

End Use Survey: Residential and Commercial Sector

**IEA Energy Efficiency in Emerging Economies
Training Week for Southeast Asia**

16 – 20 July 2018

Jakarta, Indonesia

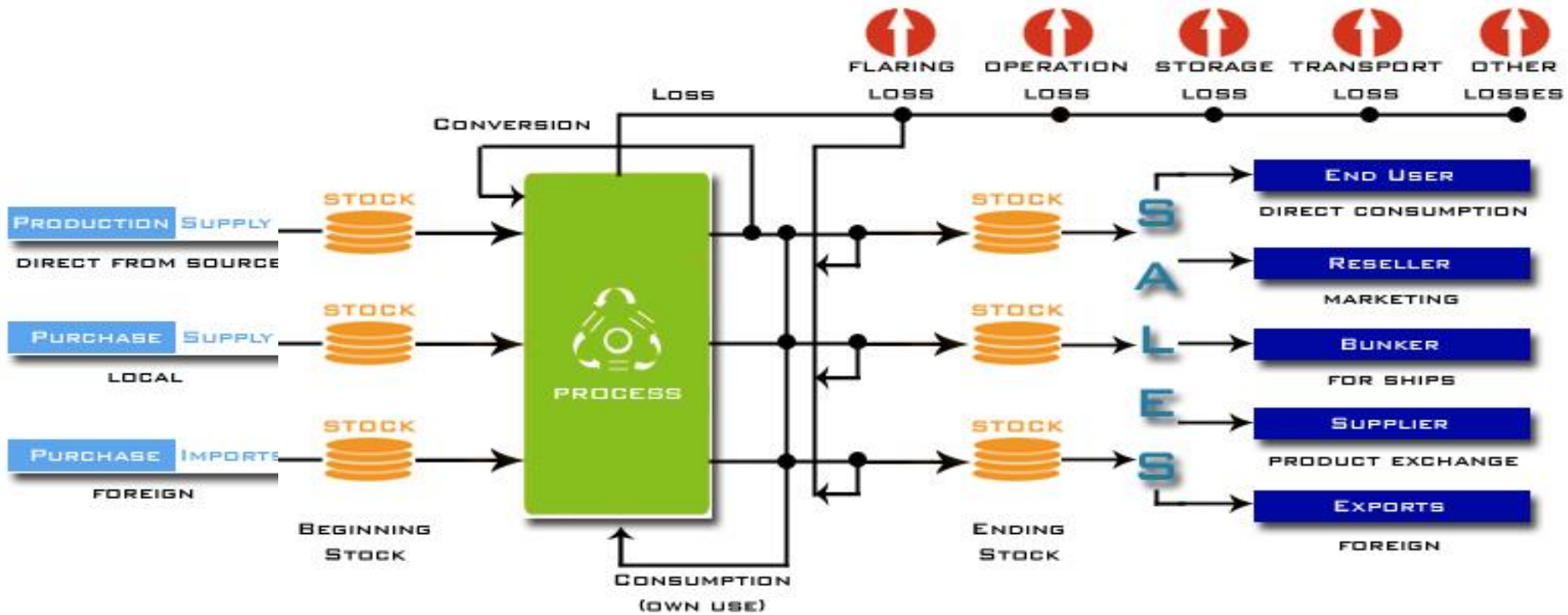
Outline

- Introduction
- National Energy Balance
- Energy Flow Chart, 2016
- Residential Survey
- Commercial Survey
- Way Forward and Conclusions

Introduction

- The National Energy Balance (NEB) report is an extension of Suruhanjaya Tenaga / Energy Commission's (ST) role from regulator of electricity and gas supplies to the main reference point for energy data in Malaysia. A complete statistical publication for energy supply and demand of the nation, it is based upon an energy balance format using similar energy units for all reported data
- NEB covers three major areas, namely the Energy Supply, Transformation and Final Usage - Including natural gas, crude oil, petroleum products, coal and coke, electricity, hydropower and renewable energy
- With this extended role, ST has formed various cooperation arrangements, to supply monthly, quarterly and annual energy data to the relevant agencies such as the International Energy Agency (IEA), International Energy Forum Secretariat (IEFS), United Nations Statistics Division (UNSD), The Institute of Energy Economics, Japan (IEEJ), Asia Pacific Economic Cooperation (APEC) and ASEAN Centre for Energy (ACE). This cooperation demonstrates ST's commitment in providing accurate information while providing an opportunity to further enhance the Commission's capacity and expertise in related areas.

National Energy Balance



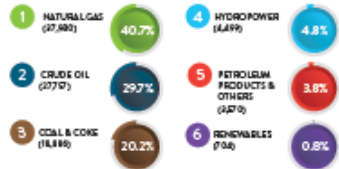
National Energy Balance

- Currently, about 70 data providers
- Divided into fuel types ; oil, gas, electricity and coal
- In quarterly basis based on region
- Questionnaire based on energy balance format
- Collected via email, fax and postage
- Primary and secondary sources
- Common unit of measurement based on fuel types

Energy Flow Chart, 2016 (ktoe)

PRIMARY SUPPLY

PRIMARY SUPPLY* (93,395)



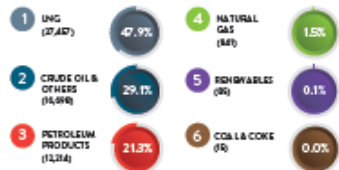
PRIMARY PRODUCTION (102,801)



IMPORTS (50,235)

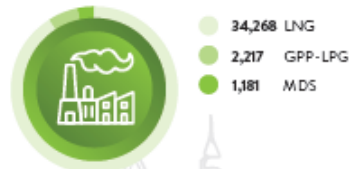


EXPORTS (57,310)



TRANSFORMATION

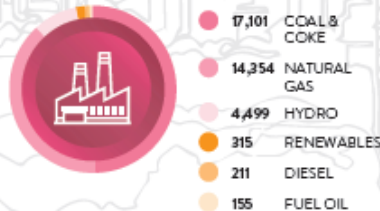
GAS PLANT INPUT



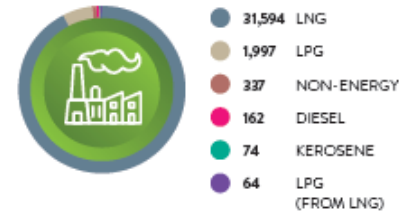
OIL REFINERIES INPUT



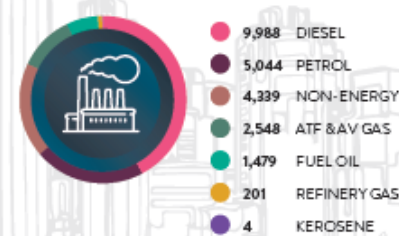
POWER STATIONS & SELF GENERATION INPUT



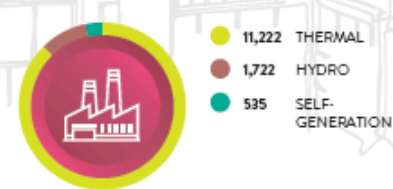
GAS PLANT OUTPUT



OIL REFINERIES OUTPUT

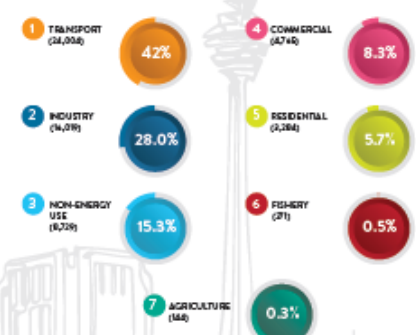


POWER STATIONS & SELF GENERATION OUTPUT

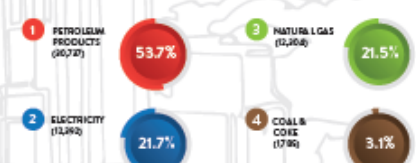


FINAL USE

FINAL USE BY SECTOR (57,218)



FINAL USE BY FUEL (57,218)



Note: * Primary Supply = Primary Production - Flaring + Imports - Exports - Blenders (+/-) Stock Change (+/-) Statistical Discrepancy

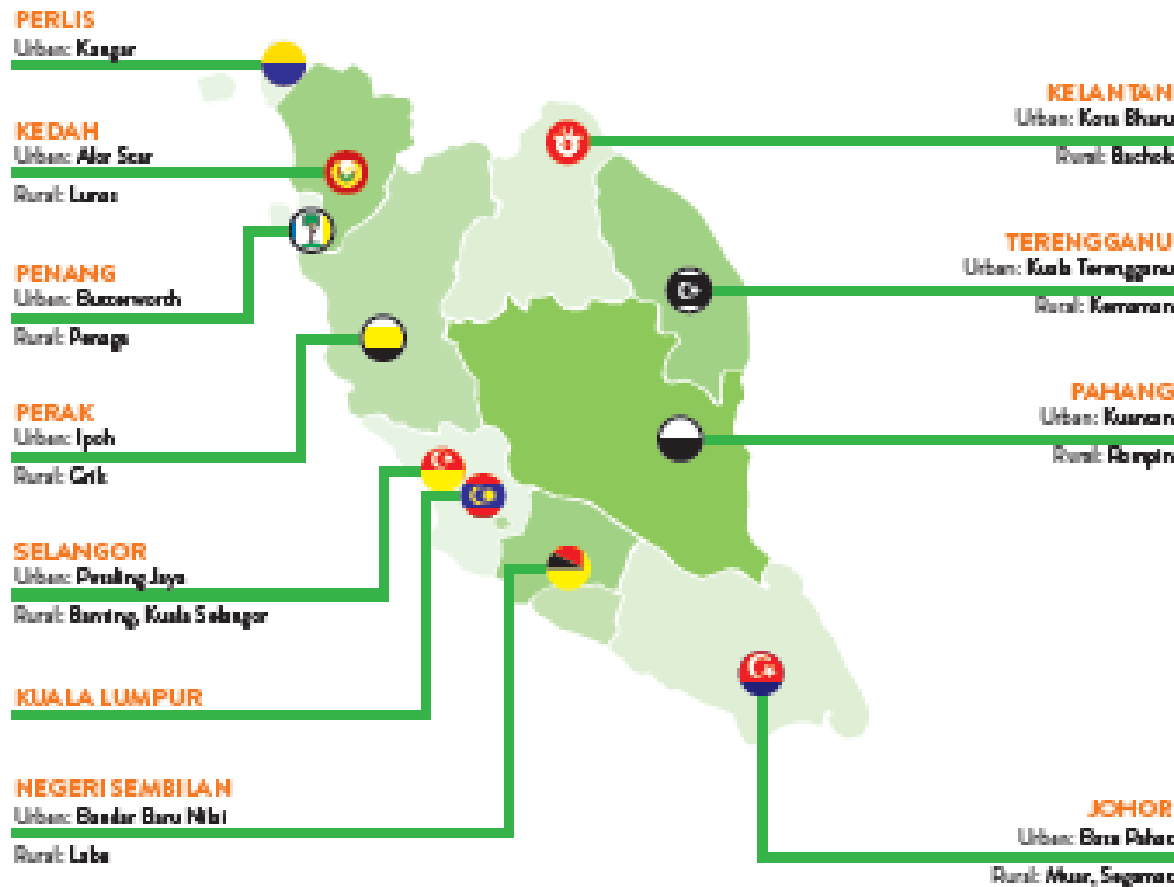
Residential Survey

Energy Commission has successfully conducted a survey with **2,000 households in Peninsular Malaysia** with the aim to have an in-depth understanding of energy consumption pattern within households. There are many variables and factors that affect a household's energy consumption of which were not properly identified before. This survey enabled us to have a better view of where, when and how the energy is consumed within households.

The number of samples is calculated based on the actual number of households in *Malaysia*. Hence, 2,000 households were selected across *Peninsular Malaysia* for this survey. The samples were broken down to four (4) main regions, namely Central, South, East Coast, and North, and then further broken down to ten (10) types of houses. The energy consumption for each household is categorised into fuel types (natural gas, LPG, kerosene and electricity) and five (5) end-uses as described by the IEA (International Energy Agency).

Overall, electricity, LPG and natural gas are the major form of energy used in households in *Peninsular Malaysia*, where electricity accounted for more than 80% of energy consumption. Electricity consumption is distributed evenly among the four regions of *Peninsular Malaysia*, whereas LPG showed a slightly bigger contribution from the central region. In terms of end-uses, appliances have the biggest share in energy consumption, followed by air-conditioning system, cooking, lighting, and water heating. Appliances category covers a wide range of items which explains the high percentage of appliances in household's energy consumption.

Residential Survey



2,000 households



10 types of house



5 categories



53 electrical appliances

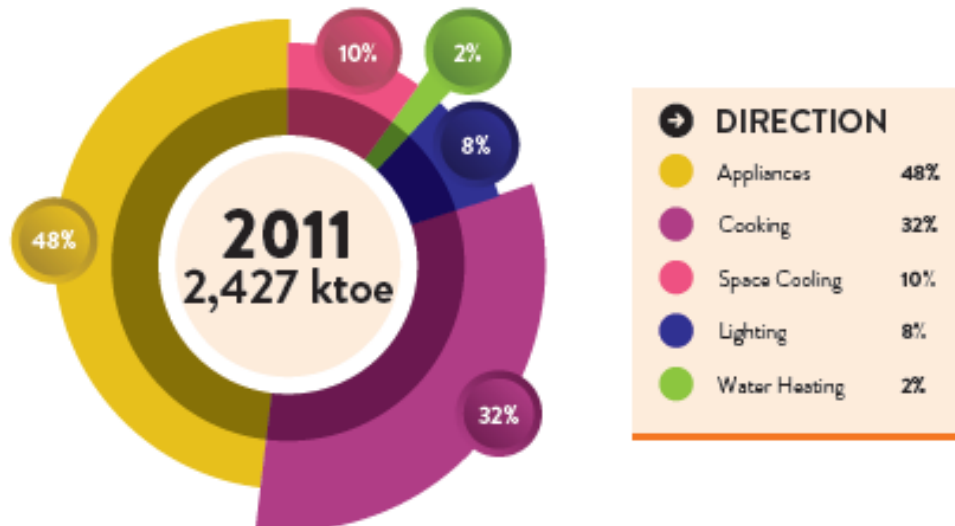


Historical trend from 2011 to 2014

Residential Survey

FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2011

YEAR: 2011 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	242	242
Water Heating	-	-	-	52	52
Lighting	-	-	9	173	181
Cooking	-	693	-	86	779
Appliances	-	-	-	1,173	1,173
TOTAL	-	693	9	1,726	2,427



Residential Survey

FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2012

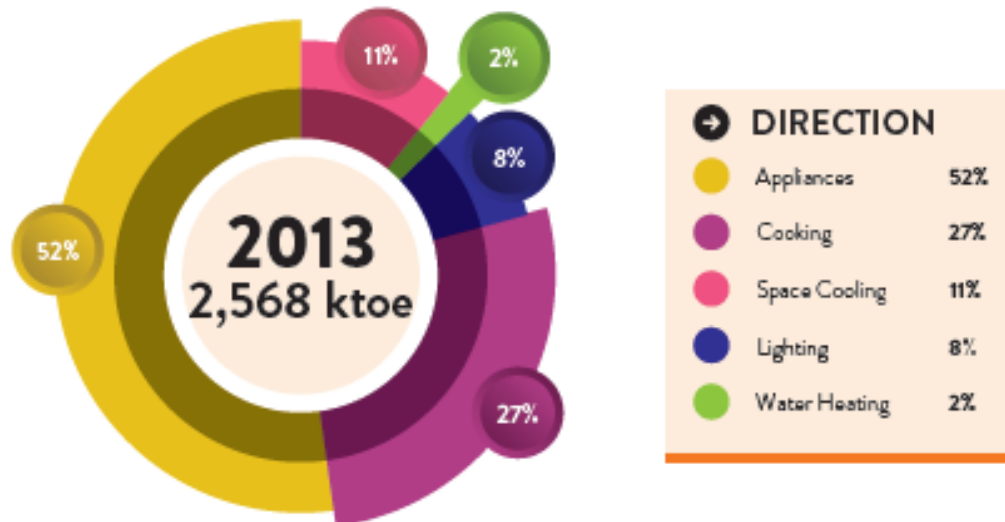
YEAR: 2012 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	259	259
Water Heating	-	-	-	56	56
Lighting	-	-	5	185	190
Cooking	1	593	-	93	686
Appliances	-	-	-	1,260	1,260
TOTAL	1	593	5	1,853	2,451



Residential Survey

FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2013

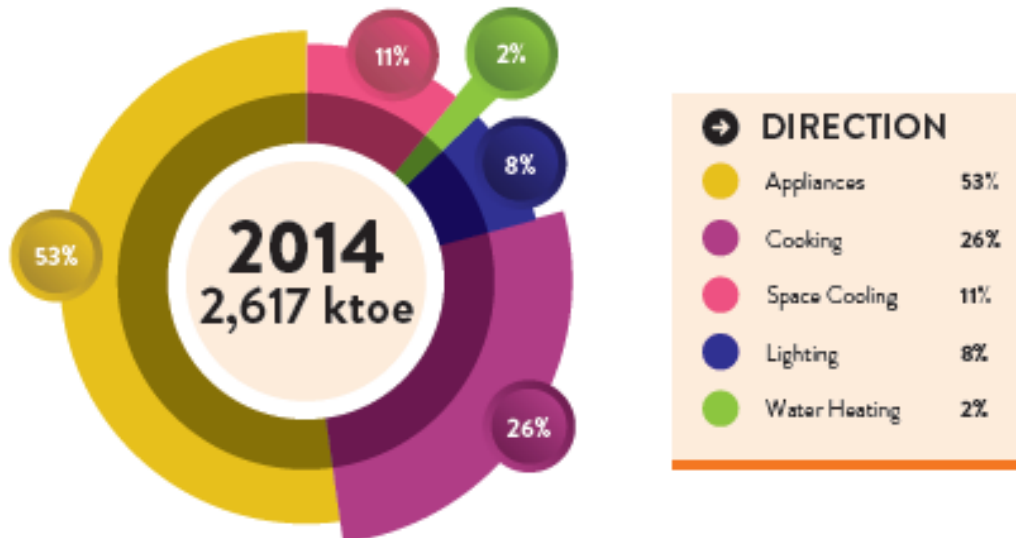
YEAR: 2013 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	276	276
Water Heating	-	-	-	59	59
Lighting	-	-	1	197	198
Cooking	1	596	-	99	695
Appliances	-	-	-	1,340	1,340
TOTAL	1	596	1	1,971	2,568



Residential Survey

FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2014

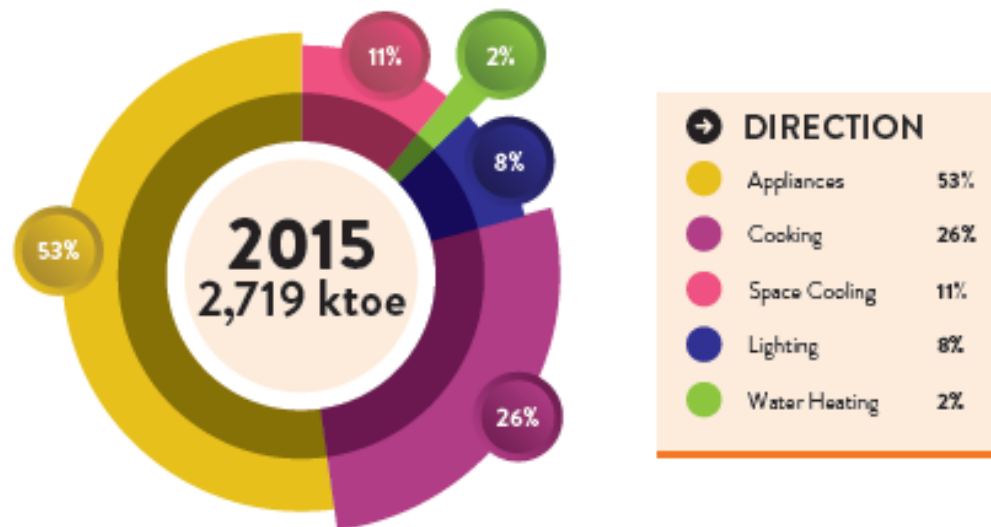
YEAR: 2014 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	286	286
Water Heating	-	-	-	61	61
Lighting	-	-	4	204	209
Cooking	1	571	-	102	674
Appliances	-	-	-	1,388	1,388
TOTAL	1	571	4	2,041	2,617



Residential Survey

FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2015

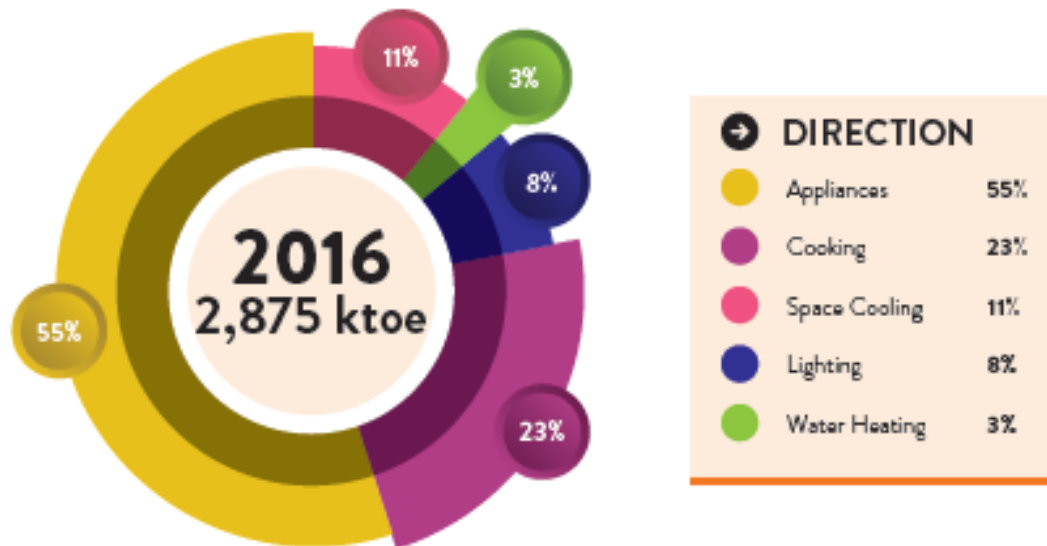
YEAR: 2015 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	296.24	296
Water Heating	-	-	-	63.48	63
Lighting	-	-	0	211.60	212
Cooking	1	602	-	105.80	708
Appliances	-	-	-	1,438.88	1,439
TOTAL	1	602	0	2,116	2,719



Residential Survey

FINAL ENERGY CONSUMPTION BY AGGREGATED CATEGORIES IN RESIDENTIAL SECTOR, 2016

YEAR: 2016 / UNIT: KTOE	NATURAL GAS	LPG	KEROSENE	ELECTRICITY	TOTAL
Space Cooling	-	-	-	327	327
Water Heating	-	-	-	70	70
Lighting	-	-	3	233	236
Cooking	1	538	-	117	655
Appliances	-	-	-	1,586	1,586
TOTAL	1	538	3	2,333	2,875



Commercial Survey

In Malaysia, studies on commercial energy consumption are scanty and far between. Therefore, a broader and more comprehensive survey to identify the energy consumption of the commercial sector will be conducted, for which an appropriate set of questionnaires will be developed.

The commercial sector encompasses substantial number of economic activities within the private and public sectors. Activities within the commercial sector can be grouped into 12 main categories, based on definition by the International Energy Agency (IEA) as outlined below;

1. Wholesale and Retail Trade	7. Travel Agencies and Tour Operators
2. Transportation and Storage	8. Public Administration
3. Accommodation and Food Service	9. Education
4. Information and Communication	10. Human Health and Social Work
5. Selected Services	11. Arts, Entertainment and Recreation
6. Professional, Scientific and Technical	12. Other Services

To amass robust data for analysis, the sampling would be representative of the 12 commercial sectors and all together cross-referenced with each 12 states in Peninsular Malaysia as represented by each state's services sector gross domestic product (GDP). The collation of data from the business premises sought from these states would allow the energy consumption categorized by fuel type for the commercial sector in Peninsular Malaysia to be determined.

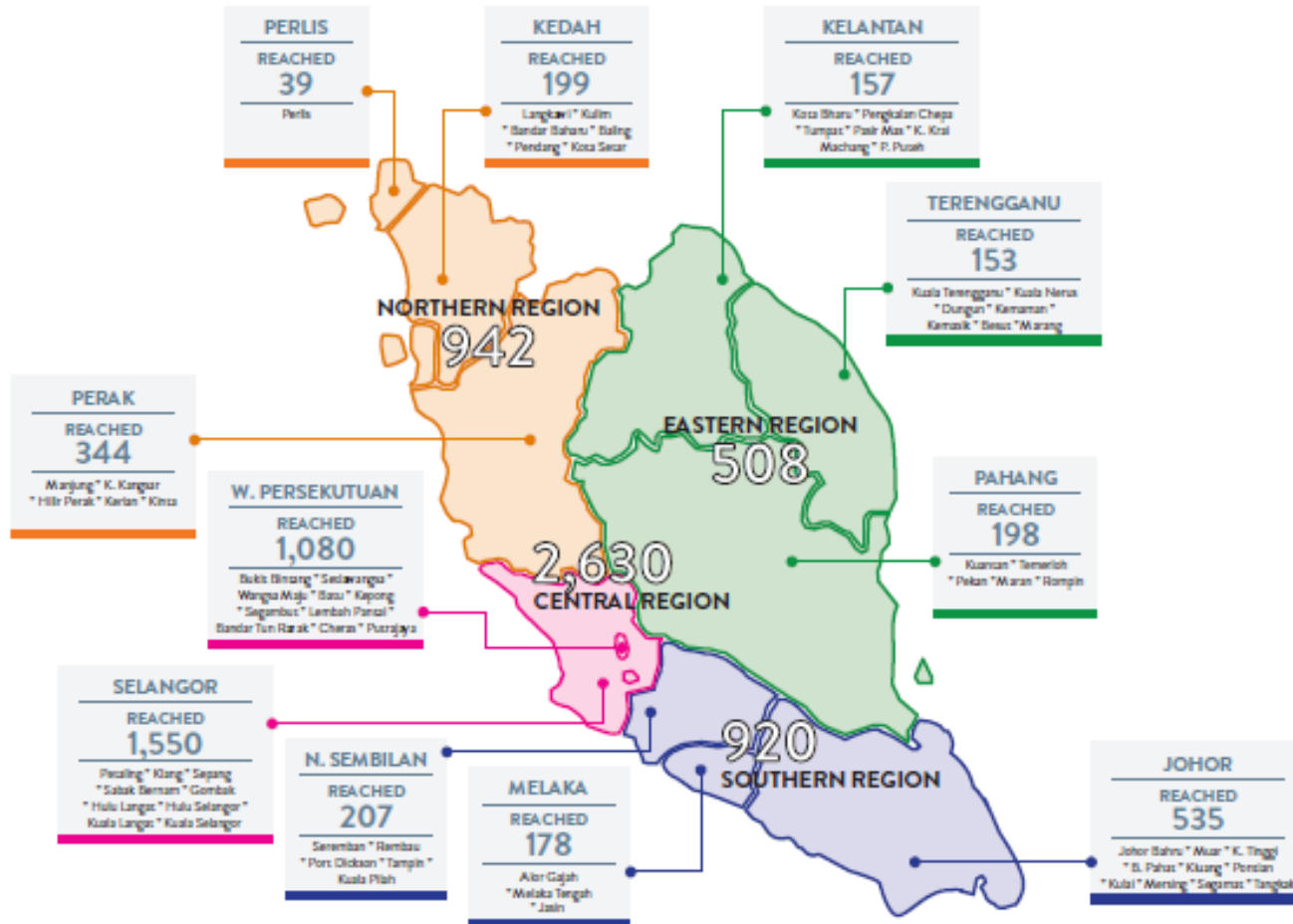
Commercial Survey

PENINSULAR
MALAYSIA

REACHED 5,000

TARGET 5,000

PROGRESS 100%



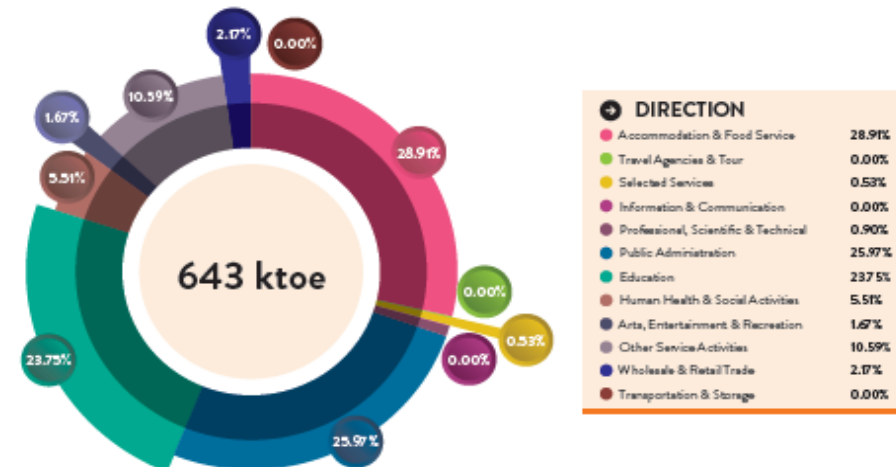
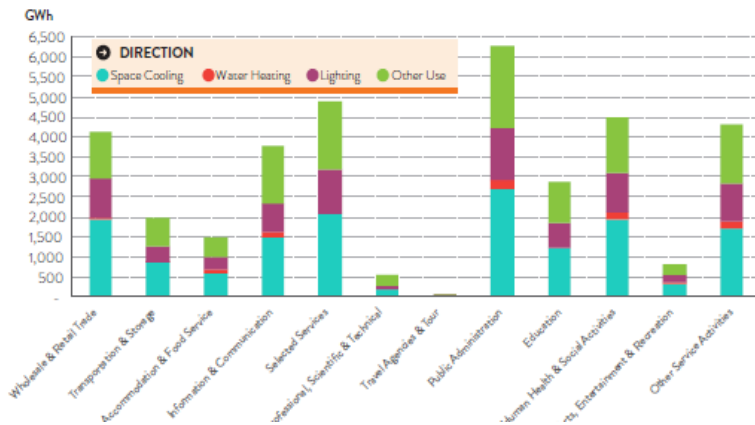
Commercial Survey

FINAL ELECTRICITY CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2014

UNIT: GWh	CATEGORY	SPACE COOLING	WATER HEATING	LIGHTING	OTHER USE	TOTAL
C1	Wholesale & Retail Trade	1,923.81	41.19	1,015.04	1,139.45	4,119.50
C2	Transportation & Storage	872.02	5.28	396.76	683.13	1,957.39
C3	Accommodation & Food Service	572.58	115.59	301.09	498.20	1,487.60
C4	Information & Communication	1,500.61	137.00	692.94	1,443.62	3,774.17
C5	Selected Services	2,063.48	-	1,139.83	1,709.25	4,913.05
C6	Professional, Scientific & Technical	176.63	-	107.83	248.04	532.50
C7	Travel Agencies & Tour	7.86	0.01	2.66	8.44	18.96
C8	Public Administration	2,677.69	238.75	1,289.03	2,061.06	6,266.53
C9	Education	1,217.47	-	612.46	1,036.05	2,865.98
C10	Human Health & Social Activities	1,926.96	182.28	1,002.54	1,378.32	4,489.65
C11	Arts, Entertainment & Recreation	311.89	36.82	203.38	258.85	810.94
C12	Other Service Activities	1,690.76	183.37	976.23	1,454.02	4,304.38
TOTAL		14,941.75	940.29	7,739.79	11,918.43	35,540.66

FINAL LPG CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2014

UNIT: ktoe	CATEGORY	OTHER USE
C1	Wholesale & Retail Trade	13.96
C2	Transportation & Storage	-
C3	Accommodation & Food Service	185.90
C4	Information & Communication	-
C5	Selected Services	3.40
C6	Professional, Scientific & Technical	5.79
C7	Travel Agencies & Tour	-
C8	Public Administration	167.01
C9	Education	152.71
C10	Human Health & Social Activities	35.41
C11	Arts, Entertainment & Recreation	10.73
C12	Other Service Activities	68.10
TOTAL		643.00



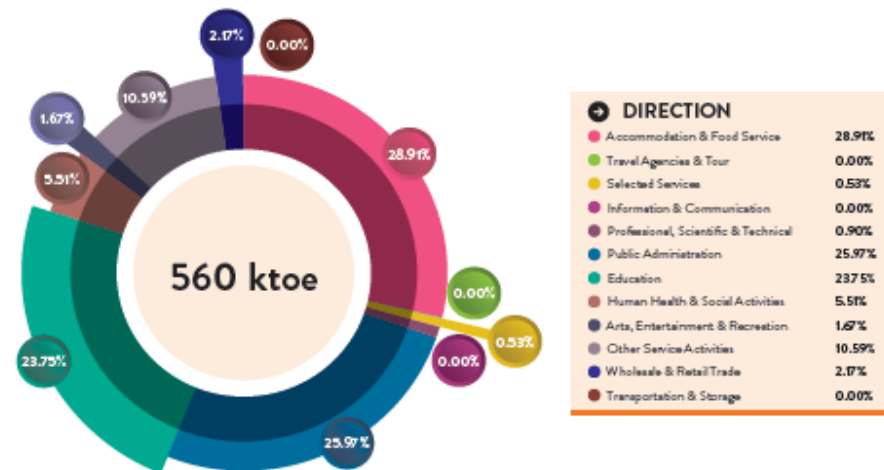
Commercial Survey

FINAL ELECTRICITY CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2015

UNIT: GWh	CATEGORY	SPACE COOLING	WATER HEATING	LIGHTING	OTHER USE	TOTAL
C1	Wholesale & Retail Trade	1,969.19	42.17	1,038.99	1,166.33	4,216.67
C2	Transportation & Storage	892.59	5.41	406.12	699.24	2,003.57
C3	Accommodation & Food Service	586.08	118.31	308.19	509.95	1,522.69
C4	Information & Communication	1,536.01	140.23	709.28	1,477.67	3,863.20
C5	Selected Services	2,112.16	-	1,166.72	1,749.57	5,028.95
C6	Professional, Scientific & Technical	180.80	-	110.37	253.89	545.06
C7	Travel Agencies & Tour	8.05	0.01	272	8.64	19.41
C8	Public Administration	2,740.85	244.39	1,319.43	2,109.68	6,414.36
C9	Education	1,246.19	-	626.91	1,060.49	2,933.58
C10	Human Health & Social Activities	1,972.42	186.58	1,026.19	1,410.84	4,595.56
C11	Arts, Entertainment & Recreation	319.24	37.69	208.18	264.96	830.07
C12	Other Service Activities	1,730.65	187.69	999.26	1,488.32	4,405.92
TOTAL		15,294.21	962.48	7,922.37	12,199.58	36,379.03

FINAL LPG CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2015

UNIT: ktoe	CATEGORY	OTHER USE
C1	Wholesale & Retail Trade	12.16
C2	Transportation & Storage	-
C3	Accommodation & Food Service	161.91
C4	Information & Communication	-
C5	Selected Services	2.97
C6	Professional, Scientific & Technical	5.04
C7	Travel Agencies & Tour	-
C8	Public Administration	145.45
C9	Education	132.99
C10	Human Health & Social Activities	30.84
C11	Arts, Entertainment & Recreation	9.34
C12	Other Service Activities	59.31
TOTAL		560.00



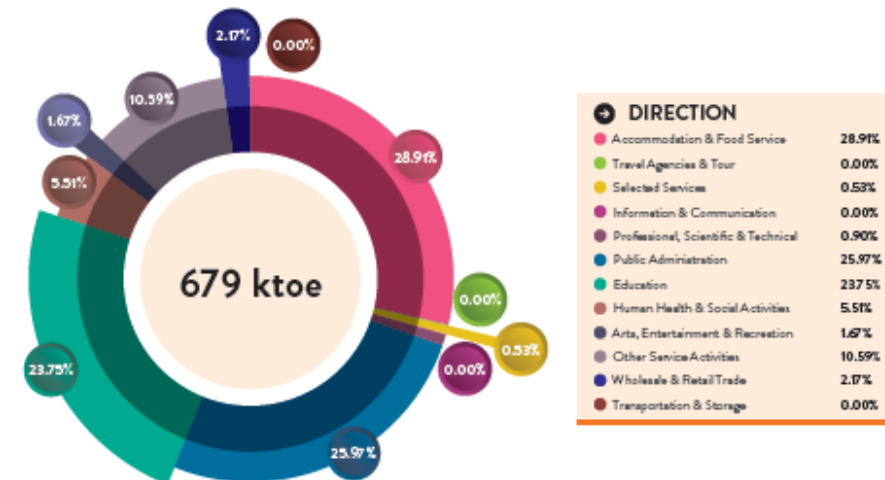
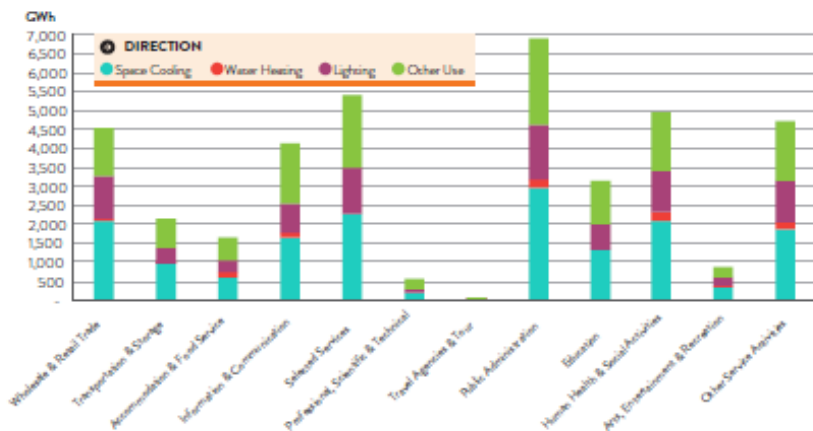
Commercial Survey

FINAL ELECTRICITY CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2016

UNIT: GWh	CATEGORY	SPACE COOLING	WATER HEATING	LIGHTING	OTHER USE	TOTAL
C1	Wholesale & Retail Trade	2,116.80	45.33	1,116.87	1,253.76	4,532.76
C2	Transportation & Storage	959.50	5.82	436.57	751.66	2,153.75
C3	Accommodation & Food Service	630.02	127.18	331.29	548.17	1,636.83
C4	Information & Communication	1,651.15	150.75	762.45	1,588.44	4,152.78
C5	Selected Services	2,270.49	-	1,254.17	1,880.72	5,405.92
C6	Professional, Scientific & Technical	194.35	-	118.65	272.92	585.92
C7	Travel Agencies & Tour	8.65	0.01	2.92	9.28	20.86
C8	Public Administration	2,946.31	262.71	1,418.34	2,267.82	6,895.18
C9	Education	1,339.60	-	673.90	1,139.99	3,153.49
C10	Human Health & Social Activities	2,120.27	200.57	1,103.11	1,516.59	4,940.04
C11	Arts, Entertainment & Recreation	343.17	40.51	223.79	284.82	892.29
C12	Other Service Activities	1,860.37	201.76	1,074.17	1,599.88	4,736.19
TOTAL		16,440.66	1,034.62	8,516.23	13,114.06	39,106.00

FINAL LPG CONSUMPTION BY AGGREGATED CATEGORIES IN COMMERCIAL SECTOR, 2016

UNIT: ktoe	CATEGORY	OTHER USE
C1	Wholesale & Retail Trade	14.74
C2	Transportation & Storage	-
C3	Accommodation & Food Service	196.31
C4	Information & Communication	-
C5	Selected Services	3.60
C6	Professional, Scientific & Technical	6.11
C7	Travel Agencies & Tour	-
C8	Public Administration	176.36
C9	Education	161.26
C10	Human Health & Social Activities	37.39
C11	Arts, Entertainment & Recreation	11.33
C12	Other Service Activities	71.91
TOTAL		679.00



Conclusions

- Sample size is small and not reflect the real population
- Limited budget
- Coverage only in Peninsular Malaysia
- Consultant experience is very important
- No secondary source to benchmarking the survey results
- Some of the results is not make sense and need some modification to reflect the true situation
- Need to have expert judgement before adopting the survey results.

Thank You

Malaysia Energy Information Hub

<http://meih.st.gov.my/>

