



A customer's technical guide to

ENERGY EFFICIENCY



This manual can quickly start your organization's journey towards energy efficiency. Most notably, you'll find cost-efficient strategies for managing electricity consumption with successful case studies. Very useful info to further improve your operations.



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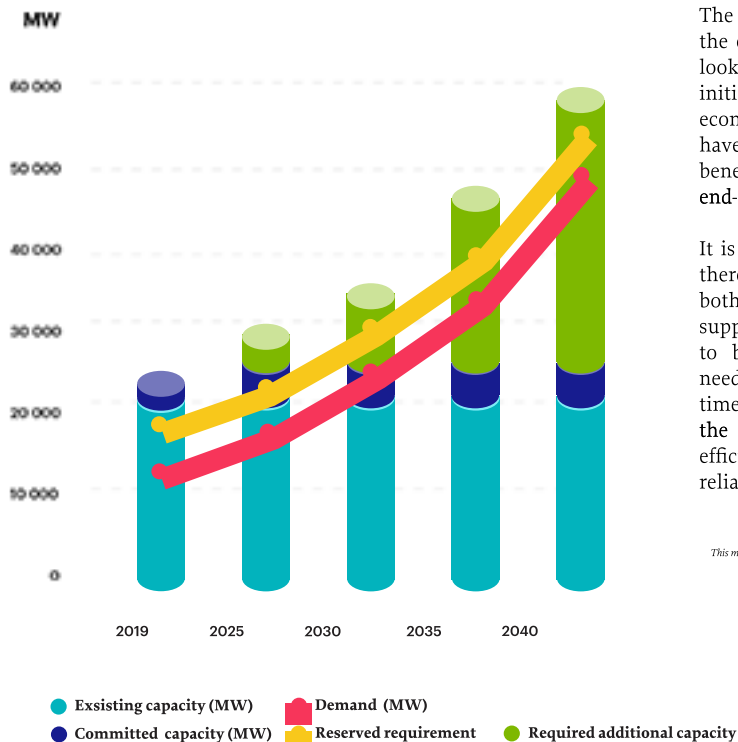


Power Situation in the Philippines

We use electrical energy every day, lots of it – to light up and cool our homes and office buildings; make products; and provide services indispensable to our daily lives – essentially, to power up an entire nation. But this energy is limited, and **may** run in excess, run short, or worse, run out.

As industries, businesses and population grow, so does energy consumption. Demand for electrical energy is expected to increase as the economy grows.

According to the Philippine Power Statistics and Situation Report¹ by the Department of Energy (DoE), demand in Luzon, where Meralco's franchise area is located, reached a peak 11,344 Megawatts in 2019, which is an 4.3% **growth** versus the previous year (2018); and at an annual average growth rate of 6.2% in the Luzon grid, demand for power will more or less double in the next 15 to 20 years.



The power industry is striving to meet the ever-growing electricity demand, looking for cost-effective ways and initiatives to address it. Fortunately, economical and efficient alternatives have emerged that are proven to be beneficial to both the utilities and end-users (customers).

It is important to note however that there should always be solutions from both the demand side (end-users) and supply side, and not just on one side, to balance meeting the end-user's needs for electricity while at the same time providing the power grid with the opportunity to improve system efficiencies for stability and reliability.

KNOW MORE ABOUT ENERGY EFFICIENCY

This manual offers up-to-date and cost-effective strategies for managing your electricity consumption. We hope that the following pages would inspire you to begin your journey towards energy efficiency.

¹ https://www.doe.gov.ph/sites/default/files/pdf/electric_power/2019_power-situation-report.pdf
<https://www.doe.gov.ph/sites/default/files/pdf/announcements/iloilo-a-b4-q2-power-demand-and-supply-outlook.pdf?c&attempt=1>



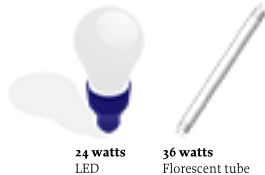
Why Energy Efficiency

While increasing power generating capacity is necessary, utilizing energy efficiently and responsibly is equally important. Energy efficiency contributes to sustainability – economic, social and environmental. With energy efficiency, we can **increase** energy savings and reduce costs; stimulate the economy; conserve resources; and ensure security of supply, while contributing to reducing our carbon footprint.

Recognizing the value and many benefits of energy efficiency, a landmark policy was put in place and signed into law on April 12, 2019 – Republic Act 11285 or the Energy Efficiency and Conservation Act. With this law, the Philippines now joins the many jurisdictions around the world that have an energy efficiency and incentive framework in place.

ENERGY EFFICIENCY IS A WIN-WIN FORMULA FOR THE CUSTOMER, THE UTILITY, AND THE NATION.

ENERGY EFFICIENCY



LUMENS OUTPUT = SAME



Energy Efficient Technologies produce desired outcomes with least amount of energy



The Energy Efficiency & Conservation (EE & C) Law

WHAT YOU NEED TO KNOW ABOUT THE EE&C LAW

The EE&C Law is our country's response to institutionalize energy efficiency as a national way of life, for all sectors of the society: commercial, industrial, transport and residential sectors. The Law will also promote and encourage the use of efficient **renewable** energy sources and reinforce related laws for a comprehensive approach to energy efficiency, conservation, sufficiency and sustainability.

DESIGNATED ESTABLISHMENTS

Energy intensive sectors or those consuming huge amounts of energy as identified by the Department of Energy (DOE), whether public or private, are considered as "Designated Establishments." The energy consumption of these sectors shall be calculated based on their aggregate energy consumption of all forms of energy like electricity and gas/fuel at their respective fixed locations.

Designated establishments are classified as either **Type 1, Type 2** or **Other Designated Establishments**

Classification Designated Establishments



Other Designated Establishment

100,000 kWh but less than 500,000 kWh



Type 1 Designated Establishment

500,001 kWh to 4,000,000 kWh



Type 2 Designated Establishment

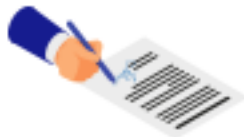
More than 4,000,000 kWh and higher

*Combination of Electricity and Fuel

Type 1 are those with an annual energy consumption of 500,000 kilowatt-hours (kWh) to 4,000,000 kWh for the previous year. Type 2 are those with an annual energy consumption of more than 4,000,000 kWh for the previous year.

Other Designated Establishments are those with an annual energy consumption of 100,000 kWh but less than 500,000 kWh. All other forms of energy aside from electricity will have to be converted to its energy equivalent in terms of kilowatt-hours (kWh) to determine their aggregate energy consumption.





DEPARTMENT CIRCULAR NO. 2021-01-0001

GUIDELINES FOR THE QUALIFICATIONS, ASSESSMENTS, REGISTRATION,
AND CERTIFICATION OF ENERGY CONSERVATION OFFICERS (CECO), ENERGY MANAGERS (CEM), AND ENERGY AUDITORS (EA)

REGISTRATION

(FOR TYPE I, II AND OTHER DESIGNATED ESTABLISHMENTS)

- Registration with the DOE allows for the monitoring and submission of reportorial requirements with the Department of Energy (DOE)
- Information required and other documents as may be prescribed by the Department of Energy (DOE):
 - Basic Information about company
 - Business activities
 - Name of corporate representative and energy manager or officer and their contact details
 - Address of each site of business activity that qualifies as a designated establishment
- Online registration
<https://bit.ly/DOE-Designated-Establishments>

ENERGY MANAGER OR OFFICER

(FOR TYPE I AND II DESIGNATED ESTABLISHMENTS ONLY)

- A designated establishment shall employ from among its employees, or hire in a retainer basis an energy manager or a conservation officer who shall have passed the required certification process
- For Type 1 – certified energy conservation officer (CECO)
- For Type 2 – certified energy manager (CEM)

PROFESSIONAL COMPETENCY

Certified Energy Conservation Officer
(CECO)

QUALIFICATIONS

- With at least two (2) years of continuous hands-on experience on the installation, operation, and maintenance of energy-consuming machines and equipment in facilities with energy consumption for Type 1 Designated Establishments
- Must pass the certification examination and assessment of TESDA prescribed for CECO.
- Continuously undergo EE&C seminars conducted by TESDA or third-party institutions

Certified Energy Manager
(CEM)

QUALIFICATIONS

- Must be a licensed engineer or a graduate of a four (4) year course or at least three (3) years of continuous hands-on experience on the installation, operation, and maintenance of energy-consuming machines and equipment in facilities with energy consumption for Type 2 Designated Establishments
- Must pass the certification examination and assessment of DOE
- Continuously undergo energy efficiency and conservation seminars conducted by DOE or any third-party institutions.

The Certificate Program for CECO and CEM is still under development and will be completed after 3 years.
For full details of qualifications for CECO or CEM, visit the DOE Website <www.doe.gov.ph>

The EE&C Law

KEY COMPLIANCE REQUIREMENTS



MEMORANDUM CIRCULAR 2020-05-0001

DIRECTING ALL DESIGNATED ESTABLISHMENTS
UNDER COMMERCIAL, INDUSTRIAL AND TRANSPORT
SECTORS TO SUBMIT ENERGY CONSUMPTION REPORTS

REPORTORIAL REQUIREMENTS

(FOR TYPE I AND II DESIGNATED ESTABLISHMENTS ONLY)

- ANNUAL ENERGY EFFICIENCY & CONSERVATION REPORT (AEER) - Form 3
 - Contains the designated establishment's EE&C plans/programs and annual targets among others
- ANNUAL ENERGY UTILIZATION REPORT (AEUR) - Form 4
 - Contains the designated establishments periodic energy use in terms of kWh and its specific energy consumption for the period of January 1 to December 31 of the previous year.
- Both reports are to be reviewed by the ECO or EM and electronically submitted to the DOE using the online submission portal.
- Note: Other Designated Establishments are required to submit an Annual Energy Utilization Report (AEUR)
- For more details on the content of the reports, visit <https://www.doe.gov.ph/laws-and-issuances/memorandum-circular-no-mc2020-05-0001>
- Online submission
<https://bit.ly/DOE-Designated-Establishments>



The EE&C Law

MINIMUM ENERGY PERFORMANCE FOR SECTORS

The Minimum Energy Performance for Sectors or MEPS refers to a minimum level of energy performance for the different energy intensive sectors – commercial, industrial and transport. The MEPS is a strategic approach to allow a **mechanism** of checking and tracking if each energy intensive sector is improving in their energy use and in due course, meet their prescribed energy performance.

The MEPS will ensure that each sector are doing everything they can to have appropriate and effective initiatives and action plans and contribute in meeting the objectives and goals of the EE&C law and ultimately reap its benefits.

The MEPS will be developed by the DOE, in consultation with relevant stakeholders, and guided by a cost-benefit-analysis. The MEPS is still in a work in process, and once completed, the DOE will release this for immediate adoption and enforcement.



Managing Energy Efficiently

SPECIFIC ENERGY CONSUMPTION

Specific energy consumption (SEC), also known as energy intensity index (EII) or energy utilization index (EUI), is the energy consumption in kilowatt-hour of all forms of energy, including renewable energy used within the premises divided by the volume required per unit of a product, service or any other indicator relevant to energy consumption. This “per unit” can refer to production volume, sales amount, transportation kilometer or floor space, to name a few.

SEC measurement can serve as a benchmarking tool to help gauge an organization’s performance by evaluating it against (1) its past performance, (2) the industry average, and (3) the best in the industry.

Hence, energy efficiency encourages businesses and industries to improve their SECs in order to remain competitive and profitable.

SEC is a required information in the designated establishment’s annual energy consumption reportorial submission to the Department of Energy (DOE).

$$\text{SEC} = \frac{\text{Energy Input (kWh)}}{\text{Unit of Product or Service}}$$

Industrial

Soft drinks
Manufacturing
Plants

kWh
Metric Ton of
Soft Drinks

Automotive
Vehicle
Assembly

kWh
No. of Vehicles

Paper
Manufacturing

kWh
Metric ton of Paper

Wood
Manufacturing

kWh
M³ of Wood

Commercial

kWh
Floor Area in m²

Offices,
Commercial
Areas

kWh
No. of Guests Served

Hotel

kWh
No. of Meals Served

Fast Food
Restaurant

kWh
Transactions

E-Commerce

The lower the SEC, the better
As the SEC decreases, this tells us that

- (1) We are using the least amount of energy for every service rendered or product produced, or
- (2) We are using the same amount of energy with improved service or increased production output.

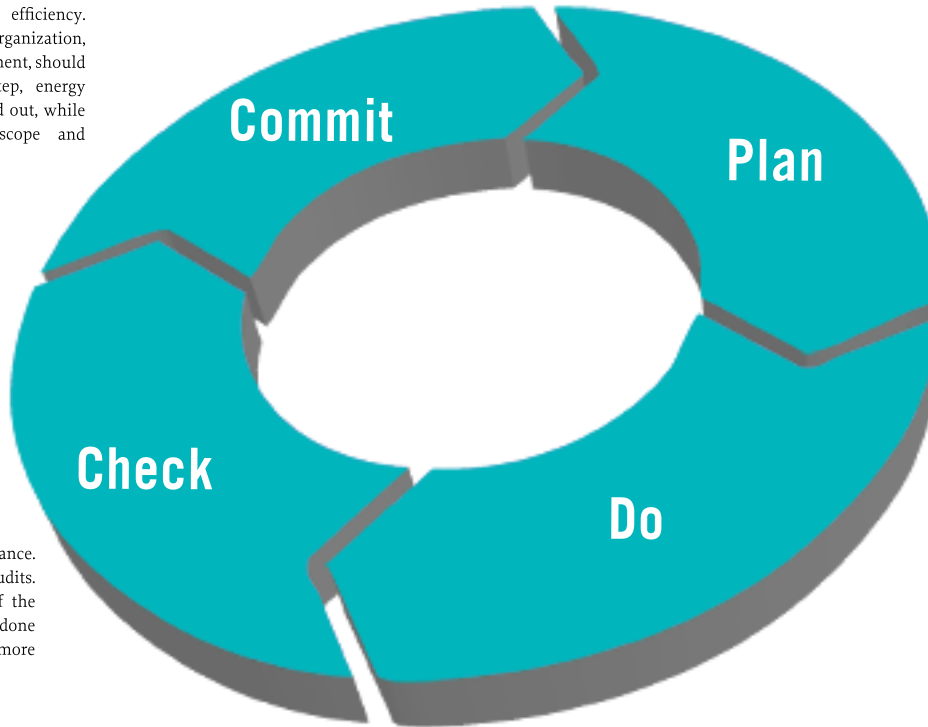
The SEC helps an organization or industry measure the energy required to produce their goods or services. Continuous improvement of the SEC increases efficiency in operations and profitability.



Quick Guide to Energy Efficiency

Commit to energy efficiency. Everyone in the organization, including upper management, should be involved. In this step, energy efficiency policies are laid out, while roles, responsibilities, scope and boundaries are defined.

Monitor energy performance. Carry out internal audits. Review plans to check if the measures can still be done better, faster and more cost-effectively.



Know more about your organization's energy consumption. Information gathering can reveal so many things about who uses energy, and why, where, when and how much energy is used in your organization. Analyze past, present and future energy use. Define baselines and performance indicators. Identify opportunities, as well as specific plans, to achieve desired goals.

Act on the plans in the timeliest and most cost-effective manner. This step also includes training, documentation, operational controls, design and procurement, as necessary.



Opportunities for Energy Efficiency

EFFICIENT PROCESS / BUILDING DESIGN SOLUTION

DESCRIPTION INVESTMENT

	ZERO	MINIMAL	INTENSIVE
BEHAVIORAL CHANGE	✓	-	-
PROCESS EFFICIENCY IMPROVEMENT DESIGN	✓	-	-
BETTER BUILDING DESIGN AND ENVELOP	-	✓	✓

EFFICIENT TECHNOLOGY SOLUTIONS

DESCRIPTION INVESTMENT

	ZERO	MINIMAL	INTENSIVE
LED TECHNOLOGY, SMART LIGHTING	-	✓	✓
INDUCTION HEAT TECHNOLOGY	-	✓	✓
INVERTER TECHNOLOGY / VARIABLE SPEED DRIVES	-	✓	✓
BUILDING / COMPOUND MANAGEMENT SYSTEMS	-	✓	✓
ENERGY CONSUMPTION MONITORING (i.e. ENERGY MANAGEMENT SYSTEMS, LOAD PROFILING, SUB-METERING, etc.)	-	✓	✓
HEATING, VENTILATION & AIR CONDITIONING - HVAC (i.e. DISTRICT COOLING, HIGH EFFICIENCY CHILLERS, COLD STORAGE SYSTEMS etc.)	-	-	✓
WASTE HEAT RECOVERY (i.e. CO-GENERATION, HEAT PUMP, etc.)	-	-	✓
HIGH EFFICIENCY MOTORS	-	-	✓
POWER FACTOR CORRECTION	-	-	✓

SUSTAINABILITY SOLUTIONS

DESCRIPTION INVESTMENT

	ZERO	MINIMAL	INTENSIVE
GOOD HOUSEKEEPING	✓	✓	-
REGULAR ENERGY AUDIT	✓	✓	-
PROPER EQUIPMENT MAINTENANCE	-	✓	-
RENEWABLE SOURCES	-	-	✓
ELECTRIC VEHICLES AND CHARGING STATIONS	-	-	✓

Improve your organization's energy efficiency and sustainability efforts with these proven solutions. Implementing some of them though may need the assistance of energy service companies (ESCOs) or other trade allies.

The Good News is – energy efficiency is widely available, with some proven measures requiring zero investment!



Case Study 1

MERALCO OPERATING CENTER

Solutions Implemented: Efficient technologies (High Efficiency Chillers, LED Lighting Technology)

The Lopez Building, a decades old landmark in the heart of the Ortigas Business District and the main office of Meralco, implemented cost-effective energy efficiency solutions and was able to save 51.6 kWh/m² in SEC, resulting in savings of P12 million per year, while recovering its investment in just 3 years. With these energy efficiency measures, Meralco has significantly reduced its power consumption, while continuing to provide its customers the best value in energy, products and services, and without sacrificing the comfort, convenience and productivity of its employees.

ENERGY EFFICIENCY MEASURES

	SOLUTION	DESCRIPTION	INVESTMENT	PAYBACK PERIOD
EFFICIENT TECHNOLOGIES	EFFICIENT LIGHTING TECHNOLOGY	CONVERSION OF LIGHTING TO LED	P 7M ++	1 YEAR
	HIGH EFFICIENT CHILLERS	UPGRADE OF EXISTING CHILLERS	P 33M ++	7 YEARS
TOTAL			P 40M ++	

AFTER ENERGY EFFICIENCY MEASURES

SEC

REDUCTION OF OVER
51.6 kWh/m²

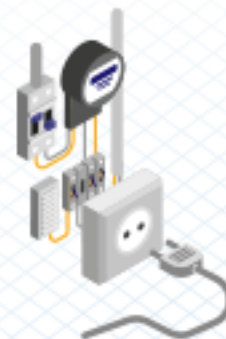
Before = 138.02 kWh/m²
After = 86.44 kWh/m²

Savings

AS MUCH AS
P 12,000,000
PER YEAR

Payback Period

IN JUST
3 Years



Case Study 2

SHOPPING MALL

Solutions Implemented: Efficient Operating Procedures, Proper Maintenance, Efficient Technologies, Improved Building Design and Envelope

A Meralco-client mall that implemented cost-effective energy efficiency measures was able to save over 10 kWh/m² in SEC, resulting in savings of as much as P9.6 million every year, while recovering its investment in just 2 months. With these energy efficiency measures, the mall has remained profitable and competitive, while continuously offering customers a convenient shopping experience.

ENERGY EFFICIENCY MEASURES

EFFICIENT OPERATING PROCEDURE

EFFICIENT TECHNOLOGIES

PROPER MAINTENANCE

IMPROVED BLDG. DESIGN AND ENVELOP

SOLUTION

DESCRIPTION

INVESTMENT

LIGHTING

- CONSTRUCTION OF ELECTRIC ENABLING CHANGE OF REQUIRED LIGHTING CONFIGURATION BASED SPECIFIC SCENARIOS

—

ESCALATOR

- PROPER SCHEDULING OF LIGHTING
- ACTIVATION OF ESCALATORS 30 MINUTES AFTER OPENING HOURS

—

CHILLERS SENSORS

- UPGRADE OF EXISTING SENSORS (I.E. DIFFERENTIAL PRESSURE SENSOR OF CHILLERS)

P50,000 ++

PUMP

- REHABILITATION OF PUMPS AND MOTORS

P200,000 ++

THERMAL INSULATION

- IMPROVEMENT OF THERMAL INSULATION

P800,000 ++

TOTAL P 1.05M ++

AFTER ENERGY EFFICIENCY MEASURES

SEC

REDUCTION OF OVER

10 kWh/m²

Before = 194.03 kWh/m²

After = 182.02 kWh/m²

Savings

AS MUCH AS

P 9,600,000

PER YEAR

Payback Period

IN JUST

2 Months



Case Study 3

MANUFACTURING PLANT

Solutions Implemented: Efficient Technologies

A Meralco-client manufacturing plant that employed energy efficiency measures was able to reduce over 0.1 kWh/kg in SEC, resulting in savings of as much as P70 million every year, while recovering its investment in just over a year. With these energy efficiency measures, the **manufacturer** has attained an improved manufacturing process, while reducing power consumption and increasing its profit.

ENERGY EFFICIENCY MEASURES

EFFICIENT TECHNOLOGIES	SOLUTION	DESCRIPTION	INVESTMENT
	VARIABLE SPEED DRIVES	<ul style="list-style-type: none"> REPLACEMENT OF AIR COMPRESSOR SHIFTED TO VARIABLE-SPEED DRIVE (VSD) 	P 2M ++
	HIGH EFFICIENT CHILLERS	<ul style="list-style-type: none"> SHIFTED TO CENTRALIZED WATER CHILLER FROM INDIVIDUAL WATER CHILLER PER MACHINE 	P 4M ++
	HIGH EFFICIENCY MOTORS	<ul style="list-style-type: none"> REPLACEMENT OF MECHANICAL EQUIPMENT SHIFTED TO SERVO MOTORS 	P 70M ++
TOTAL			P 76M ++

AFTER ENERGY EFFICIENCY MEASURES

SEC

REDUCTION OF OVER

0.1 kWh/m²

Before = 1.74 kWh/m²

After = 1.65 kWh/m²

Savings

AS MUCH AS

P 70,000,000

PER YEAR

Payback Period

IN JUST

1 Year



How Meralco can Help your Business

As a customer-centric organization, Meralco is a strong advocate of energy efficiency. Here are some of the ways we can help you in your journey towards energy efficiency and compliance to the EE&C Law:

PROGRAMS & EDUCATION CAMPAIGNS

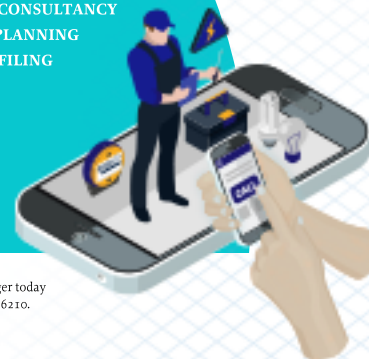
- POWER CLUB
- POWER IDEAS
- POWER UP FORUMS
- POWER LAB
- ORANGE TAG
- BRIGHT IDEAS
- MERALCO ADVISORY

PRODUCTS & SOLUTIONS

- PREPAID ELECTRICITY
- MERALCO ONLINE
- NET METERING
- RENEWABLE ENERGY SOLUTIONS
- PEAK-OFF-PEAK RATES PROGRAM
- CERTIFIED BY MERALCO (CBM)
- ELECTRIC VEHICLE & CHARGING SOLUTIONS
- ENERGY SERVICES
- END-TO-END URBAN SERVICES

SERVICES

- BUSINESS AND TECHNICAL CONSULTANCY
- STRATEGIC PLANNING
- POWER PROFILING



To learn more,
call your Meralco account manager today
or the Meralco business hotline 16210.

Glossary

Annual Energy Efficiency & Conservation Report (AEECR)

Refers to the establishments' energy efficiency and conservation plans, programs, activities and projects implemented and on-going including the target value of investment and savings or improvement in productivity in lieu of energy saving.

Annual Energy Utilization Report (AEUR)

Refers to the report of utilized energy starting from January 1 to December 31 of the previous year. AEUR will establish the baseline average energy consumption of the company as an entity and as part of the sector where it belongs.

Certified Energy Conservation Officer (CECO)

Refers to a professional who obtains a certification as a CECO after demonstrating high levels of experience, competence, proficiency, and ethical fitness in the energy management profession, and who shall be responsible for the supervision and maintenance of the facilities of Type 1 designated establishments for the proper management of energy consumption and such other functions deemed necessary for the efficient and judicious utilization of energy under the Act.

Certified Energy Manager (CEM)

refers to a licensed engineer who obtains a certification as a CEM after demonstrating high levels of experience, competence, proficiency, and ethical fitness in the energy management profession, and who shall be chosen by Type 2 designated establishments to plan, lead, manage, coordinate, monitor, and evaluate the implementation of sustainable energy management within their organizations.

Designated Establishments

Refers to a private or public entity in the commercial, industrial, transport, power, agriculture, public works, and other sectors identified by the DOE as energy intensive industries based on their annual energy consumption in the previous year or an equivalent annual index.

Minimum Energy Performance (MEP)

Refers to a minimum level of energy performance for energy-consuming products including appliances, lighting, electrical equipment, machinery, and transport vehicles that must be met or exceeded before they can be offered for sale or used for residential, commercial, transport, and industrial purposes;

Republic Act No. 11285 otherwise known as the Energy Efficiency and Conservation (EE&C) Act

Signed on April 12, 2019, it is an Act Institutionalizing Energy Efficiency And Conservation, Enhancing The Efficient Use Of Energy, And Granting Incentives To Energy Efficiency And Conservation Projects.



To learn more about how to manage your energy more efficiently,
Call 16210 or email us at
customercare@meralco.com.ph

