UTM SUSTAINABLE ENERGY MANAGEMENT PROGRAM

Masilah Bandi
UTM Energy Manager
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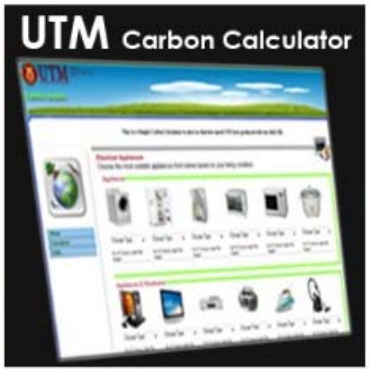
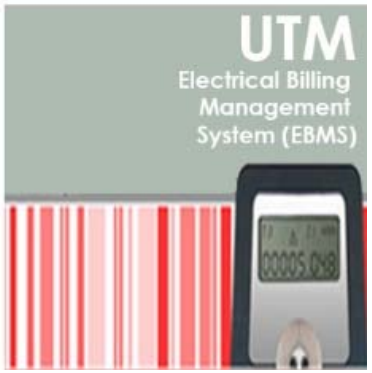
3 April, 2013
KSL Hotel & Resort
Johor Bahru





Hjh Masilah binti Hj Bandi,
Senior Electrical Engineer / UTM Energy Manager
Maintenance Division, Office of Asset & Development
Universiti Teknologi Malaysia
hp: 019-7111905, masilah@utm.my

- BSc of Electrical Engineering from University of Hartford, Connecticut, USA in May, 1991
- MSc in Maintenance Engineering & Asset Mgmt, UniversityofManchester,UK in Sept, 2010
- Registered Electrical Energy Manager (REEM) with Suruhanjaya Tenaga Malaysia (PTE-0002-2013), Member of Malaysian Energy Professional Association (MEPA), Certified Energy Manager from Asean Energy Management Scheme/Greentech, Graduate Member of BEM, IEM & Asean Engineer
- 11 years until now working at Maintenance Dept, Office of Asset & Development with 6 years heading Telecomunication Section and 2 years now heading the Electrical Infrastructure & Energy Mgmt Section, 2 years working as Research Officer in FKE-UTM (2002-2004)
- 11 years working at Celcom (M) Berhad as an Electrical Engineer, Head of Unit, Head of Department and Head of Division. (1991-2002)
- Grand Prize Winner of Anugerah Inovasi Naib Canselor 2008 (won RM3,000)
- Top 7 finalist Anugerah Inovasi Kementerian Pengajian Tinggi 2011
- Top 3 finalist of Anugerah Inovasi Naib Canselor 2010 (won RM3,000)

Content

- Introduction
- Energy Efficiency Practices
- Road Map

INTRODUCTION

2010-2012 highlights (benchmark year 2009)

RM bill reduction **RM4,434,767**

RM % reduction **16.8%**

kWh reduction **14,542,426**

kWh % reduction **24.3%**

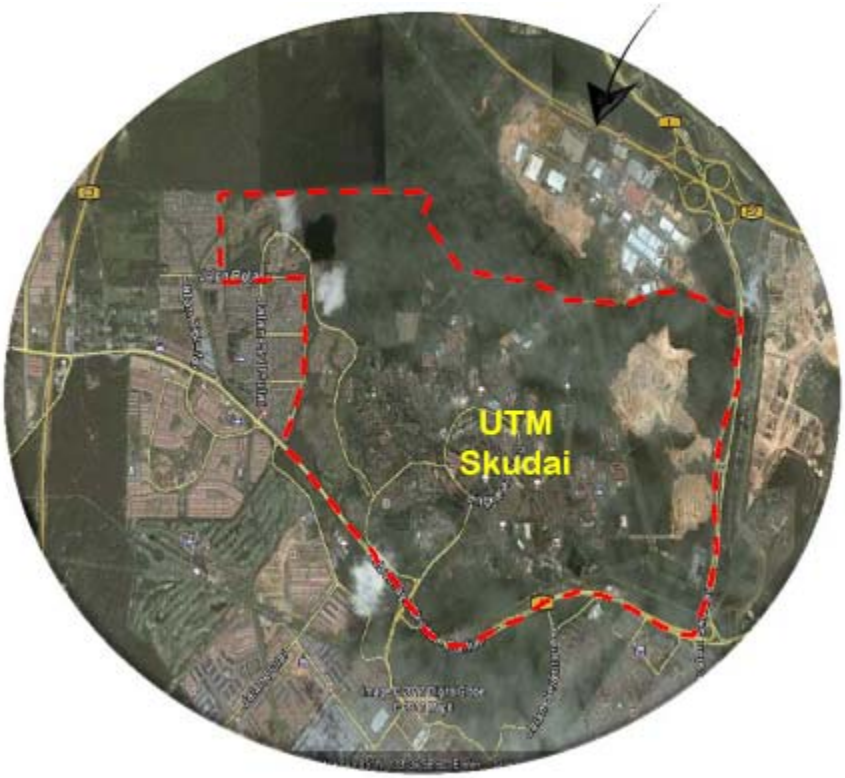
OPTR discount **RM1,244,180**

Energy Efficiency Index **149 kWh/m²**

Energy Efficiency Index reduction **10.78%**

SNAPSHOTS OF UTM

Total Area	2,829.90 acres
Green Area	1,008.49 acres
Student Hostel	789.24 acres
Administration Zone	414.64 acres
Recreational & Sports Area	411.16 acres
Technology Park	130 acres
Commercial	39 acres
Staff Residential	36.46 acres
Number of Staff	2,074
Number of Students	24,275



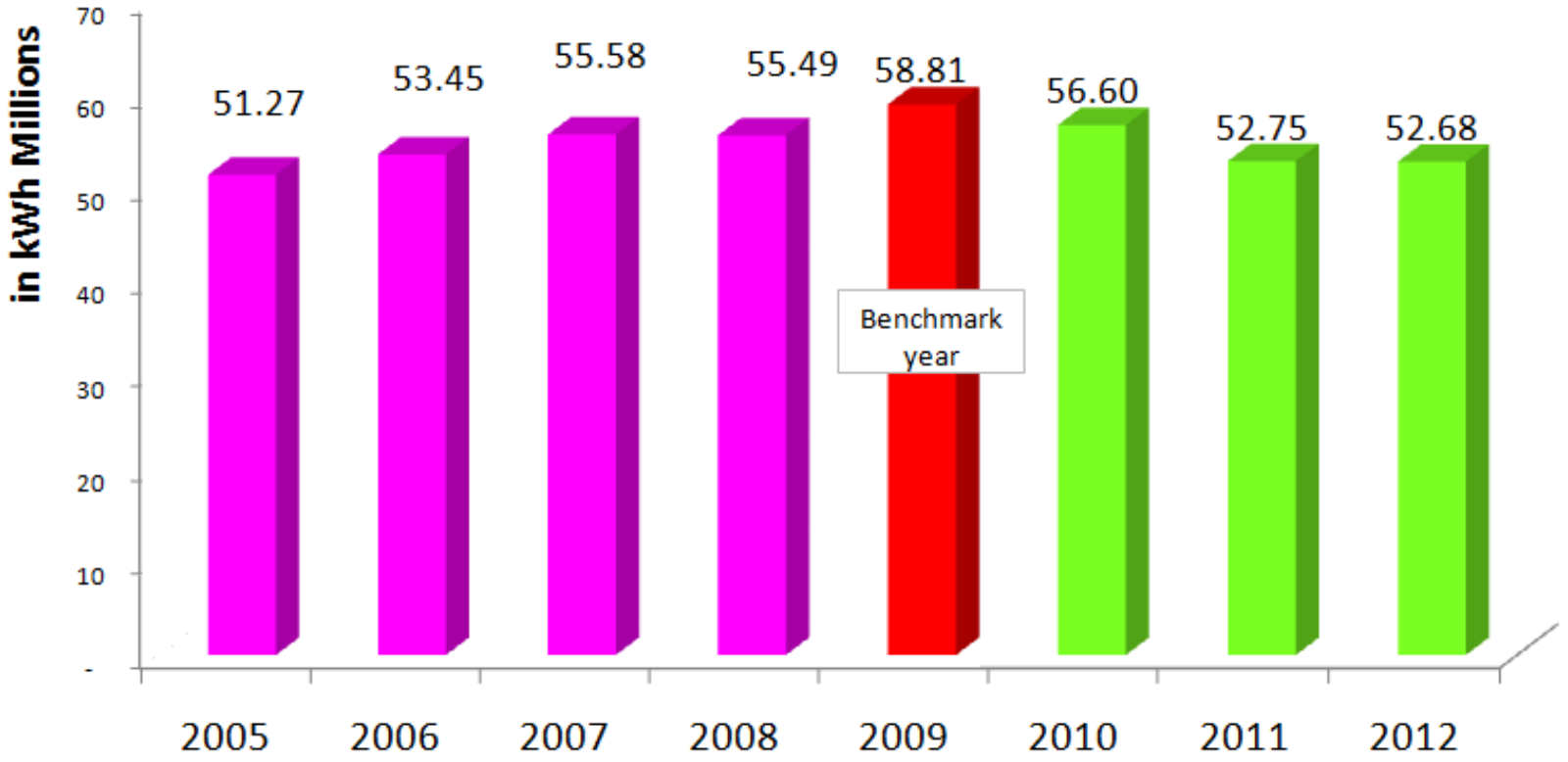
UTMJB – Before 9th Malaysia PLAN

- 25,000 population (20,000 students and 5,000 staff)
- 1145 hectares of land, 572 buildings and 939,163 m^2 gross floor area
- 49 electric substations, 220,000 light tubes and 2,580 street lights
- 17 centralised airconds system (chillers&cooling towers) and 5,873 split unit airconds
- Average 2011 electrical bill is RM1.5 million/month or RM17 .6 million/year

UTM's 9th Malaysia's Project (2008-2012)

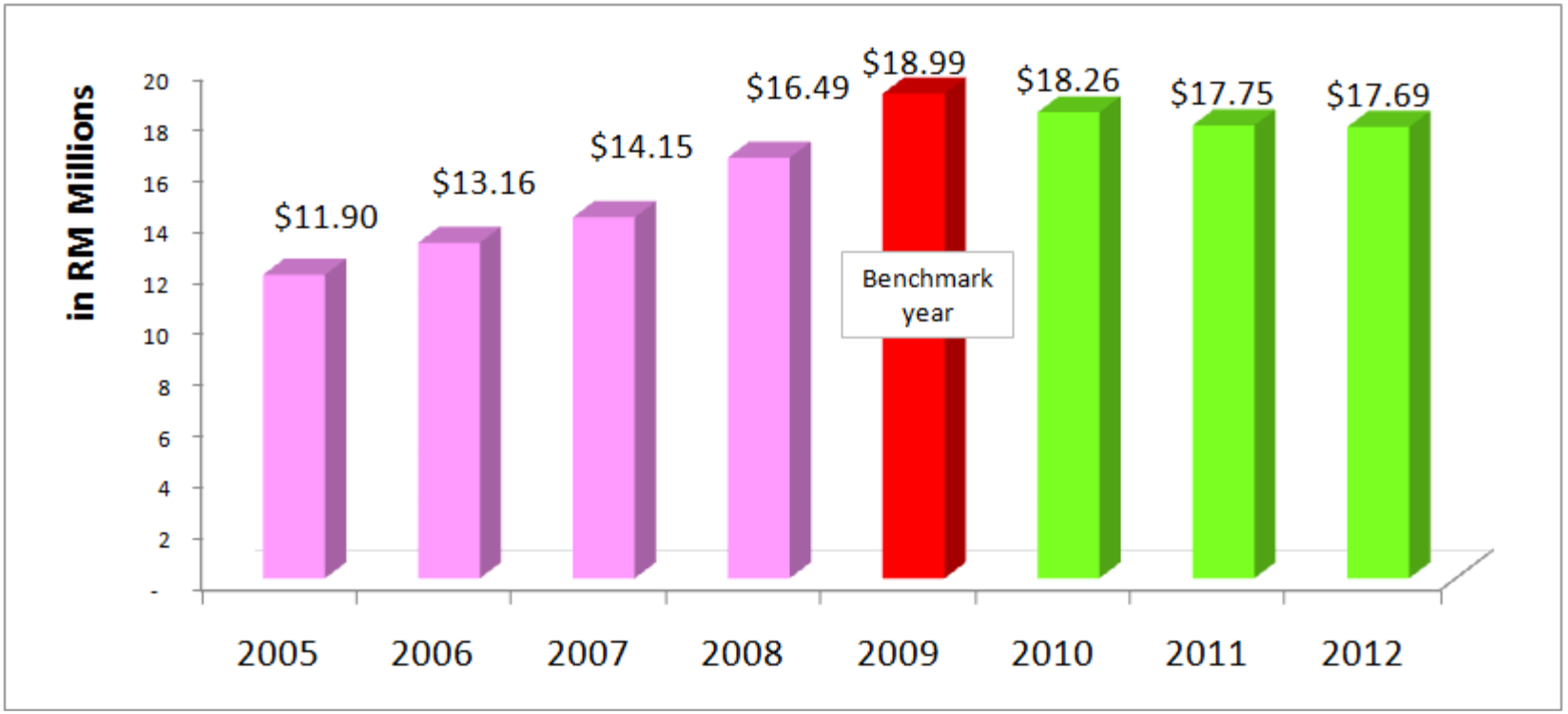
- 34 new buildings – cost ~ RM 1 billion
- 2,527 rooms with additional GFA = 138,810 m^2
- 11 new electric substations – total 60 substations
- 3,269 new split units a/c system – total 9,142 units a/c
- 3 chillers & Cooling Towers (~3.6M Watt) – Total 20 sys
- 57,752 lights tube (~2.5M Watt) – Total ~280,000 tubes
- 578 numbers of compound and street light with 156 new LED Street Lights – Total Street Light is 3,158
- Estimated increase in UTM electrical bill of RM500,000/month

Electrical usage trend at UTMJB 2003 to 2012 (in kWh)



Tahun	Penggunaan tenaga kWh	Bil Elektrik	Beza vs 2009 in kWh	% reduce in kWh	Beza vs 2009 in RM	% reduce in kWh	Diskaun OPTR	Total jimat in RM
2012	52,818,914	17,778,288	- 5,993,452	-10.2%	- 1,216,224	-6.4%	960,015	(2,176,239)
2011	52,746,516	17,748,575	- 6,065,851	-10.3%	- 1,245,937	-6.6%	284,165	(1,530,101)
2010	56,604,479	18,266,085	- 2,207,887	-3.8%	- 728,427	-3.8%	0	(728,427)
Total	162,169,909	53,792,948	**- 14,542,426**	**-24.3%**	**- 3,190,587**	**-16.8%**	1,244,180	**- 4,434,767**
2009	58,812,366	18,994,512	<---------Benchmark year					

Electrical usage trend at UTMJB 2003 to 2012 (in RM)



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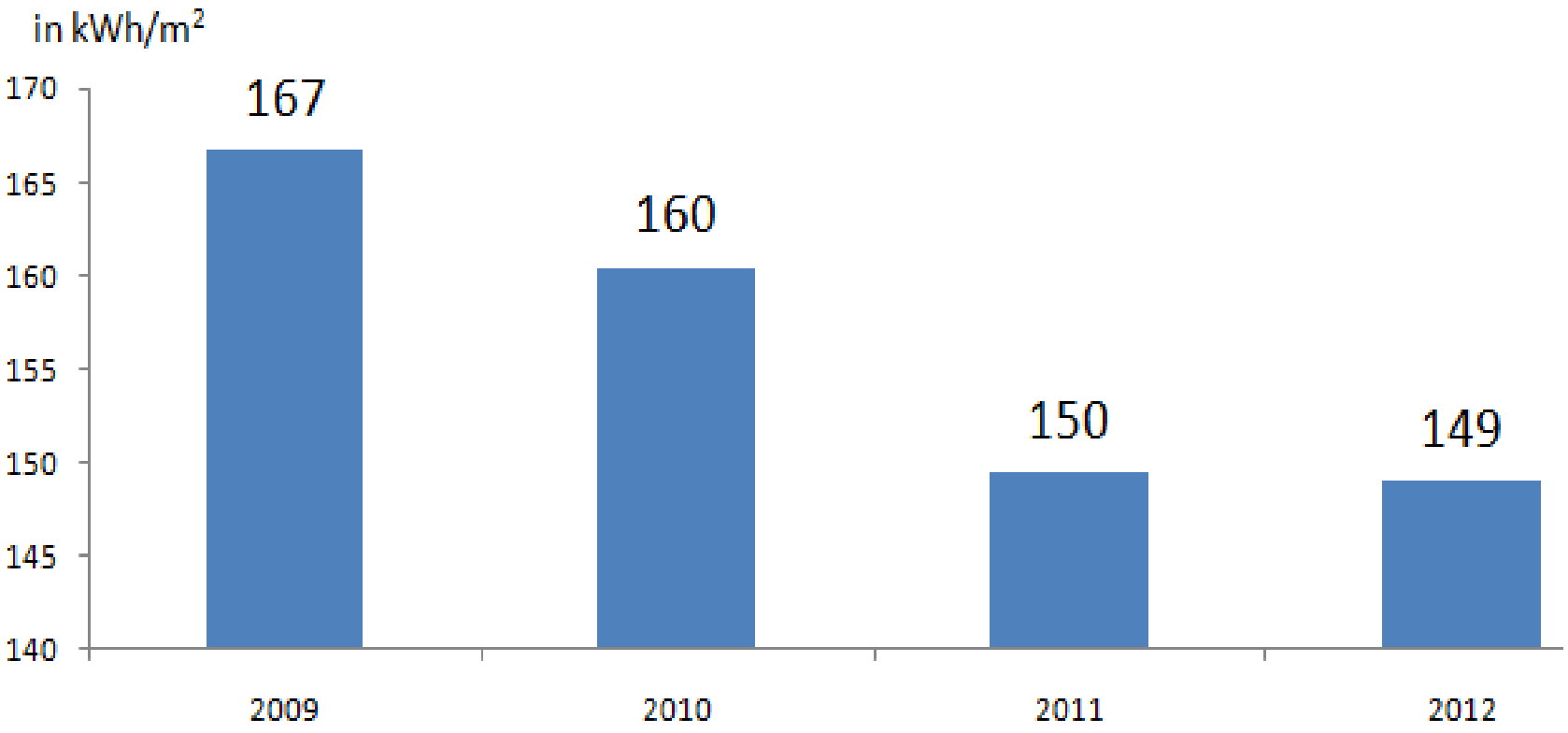
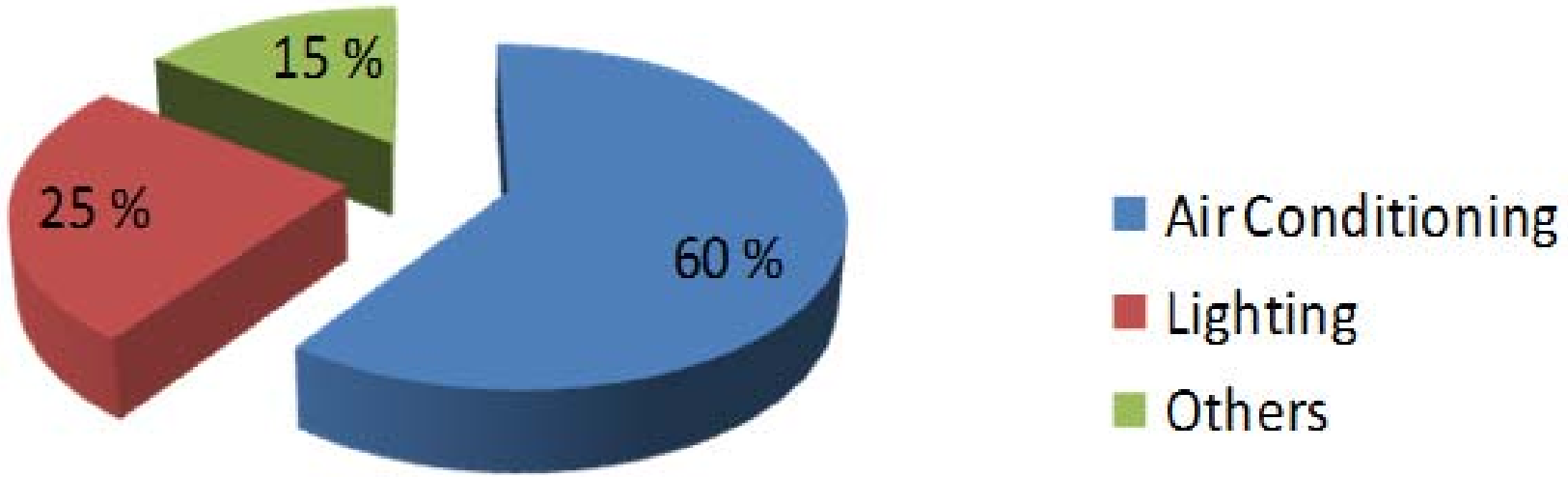
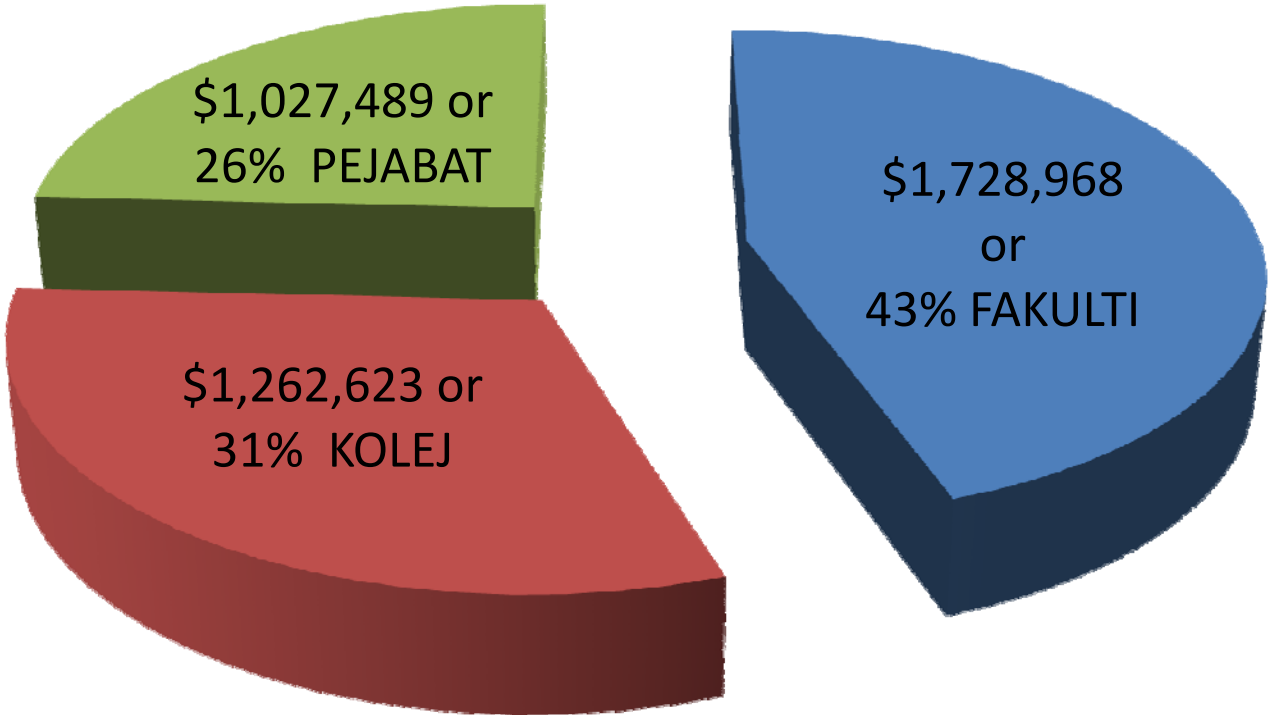
UTM ENERGY EFFICIENCY INDEX



Energy Consumption in buildings



Energy consumption in buildings



Where and How UTM Start SEM?

Start by
Building People!

Jan 2011:
Training for 30 Energy Managers

energy management matrix

before SEMP implementation

current status as of Mac 2013

	Energy Policy	Organization	Motivation	Information System	Marketing	Investment
4	Energy policy, action plan and regular review, have commitment of top management as part of an environmental strategy	Energy management has been fully integrated into management structure. Clear delegation of responsibility for energy consumption	Formal and informal channels of communication regularly exploited by energy manager and energy staff at all levels	Comprehensive system sets targets, monitors consumption, identified faults, quantifies savings and provides budget tracking	Marketing the value of energy efficiency and the performance of energy management both within and outside the organization	Positive discrimination in favor of 'green' schemes with detailed investment appraisal of all new build and refurbishment opportunities
3	Formal energy policy, but no active commitment from top management	Energy manager accountable to energy committee representing all users, chaired by a member of the managing board	Energy committee used as main channel together with direct contact with major users	M & T reports for individual premises based on sub-metering, but savings not reported effectively to users	Programme of staff awareness and regular publicity campaigns	Some payback criteria employed as for all other investment
2	Un adopted energy policy set by energy manager or senior department manager	Energy manager in post reporting to ad-hoc committee, but line management and authority are unclear	Contact with major users through ad-hoc committee chaired by senior department manager	Monitoring and targeting reports based on supply meter data. Energy unit has ad-hoc involvement in budget setting	Some ad-hoc staff awareness training	Investment using short term payback criteria only
1	An unwritten set of guidelines	Energy management is the part-time responsibility of someone with only limited authority or influence	Informal contacts between engineer and a few users	Cost reporting based on invoice data. Engineer complies reports for internal use within technical department	Informal contacts used to promote energy efficiency	Only low cost measures taken
0	No explicit policy	No energy management or any formal delegation of responsibility for energy consumption	No contact with users	No information system. No accounting for energy consumption	No promotion of energy efficiency	No investment in increasing energy efficiency in premises

UTM Energy Management Committee

Timbalan Naib Canselor (Pembangunan)

Advisor:
Prof Dr Zainuddin Manan

Energy Manager (REEM)

Ketua BPU

Timbalan Bendahari

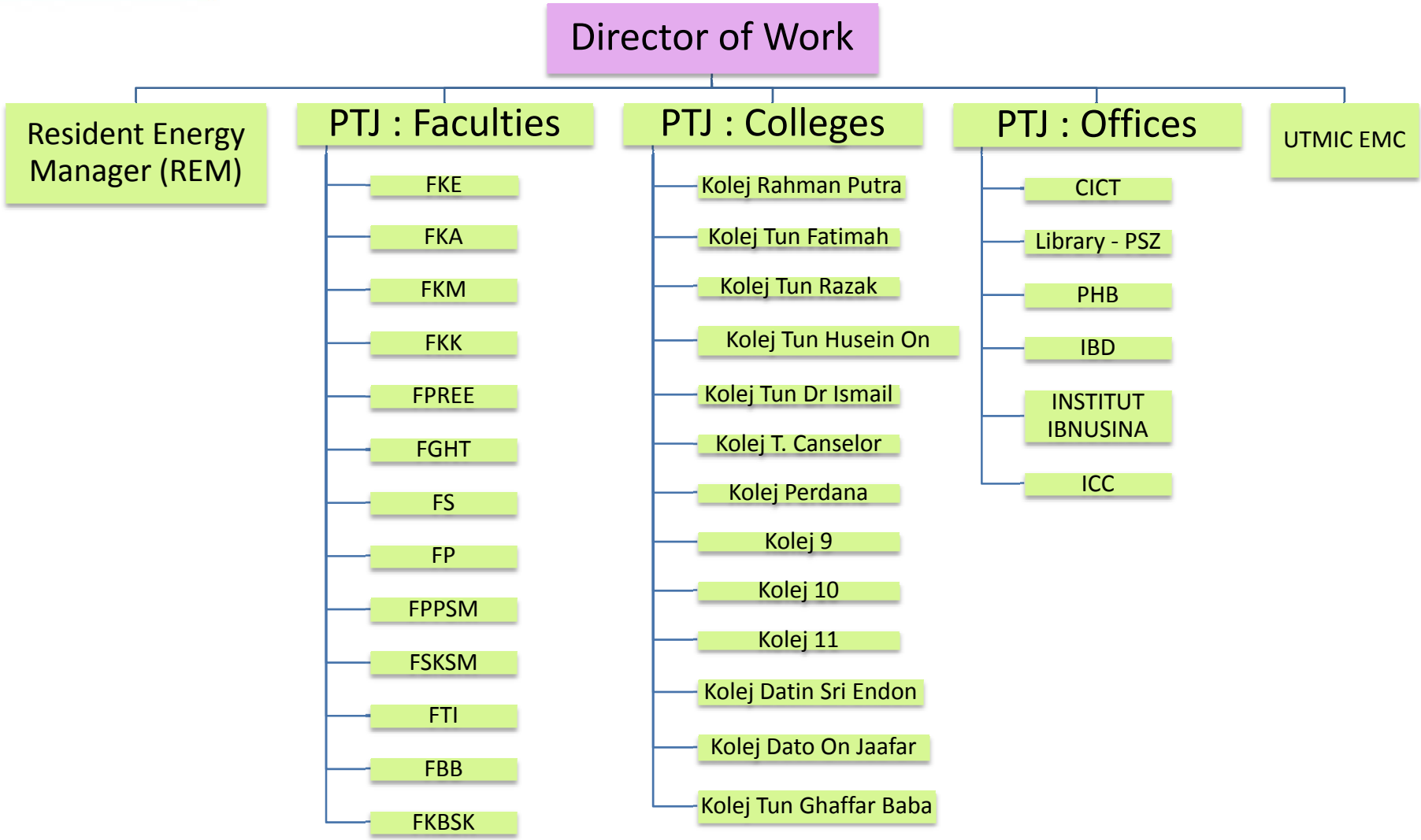
Timbalan Pendaftar

Pengarah Kerja

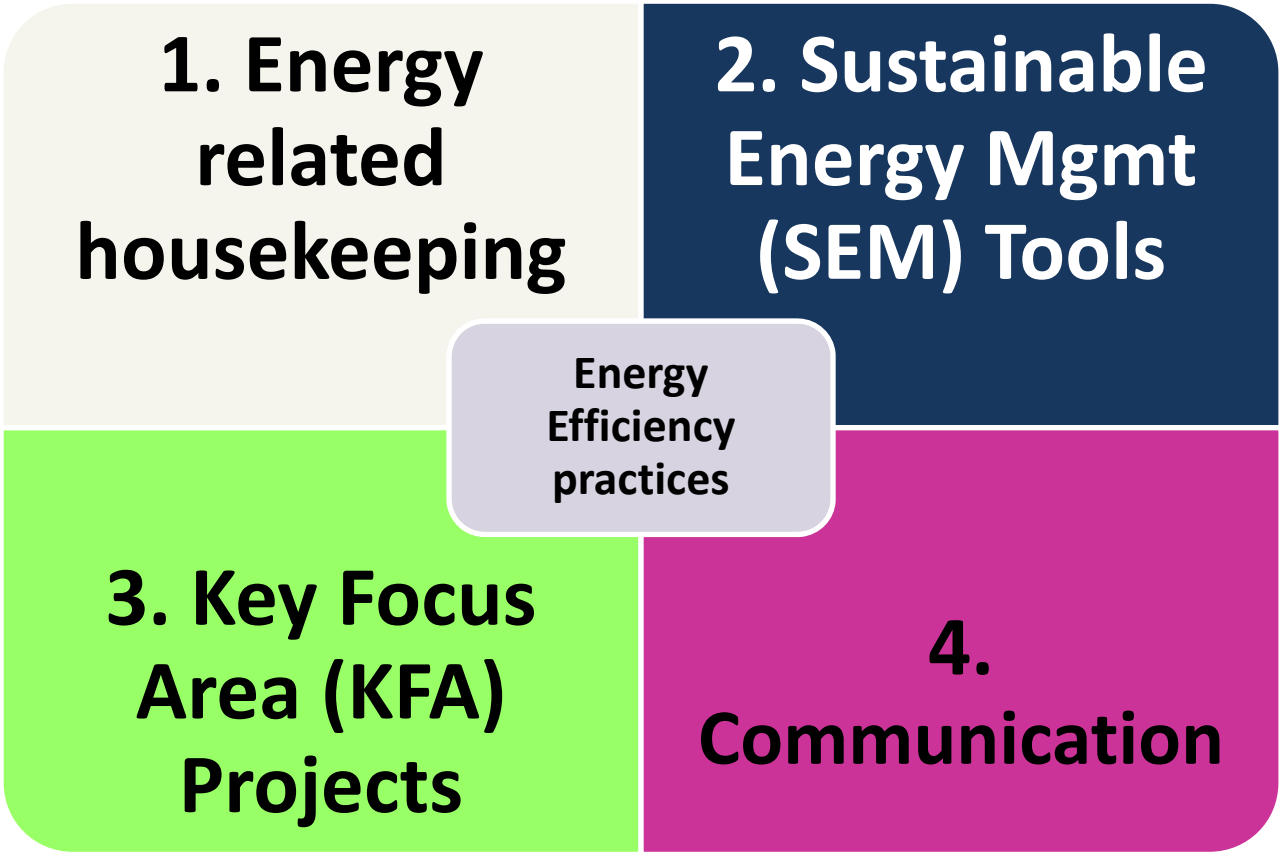
PTJ EMC

Description:
REEM – Registered Electrical Energy Manager
BPU – Bahagian Penyenggaraan dan Ubahsuai
EMC PTJ - Pusat Tangung Jawab Energy Mgmt Committee

UTM PTJ Energy Management Committee



ENERGY EFFICIENCY PRACTICES



EE practices

Housekeeping

- Reset centralised AC System (24°C & 7.30 am-4.30pm)
- Policy not to use centralised AC during weekend
- Continuous monthly/daily/ weekend checking on Street/ Building Lightings, Centralised AC System, SPACE
- Soft starter for AC system project

SEM Tools

- Bi-monthly Energy Mgmt Review
- Electrical Billing Management System (EBMS)
- TNB OPTR 20% discount
- TNB Street Lighting Tariff Correction
- Optimal Audit
- Optimal Heat
- Optimal Water

Key Focus Area

- Retrofit T5 tube project
- Replace AC System using VRV system
- PFI overhaul AC system FKE using VRV system
- PFI LED Street Lighting Retrofit Project
- Renewable Energy Plan (PFI Solar system project Wind Turbine Pilot Project)

Communication

- Awareness Program at faculties, colleges and offices
- Energy Saving Campaign
- Yearly workshop on Energy Management Working Procedure
- Monthly Energy Management Report to UMG
- Email Group & Facebook

Legend:
EE : Energy Efficiency
SEM : Sustainable Energy Management
PFI : Private Financing Initiatives
OPTR : Off Peak Tariff Rider
EBMS : Electrical Billing Management System
UMG : University's Management Group

1. Energy related housekeeping

Energy Efficiency practices

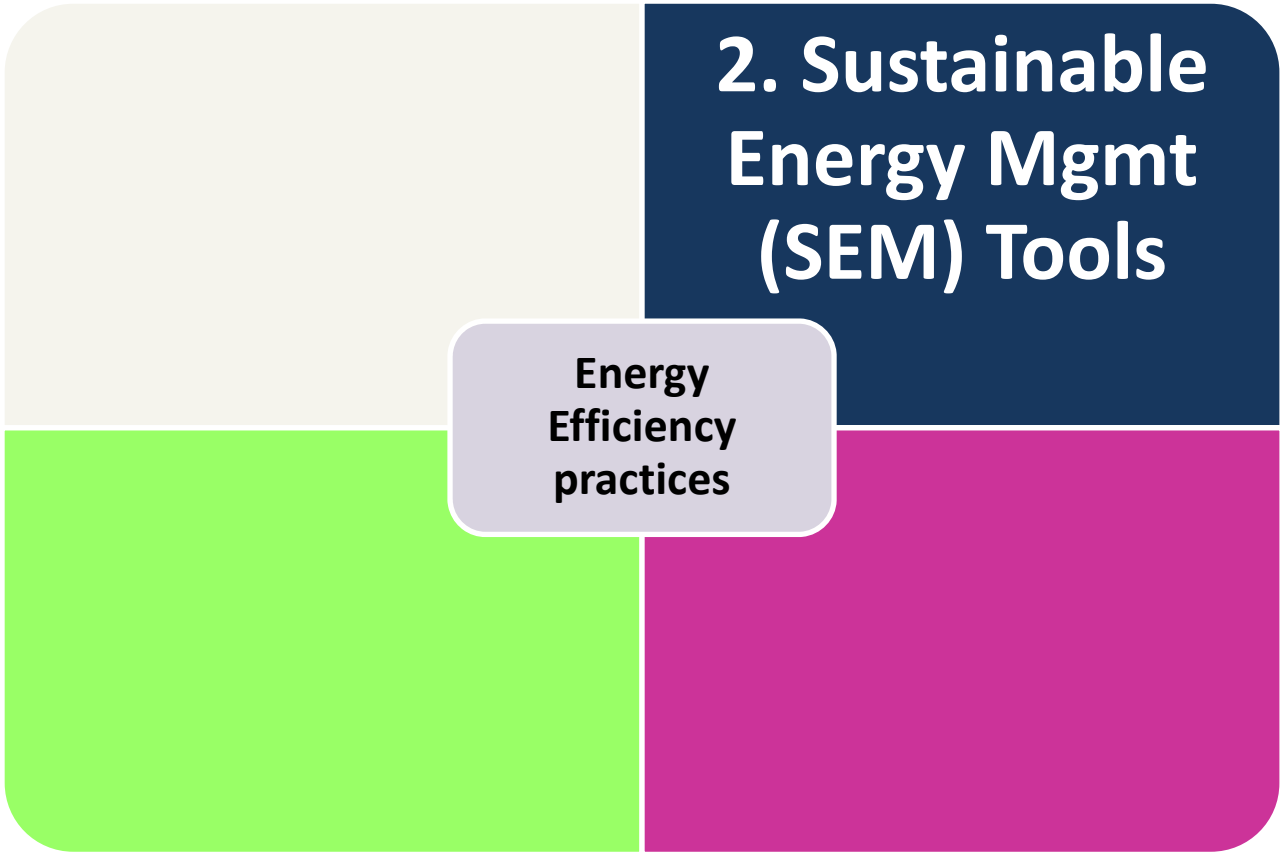
Housekeeping - no cost initiatives

1. Re-set all A/C system temperature setting to 24°C include manually check all 17 Centralised A/C.
2. Reset scheduling on/off times at 7:30am/ 4:30 pm for A/C Centralized System .
3. Off all electrical sourced at colleges.
4. Lights de-lamping/switch optimisation
5. Sending monthly electrical bills to all faculties, colleges and offices (~50 bills)

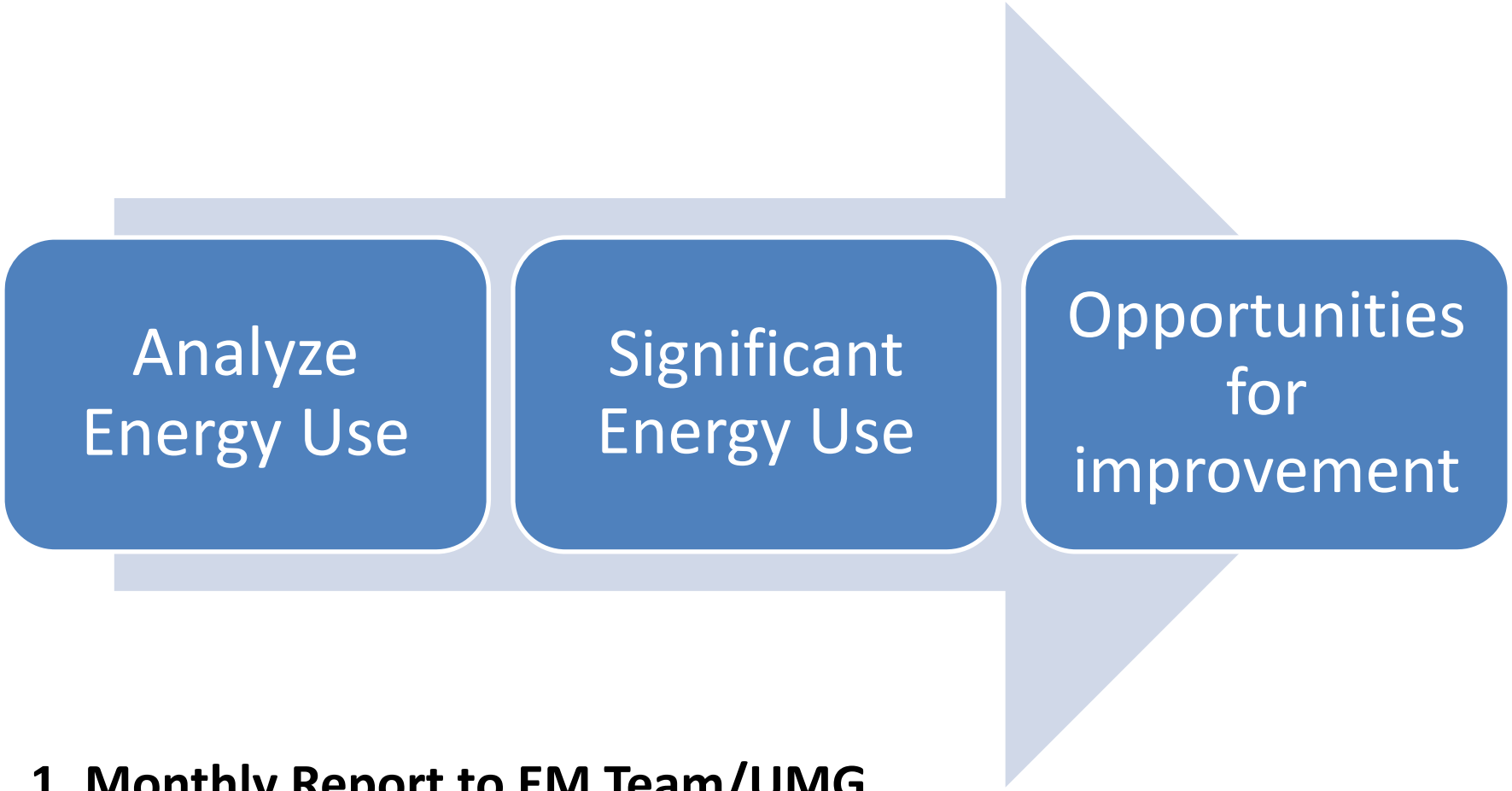
Housekeeping - low cost initiatives

1. Change all photo sensor at feeder pillar to timer for all Street Lights.
2. Install new TNB meter based on requirement from tariff study on OPTR discount & correction of Street Light tariff.
3. Install automatic room lighting controls via EIB at identified location (ie Library, Mosque, Hall Theatre)
4. Install soft-starter at AC system to reduce power surge starting time.
5. Install timer at AC System control at identified location to control the centralised system off schedule (ie FAB Studio, IVAT and Postgraduate room)

2. Sustainable Energy Mgmt (SEM) Tools

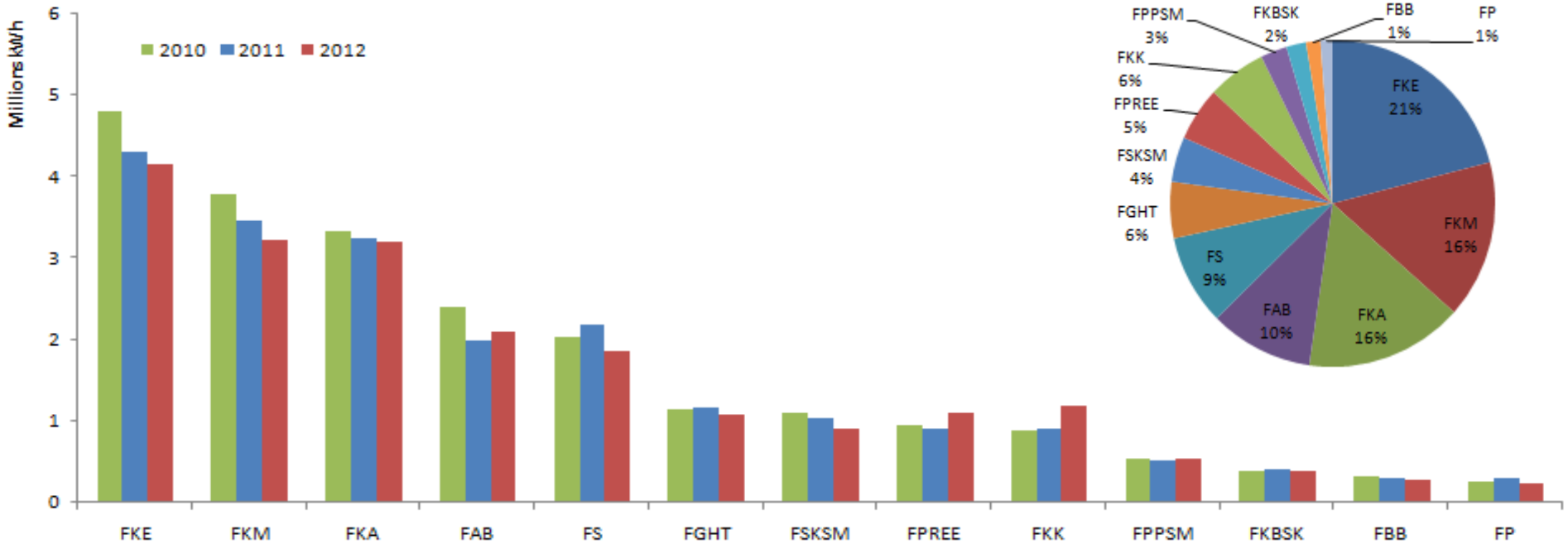


1- Energy Review



1. **Monthly Report to EM Team/UMG**
2. **Bi-monthly meeting with EM team**

Penggunaan tenaga elektrik fakulti UTM (in kWh) (2010 vs 2011 vs 2012)

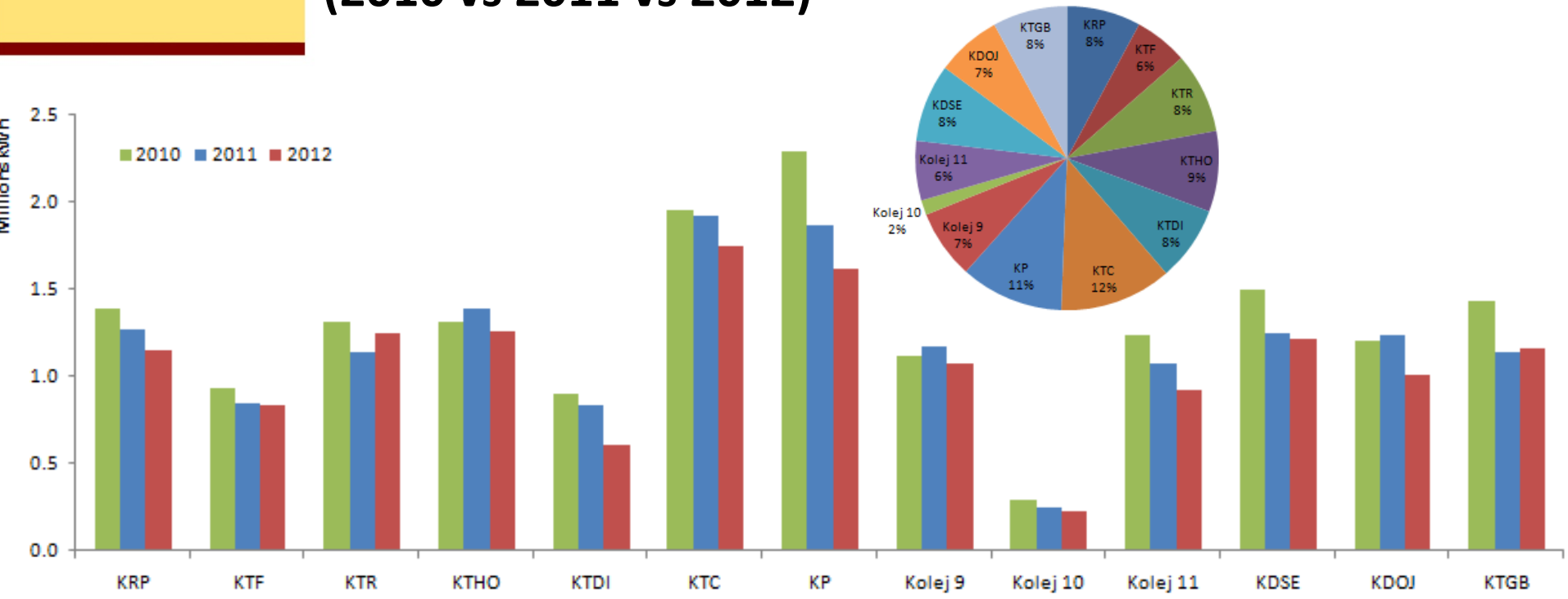


Tempoh	FKE	FKM	FKA	FAB	FS	FGHT	FSKSM	FPREE	FKK	FPPSM	FKBSK	FBB	FP
2010	4,806,656	3,785,149	3,346,323	2,394,472	2,036,774	1,150,083	1,106,955	949,844	888,201	541,076	398,712	315,247	256,451
2011	4,315,138	3,472,290	3,255,201	1,989,045	2,198,357	1,163,353	1,031,040	907,941	915,989	518,376	416,749	302,821	293,213
2012	4,167,484	3,218,897	3,211,452	2,108,356	1,869,224	1,079,394	916,529	1,094,333	1,195,157	536,814	398,442	285,301	247,250
Beza 2011/2012	(147,654)	(253,393)	(43,749)	119,310	(329,132)	(83,959)	(114,511)	186,393	279,168	18,438	(18,306)	(17,519)	(45,963)

Semua fakulti menunjukkan pengurangan penggunaan tenaga jika dibandingkan dengan tahun 2011 kecuali FAB, FPREE, FKK & FPPSM.

Jumlah pengurangan kategori fakulti adalah 450,879 kWh atau -2.17% drpd 2011

Penggunaan tenaga elektrik di kolej UTM (in kWh) (2010 vs 2011 vs 2012)

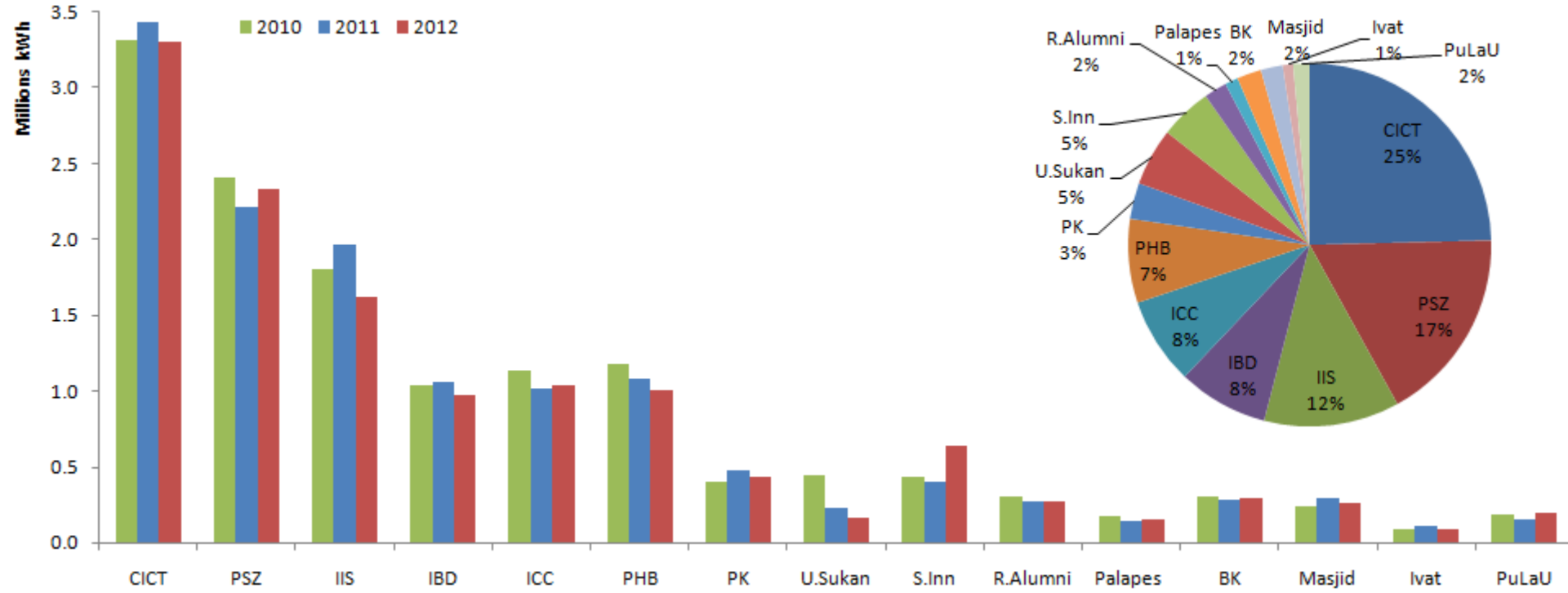


Tempoh	KRP	KTF	KTR	KTHO	KTDI	KTC	KP	Kolej 9	Kolej 10	Kolej 11	KDSE	KDOJ	KTGB
2010	1,395,253	937,674	1,315,743	1,314,580	904,347	1,961,757	2,290,375	1,119,097	292,469	1,241,840	1,498,382	1,205,795	1,438,642
2011	1,268,121	846,181	1,138,734	1,392,060	834,323	1,922,232	1,870,858	1,177,586	248,209	1,071,314	1,252,659	1,236,691	1,139,503
2012	1,155,441	832,917	1,252,865	1,258,469	604,003	1,752,276	1,620,667	1,074,426	231,099	927,218	1,215,439	1,013,449	1,165,443
Beza 2011/2012	(112,680)	(13,264)	114,131	(133,591)	(230,320)	(169,956)	(250,191)	(103,159)	(17,110)	(144,096)	(37,219)	(223,242)	25,940

Semua kolej (kecuali KTR & KTGB) menunjukkan pengurangan penggunaan tenaga jika dibandingkan dengan tahun 2011.

Jumlah pengurangan kategori kolej adalah 1,294,759 kWh atau -8.41% drpd 2011

Penggunaan tenaga elektrik pejabat UTM (in kWh) (2010 vs 2011 vs 2012)



Tempoh	CICT	PSZ	IIS	IBD	ICC	PHB	PK	U.Sukan	S.Inn	R.Alumni	Palapes	BK	Masjid	Ivat	PuLaU
2010	3,314,375	2,405,285	1,808,295	1,040,142	1,134,204	1,181,378	400,424	445,948	431,351	309,243	173,104	306,188	244,552	90,628	186,028
2011	3,437,297	2,209,652	1,970,140	1,062,535	1,022,228	1,080,587	474,951	225,259	400,118	273,592	146,860	287,849	299,375	105,649	152,272
2012	3,307,772	2,335,750	1,623,532	973,218	1,041,529	1,003,141	431,087	168,750	639,875	271,952	157,420	291,192	263,526	94,183	196,731
Beza 2011/2012	(129,525)	126,098	(346,608)	(89,317)	19,301	(77,446)	(43,865)	(56,509)	239,757	(1,640)	10,560	3,344	(35,850)	(11,467)	44,459

Semua pejabat (PSZ, ICC, ScholarInn, Balai Keselamatan & Pusat Latihan menunjukkan pengurangan penggunaan tenaga jika dibandingkan dengan tahun 2011.

Jumlah pengurangan kategori kolej adalah 345,282 kWh atau -2.63% drpd 2011

2. EBMS

- Development of the system start in Sept 2012 (system structure & data collection) and can be access via UTM local intranet http://161.139.20.111/Defaultebms.aspx
- There are 539 meters registered in the system.
- First 50 electrical bill statement starting Oct 2010 bills were generated to all faculties, colleges and offices and have been sent to these PTJ every month since then.
- Electrical bill generation for 133 arcades around campus is also using this system.
- Finalist “UTM Vice Chancellor Innovation Award 2011” (received RM3,000 on 7 July, 2011)
- Use by all 28 UTM Energy Managers and students, PHB Development Division for new blocks and PHB Service Division for Arcade electric bill generation.

Sample of Electric bill statement

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

BAHAGIAN PENYENGGARAAN & UBAHSUAI
PEJABAT HARTA BINA
UNIVERSITI TEKNOLOGI MALAYSIA
81310 UTM, SKUDAI, JOHOR

Rujukan Kami : UTM.J.05.02/11/12/8 Jld 2 (111) 12 hb Nov, 2012

Dekan
Fakulti Kejuruteraan Elektrik
Universiti Teknologi Malaysia
81310 UTM, Skudai, Johor

PERKARA : PENYATA BULANAN BIL ELEKTRIK

Tempoh bil : Oct 2012 **Jumlah bil : RM 122,298.38**

Berikut adalah perbandingan kos penggunaan tenaga elektrik di Fakulti saudara.

	2010	2011	2012
Jan	121,304.45	125,802.72	115,950.74
Feb	152,488.52	82,553.47	90,555.50
Mar	120,753.79	106,423.20	111,392.11
Apr	105,532.42	129,579.26	115,669.01
May	129,137.47	74,903.33	127,971.48
Jun	102,509.87	123,522.36	95,772.46
Jul	125,178.05	110,716.94	113,285.02
Aug	106,351.78	115,717.06	87,011.18
Sep	103,485.32	76,251.24	113,476.27
Oct	125,474.12	112,843.22	122,298.38
Nov	99,046.66	120,475.37	0.00
Dec	93,060.29	113,974.85	0.00
Total (RM)	**1,384,322.73**	**1,292,763.02**	**1,093,382.16**

Sila email kepada masilah@utm.my untuk mendapatkan maklumat terperinci bagi penyata di atas.

Sekian, terima kasih.

HJH. MASILAH BT. HJ. BANDI
Jurutera Elektrik
Unit Elektrik
Pejabat Harta Bina
b.p. Pengarah Kerja

s.k. Energy Manager FKE (melalui email)

Type of energy meter use in UTM

Digital kWh meter in UTM

Schneider PM500

Schneider PM700

Analog kWh meter in UTM

3 phase

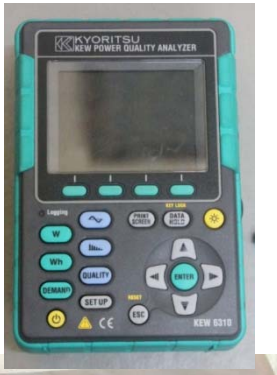
1 phase

Type of energy meter logger use in UTM

Power Monitoring System (2 system)

Schneider PM700

PM700 Energy Meter Logger (3 unit)



Kyoritsu Meter Logger (3 unit)

EBMS – continuous improvement

- Online connection to all Schneider PM700 energy meter that allow meter remote reading.
- Additional reporting that include EEI by blocks
- Include inventory for all significant energy equipment ie furnace, aircond system, pump system etc

3. TNB Tariff

- Domestic Tariff
- Commercial Tariff
- Industrial Tariff
- Mining Tariff
- Street Lighting Tariff
- Specific Agriculture Tariff
- Top-Up and Standby Tariff

Chronology of UTM TNB tariff changes
- from tariff C1 (standard)
- to tariff C1 (with OPTR)
- to tariff C3 (standard)
- to tariff C3 (with OPTR)

Year changed	Jun 2006	July 2008	Mac 2009	Jun 2011 (C1 OPTR)	Dec 2012 (C3 OPTR)
kWh peak	0.234	0.296	0.288	0.312	0.295
kWh Off-peak	14.4	18.2	17.7	0.2495	0.236
MD C1	19.5	24.6	23.93	25.9	25.03
MD C2	29.00	36.6	35.60	38.60	37.30
kWh Street Lighting, G	0.123	0.155	0.151	0.164	0.164

Simulation : Bill TNB tariff comparison between C1, C2 & C3

Month	Total kWh (A)	Max Demand (B)	Peak kWh (C)	Off peak kWh (D)	UTM bil if use tariff C1 standard (E)	Actual UTM bil C2 standard (F)	Actual UTM bil C1 with OPTR (G)	UTM bil if use tariff C3 standard (H)	UTM bil if use tariff C3 with OPTR (I)	C1 standard vs C2 standard (W)	C1 standard vs C1 with OPTR (Y)	C1 standard vs C3 new (X)	C1 standard vs C3 old (Z)
Nov-11	4,790,082	14,768	3,461,725	1,328,357	1,706,190	1,731,779	1,630,844	1,642,722	1,549,249	25,589	(75,347)	(156,941)	(63,468)
Dis-11	5,138,331	14,198	3,700,570	1,437,761	1,791,537	1,798,612	1,709,985	1,705,045	1,623,797	7,075	(81,552)	(167,739)	(86,492)
Jan-12	4,526,859	13,610	3,250,609	1,276,250	1,604,275	1,622,180	1,531,884	1,538,463	1,455,112	17,905	(72,391)	(149,163)	(65,812)
Feb-12	4,253,059	14,134	3,092,933	1,160,126	1,538,960	1,575,580	1,473,156	1,495,265	1,399,841	36,621	(65,804)	(139,119)	(43,695)
Mac-12	5,328,332	14,438	3,886,184	1,442,148	1,851,073	1,860,440	1,769,272	1,763,662	1,679,972	9,367	(81,801)	(171,101)	(87,411)
Apr-12	4,887,281	14,411	3,552,528	1,334,753	1,725,352	1,746,122	1,649,642	1,655,996	1,566,848	20,770	(75,709)	(158,504)	(69,356)
Mei-12	5,532,904	14,968	4,046,032	1,486,872	1,921,569	1,932,176	1,837,231	1,831,692	1,744,489	10,607	(84,338)	(177,080)	(89,877)
Jun-12	4,968,513	14,284	3,594,922	1,373,591	1,745,400	1,760,467	1,667,487	1,669,307	1,583,658	15,067	(77,912)	(161,742)	(76,093)
Jul-12	4,156,918	12,186	3,036,895	1,120,023	1,465,831	1,484,338	1,402,302	1,407,737	1,331,890	18,507	(63,529)	(133,942)	(58,094)
Ogos-12	3,353,580	10,883	2,397,479	956,101	1,207,322	1,228,667	1,153,090	1,165,722	1,095,616	21,345	(54,232)	(111,706)	(41,600)
Sept-12	4,564,883	14,476	3,338,018	1,226,865	1,635,447	1,668,736	1,565,858	1,583,319	1,487,660	33,289	(69,590)	(147,787)	(52,128)
Okt-12	5,256,647	14,665	3,864,967	1,391,680	1,836,087	1,853,579	1,757,148	1,757,549	1,668,621	17,493	(78,938)	(167,466)	(78,538)
Total					20,029,042	20,262,676	19,147,898	19,216,477	18,186,752	233,634	(881,143)	(1,842,289)	(812,565)

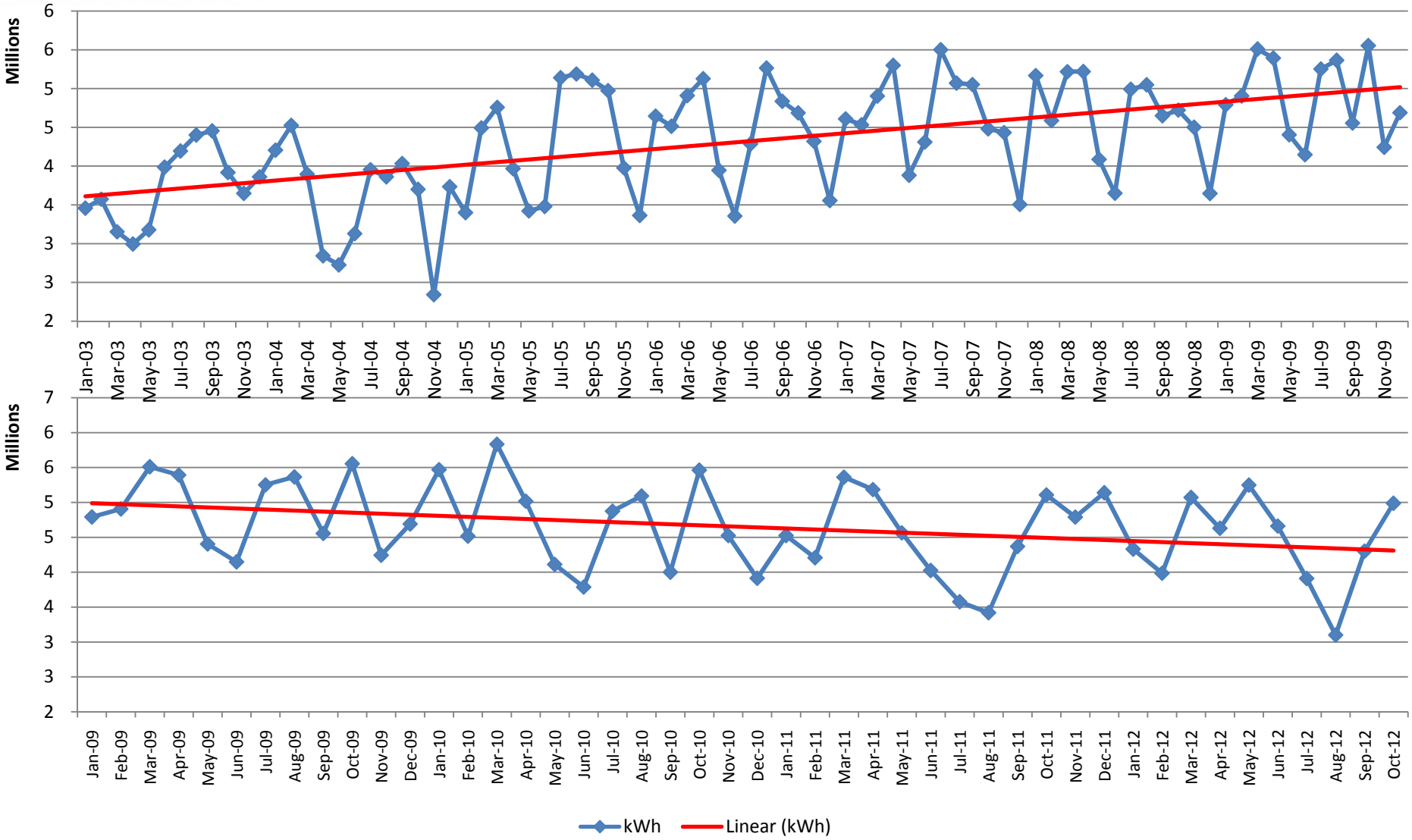
Note : (include 10% discount for government & 1% Renewable Energy charge)

Tariff	MD	Peak	Off-peak
C1 standard	25.9	0.312	0.312
C1 with OPTR	25.9	0.312	0.2496
C2 standard	38.6	0.312	0.192
C3 standard	37.3	0.295	0.177
C3 with OPTR	25.03	0.295	0.236

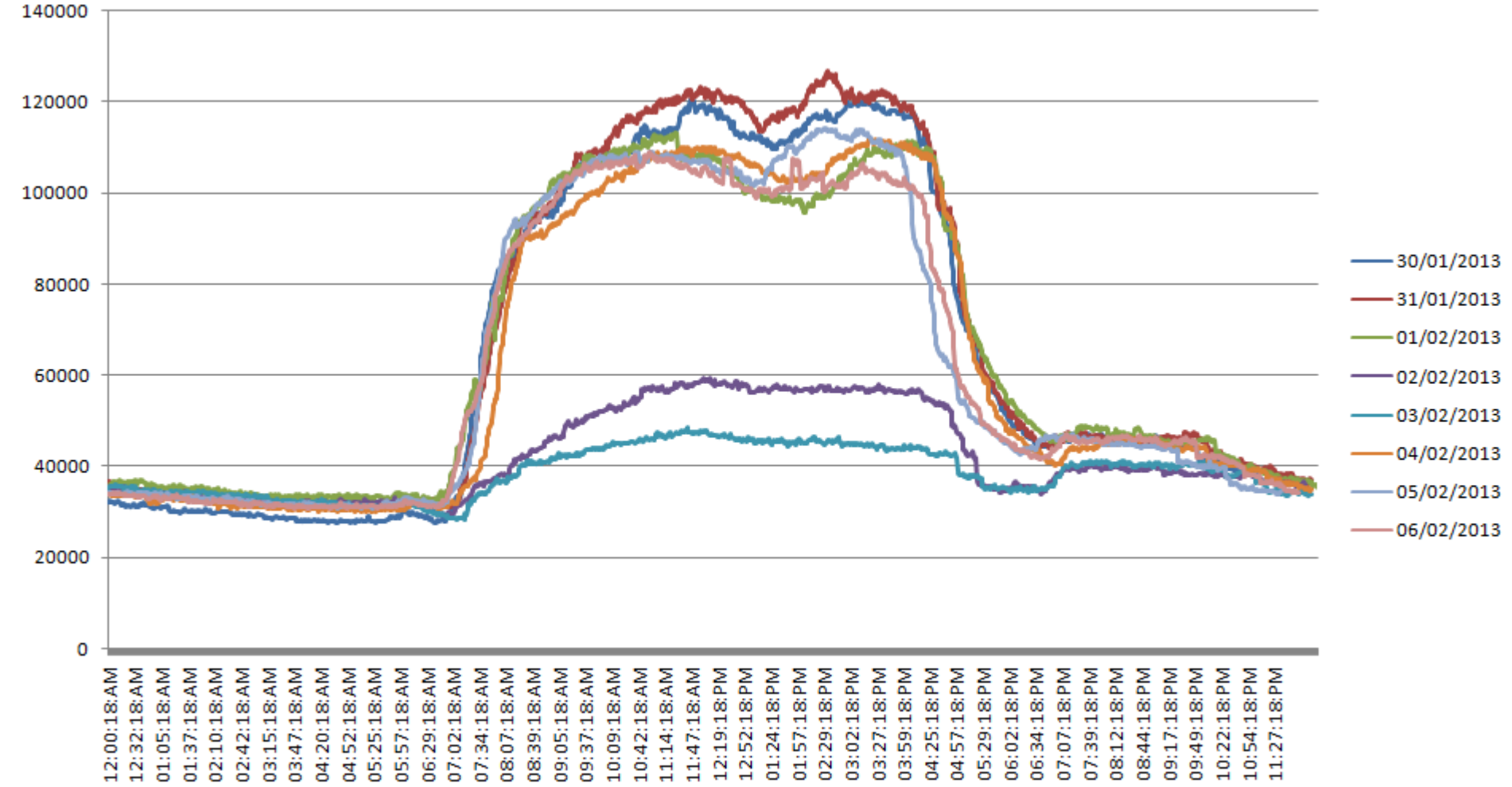
Total C2 vs C1 std	233,634	1.2%
Total C1 optr vs C1 std	(881,143)	-4.4%
Total C3 optr cs C1 std	(1,842,289)	-9.2%

A - Total energy consumption
B - Maximum Demand for the month
C - Total energy consumption during peak hour (8am-10pm)
D - Total energy consumption during offpeak hour (10pm-8am)
E - Simulation bil if using old C standard
F - Simulation bil if using old C2
G - Actual UTM bil (with 20% discount Off Peak Tarif Rider OPTR
H - Simulation bil if using the C3 standard
I - Simulation bil if using the new C3 with OPTR
W - Cost increase if choose C2
X - Cost saving enjoyed if choose C3 new
Y - Cost saving currently enjoyed when use C1 new
Z - Cost saving enjoyed if choose C3 old

Electrical Consumption (kWh) Trend 2003/2009 vs 2009/2012



UTM Electrical Energy Consumption Profile



Business

- For Commercial
  - Pricing & Tariff
  - CARE Program
  - Maximum Demand
  - Bulk Payment System
  - Bulk Supply Interconnection Guideline
- For Industrial
- For Housing Developers & Electrical Contractors
- Discounts, Rebates & Offers
- Charges and Penalties
- Energy Savings at Work
- Power Quality
- Tenaga Link
- Malaysian Grid Code

Off-Peak Tariff Rider

Print this page

The Off Peak Tariff Rider (OPTR) scheme is offered to all medium voltage commercial and industrial customers who are currently not enjoying any off-peak usage tariff rates. These are:

- Medium Voltage General Commercial Tariff C1
- Medium Voltage General Industrial Tariff E1
- Medium Voltage Special Industrial Tariff E1s

Customers enrolled in the OPTR scheme will enjoy a **20% discount** on electricity usage during off-peak hours (10.00 p.m. to 8.00 a.m.) every day.

Visit a Kedai Tenaga near you and sign up today!

How This Affects Your Business

Since the discount applies to off-peak electricty usage, you should reschedule your operations to increase production or extend your operating hours to anytime between 10.00 p.m. and 8.00 a.m. With the 20% discount applied to electricity usage during those hours, you stand to enjoy significant savings in your monthly electricity bill.

Eligibility

You are eligible to enroll in the OPTR scheme if:

- You are an existing TNB customer under the **C1, E1, or E1s tariff.**
- Your have been receiving electricity supply from TNB for **at least one (1) month.**
- Your latest Load Factor is **higher than** the average Load Factor over six (6) months prior to your application.
- You do not have an outstanding amount not more than the total deposit/bank guarantee paid. Otherwise this outstanding amount must be settled before applying.

Additional Requirements

- To enjoy the OPTR scheme, your electromechanical meter must be replaced with an electronic meter. You will be charged a fee for this meter replacement.
- If you are already using electronic meter, you will only need to pay the meter reprogramming charge.
- You will also need to sign a supplementary supply contract.

The OPTR scheme will be activated in the following consumption period (meter reading month), as soon as all requirements are met and all metering-related works are completed.

Please note that you are not required to enrol in this scheme; you reserve the right to remain with your existing tariff rates should it prove more beneficial to you and your business.

TARIFF MANAGEMENT PROJECT
- TNB OFF-PEAK TARIF RIDER 20%DISCOUNT

UTM saving to-date

= RM1,244,180

UTM saving 2012

= RM960,015

UTM saving 2011

= RM284,165

1. **OPTR = Off Peak Tarif Rate dgn kadar RM0.25/kWh di banding dengan Kadar Tarif Rata RM0.312/kWh (20% discount)**
2. **Diskaun 20% OPTR bermula pada 20/07/2011 average RM80K/sebulan**

Month	Total kWh	Max Demand	Off peak kWh	OPTR discount
Total OPTR discount for 2011				RM 284,165
Jan	4,526,859	13,610	1,276,250	RM 79,128
Feb	4,253,059	14,134	1,160,126	RM 71,928
Mac	3,886,184	14,438	1,442,148	RM89,413
Apr	3,552,528	14,411	1,334,753	RM82,755
Mei	5,532,904	14,968	1,486,872	RM92,186
Jun	4,968,513	14,284	1,373,591	RM85,163
July	4,156,918	12,186	1,120,023	RM69,441
Aug	3,353,580	10,883	956,101	RM59,278
Sep	4,564,883	14,476	1,226,865	RM76,066
Oct	5,256,647	14,665	1,391,680	RM86,284
Nov	4,652,526	14,621	1,293,776	RM80,214
Dec	4,923,403	13,782	1,421,928	RM88,160
Total OPTR discount for 2012				RM 960,015
Total discount 20% OPTR to date				RM 1,244,180

NO AKAUN PENGGUNA.	NO. KONT.	JUMLAH CAGARAN.	NO. BIL	TARIF
0340 00298061 10	00084074	0.00	42454549	102

PENGARAH BAHAGIAN HARTA
NO U/P, JURUTERA ELETRIK BAHAGIAN HARTA
PEJABAT HARTA BINA
UNIVERSITI TEKNILOGI MALAYSIA
81310 UTM SKUDAI JOHOR

****
BIL SALINAN
****
BIL LPC MUKA : 1

Project Street Lighting

S E J A R A H

	TARIKH	JUMLAH	KOD	TARIKH KEMASKINI	UNIT BACAAN
BIL TERAKHIR	01/10/2012	1,565,371.85	1	31/10/2012	00003635
BYRN. TERAKHIR	29/10/2012	1,565,371.85			

MUATAN TERTINGGI DICATAT 15,433.00

B A C A A N

NO. JANGKA	EJ	BACAAN DAHULU	BACAAN SEMASA	KEGUNAAN	UNIT	
M 908700889	1.0000	0.00	14,665.00	14,665.00	KW	P
M 908700889	1.0000	0.00	1,141,450.00	1,141,450.00	KVARh	
M 908700889	1.0000	0.00	1,393,414.00	1,393,414.00	kwh	O
M 908700889	1.0000	0.00	3,869,781.00	3,869,781.00	kwh	P
S 712421152	1.0000	20,753.00	27,300.00	6,547.00	kwh	

C A J

KETERANGAN	KEGUNAAN	KADAR	JUMLAH
Cons'n Peak C1U OPTR	3,864,967.30	0.3120	1,205,869.80
Cons OPk C1U OPTR	1,391,680.70	0.2496	347,363.50
Consum.MD C1U OPTR	14,646.76	25.9000	379,351.03
TNB dsc.trf C1U OPTR			193,258.43-
Kumpulan Wang Tenaga Boleh Baharu			17,393.26

Project OPTR

SUBSIDI BHN API KER. PERSEKUTUAN RM 1,063,840.42

TARIKH BACAAN DAHULU : 01/10/2012
KOD: N SEMASA : 01/11/2012
BIL HARI: 31 HARI

NO TEL ADUAN : 15454
NO TEL PERTANYAAN AM : 1300885454
PEJABAT : 07-2192200
NO TIANG :

J U M L A H K E C I L

JUMLAH CAJ	:	1,756,719.16
PELARASAN ANGGARAN	:	0.00-
PELBAGAI	:	0.00
PENALTI	:	0.00
BIL SEMASA	:	1,756,719.16
TUNGGAKAN	:	0.00
CAGARAN TAMBAHAN	:	0.00
JUMLAH BIL	:	1,756,719.16
PENGGENAPAN	:	0.01-
JUMLAH PERLU DIBAYAR:		**1,756,719.15**

UNTUK MENGELAKKAN PEMOTONGAN BEKALAN ELEKTRIK
SILA BAYAR SEBELUM: 01/12/2012
DI: TNB Johor Bahru
MENARA WISMA TNB
JLN YAHYA AWAL
YAHYA AWAL
80200 JOHOR BAHRU JOHOR

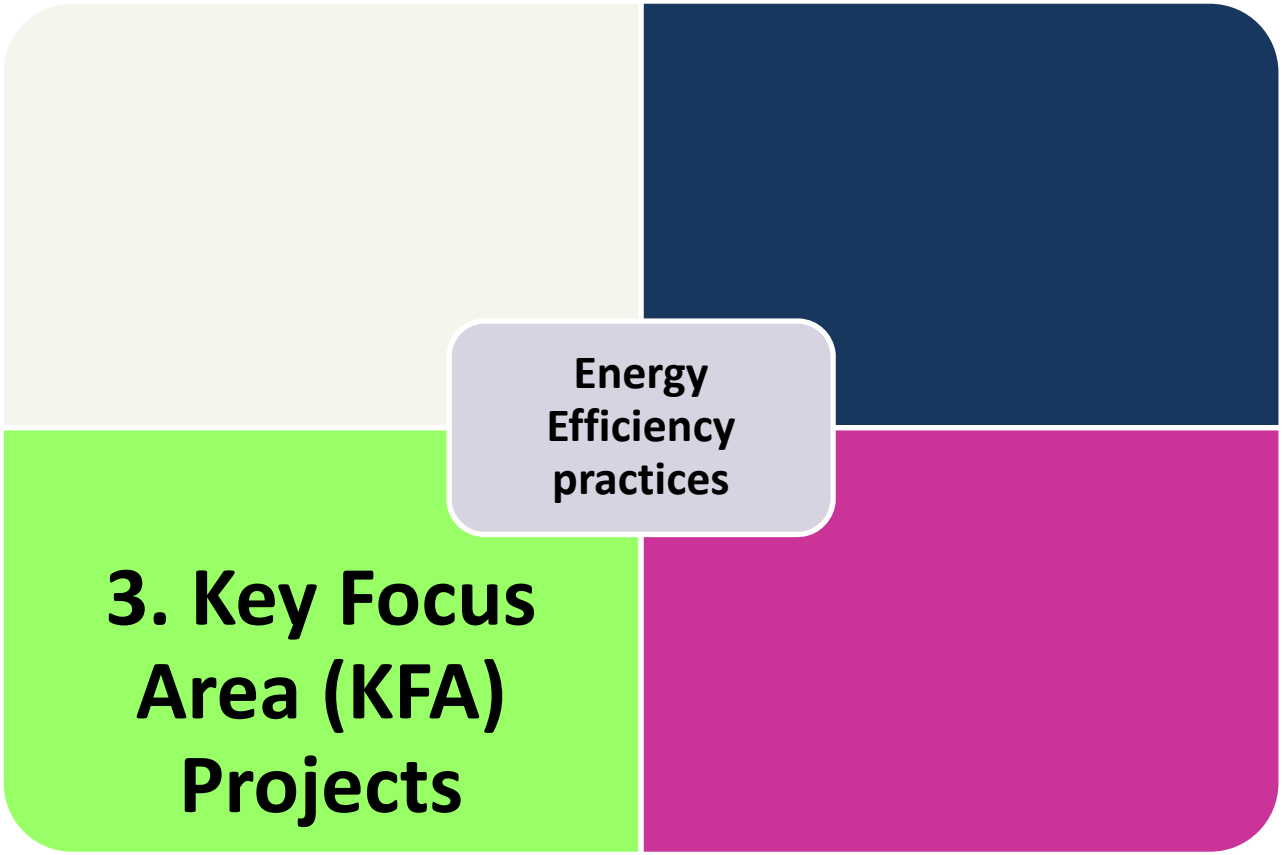
TARIFF MANAGEMENT PROJECT
- STREETLIGHTING TARIFF CORRECTION

Month	Meter reading before	Meter reading after	Consumption	Before	After	Saving
May-Jun 2012	0	5,976	5,976	RM1,865	RM980	RM884
Jul 2012	5,976	8,894	2,918	RM910	RM479	RM432
Ogos 2012	8,894	14,235	5,341	RM1,666	RM876	RM790
Sep 2012	14,235	20,753	6,518	RM2,034	RM1,069	RM965
Okt 2012	20,753	27,300	6,547	RM2,043	RM1,074	RM969
Nov 2012	27,300	33,737	6,437	RM2,008	RM1,056	RM953
Dec 2012	33,737	40,656	6,919	RM2,159	RM1,135	RM1,024
					Saving to date	**RM6,017**

- Above table is calculation for only one feeder pillar and the pilot project was commissioned in Mei 2012.
- 2 more feeder pillars were commissioned in Dec 2012 – UTM will start to enjoy the saving by Jan 2013 bil
- Targetted yearly saving for 3 feeder pillars are RM36,000.00

Summary on tariff projects

- UTM had enjoyed so far RM1, 244,180 from the tariff change C1 to C1 with OPTR
- The percentage for yearly reduction is 4.4% or ~ RM1 million comparing Tariff C1 OPTR with Tariff C1 standard.
- When upgrading to 132 kV project commissioned, UTM electric bill will reduce 9.2% yearly or approximate RM1.8 million comparing with Tariff C1 standard when the tariff change to C3 OPTR.
- Currently, for Street Lighting tariff correction project, UTM had enjoyed ~ RM6,000 for year-end 2012 and target to enjoy at least RM50K every year.



3. Key Focus Area (KFA) Projects

T5 Retrofit project

Project cost RM1.5 million

ROI & Profit Calculation of Energy Saving T5 Retrofit Project in UTMJB

No	Contractor's name	A T5 installed	B kWatt per hour	C kWh saved per year	D RM saved per year	E Return of Investment	F Total saving in 5 years (RM)	G CO2 reduction metric tonnes/year
1	PTIS Engineering Sdn Bhd (Academic Blocks)	20,113	402	798,084	374,025	1.5	1,327,072	543
2	Stagno Technolgy Sdn Bhd (Faculties Blocks)	28,662	573	1,137,308	533,003	1.5	1,891,142	773
3	Zulaz Engineering Sdn Bhd (Library & Data Center)	4,931	99	195,662	91,698	1.5	325,351	133
4	MHMT Sdn Bhd (Other Offices)	2,497	50	99,081	46,435	1.5	164,754	67
Total		56,203	1,124	2,230,135	1,045,160	1.5	3,708,319	1,516

Lagend

A = Quantity saving T5 lamp installed

B = A x 20 Watt ÷ 1000 (to convert to kWh)

C = B x 8 jam x 248 days (365 days - 117 days of weekends & public holiday)

D = (C x RM0.312) + (B x RM25.90)Max Demand x 12bulan

E = (A x RM27/lamp) ÷ D

F = (5 years Life Cycle of T5 - E) x D (Total Life Cycle cost - Capex)

G = C x 0.68 CO2 metric ÷ 1000 (to convert to tonnes)

Saving of RM5.2 million in 5 years

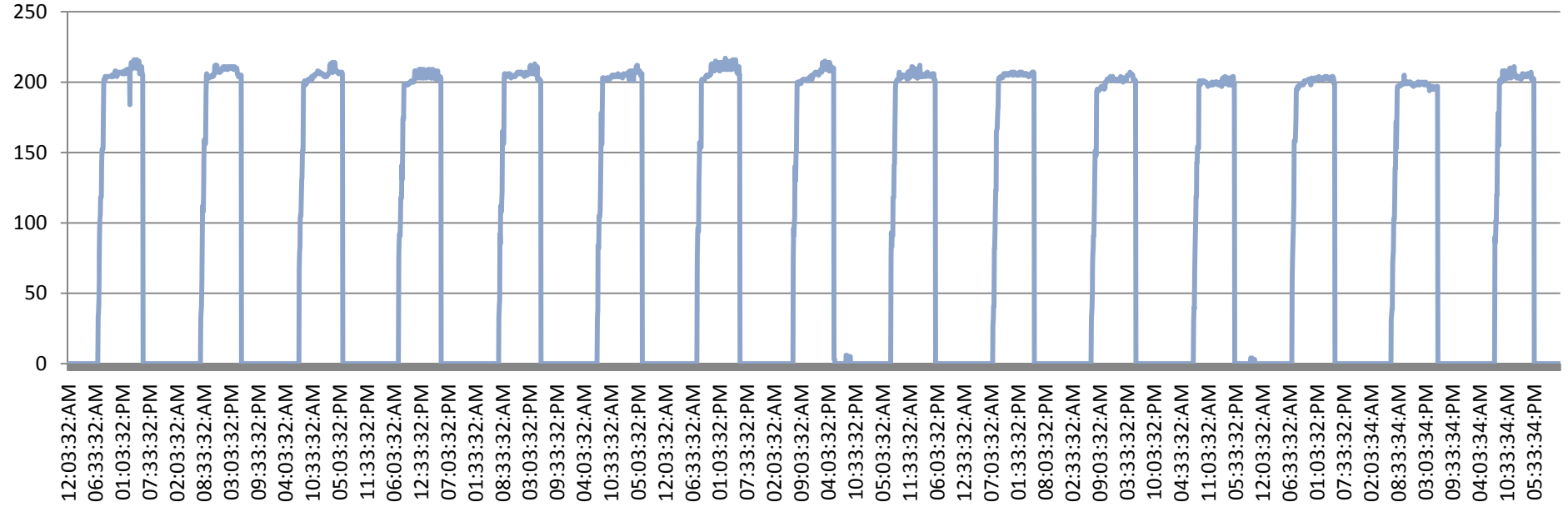
3.2 VRV AC REPLACEMENT PROJECT

The project cover below faculties with total cost of

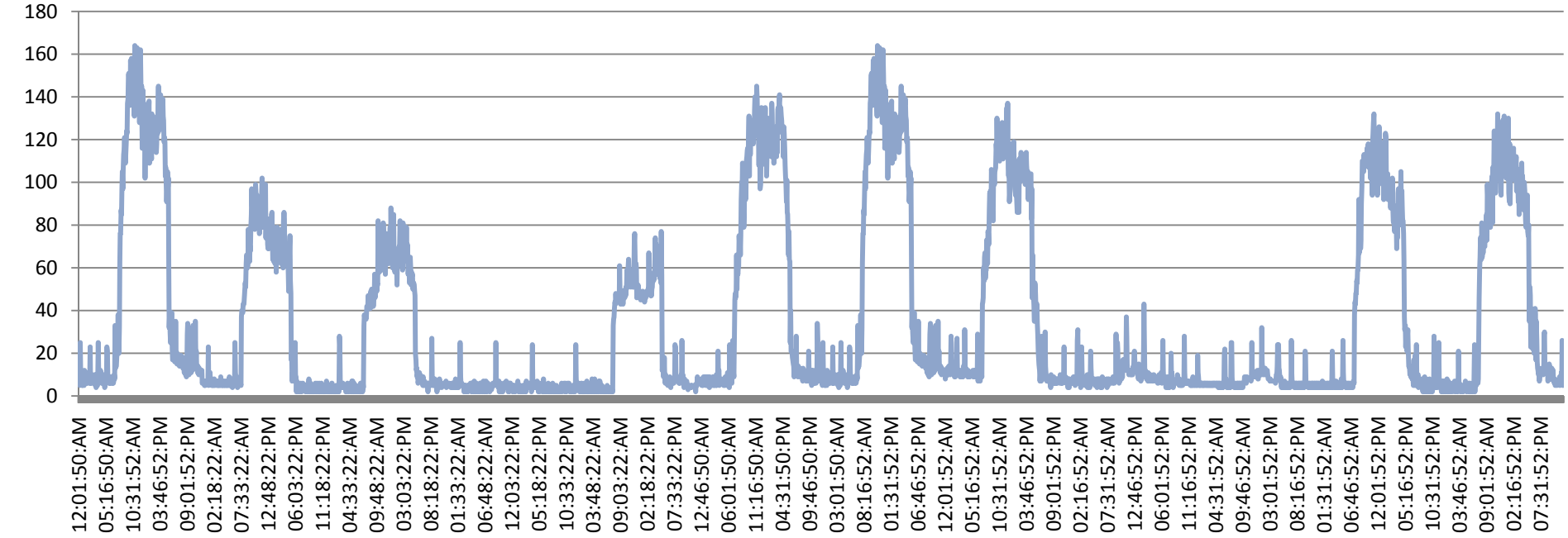
RM5.575 million 906 units of VRV set

- FKK - BLOCK N01 (160 UNITS)
- FAB - BLOCK B02, B05 & B08 (83 UNITS)
- FGHT – BLOCK C03, C04 (70 UNITS)
- FS – BLOCK C10,C15,C17,C18,C19,C20,C21&C22 (260 UNIT)
- FP – BLOCK C13 & C14 (64 UNIT)
- FPPSM – BLOCK D05 & D06 (97 UNIT)
- FKM – BLOCK C23, C24 & C25 (154 UNITS)
- DEWAN KULIAH – 18 UNIT

N01 - KW BEFORE

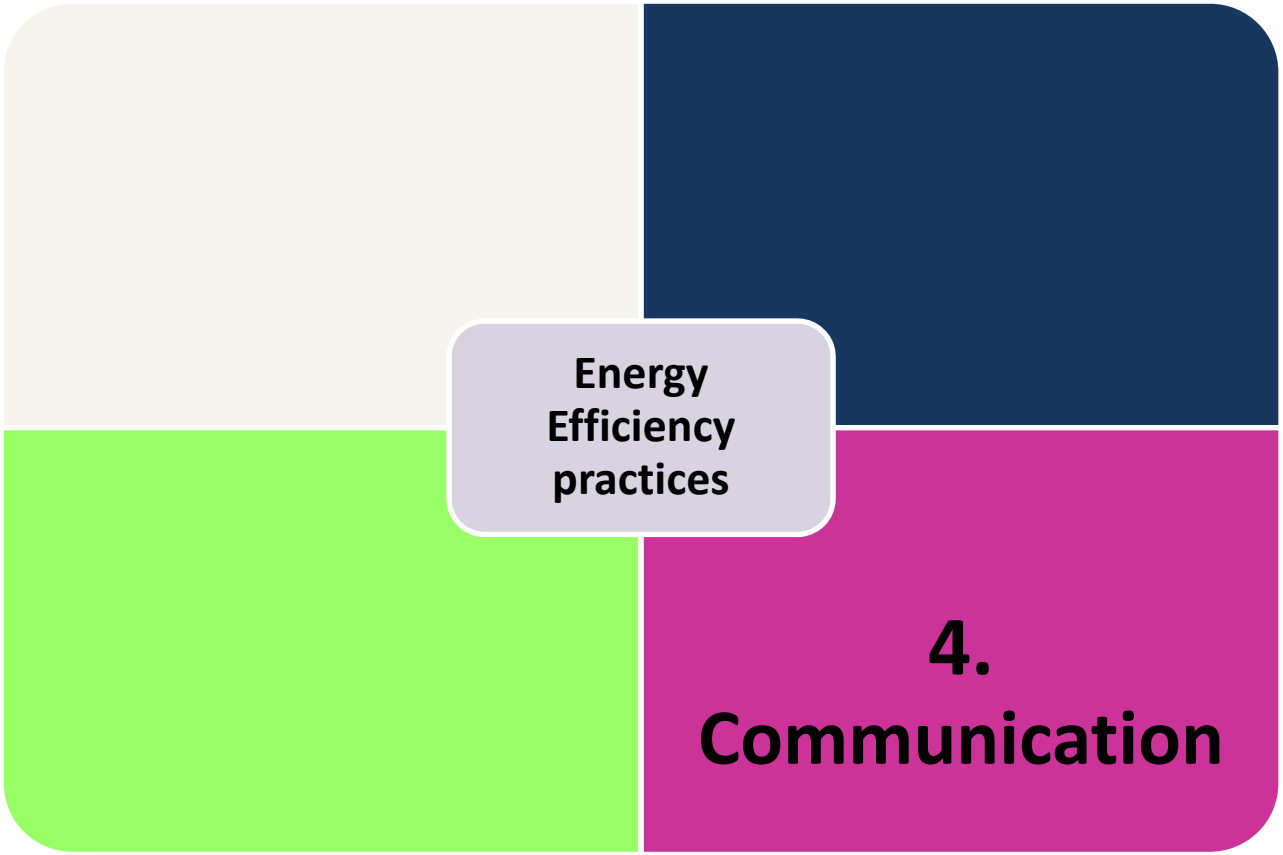


N01 - KW AFTER

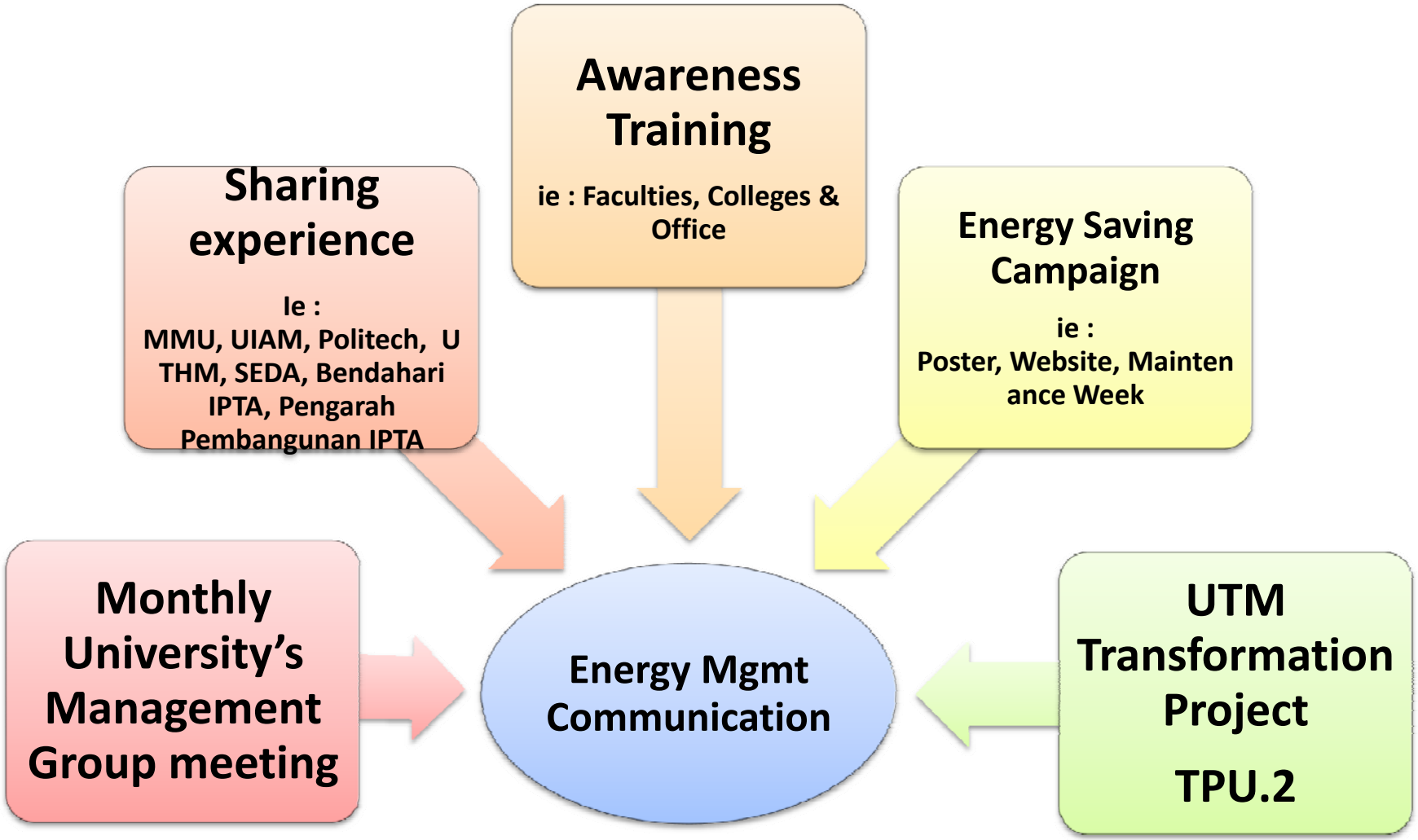


In-progress KFA project in 2013

1. PFI Overhaul AC system FKE using VRV system
2. PFI LED Street Lighting Retrofit Project
3. PFI Solar system project
4. Pilot Project - Wind Turbine install at A/C compressor in Data Centre
5. Continue project on Street Lighting tariff correction


Energy Efficiency practices
4. Communication

Marketing & Motivation platforms




SAVE AC
Set the room temperature to 24°c
All windows and doors must be closed when the air conditioner is on
Vents for air pathways must not be blocked
Ensure that the air conditioner is switched off when it is not needed
Always use energy efficient equipment to reduce heat generation
Conditioning is for comfort but let's also SAVE energy!
SAVE AC
UTM


UTM
ENERGY SAVING CAMPAIGN
A few conservation tips:
Keep air-cond 24°C
Keep door and window closed when air-cond is in used
Switch off lights and air-cond when not in room
Switch off computer/laptop when not in use
Switch off all electrical appliances at day end
Use window daylighting in rooms.
Saving energy helps protect environment


UTM
HARI BERSAMA PELANGGAN
Kempen Pengurangan Pembaziran
24-25 OKT. 2011
DATARAN AGORA
9.00 PAGI - 5.00 PETANG

Energy Saving Campaign in UTM 2011

No	Faculty / Office	Program date	Saving in 2011 (RM)	2011 % reduced
1	FKE	11 Feb 2011	122,699	8.9%
2	FKK	30 Mac, 2011	18,669	7.3%
3	FBB	08 July, 2011	3,977	4.4%
4	FKM	03 Aug, 2011	53,454	4.9%
5	PSZ	16 Aug, 2011	28,784	4.2%
6	FPPSM	21 Sep, 2011	535	0.3%
7	FSKSM	16 Nov, 2011	10,392	3.3%

Energy Saving Campaign & Sharing Experience Activities in 2012

1. Multimedia University Visit UTM on SEMP – 20/03/2012
2. Energy Saving Campaign at Fakulti Pendidikan 21/03/2012
3. Induksi Staf baru UTM 30/3/2012
4. Induksi Staf baru UTM 02/4/2012
5. UTM SEMP at UTHM Open Day – 25/04/2012
6. Energy Saving Campaign at KTGB 26/04/2012
7. Politeknik Melaka Visit UTM on SEMP – 24/05/2012
8. Mesyuarat Pengarah-Pengarah Pembinaan IPTA di UTeM – 28/06/2012
9. US Conference in 06/2012
10. Mesyuarat Bendahari-Bendahari IPTA di Tasik Kenyir – 01/07/2012
11. Bengkel SEDA on SEMP – 11/07/2012
12. UIA Visit on UTM SEMP – 09/10/2012
13. Induksi Staf baru UTM 02/11/2012
14. Helsinki Metropolia University Finland Visit 5/11/2012

Sharing experience with other organization

Mesyuarat Pengarah-Pengarah Pembangunan IPTA
27 Jun, 2012

AEMAS Conference,
18 Jul, 2011

Bengkel Energy
SEDA,
11 Jul, 2012

Mesyuarat Bendahari-Bendahari
IPTA , 1 Jul, 2012

2nd STAR
Energy Management Gold Standard

Award for the achievement of energy saving

29 January 2013 @ Marriot Hotel, Putrajaya

AEMAS

Certificate of Registration

Awarded to

Universiti Teknologi Malaysia (UTM)

AEMAS certifies that the Energy Management System of Universiti Teknologi Malaysia, (UTM), has been audited and found in accordance with the requirements of:

Energy Management Gold Standard

Audit conducted: 14-15 January 2013
Validity of this certificate: 01 February 2013 – 31 January 2015
Auditors: Ir. Al Khairi Mohd Daud (AEMAS Country Expert-Malaysia)
Hasbullah Harun (AUD-MY-001-1210)
AEMAS Certificate No.: EMGS-MY-2-001-0113
Gold Standard level: 2-star
The validity of this certificate can be verified from the following web site:
www.aemas.org

The Energy Management Gold Standard, delivered under the ASEAN Energy Management Scheme (AEMAS), requires companies to establish their sustainable energy management system with demonstration for the achievement of measurable energy savings.

Ir. HARDIV HARRIS SITUMEANG, D. Sc.
Executive Director, ASEAN Centre for Energy

Mr. AHMAD ZAIRIN ISMAIL
Country Coordinator – AEMAS Malaysia
Malaysian Green Technology Corporation

AEMAS is co-funded by the European Union

Winner of ASEAN Energy Award Sep 2012

Large building category

5 Sept 2012 @ Phnom Penh, Cambodia

ASEAN ENERGY EFFICIENCY AND CONSERVATION BEST PRACTICES AWARDS FOR ENERGY EFFICIENT BUILDINGS 2012

ASEAN ENERGY AWARDS 2012

UTM ONE-STOP-CENTRE FOR SUSTAINABLE ENERGY MANAGEMENT PROGRAMME, MALAYSIA

WINNER

Energy Management – Large Building Category

Given this 12th day of September 2012 on the occasion of 30th AMEM in Phnom Penh, Cambodia

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Congratulations to UTM. Awarded Energy Management Gold Standard Certification under AEMAS*

The First of the Two Showcase Organisations with Sustainable Energy Management System in Malaysia.

*ASEAN Energy Management Accreditation Scheme

10 July, 2012 @ KLCC

AEMAS

Certificate of Registration

Awarded to

Universiti Teknologi Malaysia (UTM)

AEMAS certifies that the Energy Management System of Universiti Teknologi Malaysia, (UTM), has been audited and found in accordance with the requirements of:

Energy Management Gold Standard

Audit conducted: 4-6 July 2011
Validity of this certificate: 01 August 2011 – 31 July 2013
Auditor: Ir. Al Khairi Mohd Daud (AEMAS Country Expert-Malaysia)
Hasbullah Harun (AUD-MY-001-1210)
AEMAS Certificate No.: EMGS-MY-001-0711
Gold Standard level: 1-star
The validity of this certificate can be verified from the following web site:
www.aemas.org

The Energy Management Gold Standard, delivered under the ASEAN Energy Management Scheme (AEMAS), requires companies to establish their sustainable energy management system.

Ir. HARDIV HARRIS SITUMEANG, D. Sc.
Executive Director, ASEAN Centre for Energy

MR. AHMAD ZAIRIN ISMAIL
Country Coordinator – AEMAS Malaysia
Malaysian Green Technology Corporation

AEMAS is co-funded by the European Union

Awareness Campaign in FKK on 30 Mac, 2011

WE PLEDGE

I AM AN ENVIRONMENTAL FRIENDLY PERSON!

I pledge to:

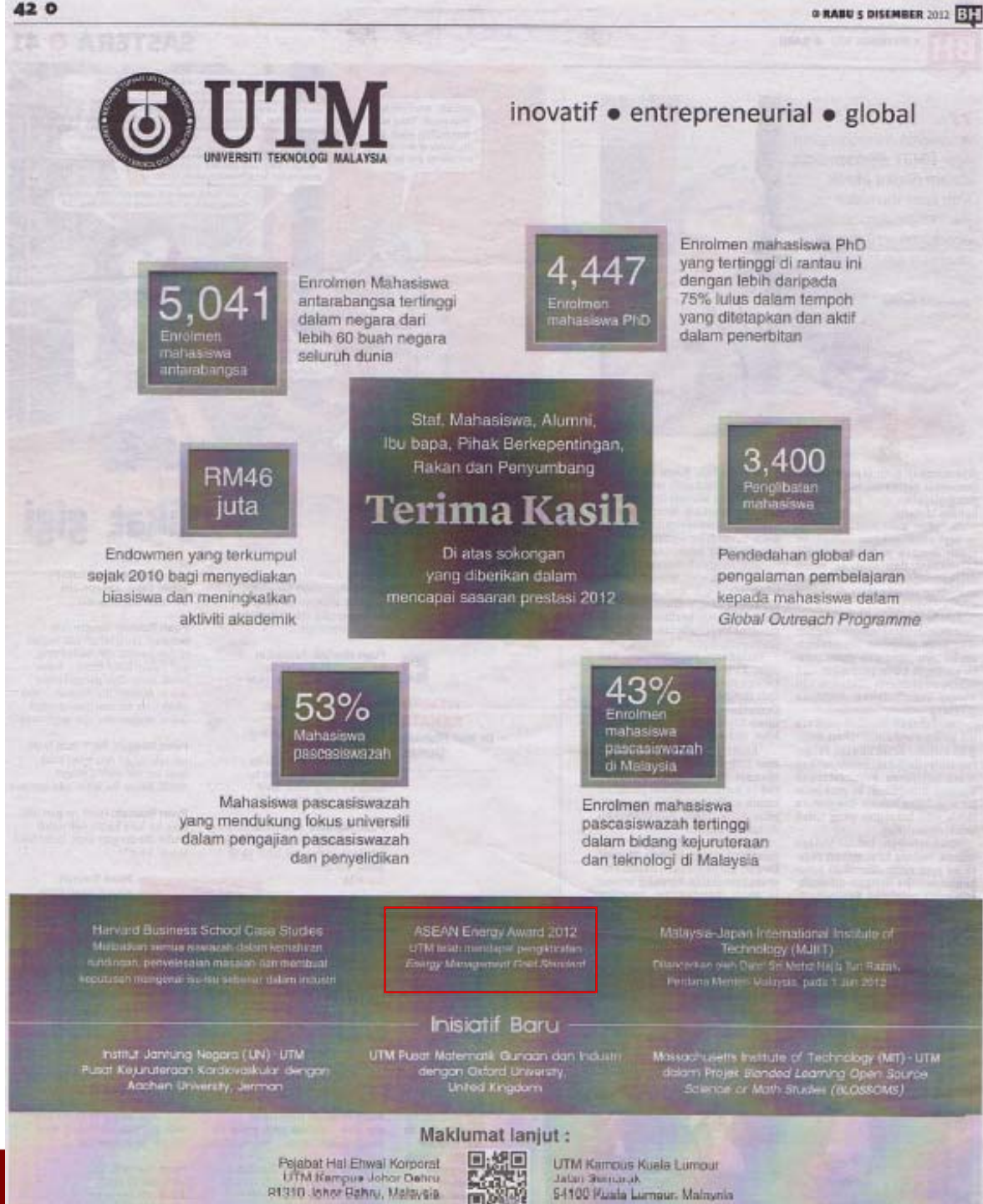
- Keep air-conditioning at 24°C or at comfortable level without the need to use jacket
- Keep door and window closed when air-conditioning is in used
- Switch off lights and air-conditioning when not in room for more than 15 minutes e.g. going to classes/meetings.
- Set computer/laptop in hibernate mode when not in room for more than 15 minutes e.g. going to classes/meetings.
- Switch off all electrical appliances when not in used or at day end.
- Use window day-lighting in rooms on sunny days (if possible).

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Awareness Campaign in FBB on 8 Jul, 2011

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

ASEAN Energy Award 2012 - One of the 10 UTM key achievements appeared in Berita Harian newspaper on 5th Dec, 2012



One-Day Seminar on

"Practising What it Preaches - UTM 1-Year Transformation to a Sustainable Energy Management Organisation"

20 November 2012

organized by: PROSPECT

supported by: GreenTech Malaysia, AEMAS

UTM UNIVERSITI TEKNOLOGI MALAYSIA

RESEARCH UNIVERSITY

Highlights :

- UTM grand project entitled 'A One Stop Centre for Sustainable Energy Management' was announced Winner of 'ASEAN Energy Award 2012 – Large Building Category' by ASEAN Centre for Energy (ACE)
- UTM was awarded Energy Management Gold Standard
- UTM was the first organisation who has trained 30 of its staff as certified Energy Managers
- UTM has saved RM800,000 in year 2010 and RM1.7 million in year 2011
- UTM's proprietary in-house Electrical Billing Management System (EBMS)

UTM SUSTAINABLE ENERGY MANAGEMENT PROGRAM

"A One Stop Centre for Sustainable Energy Management"

FMM Conference on Energy Efficiency & Conservation 2012

July 19, 2012; Royale Chulan Kuala Lumpur

MMU Visit
20-03-2012

Kempen Pengurangan Pembaziran 24 & 25 Okt, 2011

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

ENERGY SAVING AWARENESS AT COLLEGES

Penggunaan peralatan elektrik

BIL	ITEM	KRP	KTF	KTR	KTHO	KTDI	KTC	KP	K10	KDSE	KTGB	KDOJ
1	IRON	187		384	313	465			84	353	195	700
2	CEREK	231		521	398	599			233	569	378	650
3	HAIR DRYER	17		39	21	30			13	65	17	20
4	TOASTER	9		19	12	24			7	46	34	235
5	RADIO	4		14	5	6			10	24	11	6
6	CHARGER H/P	1177		935	1033	1340			422	904	542	800
7	KOMPUTER	973		995	688	1263			387	854	542	755
8	PETI SEJUK	15		6	5	5			20	74	91	350
	PERIUK NASI	7				30					51	

BIL	ITEM	KRP	KTF	KTR	KTHO	KTDI	KTC	KP	K10	KDSE	KTGB	KDOJ
1	BILIK BERHAWA DINGIN		23			24	36			5	5	
2	RUMAH KELUARGA							20				

ROADMAP

SEMP METHODOLOGY

A. Building Housekeeping & Best Practices
(ie Electrical Tariff Review, TNB OPTR Scheme, Retime of centralised a/c system operation, EAC Electrical Bill statement system, Operation& Maintenance Policy)

simultaneous

sequential

B. SETTING UP SUSTAINABLE ENERGY MANAGEMENT SYSTEM

- Development of energy policy
- Development of an energy management committee
- Establishment of energy accounting center (EAC) & appointmnt of Headof EAC
- Establishment of Energy Efficiency Index for overall organization and each EAC
- Establishment of overall & EAC working procedure
- Establishment of reporting and monitoring system

C. ENERGY AUDIT & RECOMMENDATION FOR IMPROVEMENT

- Overall energy survey
- Establish building energy balances and existing equipment details
- Evaluating systems performance
- Setting the practical utility benchmark targets and building benchmarking
- Recommendations for improvement via UTM Transformation Projects
- Economic analysis

D.OTHERS

- Energy saving and policy posters
- Working manuals booklet
- 'Energy Manager' in-house workshop
- Providing Energy Awareness seminar
- Installation of electrical meters

success factors

Understanding

Commitment

Engagement

Enjoy the challenges

Teamwork

Long term, sustainability

Concluding remarks

- The approach adopted so far has worked
- Overall energy consumption, EEI and cost has decreased at the background of increase in tariff and number of students
- Less cost but maximum impact
- Teamwork and the top management commitment has been the CSF in building the people and the culture, and in sustaining the energy & cost reduction
- Engagement of campus community works

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Thank you

- **Remember: Keep it simple**
- **The best of luck with your future efforts to improve your energy performance**

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