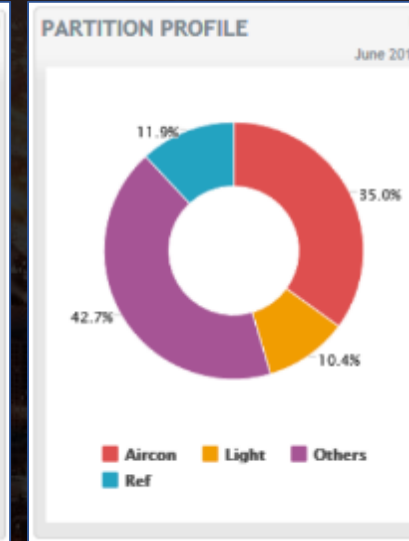
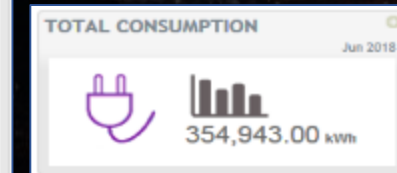
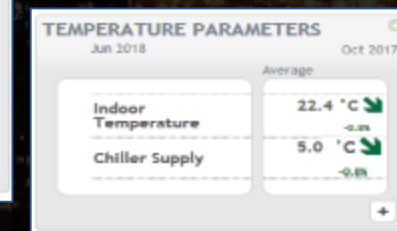
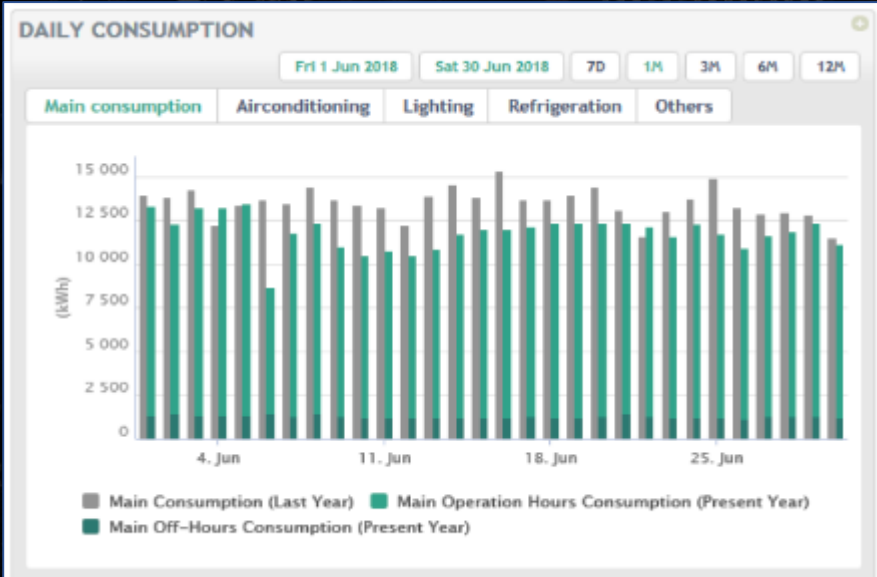
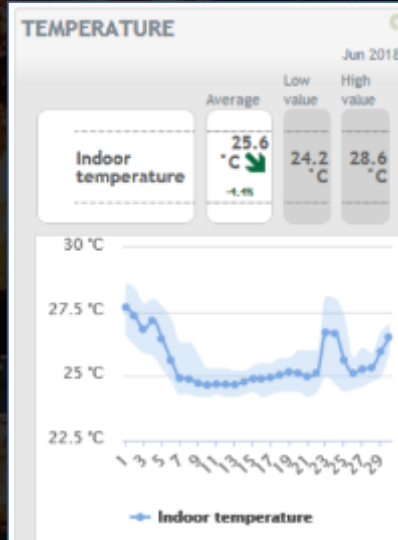
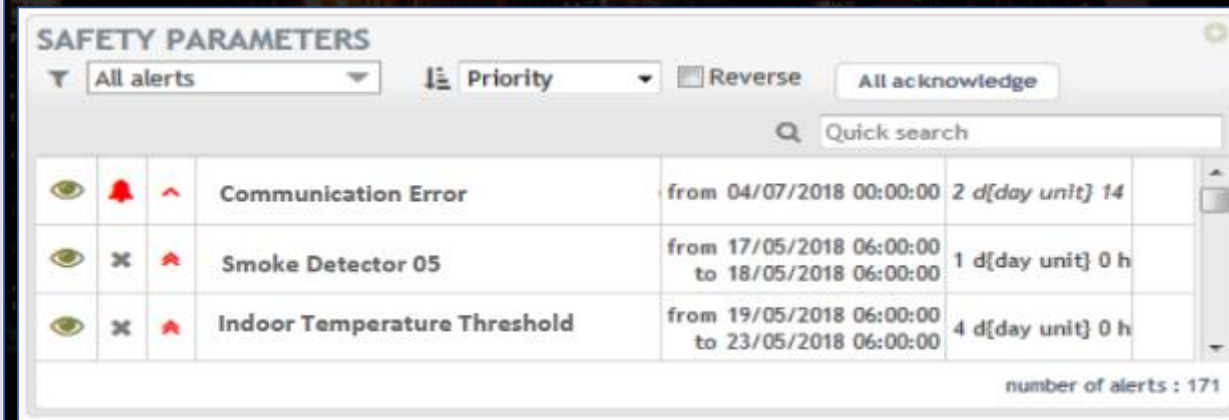
Integrates different building systems into one Dashboard
(electrical, mechanical, lighting)

Reduce operational manpower





MSERV ENERGY MANAGEMENT SYSTEM (EMS)





EMS KITS & APPLICATION

SMALL STORE KIT



1 Optical Pulse Reader
3 Current Sensors (for AC)
2 Temperature & Humidity

OFFICE KIT



1 Optical Pulse Reader
2 Power Meter (2 sets of CTs)
1 Indoor Air Quality
3 Temperature & Humidity

ELECTRICAL PLANT ROOM KIT

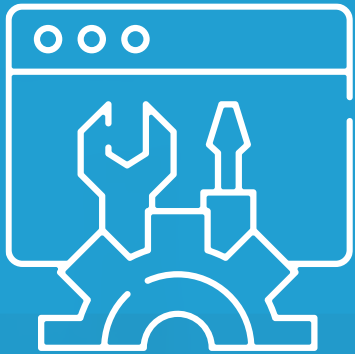


1 energyBox (concentrator)
1 Power Quality Meter
1 set of open CTs 2500A
2 Power Meter
2 set of open CTs 1000A

CHILLER PLANT ROOM KIT



1 energyBox (concentrator) (Bacnet & Modbus)
Temperature & Pressure sensor
Ultrasonic Flow Meter
Meter with CTs



ENERGY MANAGEMENT SERVICES

PREVENTIVE MAINTENANCE

*Scheduled Comprehensive
Preventive Maintenance*

RETAINER

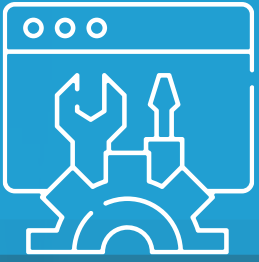
*Ensure compliance with
DOE and EE&C Law*

MANAGED SERVICE

*Daily operatorship and maintenance;
Provision of manpower & tools for daily operations*

FULL ESCO

*Managed Service
with Energy Performance Guarantee*



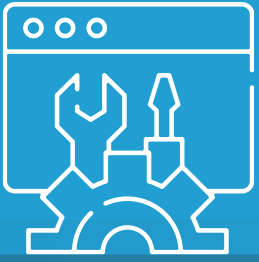
ENERGY MANAGEMENT WITH ANNUAL PM

PREVENTIVE MAINTENANCE

- Annual Preventive Maintenance of covered equipment
- Provision of experienced manpower, tools and testing van
- Annual PM report with findings and recommendations
- Power Quality Analysis

MSERV EMS SOFTWARE (Energy Analytics)

- Alarms and Notifications
- Automated Reports
- Metering
- Billing
- Power quality



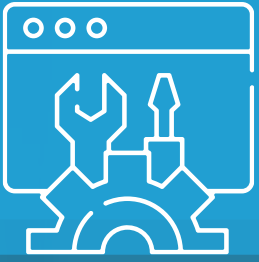
ENERGY MANAGEMENT WITH RETAINER SERVICES

MSERV EMS SOFTWARE (Energy Analytics)

- Alarms and Notifications
- Automated Reports
- Metering
- Billing
- Power quality

RETAINER

- Energy Audit
- Annual Preparation of required government reports
- Monitor compliance with government requirements
- Quarterly Energy Efficiency report and analysis
- Engineering and sustainability consulting



ENERGY MANAGEMENT WITH MANAGED SERVICES

MSERV EMS SOFTWARE (Energy Analytics)

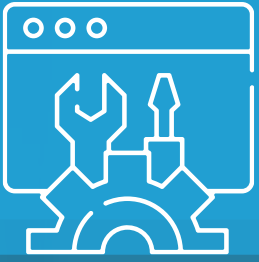
- Alarms and Notifications
- Automated Reports
- Metering
- Billing
- Power quality

RETAINER

- Energy Audit
- Annual Preparation of required government reports
- Monitor compliance with government requirements
- Quarterly Energy Efficiency report and analysis
- Engineering and sustainability consulting

MANAGED SERVICE

- Regular Operations and Preventive maintenance of equipment (daily, monthly, quarterly, annual)
- Power Quality Analysis
- Provision of required daily manpower, tools and consumables
- Regular O&M reports
- Service Level Agreement (downtime, emergency response time)



ENERGY MANAGEMENT WITH FULL ESCO SERVICES

MSERV EMS SOFTWARE (Energy Analytics)

- Alarms and Notifications
- Automated Reports
- Metering
- Billing
- Power quality

RETAINER

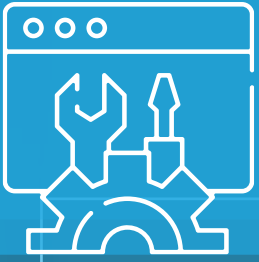
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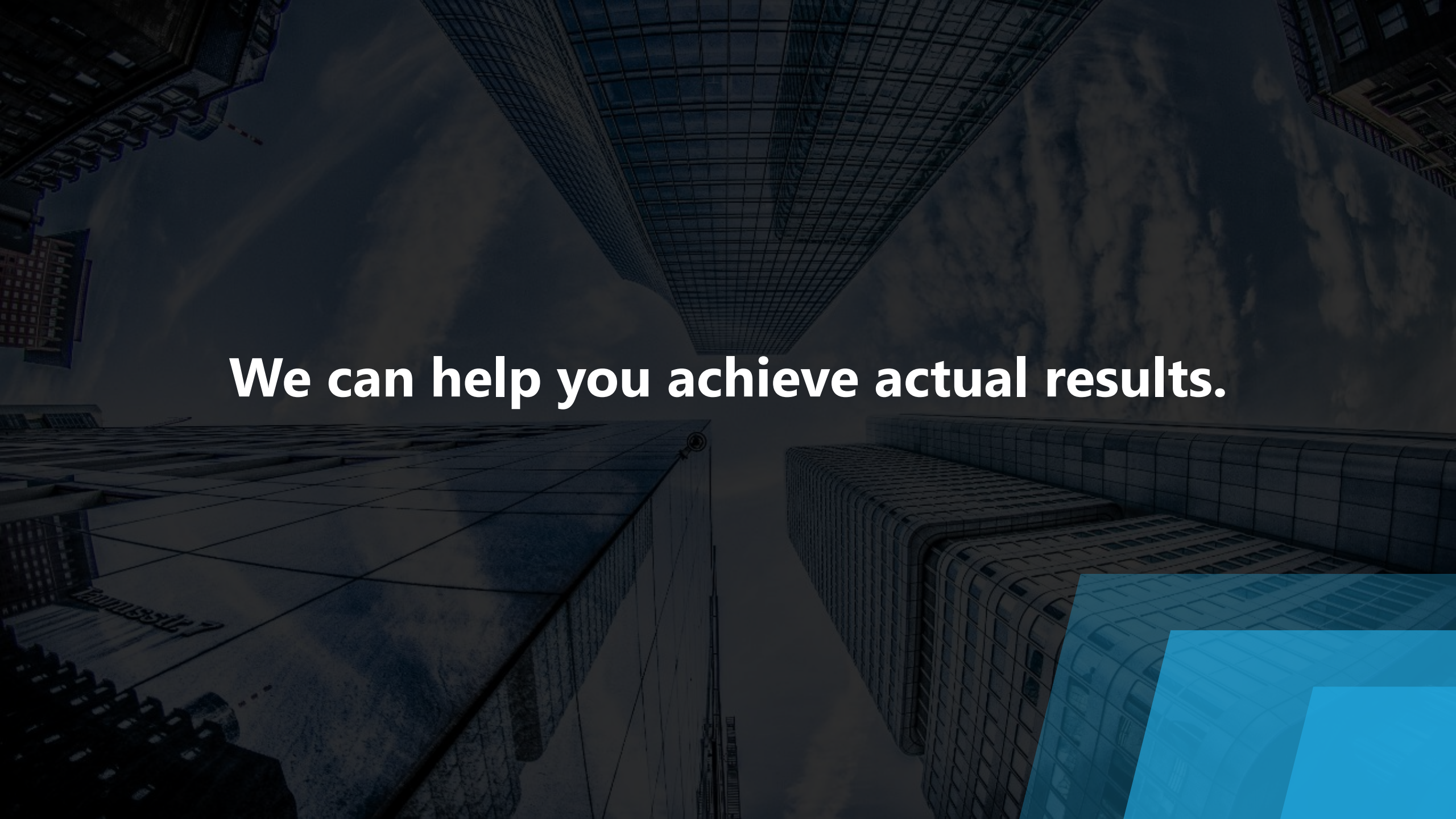
ESCO

- Design and Build of Energy Efficient systems
- Guaranteed Energy Performance
- Ensure working systems
- Financing options



ENERGY MANAGEMENT SERVICES

	Preventive Maintenance	Energy Retainer	Managed Service	Full ESCO
MSERV EMS Software (Energy Analytics)	✓	✓	✓	✓
Energy Audit		✓	✓	✓
Annual Preparation of required government reports		✓	✓	✓
Monitor compliance with government requirements		✓	✓	✓
Quarterly Energy Efficiency report and analysis		✓	✓	✓
Engineering and sustainability consulting		✓	✓	✓
Preventive maintenance of equipment	✓		✓	✓
Provision of required daily manpower, tools and consumables			✓	✓
Regular O&M reports			✓	✓
Service Level Agreement			✓	✓
Design and Build of energy efficient systems				✓
Guaranteed Energy Performance				✓
Financing options				✓

A low-angle, upward-looking perspective of several tall skyscrapers with glass facades, reaching towards a sky filled with soft, white clouds. The perspective creates a sense of height and scale. In the bottom right corner, there are overlapping semi-transparent blue geometric shapes, including a large triangle and a smaller square, which serve as a design element.

We can help you achieve actual results.



Insular Life Corporate Center

Chiller Plant Upgrade with CMS

From 1.32 kW/TR to 0.69 kW/TR

**~60% REDUCTION IN POWER
CONSUMPTION PHP 2M
SAVINGS PER MONTH**



Meralco BSC

Chiller Plant Upgrade with CMS

**~60% REDUCTION IN KWH
CONSUMPTION
~7.2M PER YEAR**



LED Lighting Replacement

Reduced lighting bill by 63%

**ANNUAL SAVINGS OF
~PHP14M**



Meralco

Lighting and HVAC efficiency audit in all business centers

Retrofit of lights and air-conditioning units

**REDUCED LIGHTING CONSUMPTION BY 33%
REDUCED AC CONSUMPTION BY 36%
ANNUAL SAVINGS OF ~PHP60M**

Republic Cement

Power Quality Audit

**~IMPROVED AVERAGE POWER
FACTOR FROM 81.96% TO 95%
~PHP 6.5M PER YEAR**





Robinsons Malls (10 sites)

Supply and Delivery of Oil-free Chillers

**MONTHLY SAVINGS OF PHP 1.1M ON
ELECTRICITY CONSUMPTION**



Robinsons Place Magnolia

Installation of CMS
(Chiller Management System)

**~15% REDUCTION IN
POWER CONSUMPTION**



City Gate Mixed-Use Development

EPC of Powerhouse - Supply and installation of transformer, MVSG, Transformer, Genset, Synch Panel, LVSG, cables and busduct

**20% REDUCTION (ESTIMATED
SAVINGS OF PHP 100M+) ON
OVER-ALL POWERHOUSE
CAPACITY (20.5 MVA TO
16.5MVA)**



Bonifacio
STOP OVER





Future-proof your business with energy efficiency solutions.