

Lesson Study: Cross-Border Learning for Developing International Perspectives

Task Development on Energy
Efficiency



Southeast Asian Ministers of Education Organization
Regional Centre for Education in Science and Mathematics

Purpose

- The purpose of the programme is to provide a platform for exchanging ideas of pupils from both Malaysia and Philippines.
- This is also to expose them in the learning culture of Education in the two economies which focuses on EE.
- It is hoped that the pupils could benefit from the lesson demonstration and discussions on the sample exercise given to them.

Objectives

- Communicate and exchange ideas with fellow pupils from another country.
- Apply their knowledge and skills in currency conversion, graph interpretation, and average.
- Identify the different sources of energy and ways on how to efficiently conserve energy.
- Develop pupils mathematical thinking and appreciation of the importance of energy efficiency and conservation.

Information

- **Target group**
- **Grade Level:**
 - Grade 7 in Malaysia
 - Grade 5 in Philippines
- **Number of Pupils:**
 - 17 in Malaysia
 - 32 in Philippines
- **Date & Venue**
- **Date:** 29 September 2016
- **Duration:** 60 minutes

Mechanism

- The symposium was held in a form of teleconferencing between demo teachers conducting a lesson to Malaysian and the Philippino pupils.
- The pupils were given task before the lesson (hands-on activities and problems to solve).
- There was communication and exchange of ideas between pupils.
- The answers of the exercises were compared among the two groups.
- There was a reflection of the lesson at the end of the programme

Roles of the Teachers:

- Give guidance to pupils to ask questions based on the electric bills and related to Math concepts such as currency conversion, graph interpretation and average.
- Rephrase the questions given by pupils.
- Take note on the board for important answers from the questions of the pupils leading to the understanding of conservation of energy.
- Identify the sequence of pupils who ask questions based on the relatedness of the questions and the expected answers.
- Ask questions toward the objectives of the lesson.

Materials:

- Electric bills of a typical household in Malaysia and in Philippines
- Graphs of a year-round electric bill consumption of a typical household in Malaysia and in Philippines

BIL ELEKTRIK DAN INVOIS CUKAI



No. Akaun : 02600036524010

No. Kontrak : 9111111

Deposit : RM 650.00

No. Invois Cukai : 46504321

DNG HUCK NG

603 JLN BALIK PULAU

11500 AIR ITAM PULAU PINANG



Jumlah Perlu Dibayar RM 355.40

Tarikh Bil
14 Jan 2016

	Amaun	Bayar Sebelum
Tunggakan	RM 0.00	Terima Kasih
Caj Semasa	RM 355.39	13.02.2016
Penggenapan	RM 0.01	
Jumlah Bil	RM 355.40	
	Amaun	Tarikh
Bil Terdahulu	RM 314.60	16.12.2015
Bayaran Akhir	RM 314.60	11.01.2016

Jenis Bacaan

Bacaan Sebenar

Tempoh Bil	16.12.2015 - 14.01.2016 (29 Hari)	Faktor Prorata
Tarif	0 - 021 (Komersial)	1.00
Blok Tarif (kWh)	Blok Prorata (kWh)	Kadar (RM)
≤ 200	200	0.435
>200	535	0.509
Jumlah	735	359.32

Keterangan	Tidak Kena GST	Kena GST	Jumlah
Kegunaan kWh	kWh 0	735	735
Kegunaan ICPT (RM @ 0.0152)	RM 0.00	RM 359.32	359.32
		RM 0.00	RM -14.14
Kegunaan Bulan Semasa	RM 0.00	345.18	345.18
6% GST (6% x RM 345.18)	RM	RM 28.71	28.71
KWTBB (1.6%)	RM	5.79	5.79
Kredit / Debit	RM	-16.25	-16.25
Caj Semasa	RM		355.39
No Meter	Bacaan Meter	Kegunaan	Unit
	Dahulu Semasa		

BIL ELEKTRIK DAN INVOIS CUKAI



No. Akaun : 02600036524010

No. Kontrak : 9111111

Deposit : RM 650.00

No. Invois Cukai : 46741406

DNG HUCK NG

603 JLN BALIK PULAU

11500 AIR ITAM PULAU PINANG



Jumlah Perlu Dibayar RM 525.70

Tarikh Bil
15 Feb 2016

	Amaun	Bayar Sebelum
Tunggakan	RM 0.00	Terima Kasih
Caj Semasa	RM 525.68	16.03.2016
Penggenapan	RM 0.02	
Jumlah Bil	RM 525.70	
	Amaun	Tarikh
Bil Terdahulu	RM 355.40	14.01.2016
Bayaran Akhir	RM 355.40	26.01.2016

Jenis Bacaan

Bacaan Sebenar

Tempoh Bil	14.01.2016 - 15.02.2016 (32 Hari)	Faktor Prorata
Tarif	0 - 021 (Komersial)	1.10344
Blok Tarif (kWh)	Blok Prorata (kWh)	Kadar (RM)
≤ 200	221	0.435
>200	801	0.509
Jumlah	1022	503.05

Keterangan	Tidak Kena GST	Kena GST	Jumlah
Kegunaan kWh	kWh 0	1022	1022
Kegunaan ICPT (RM @ 0.0152)	RM 0.00	RM 503.05	503.05
	RM 0.00	RM -15.53	RM -15.53
Kegunaan Bulan Semasa	RM 0.00	400.32	400.32
6% GST (6% x RM 400.32)	RM	RM 29.30	29.30
KWTBB (1.6%)	RM	6.06	6.06
Caj Semasa	RM		525.68
No Meter	Bacaan Meter	Kegunaan	Unit
	Dahulu Semasa		
991007453	72507	73520	1022 kWh

ERNESTO M GABRIEL
1210 ME POOK HERNANDEZ ST
POOK HERNANDEZ U.P. CAMPUS
Q. C.-DILIMAN
METRO MANILA

For inquiries please contact our Call Center at 1621
 or visit our website at www.meralco.com.ph

COMMONWEALTH BUS.CTR
 COMMONWEALTH
 Q. C.-BATASAN
 Tel. No. 16222666
 TIN -000-101-528-000-VAT
 61587



B4-A

33CZN51297 2320.01.0004

CUSTOMER TIN:

ELECTRIC BILL

Page 1 of 2
 EB Invoice No. 2326090061846

Account Summary for Account Number 032189193-9

Balance From Previous Billing		Current Charges		Total Amount Due
		Amount Due	Due Date	
₱ 0.00	Thank you	₱ 2,442.50	09/15/2016	₱ 2,442.50

Payments made after 09/06/2016 will be reflected on your next billing statement.

Service Info

Service ID Number	: 351309090101
Rate	: Residential
Contract in the name of	: GABRIEL, ERNESTO M
Service Address	: 1210 ME POOK HERNANDEZ POOK HERNANDEZ U. METRO MANILA

Billing Info

Bill Date	: 06 Sep 2016
Meter Reading Date	: 06 Sep 2016
Bill Period	: 07 Aug 2016 to 06 Sep 2016
Due Date	: 15 Sep 2016
Total KWH	: 278
Total current amount	: ₱ 2,442.50
Next Meter Reading	: 06 Oct 2016

BREAKDOWN OF ELECTRICITY CHARGES

BILL SUBGROUP	SUBTOTAL	PERCENTAGE
Generation	1,096.40	44.89 %
Transmission	228.49	9.35 %
System Loss	116.43	4.77 %
Distribution (Meralco)	623.46	25.53 %
Subsidies	19.91	0.82 %
Government Taxes	225.36	9.23 %
Universal Charges	97.98	4.01 %
FIT-All (Renewable)	34.47	1.41 %
Other Charges	0.00	0.00 %

Please be informed that MERALCO may conduct a routine maintenance/inspection of our customer metering facilities within your area this quarter.



Thumbs up for the app
 that will help manage
 your electricity costs.



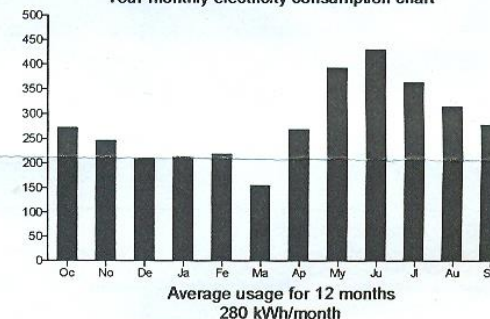
Meralco Virtual Engine
 MoVE

DOWNLOAD THE MoVE APP NOW!



Cost of electricity consumption may vary based on appliance's model and wattage

Your monthly electricity consumption chart



For authorized collecting agents

ATM / Phone Reference No.	Meralco Reference No.	Total Amount Due
0 032189193 9 0906 4	0 032189193 9 160906 4 160921 0 0	₱ 2,442.50



B2 - C4 - T4

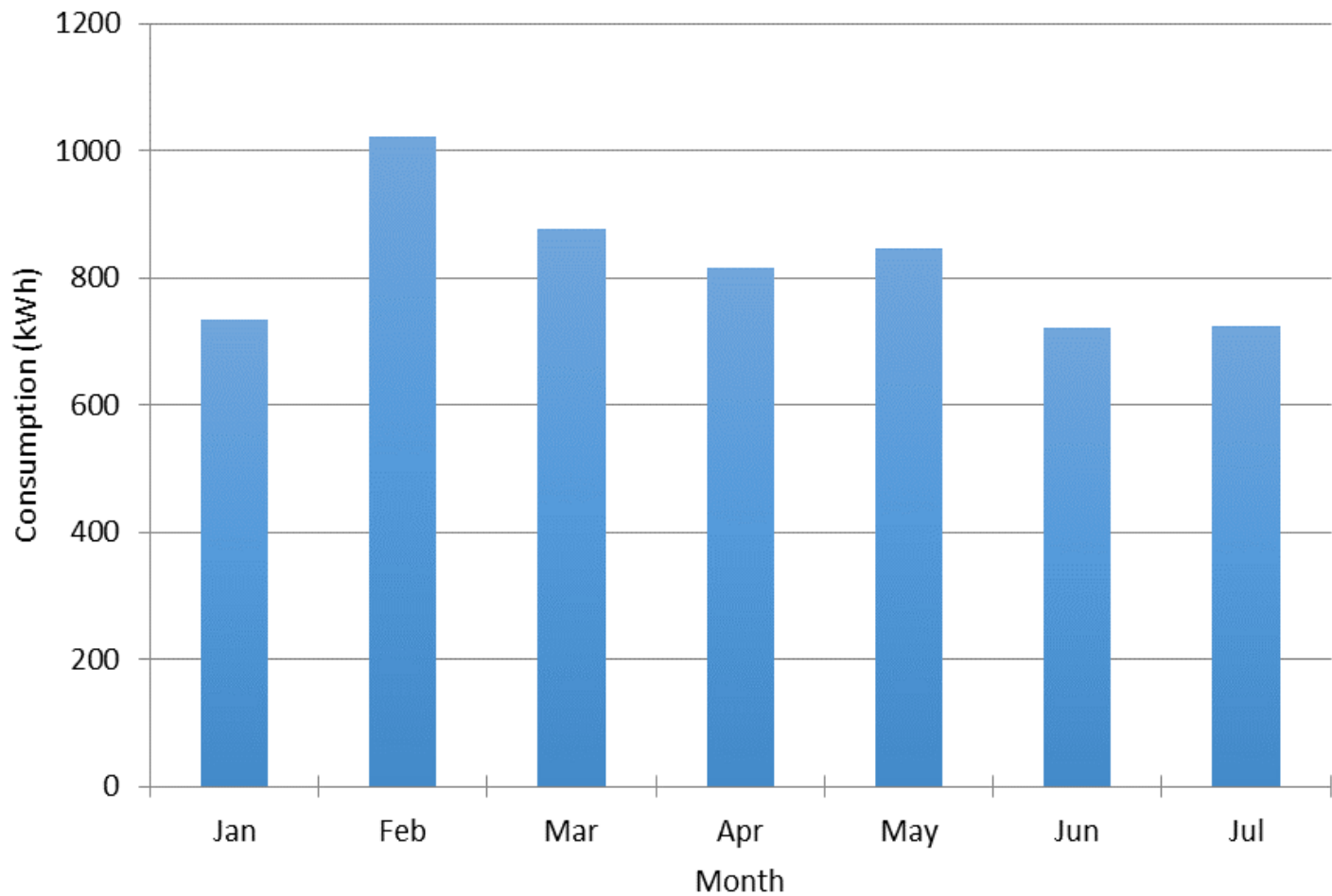


Please pay at any Meralco Business Center or through any accredited payment center on or before the due date.

CAS Permit No.: 0305-116-00036-BAVAR dtd: March 21, 2005



Typical Monthly Electricity Consumption (one household)(January - July 2016)



Expected exchange of questions in Discussion 1:

- Why is the cost of electricity cheaper in Malaysia than in Philippines?
- What are the sources of energy in Malaysia?
- What are the sources of energy in Philippines?

Expected exchange of questions in

Discussion 2:

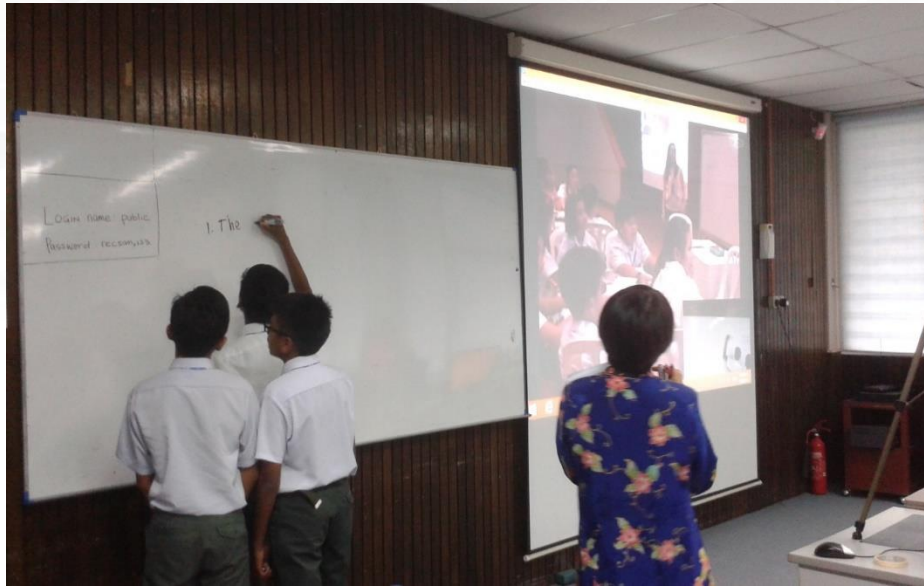
- Why is the consumption in the month of _ lower than other months?
- What are the activities in that month?
- How is the climate in that month?
- Why is the consumption in the month of _ higher than other months?
- What are the activities in that month?
- How is the climate in that month?
- How many persons live in the Malaysian household (owner of the bill)?
- How many persons live in the Filipino household (owner of the bill)?

Expected exchange of questions in Discussion 3:

- How do Filipinos conserve energy?
- How do Malaysians conserve energy?



The Lesson Implementation (Malaysia)



The Lesson Implementation (Philippines)



Total energy used (7 months)

$$= 5742 \text{ kWh}$$

Average energy used

$$\frac{5742}{7} = 820.3 \text{ kWh/month}$$

In the Philippines : 2857 kWh/month



Expected Outcomes

- Students' engagement despite language barrier
- Students learn:
 - Cost of electricity in Malaysia and the partnering school
 - The source of energy in each country
 - Natural recourses in each country
 - Other matters such as subsidy etc.
 - Important roles in quantifying the energy utilization to qualify the term efficiency in the context of energy conservation and scientific concepts on energy transformation
 - Differences in the curriculum

Findings

- Students and teachers found out that online (video conferencing) system is a potential learning platforms across countries, through this approach students were able to communicate and learn ideas and facts about energy generation and utilization across horizons
- It was learnt that, in the Philippines the cost of one KWH is expensive compare to Malaysia
- Malaysian government has a cost / subsidy to all consumer but in the Philippines none.
- In the Philippines, they depend much on the energy supply based on coal and geothermal but Malaysia produces on its own electricity through the rich natural resources of energy.
- Numbers played important roles in quantifying the energy utilization to qualify the term efficiency in the context of energy conservation and scientific concepts on energy transformation.

- Lesson plan
- Video

