IEA-NBS Energy Statistics Training
Beijing, China

Measuring energy efficiency in residential / buildings sector

(Data collection in selected APEC economies

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Outline of Presentation

Energy efficiency collection in APEC

- Background
- APEC EE templates

Case economies

- Malaysia
- The Philippines
- Issues and Challenges

Energy efficiency collection in APEC

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Background

EGEDA starts collection of energy efficiency indicators in 2014

- Residential and Commercial sectors
- 1st trial, few submissions

In 2017, Templates were revised to include Industry and Transport sectors

- pre-filled templates with energy and macro economic data available in the APEC database
- Due in June

APEC EE Templates

Activity data

- Population
- GDP
- Dwellings
- Floor area
- Household consumption expenditure
- Employment
- Services value added, etc

Commercial and Public Services

- Space heating
- Space cooling
- Lighting
- Other building energy use
- Non-building energy use (e.g. street lighting)

Residential

- Space heating
- Space cooling
- Water heating
- Cooking
- Lighting
- Refrigerators / Freezers
- Other kitchen facilities
- Laundry facilities
- TV, PC entertainment
- Other energy use in residential

- *Pre-filled activity data were taken from international data providers (WB, UN, OECD), but most are available only in the economy*
- *Energy data (total only) APEC*

Case economies

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Malaysia

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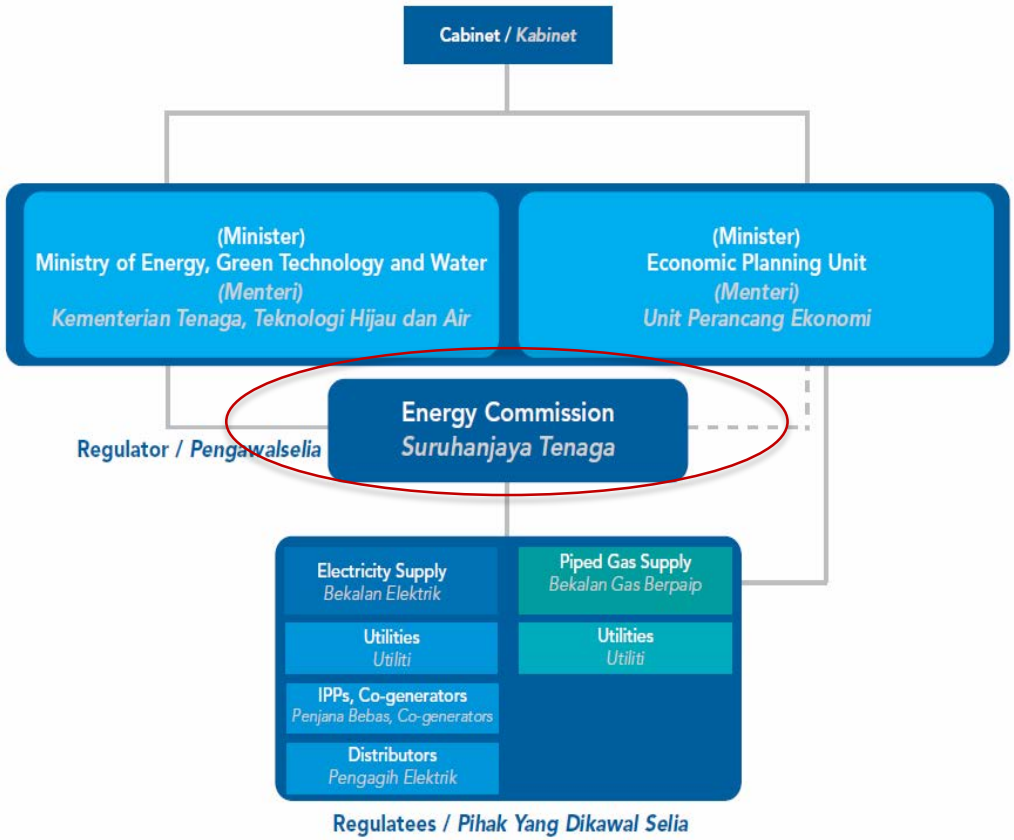
Regulatory structure



Electricity Supply Act 1990

- Regulation of electricity supply industry, including supply prices, licensing of electrical installations, safety of plant and equipment, and efficient use of electricity

Efficient Management Of Electrical Energy Regulations 2008

- Licensee or private installations to report electrical energy consumption of more than 3,000,000 kWh over 6 months to Energy Commission

Electricity (Amendment) Regulations 2013

- Minimum Electricity Performance Standards

- *Also known as **Suruhanjaya Tenaga**, statutory body under the Ministry Of Energy, Green Technology and Water Malaysia.*
- *Established in 2001 under the Energy Commission Act 2001.*
- *Regulate the electricity supply industry and piped gas supply industry in the peninsula and Sabah*

Energy efficiency framework

11th Malaysia Plan

Item	Target
Comprehensive long-term DSM master plan	Formulate policy and an action plan covering the entire spectrum of the energy sector including electrical, thermal, and use in the transport sector
Buildings	Achieve a target of 700 registered electrical energy managers (REEMs)
	Extend EPC to other government buildings
	Ensure all new government buildings adopt energy efficient designs; low carbon buildings
	Retrofit 100 government buildings
	Register 70 energy service companies (ESCOs)
	Target 100 companies to implement ISO 50001
Households	Encourage additional appliances with minimum energy performance standards (MEPSs) and extend existing labelling programme

ISO 50001 is a voluntary international standard to provide organisations with a recognised framework to manage and improve their energy performance.

Energy efficiency initiatives (1)

Sector	Scheme	Coverage
Buildings	Green Building Index Malaysia and MyHIJAU Mark (Voluntary)	
	Green Building Index	a profession-driven initiative to lead the Malaysian property industry to become more environmentally friendly;
	MyHIJAU Mark	official green labelling scheme endorsed by the government
	Uniform Building By-Laws (UBBL)	MS1525–Code of Practice on the Use of RE and EE in Non-Residential Buildings,
	Energy Performance Contracting for Government Buildings	government buildings may engage energy services companies (ESCOs) to improve energy efficiency

Leading by example

Low Energy Office (LEO)

- 1st showcase model in 2004 with Silver GBI
- BEI-100kWh/m2 annually
- CO2 reduction 56%

Green Energy Office (GEO)

- 1st certified green building (GBI-Certified)
- BEI-65kWh/m2 annually
- Solar Energy - 35kWh
- CO2 reduction 86%

The Diamond Building

- with a BEI of 85kWh/m2 per year at 2,800 hours usage - a 65% reduction in energy consumption; Platinum cert

Energy efficiency initiatives (2)

Sector	Scheme	Coverage
Residential	Minimum Energy Performance Standards	Minimum level of energy performance for appliances, lighting and electrical equipment
		currently covers five major household appliances
	Energy Efficiency Labelling and Rating	Introduced in 2005 on voluntary basis
		All equipment that meets the energy efficiency requirement (2-5 stars; 5 stars being the highest)
	Save program	Launched in 2011 to increase the number of energy efficient electrical equipment/appliances
		Purchases of refrigerators, air conditioning and energy efficient chillers get a rebate of RM100-200

Measuring energy efficiency (1)

Efforts	Description
Building Energy Index (BEI)	Launched in 2009, a measurement on the total annual energy used in a building in kilowatt hours (kWh) divided by the floor area in square meters (m^2).
	The GBI of a typical office building in Malaysia is 210kWh/m2 per year.
	Covers Non-residential New Construction (NRNC) and Existing Building (NREB); with GBI classifications* as: ▪ 86+ points (Platinum) ▪ 76 to 85 points (Gold) ▪ 66 to 75 points (Silver) ▪ 50 to 65 (Certified)
Survey on Energy Consumption in Residential Sector	Conducted in 2015 with 2,000 samples using stratified random sampling
	Energy consumption in households are categorized by fuel type (natural gas, LPG, electricity, etc) and 5 end-uses (space cooling, water heating, lighting, cooking and appliances)
Commercial Energy Consumption Survey	Survey on 12 main service sub-sectors cross-referencing with data from energy suppliers
	Consumption data of 7 fuel types and four end-use consumption (space cooling, water heating, lighting and other equipment)

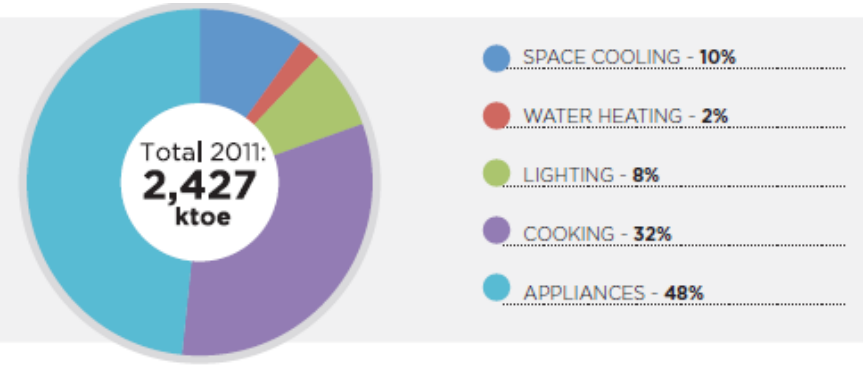
*Ir Leong Siew Meng presentation in 2nd Meeting of ERIA Research Projects 2016, 22 March 2017

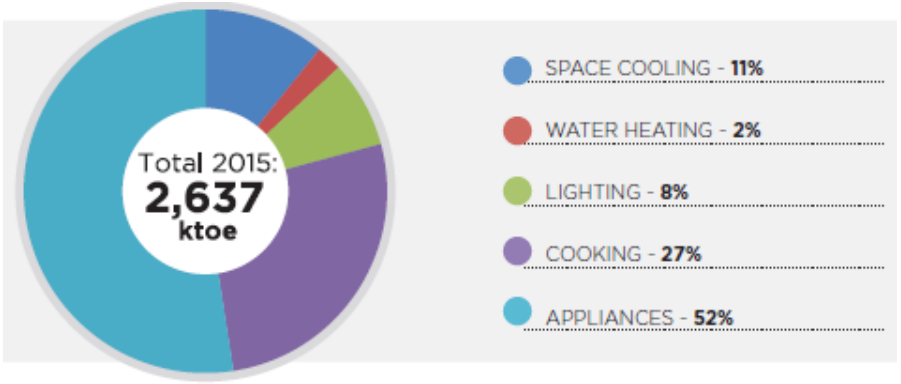
Measuring energy efficiency (2)

Result of the Residential Energy Consumption Survey

The survey, covering the period 2011-15, gives Malaysia understanding on the consumption patterns in the residential sector

- Electricity accounted for 80% of energy consumption, distributed evenly among the four regions of Peninsular Malaysia; while LPG has a slightly bigger contribution in the central region.
- Appliances, which has a wider coverage, formed the bulk of end-use demand (50%), followed by air conditioning.





Results of the commercial survey is still being tabulated

Data processing, reporting and dissemination

- Energy Information Unit (Energy Commission)
  - Custodian and focal point for Malaysia's energy data;
  - Produces the Energy Balance Table (from 2010)

Data are posted via MEIH

- Disseminated via official reports & publications;
- National Energy Balance (annual)
- Performance & Statistical Report for Electricity Supply Industry (annual)
- Statistics Handbook

The Philippines

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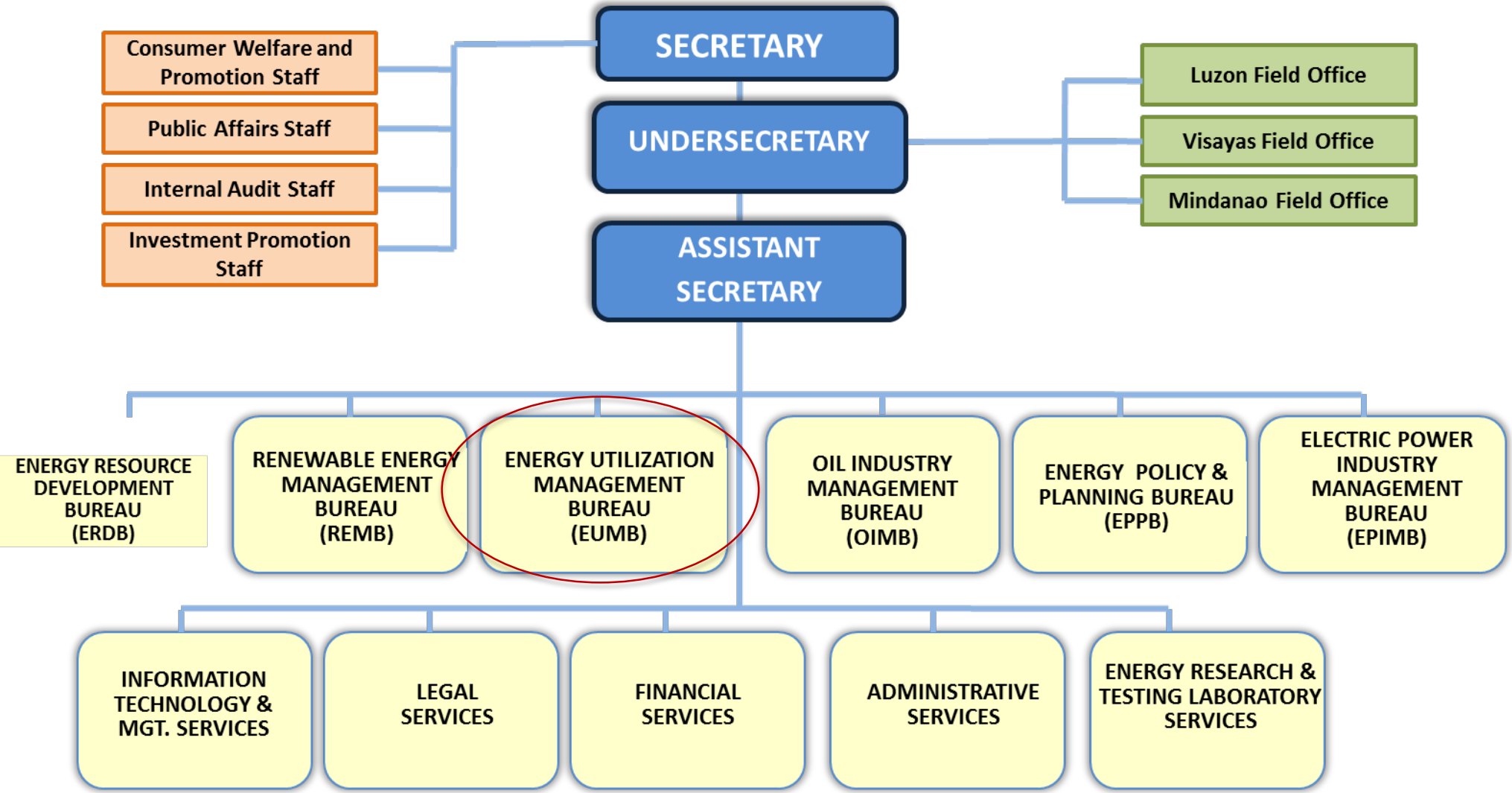
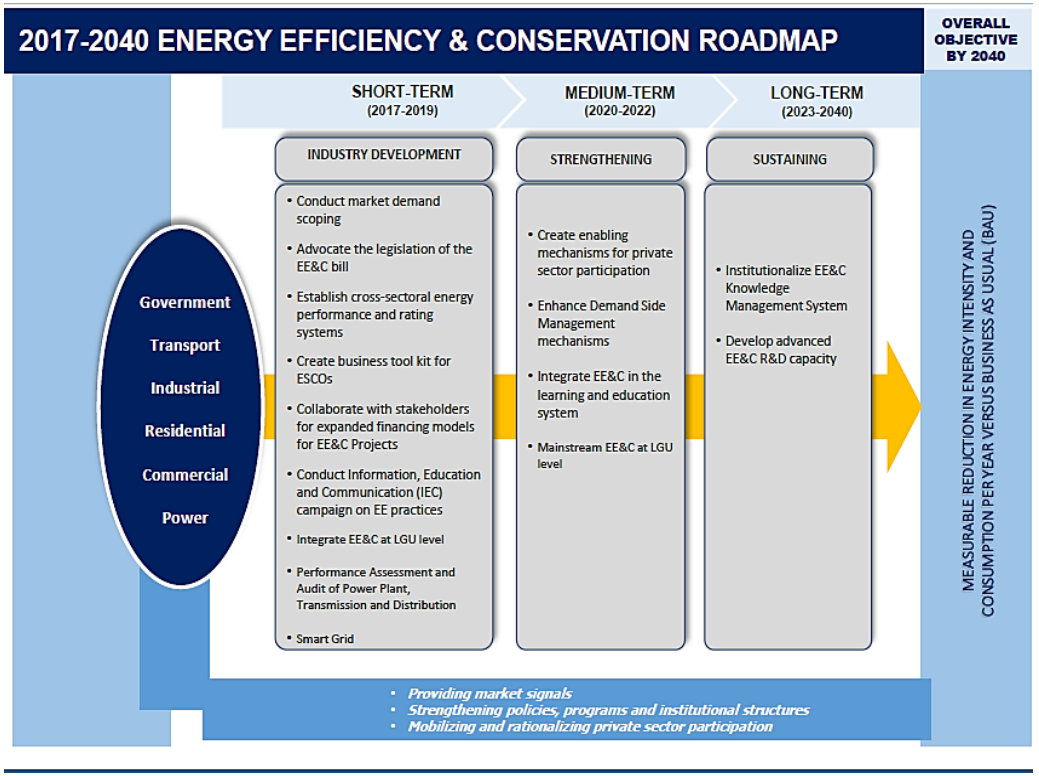
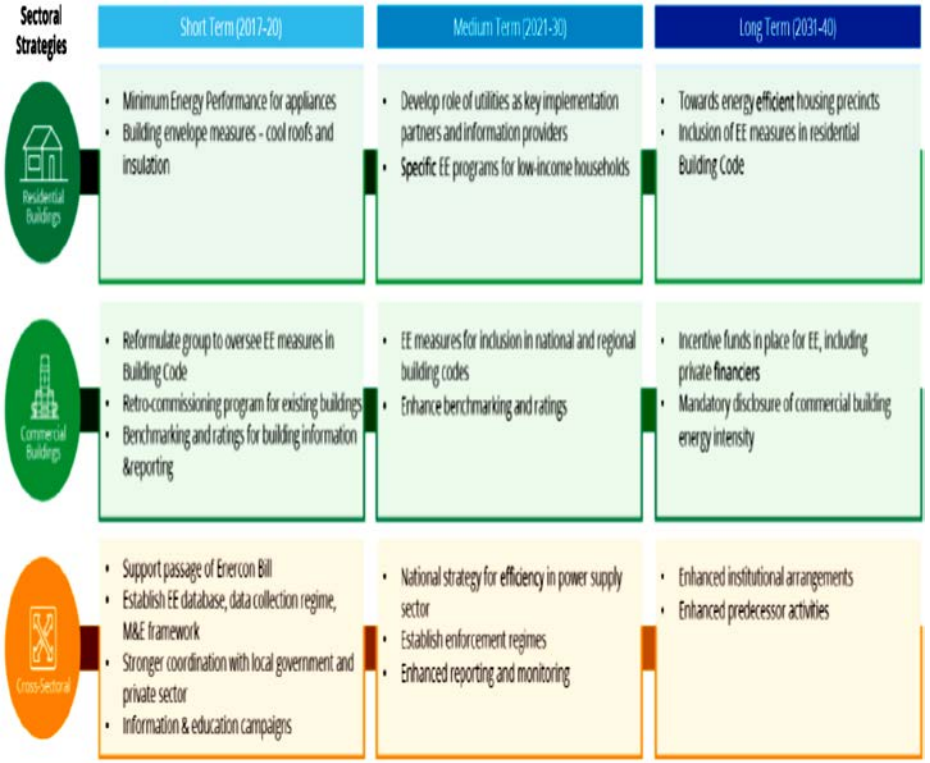
DOE organizational structure



Energy efficiency framework

Philippines Energy Efficiency Roadmap, 2017-2040

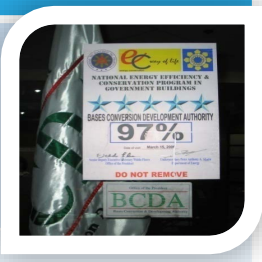




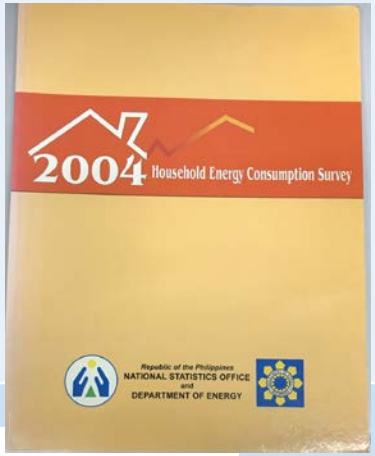
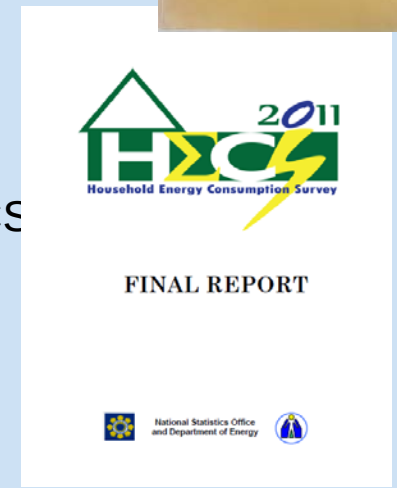
Economy-wide energy efficiency reduction target:3% by 2040 from 2017 levels

Source: DOE Philippines website

Energy efficiency initiatives

Sector	Scheme	Coverage
Buildings	Government Energy Management Program(GEMP)	Launched in 2005, a mandatory government directives to all government agencies to reduce fuel and electricity consumption by at least 10% 
	Government Buildings Efficiency Program	Strengthen and extend the GEMP and aims to develop guidelines for government procurement of energy efficiency services; Develop model ESCO procurement
	Building Codes Program	Aims to provide EE training for LGUs and DOE input to Green Building Code
	Building Information and Ratings Program	Mandatory disclosure of performance ratings on sale or lease of buildings; Annual performance tool-benchmark
Residential	Standards and Labeling Program	For household appliances and lighting products 
	Behavioral Information Program (IEC)	Awareness on billing information and pre-paid billing; housing designs (insulation and cool roofs)
Public Facilities	Promotion of Energy Efficiency Lighting Technology in Public Facilities	

Measuring energy efficiency (1)

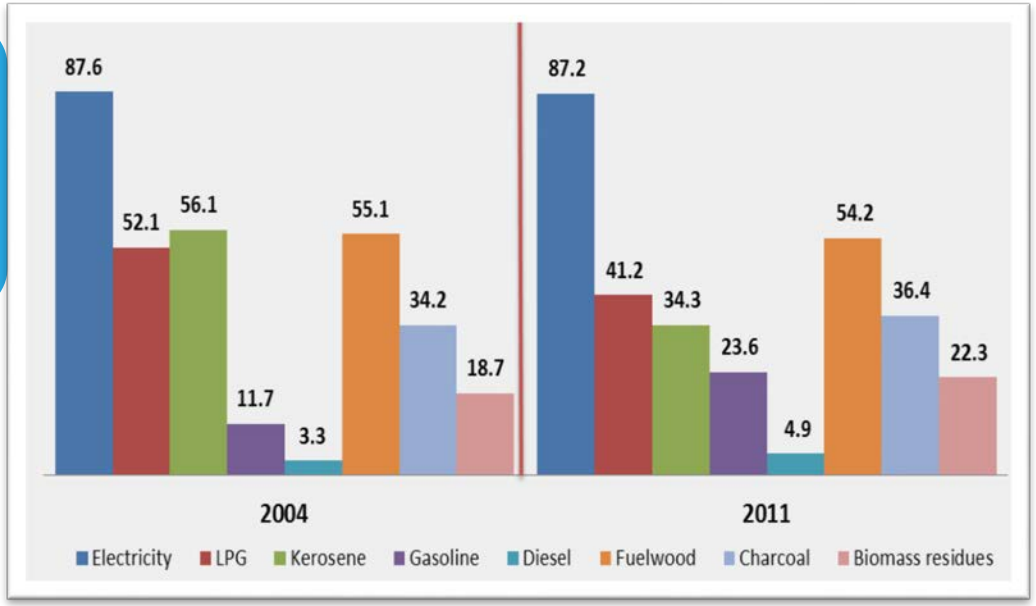
Efforts	Description	
Household Energy Consumption Survey (HECS) ❑ 1998 ❑ 2004 ❑ 2011 ❑ 2017 (proposed)	Conducted in collaboration with the National Statistics Office.	
	2004 HECS 	25,000 sample households
		Adopted the sampling design of the Labor Force Survey; and conducted together
		Response rate of 96%
	2011 HECS 	Stand-alone survey that gathers data on household energy use, patterns and preference
		25,000 sample households that are deemed sufficient to measure the levels and pattern of energy consumption at the national level.
		Response rate of 91%

Measuring energy efficiency (2)

Results of the survey

Energy consumption patterns in 2004 and 2011 were almost the same

- Electricity accounted for more than 80% of energy consumption in the Philippines
- A relevant number of households still use fuelwood and kerosene, especially in the rural areas



Proportion of Household by type of fuel used, 2004 vs 2011

Measures to Reduce Energy Consumption	% of Users of Electricity for Lighting
Switched off lights when not needed	90.9
Switched to more energy efficient lighting	75.3
Kept lamps and lighting fixtures clean	66.6
Used natural lighting when necessary	85.4
Other lighting household practices	0.5

- Awareness on energy conservation measures was high

Source: HECS 2011

Measuring energy efficiency (3)

Average consumption by end-use

End-use / Activity	Average Consumption (KWh)
Lighting	60
Cooking/Food Preparation	108
Water Heating	484
Recreation	129
Refrigeration	390
Space Cooling/Air Conditioning	277
Ironing	37
Laundry	36
Water Pumping	623
Computer Activity	84
Other Appliances	2

Type of Lamp	Average Consumption (KWh)
Fluorescent Lamps	55
Compact Fluorescent Lamps	37
Incandescent Lamps	42
Others*	
Linear Fluorescent Lamps	40
Circular Fluorescent Lamps	38
Led Lights	14
Others	20

Source: HECS 2011

Data processing, reporting and dissemination

The **Energy Policy and Planning Bureau** through **PFRD**, prepares energy statistics and Energy Balance Table submitted to ESTO

Regular publications and reports

- Philippine Energy Plan (PEP)
- Energy Sector Accomplishment Report (ESAR)
- Philippine Key Energy Statistics
- Philippine Statistical Yearbook

Survey results publications

- Household Energy Consumption Survey (HECS)
- Survey on Energy Consumption of Establishments (SECE)

Challenges

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Collection of data entails great challenge

Despite the presence of surveys, energy consumption reports are still lumped; data are not yet disaggregated into end-use

Despite existence of laws and directives, data submission is not mandatory, but mostly voluntary

Weak sub-national (regional and provincial) infrastructure facilities and system in the generation of local energy statistics;

Need for strong coordination among producers and users of energy statistics/indicators

Need for advocacy on the proper use of energy statistics in government and private business planning and decision-making

Budget restraints in conducting surveys

Note

The pictures, results, graphs used in this presentation were taken from EGEDA meetings and workshops and Philippines DOE, Malaysia Energy Commission and EGEDA websites. Please use with caution.

Thank you for your kind attention

http://aperc.ieej.or.jp/

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