

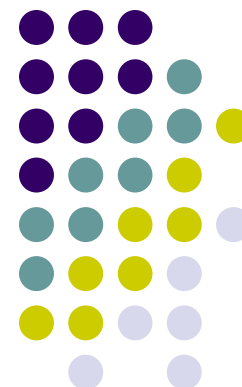
# Specificities to be taken account when developing energy efficiency indicators

- EEI activities in Asia-Pacific Region -

**The Energy Indicators Workshop organized by IEA**

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# I. Energy Efficiency Indicators

# APEC Economies are diverse



How to measure energy efficiency  
of the each economy?

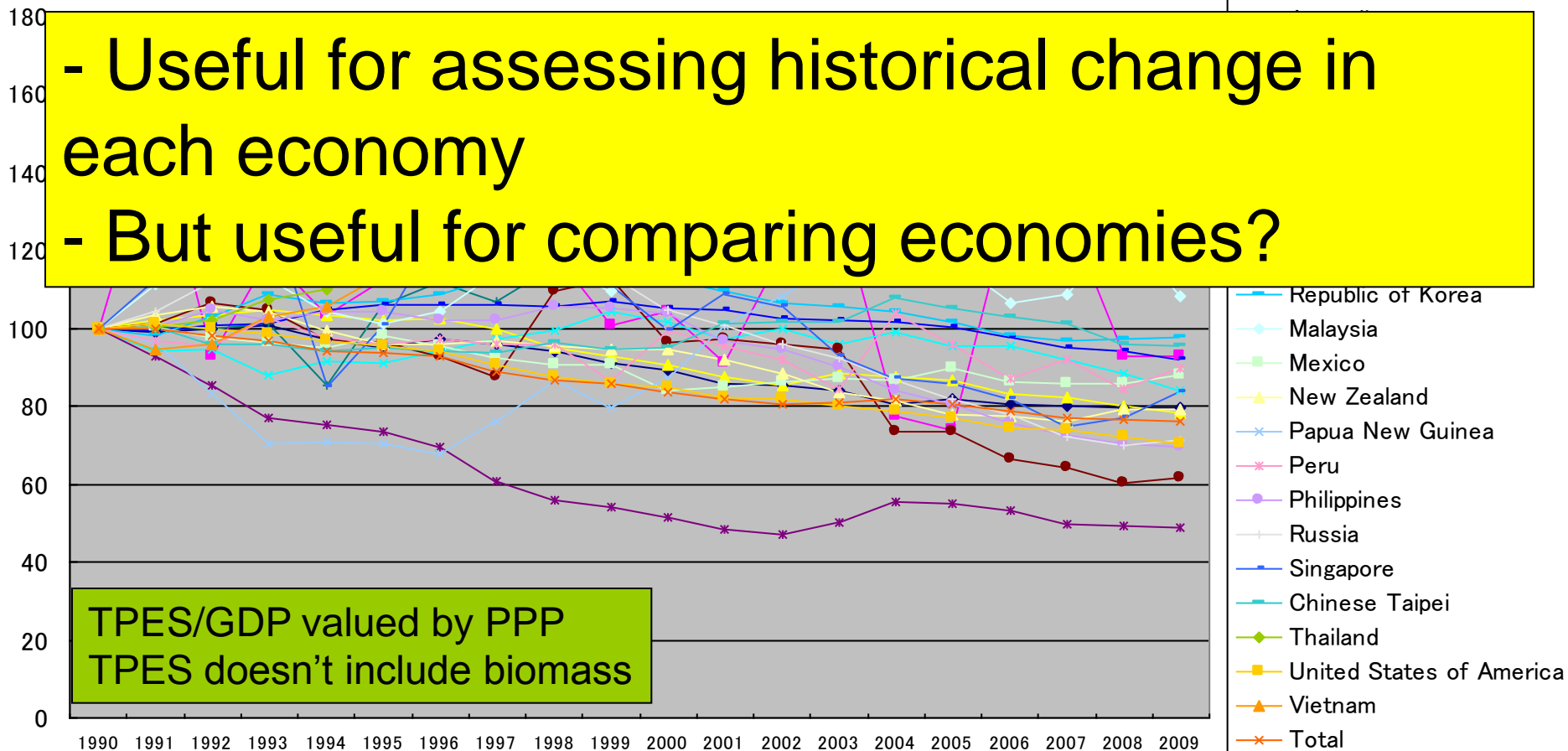
	High	Low
Size (km <sup>2</sup> )	17,075,200	707
Population (million)	1,331.46	0.40
GDP per capita (US\$)	45,745	1,113
Climate	Tropical zone	Frigid zone
Economic Structure	Industrialized	Agriculture

As of 2009

# Energy Intensity

- Time series  
(1990=100)

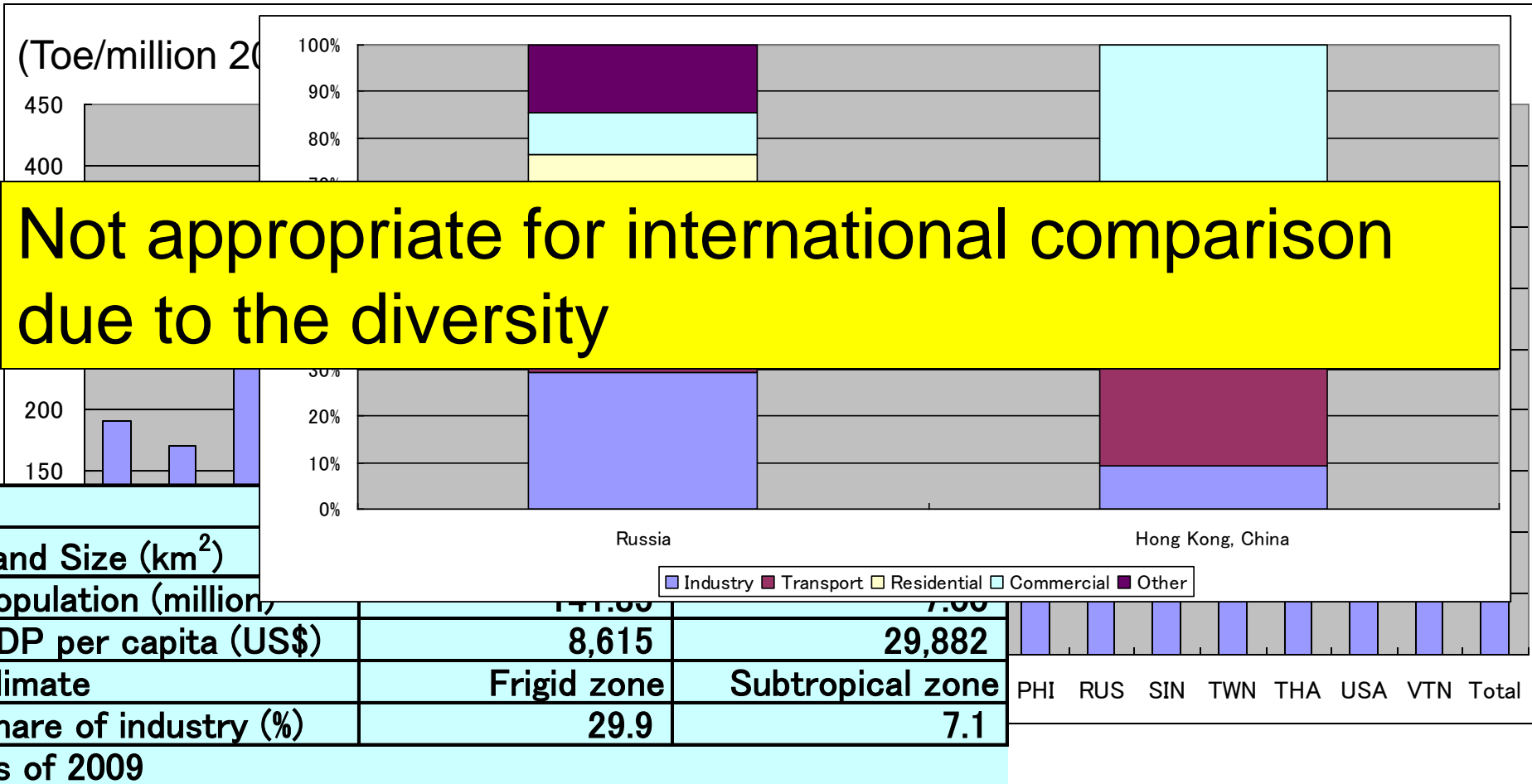
- Useful for assessing historical change in each economy  
- But useful for comparing economies?



Source: APEC Energy Database, WDI or WDI

# Energy Intensity

- Cross section



Source: APEC Energy Database, WDI of WB

# Energy Intensities

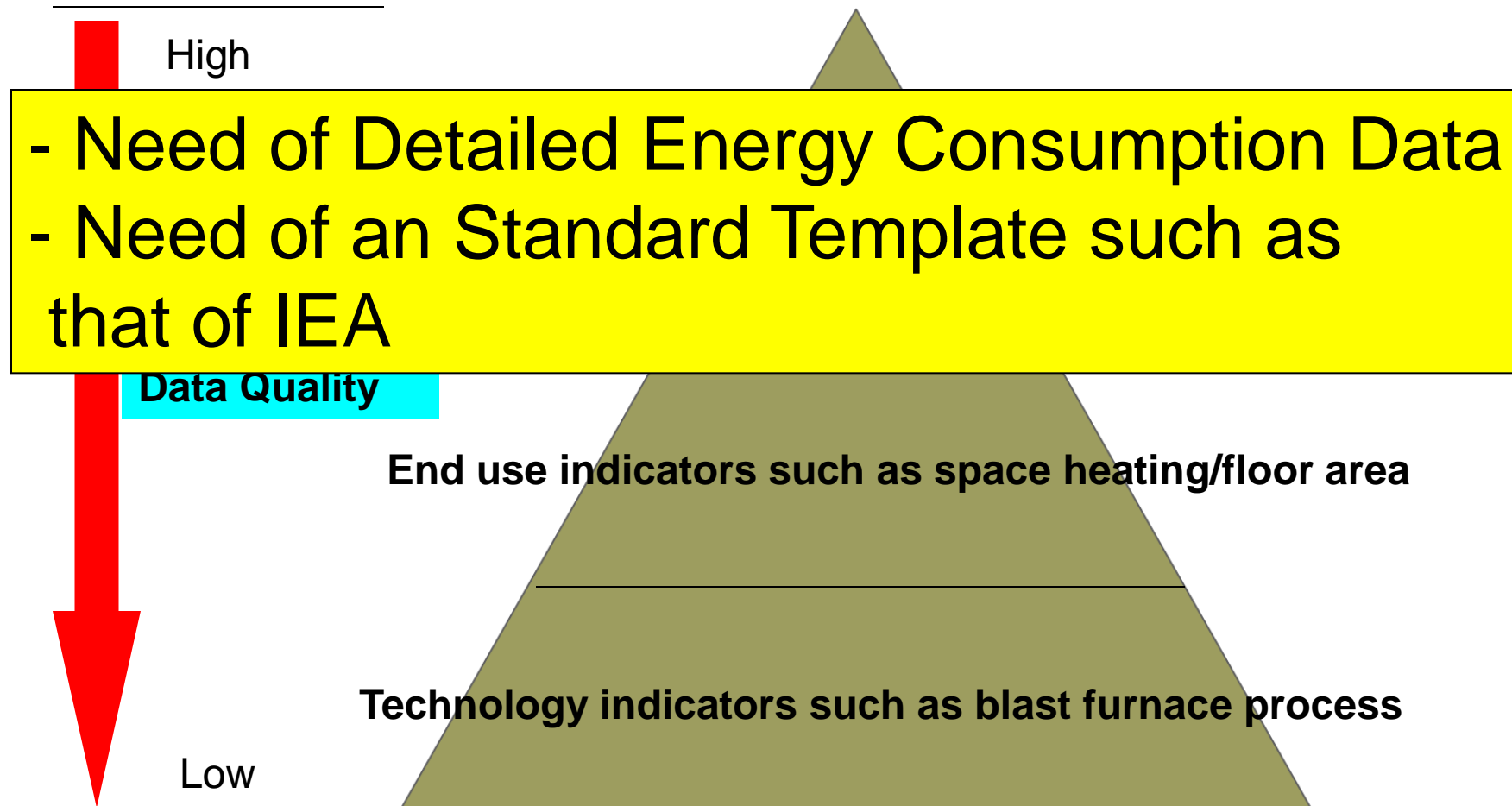
- TPES/GDP valued by PPP
  - Overall energy indicator and result from following activities
    - Industry sector
      - Use of more energy efficient boilers, furnaces, equipments
      - Shift from energy intensive industries to less intensive industries such as

## Need of preparation of energy efficiency indicators by each sector

- Improvement of road economy
  - Manage fluent traffic flow (if increased by 2km/hour average traffic flow, can achieve 5% saving of gasoline consumption)
- Residential & Commercial sector
  - Apply efficient housing technologies and use efficient appliances
  - Apply and expand green building
- Power generation
  - Improve thermal efficiency: CCGT, CCT

# Energy Efficiency Indicators

- Indicator Pyramid





## II. Energy Consumption Survey

# Energy Policies in Asia Region

- Energy efficiency and conservation is one of key policies in Asia region:
  - APEC
    - APEC leaders agreed to set up a target to improve the energy intensity in the region by 45% by 2035.

## - Need of Detailed Energy Consumption Data - Energy Consumption Surveys have Started

- Compendium: Energy efficiency policies
- East Asia Summit (ASEAN+6)
  - All EAS countries set up their energy saving goals and action plans.
  - Report energy saving result come from implementation of the action plans regularly.
  - Assess energy saving potential to be brought by the goals using energy outlook approach.
  - Conduct pilot survey on energy consumption in residential sector in ASEAN countries.

# Hong Kong, China

- Implementing body: Energy Efficiency Office, Electricity and Mechanical Service Department, Hong Kong Government
- Purpose: End use data
- Target sectors: Residential, commercial, industry and transport
- Energy consumption survey: conducted in each sector separately in a 3- year cycle.
- Data structure: sector (4) – segment (28) – end use (21) – technology (69)
  - Ex. Commercial – Restaurant – Cooking – Cooking equipments
- Combination of top-down approach and bottom-up approach
- Top-down:
  - Publications, data provided by other Government department such as transport, data collected from various utilities (power, railway, bus and ferry companies)
- Bottom-up: Results from the surveys

# Hong Kong, China

- Residential survey
  - Random sampling (1% coverage to total number of households)
  - Work with a consultant team
  - Segment
    - Public housing, Government-subsidized housing, Private housing, Other housing
  - Notification letter before survey
  - Questionnaires
    - Appliances (penetration, ownership and rating), Operating behavior
    - Fuel type, penetration
    - Energy bill, household size, floor area
  - End use
    - Lighting, space conditioning, cooking, refrigeration, entertainment, information technology
  - Pilot field work (training of field worker) – Main field work
  - Data processing, validation and analysis
  - Final report

# Energy Consumption Survey

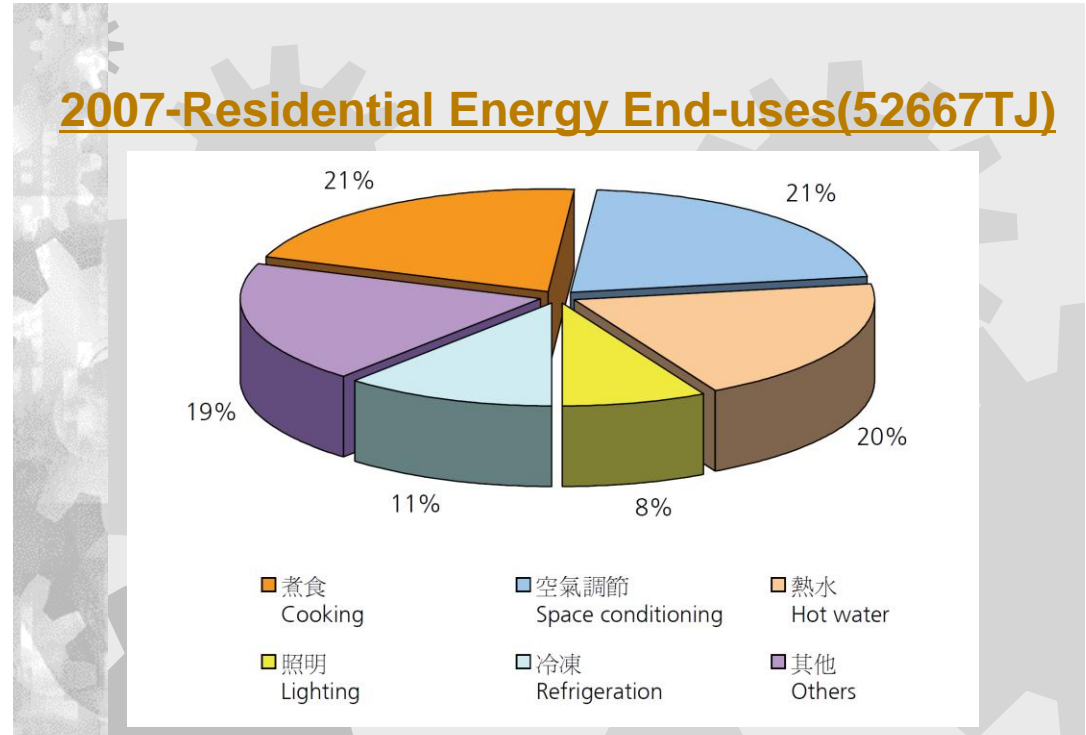
- Hong Kong, China

## 香港能源最終用途數據 Hong Kong Energy End-use Data 2011



2011年9月印發  
ISSUED IN SEPTEMBER - 2011

## 2007-Residential Energy End-uses(52667TJ)



28

# Chinese Taipei (Taiwan)

- Bureau of Energy (Government) ordered Taiwan Research Institute (TRI) to conduct the energy consumption survey in residential and service sectors from January to September in 2010.
- Random sampling: 1,718 and 1,649 complete samples in residential and service sectors respectively. The coverage was around 10%.
- Transport survey was also included.
- Questionnaire for residential sector
  - General information: House (type, space area, location), head of household (gender, age, education, occupation), household members, household income
  - Energy expenditure
  - Energy consumption by appliances
  - Awareness of energy conservation

# Chinese Taipei (Taiwan)

- Result from the Residential Survey

	Petrol.	LPG	NG	Renew.	Eletr.	Total	Diffus.	Stock	Average EC per appliance	Average EC per Household
	1000 KLOE						%	Unit	LOE	
Space heating	-	-	-	-	131	131	-	-	-	-
Space cooling	-	-	-	-	2,583	2,583	-	-	-	-
Water heating	-	592	573	100	1,568	2,833	-	-	-	-
Cooking	-	695	435	-	884	2,014	-	-	-	-
Lighting	-	-	-	-	1,223	1,223	-	-	-	-
Refrigerator	-	-	-	-	46	46	3.2	379,530	121	6
Freezer	-	-	-	-	81	81	1.8	160,860	504	10
Refrig./ Freezer	-	-	-	-	1,192	1,192	93.7	8,114,537	147	153
Dish washer	-	-	-	-	19	19	30.5	2,401,634	8	2
Clothes washer	-	-	-	-	192	192	88.8	7,065,975	27	25
Clothes Drier	-	-	-	-	26	26	12.0	963,348	27	3
TV/ Entertain.	-	-	-	-	651	651	97.0	18,342,577	35	83
PC/ ITC	-	-	-	-	1,027	1,027	71.4	10,474,718	98	132
Other appl.	-	-	-	-	1,218	1,218	-	-	-	-
Total	-	1,287	1,008	100	10,841	13,235	-	-	-	-
Annual EC per Household (LOE)	-	165	129	13	1,389	1,696	-	-	-	-
Transport	6,287	-	-	-	-	6,287	-	-	-	-

# Chinese Taipei (Taiwan)

- Results from the Service Sectors Survey

Average Energy Consumption Per Unit Space Area	Total	Space heating	Space cooling	Lighting	Other app.
	LOE				
Total	282	1	49	26	206
Industry					
Wholesale and Retail	259	1	52	31	175
Hotels and Restaurants	336	1	52	30	253
Transport Services	369	2	35	22	310
Storage and Warehousing	1,442	1	81	65	1,295
Communication	729	1	124	36	568
Finance, Insurance and Real Estate	314	0	48	24	241
Business Services	279	0	49	24	206
Social and Personal Services	484	1	58	26	399
Public Administration	302	1	30	8	264
Activities Not Adequately Defined	256	0	38	13	205

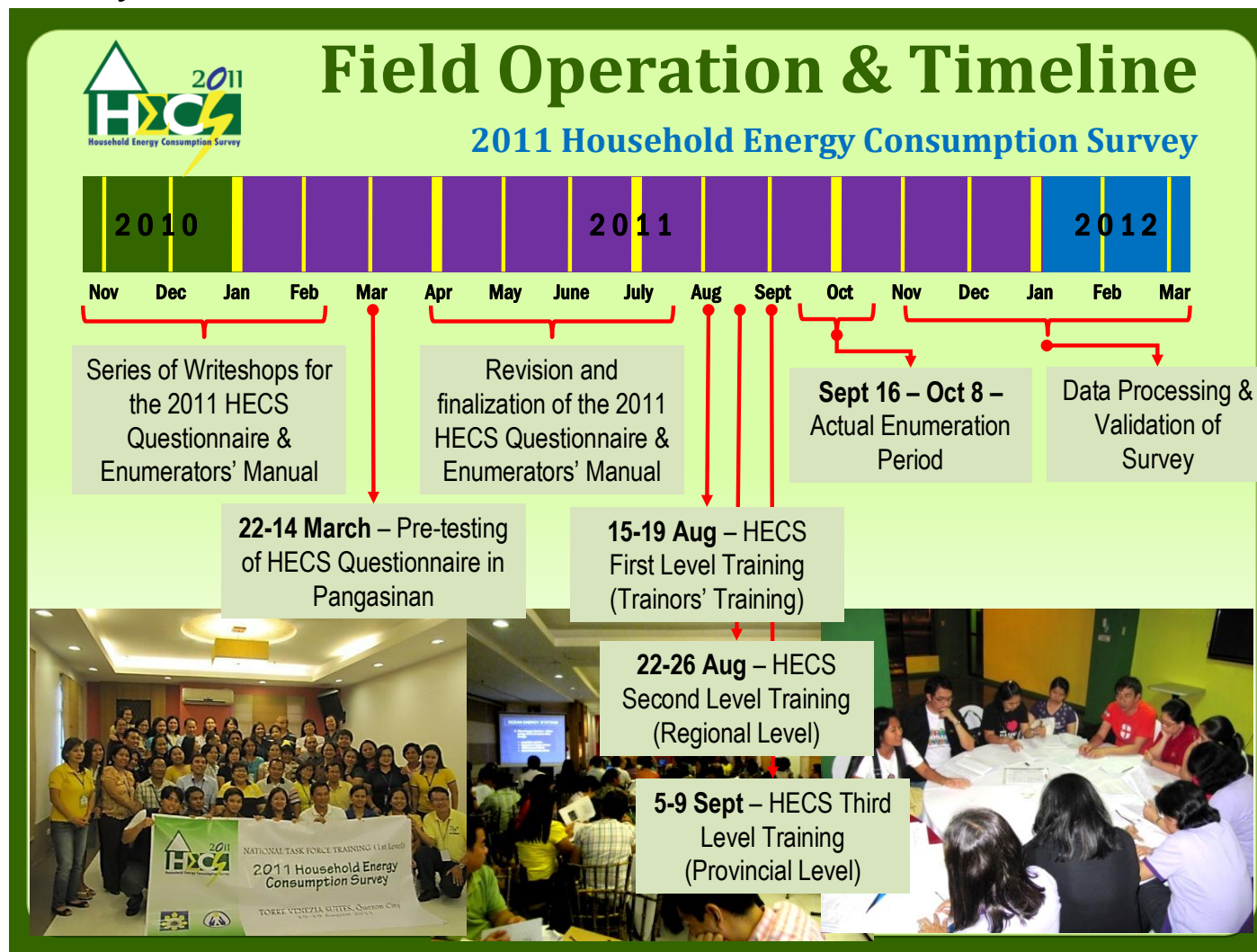


# Philippines

- 2011 Household Energy Consumption Survey (HECS)
- Collaboration with National Statistics Office due to authority of the survey
- Past surveys: 1989, 1995, 2004
- Objectives
  - Determine the change in energy consumption patterns
  - Establish fuel/energy mix of the residential sector
  - Determine the most energy consuming appliances, devices and equipments
- Questionnaires
  - Part 1: Geographic information and household (characteristics of household head and household members)
  - Part 2: Details of energy usage
  - Part 3: Family income
  - Part4: Housing characteristics
- The final results will be released around end of December 2012.

# Philippines

- Survey Schedule

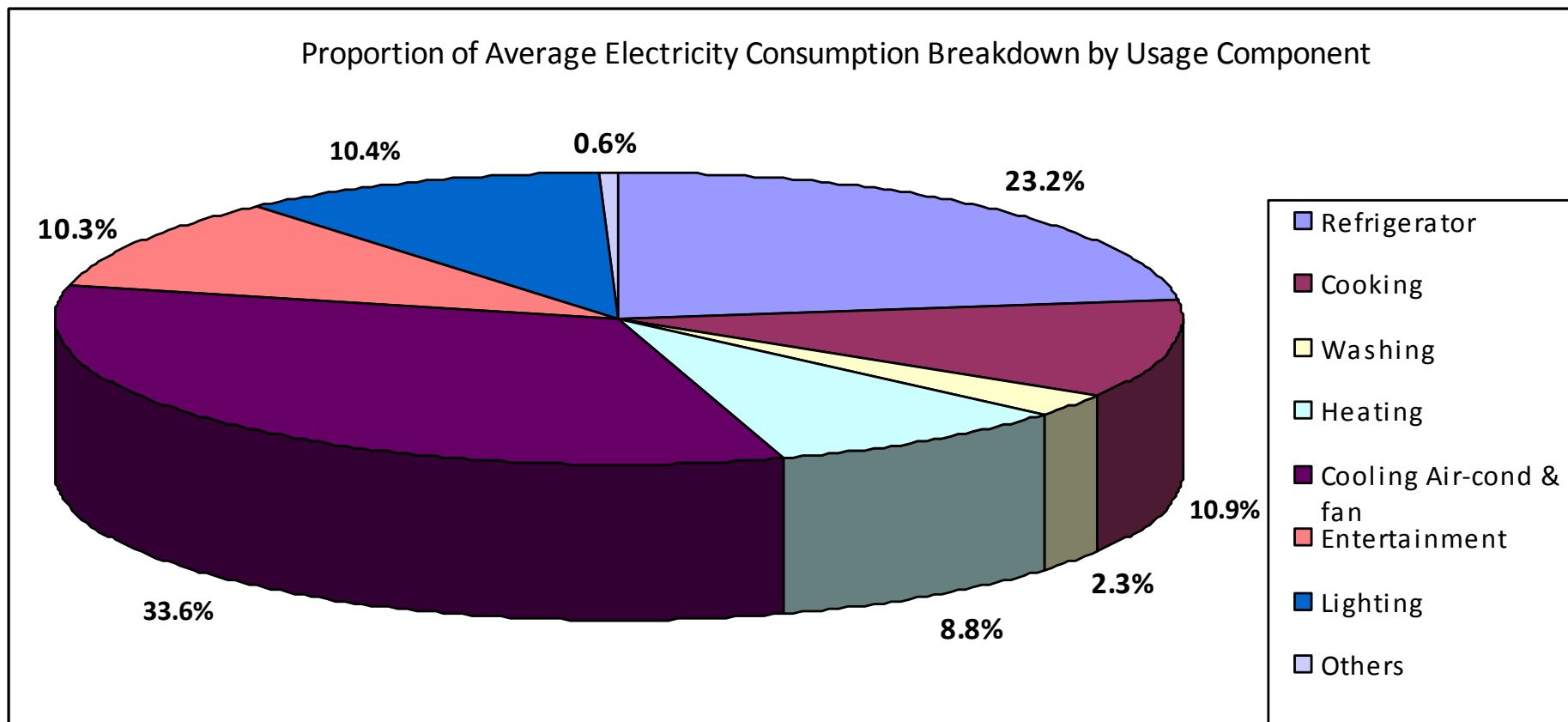


# Malaysia

- Urban household energy consumption survey
- Executing body: CETDEM (Center for Environment, Technology and Development, Malaysia) is a NGO established in 1985 and commit to improve environmental quality.
- Outline of survey
  - Housing characteristics: 5 types
  - Energy sources: electricity, gas (LPG), petrol/diesel
  - Energy consumption components;
    - Kitchen: refrigerator, cooking element (electricity)
    - Bathroom/Laundry: Washing machine, water heater
    - Living room: Cooling (air conditioners, fans), entertainments, lightings and others
    - LPG usage (kitchen)
    - Petrol/diesel usage (transport)

# Malaysia

- Results from the Survey



# Pilot Survey in ASEAN

- Executing body: ERIA Working Group for Analysis of Energy Saving Potential in EAS Region
  - ERIA: Economic Research Institute for ASEAN and East Asia
- Purpose: Increase capacity on energy consumption survey in residential sector
- Members of the WG from 16 EAS countries engaged in the pilot survey;
  - Design the questionnaire
  - Determine the samples (minimum 10 samples)
  - Request her/his colleagues to join the survey
- Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Singapore conducted the survey. Total number of samples were 68.
- Questionnaire
  - General information: floor area, household members, electricity bill per month
  - Energy sources: electricity, LPG, coal briquettes, renewable energy
  - End use: cooking, lighting, cooling, water heating

# Pilot Survey in ASEAN

- Pilot Survey in ASEAN
  - Questionnaire

## 4. Cooling and Ventilation

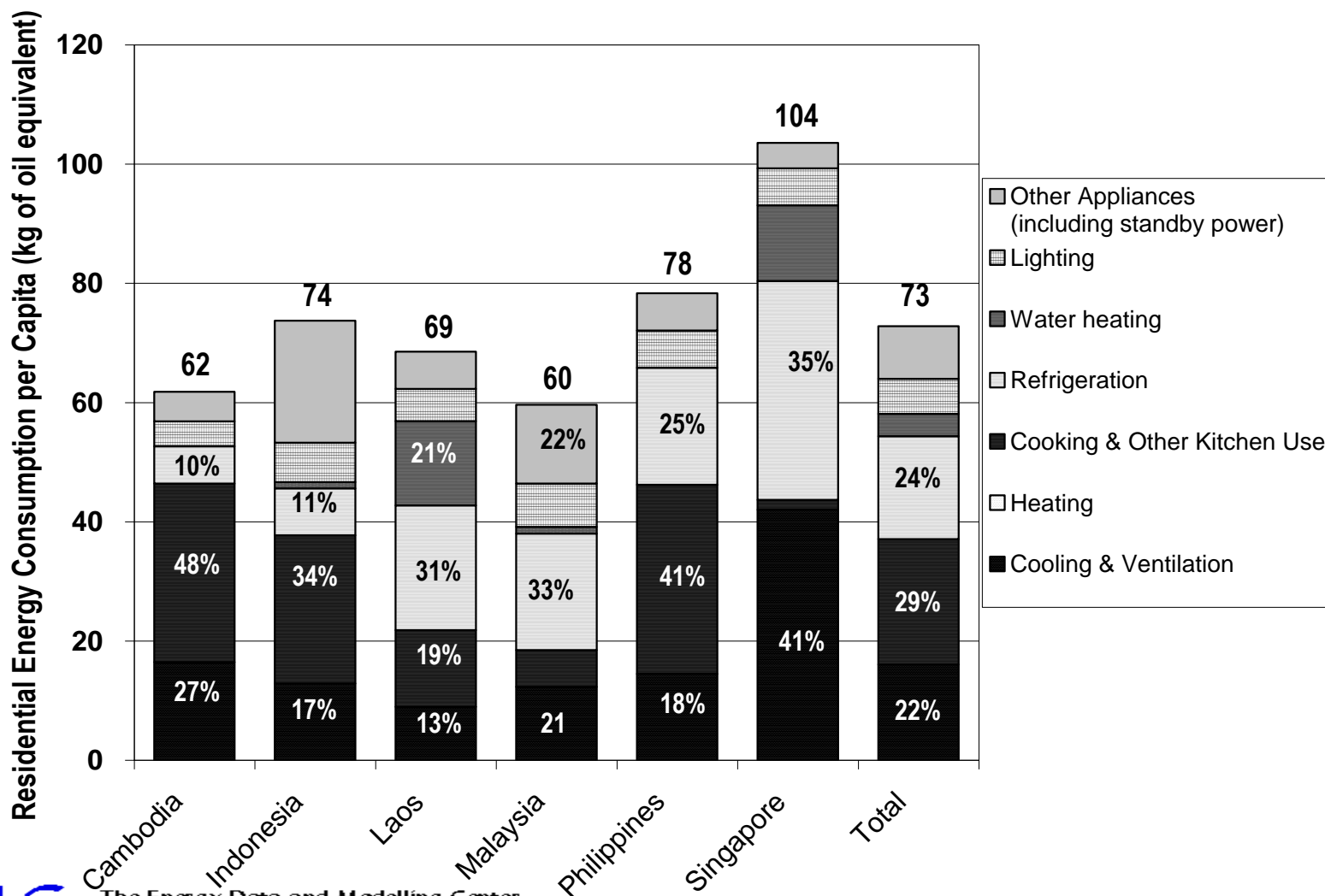
KIND OF EQUIPMENT	EQUIPMENT	AVERAGE NUMBER		
	NUMBER OF UNITS	POWER RATING	HOURS OF DAILY USAGE	NUMBER OF DAYS OF USAGE PER

- Entering power rating is very hard
- ASEAN standard power rating of appliances will be prepared

Fan1	2	30	10	30
Fan2	3	50	7	30
Fan3				
Fan4				
Exhaust Fan (EF)				
EF1				
EF2				
EF3				

# Pilot Survey in ASEAN

- Pilot Survey in ASEAN



# Conclusion

- In APEC region, energy demand-supply data, which are usually used for making energy balance tables, have been improving due to use of the existing questionnaires being comparable to IEA questionnaires and continuous capacity buildings provided by Japanese Government.
- On the other hand, detailed energy consumption data are indispensable due to promotion of energy efficiency activities, but preparation of energy efficiency indicators is still a challenge in this region.
- However several NON-OECD countries/economies have started to conduct energy consumption surveys. This is a good signal to the international society.
- In near future the countries/economies in Asia region will use the IEA EEI template and introduce their achievement on energy savings showing the relevant data.

Thank you for your attention