Implementation of Sustainable Energy Management System (SEMS) for Success of EPC

By:

AP Ir Dr Sharifah Rafidah Wan Alwi

CEng, CEM, REEM, UTM EM

Engr Masilah Bandi

PEM, REEM, UTM Resident EM

UNIVERSITI TEKNOLOGI MALAYSIA

UTM JB Campus

UTM KL Campus

ABOUT UTMJB

- 25,000 population (20,000 students and 5,000 staff)
- 1145 hectares of land, 612 buildings and 1,077,973 m^2 gross floor area
- 60 electric substations, ~280,000 light tubes and 3,158 street lights
- 20 centralised Aircond system (chillers & cooling towers) and 9,142 split unit Aircond
- UTM's TNB Electrical bill
  - RM 22.5m @ 57m kWh for year 2014 (up to Nov)
  - RM 1.64m/month @ 4.77m kWh/month (in average 2013)

m = million

RMK9 Projects summary (~ RM1 billion)

- 14 new buildings GFA = 140,581 m^2 including
  1. FKE – 12,237 m^2
  2. FKM – 5,101 m^2
  3. FAB – 7,343 m^2
  4. FKA – 7650 m^2
  5. FK – 7,569 m^2
  6. FGHT – 4,440 m^2
  7. FBME – 23,653+15695 = 39,348 m^2
  8. FS – 11,903 m^2 (not operation yet)
  9. FTI – 3,452 m^2
  10. PMU/RMC – 9,211 m^2
  11. PRZS – 10,288 m^2
  12. STADIUM – 7,107

Operation starts in 2012

- 11 new electric substations
- 57,752 lights tube (~2.5M Watt)
- 3,269 split units + 3 chillers (~3.6M Watt)
- 578 numbers of street light (~150kWatt).


FAKULTI SAINS


FBME 2


STADIUM


FAB


FBME 1


KOLAM
RENANG


FKE


FGHT


PRZS


RMC/PMU

UTM highlighted as the exemplary Energy Management Institution - In Green Purchasing Asia Magazine

COVER | OPPORTUNITIES | RETROFITS

Practising what it preaches

UTM's electricity bill hit new low in July 2011

By Stephen Ng

July 2011 was a milestone for [illegible] siti Teknologi Malaysia (UTM) — for the first time since 2008, the university's electricity bill dipped below the RM1 million (US$318,000) markenergy efficient drive . Considering that the university's monthly power consumption over the past three years was as high as RM1.7 million, the July figure of RM962,345 was a sterling achievement.

To Prof Dr Zainuddin Abdul Manan, a key member of a group who

(Single Star) (see explanation). The other was a subsidiary of Malaysia's telecommunications company, **TM Research and Development (TMRD)**.

The university will go for the [illegible] and the improvement in its electricity consumption. "We will also be the first Malaysian university to participate in the upcoming ASEAN Energy Award in 2012. At the moment, not even one university in ASEAN has taken up the challenge," he says.

Working within budget

Energy-saving initiatives began in UTM as far back as 2003, when the facilities maintenance team improved power usage at the library with the help of an energy services company (ESCO) which provided the investments, and subsequently shared the savings. Early

UTM Saves ~RM 7 Million in Energy Bills (2010-2014)

How did UTM save so much even with the development of new buildings?

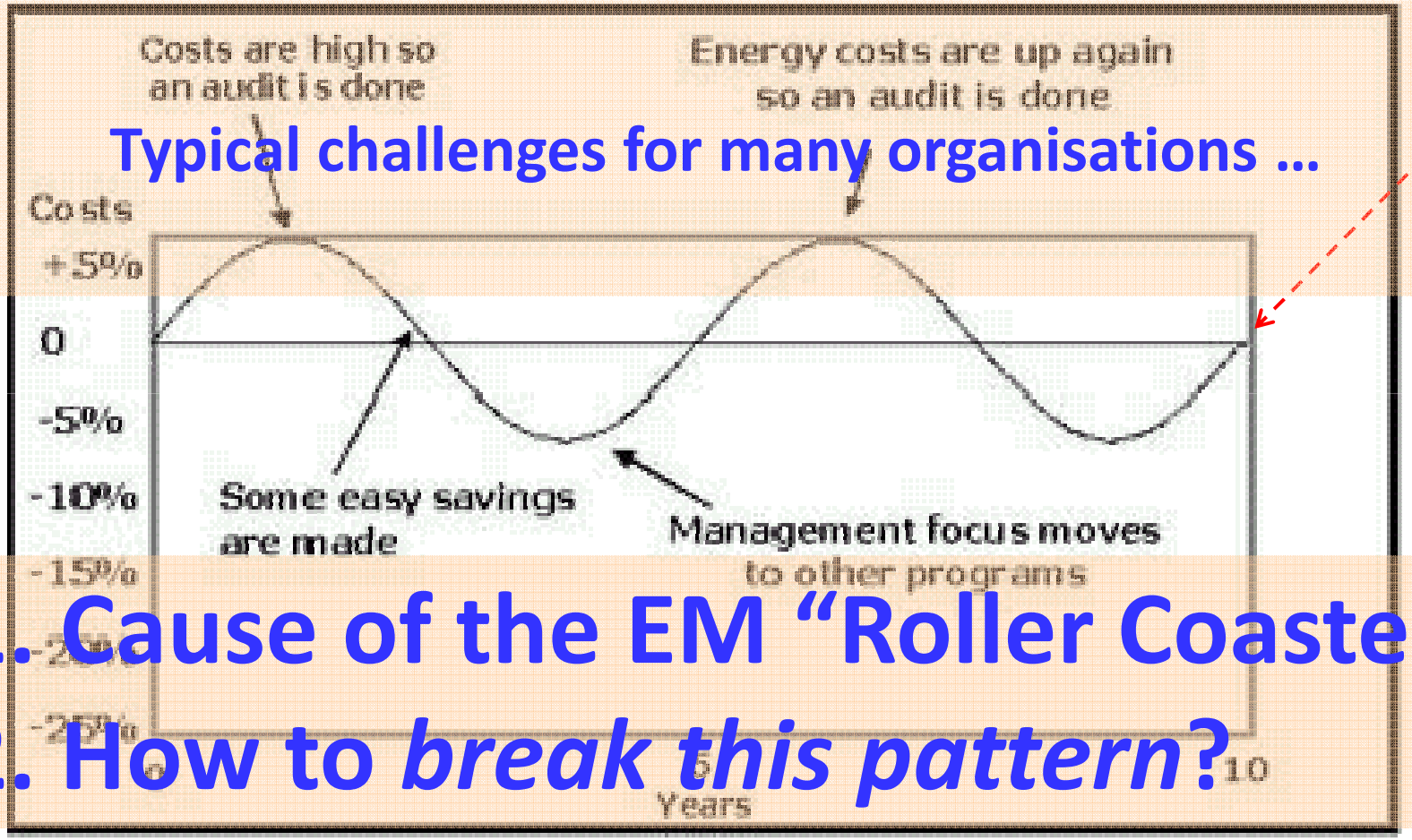
The history…

UTM's Technical EM initiatives before 2011

- History of energy saving initiatives in UTM
  - Pilot project: Library retrofit (1993, 1996)
  - 2003 onwards
    - Replacement of central air conditioning with VRV in phases and still on-going.
    - Reducing number of bulbs (on-going process).
    - Installed more than 500 individual metering (2004-2011).
    - Retime of air conditioning operation period.
    - Installation of motion sensor and photocells.
    - Installation of Electrical Installation Bus - EIB (Building Automation System).
    - Replacing conventional ballasts with electronic ballasts.
    - Replacing mono-phosphor lamp with tri-posphor lamp.
    - Replacing SON lamp with industrial PLCE lamp.
  - RMK9
    - T5 fluorescent tubes.
    - 67% of new A/C split unit are Inverter type A/C.
    - High U-Value windows, glass panels and roof insulation.
    - VSD controlled chiller system.
    - VFD controlled lift system.
    - LED street light (156 nos)

After > 10 years, where are we (in 2011)?

Emphasis on technical solution – technical energy audit



1. Cause of the EM "Roller Coaster"?
2. How to *break this pattern*?

More than 10 years!

UTM Energy Management MATRIX (before implementing Sustainable EM Programme)

	Energy Policy	Organization	Motivation	Information System	Marketing	Investment
4	Energy policy, action plan and regular review, with 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	Formal 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	Unadopted energy policy set by energy manager or senior department manager	Energy management is reporting to ad-hoc committee, but line management and duties are unclear	Contact with major users through ad-hoc committee chaired by senior departmental manager	Simple 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	Comparisons 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

1. No energy policy
2. Only ad-hoc committee
3. Ad-hoc contacts between engineer and a few users
4. Some staff awareness training
5. Monitoring reports based on supply meter data
6. Investment using short term payback criteria

Madness is..?

It's Time for Transformation!

Doing the same thing (over again) and expecting different results

Time to Break That Patterns!!!

The Tipping Points?

2008 Regulation by Energy Commission

Suruhanjaya Tenaga

Any installation which receives electrical energy from a licensee or supply authority with a **total electricity consumption equal to or exceeding 3,000,000 kWh** as measured at one metering point or more over any period of six consecutive months **must appoint energy manager.**

'Efficient Management Of Electrical Energy Regulations 2008'

ASEAN ENERGY MANAGEMENT SCHEME (AEMAS)

European Union

Partly Funded by

AEMAS
ASEAN Energy Manager Accreditation Scheme

ASEAN CENTRE FOR ENERGY
ACE

Accreditation Body

Accredit certification bodies to certify companies & energy professionals

National Support Network (NSN)

PELANGI
Indonesia

RCEE
Vietnam

ENPAP
Philippine

COPPER
International Copper Association, Ltd.
Thailand

Green Tech Malaysia
Malaysia

Certification Bodies

Certify Companies and Certify Energy Managers

Certified Company

Training cert

CEM cert

PEM cert

AEMAS Energy Management Gold Standard (EMGS)

"System of certification based on excellence in energy management"

First-time certification

Certification demonstrating sustainability in EnMgt system (continuous improvement of Energy Efficiency Index (EEI) over 3 years or maintaining of good EEI over 3 years)

Certification renewal showing improvement in EEI

In Oct 2010, UTM decided to aggressively pursue **'Sustainable Energy Management System'**

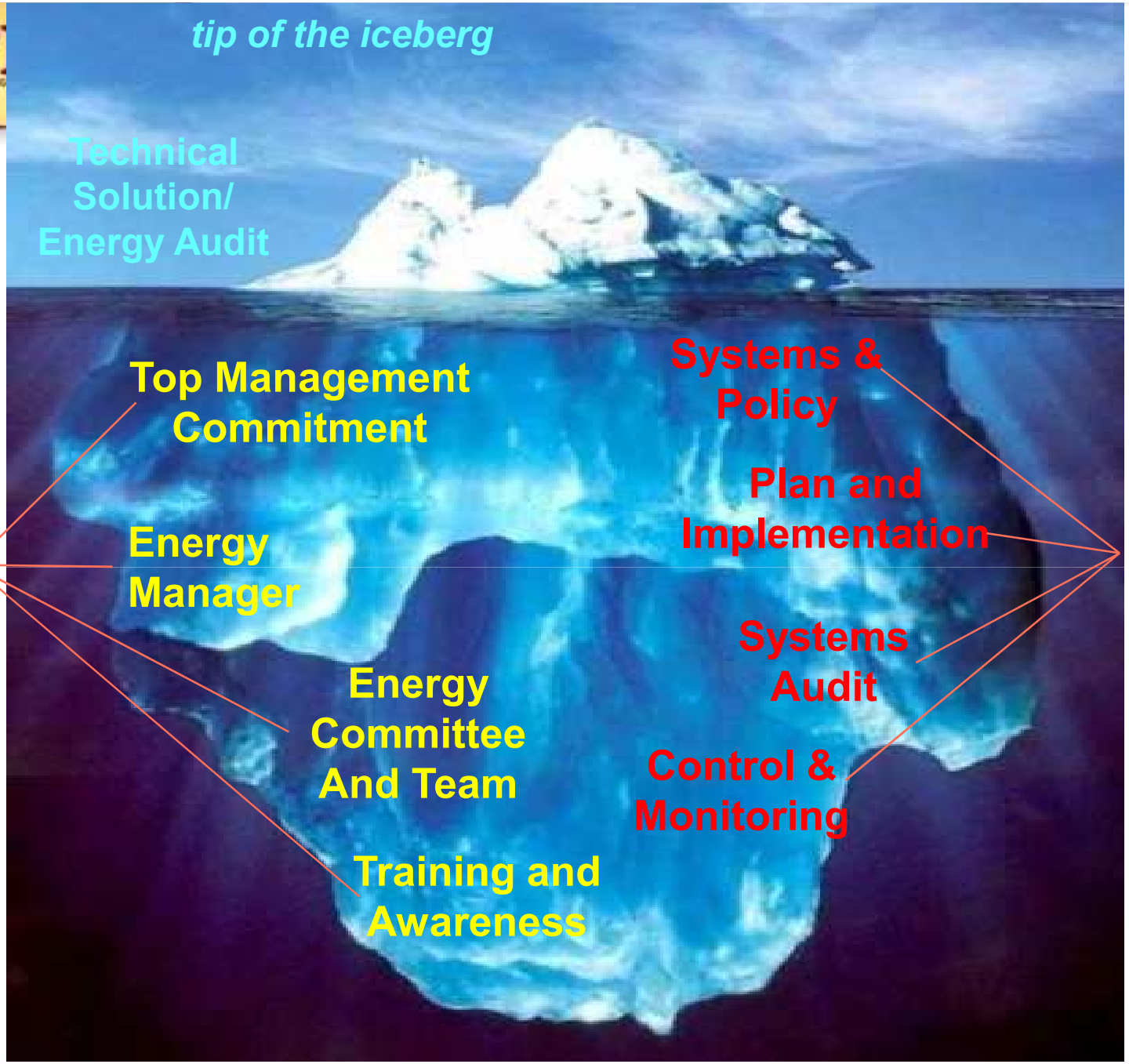
So what was wrong with our previous approach?

What is Sustainable Energy Management System (SEMS)?

Energy Management Matrix

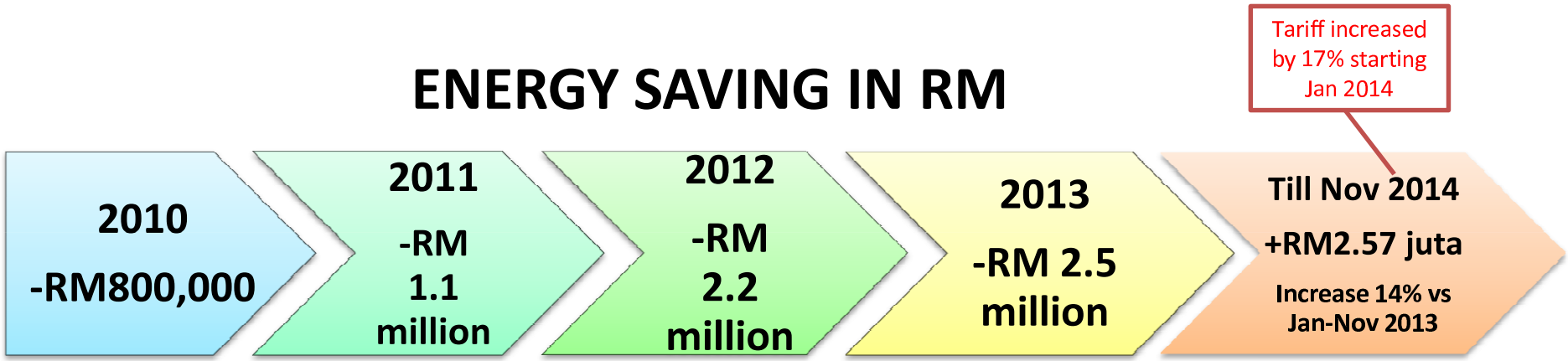
	Energy Policy	Organization	Motivation	Information System	Marketing	Investment
4	Energy policy, action plan and regular review, have commitment of top management as part	Energy management has been fully integrated into management structure. Clear delegation of	Formal and informal channels of communication regularly exploited by energy manager	Comprehensive system sets targets, monitors consumption, identified faults, quantifies	Marketing the value of energy efficiency and the performance of energy management	Positive discrimination in favor of 'green' schemes with detailed investment appraisal of all new build and refurbishment opportunities
3						Some payback criteria employed as for all other investment
2	policy set by energy manager or senior department manager	committee, but line management and authority are unclear	committee chaired by senior department manager	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 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 contact 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

Most Organisations focus on Technical Conservation Measures (Technical Audit)!!!

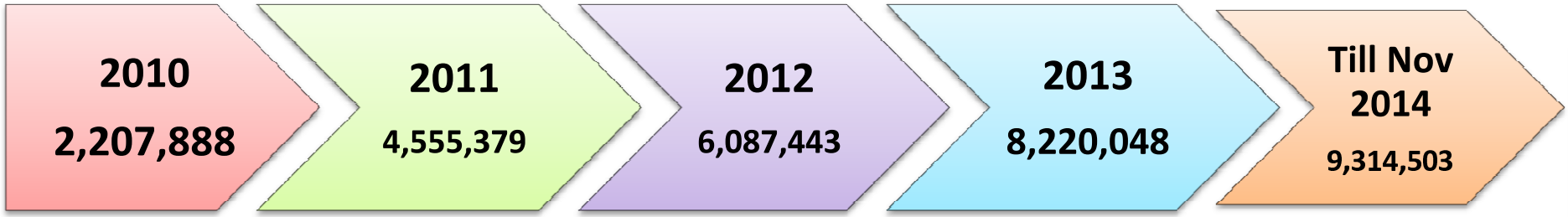

tip of the iceberg
Technical Solution/ Energy Audit
Top Management Commitment
Energy Manager
Energy Committee And Team
Training and Awareness
Systems & Policy
Plan and Implementation
Systems Audit
Control & Monitoring
People
System

AWARDS RECEIVED 2011-2014

ENERGY SAVING IN RM



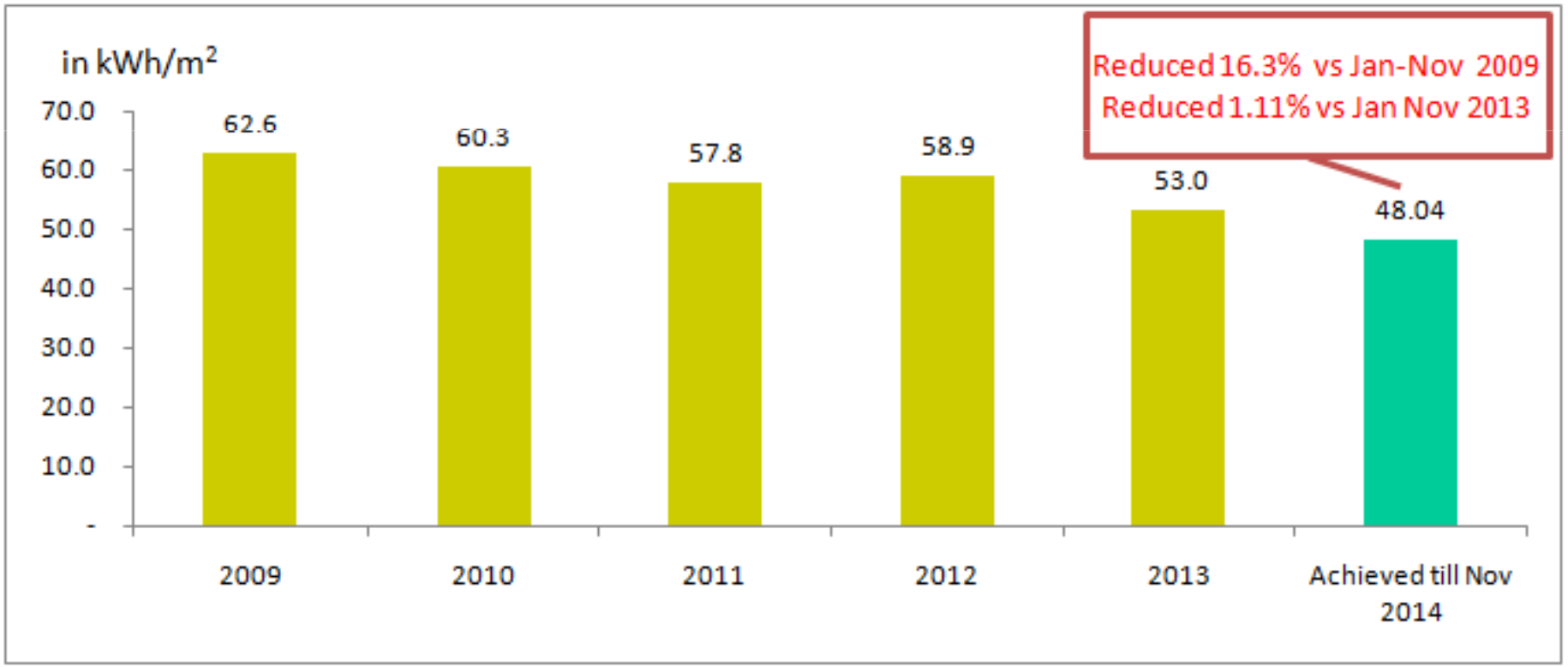
ENERGY SAVING IN kWh (not including building RMK9)



Benchmark year 2009

ENERGY EFFICIENCY INDEX (kWh/m²)

2009	2010	2011	2012	2013	Till Nov 2014
62.6	60.3	57.8	58.9	53.0	48.04



Winner of
ASEAN Energy Award 2012 – Large Building Category

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

UTM Competed with multi-nationals such as Toyota, Samsung, Hyundai, Sheraton hotels and many more industries and conglomerates to secure the first place.

Certification of End-User

This certificate

Universiti Tekn

GreenTech Malaysia certifies that th
Universiti Teknologi Malaysia has be
accordance with the requirements o
below:

Energy Manage
Gold Standa

Audit conducted: 4 - 6 July 2011
Validity of this certificate: 19 July 2011 – 1
Lead Assessor: Ir Al Khairi Mohd Daud
Assessor: Hasbullah Harun
Certificate No.: EMGS0001
Gold Standard level: 1-star

The Energy Management Gold Standard re
energy management system according to
Energy Efficiency Index improves against a

★
★★
★★★

Certifica

Universit

AEMAS certifies that th
Teknologi Malaysia, (UTM
with the requirements of:

Energy Ma
Gold S

Audit conducted: 14-15 Janua
Validity of this certificate: 01 F
Auditors: Ir. Al Khairi Mohd Da
Hasbullah Harun (AL
AEMAS Certificate No.: EMGS
Gold Standard level: 2-star
The validity of this certificate

The Energy Management G
Management Scheme (AEMA
energy management system v
energy savings.

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

AEMAS is co-funded by the European Union

Certificate of Registration

AEMAS
ASEAN Energy Management Scheme

Awarded to

Universiti Teknologi Malaysia

GreenTech malaysia certifies that the Energy Management System of Universiti Teknologi Malaysia has been audited and found in accordance with the requirements of:

Energy Management Gold Standard

★★★

Audit conducted: 28-29 January 2014
Validity of this certificate: 01 October 2014 – 30 September 2016
Auditor: Mr. Al-Khairi Mohd Daud & Hishamudin Ibrahim
Certificate No.: EMGS001
Gold Standard level: 3-star

The Energy Management Gold Standard requires companies to establish their energy management system according to ISO 50001 and to demonstrate that their Energy Efficiency Index improves against an established energy baseline.

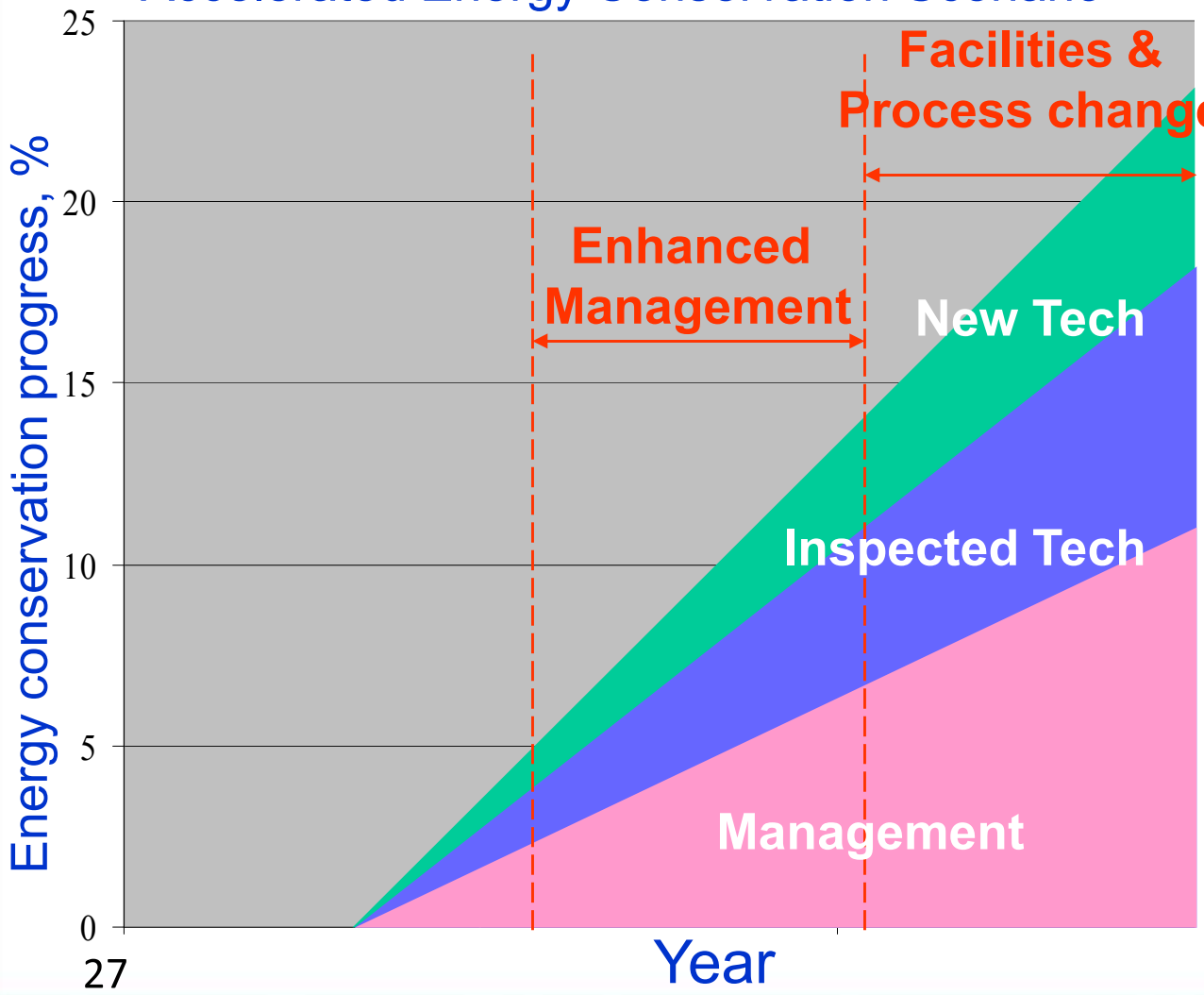
Ir. Ahmad Hadri Haris
Chief Executive Officer
Malaysian Green Technology Corporation

Ahmad Zairin Ismail
Country Coordinator – AEMAS Malaysia
Malaysian Green Technology Corporation

GreenTech

Developing ‘Sustainable Energy Management System’ in UTM

The Japanese experience



Large Investment
Effect : 5%

Medium Investment
Effect : 7%

Small Investment*
Effect : 11%

* Investment on People & EM Support System

- **Create the culture of savings**
- Caters for no cost and low costs

Where and How to Start?

Element 1. Start by Building the People & Culture

Jan 2011: Trained 30 UTM Energy Managers

EPC Pre-requisite 1:
Trained personnel's who understand SEMS

EM Work Procedure

People First!

Energy Management Work Procedures (EM-WP)	Responsibilities	Tools
A. Assign Energy Manager	Executive Board	
B. Set up EM Committee	Executive Board and Energy Manager	
C. Evaluate EM Status	Executive Board and Energy Management Committee	Energy Management Matrix, Energy Efficiency Index
D. Set up or Review EM Components	Executive Board and Energy Management Committee	
E. Set or Revise ET&P	Executive Board and Energy Management Committee	Energy Efficiency Index, Working manual and tools
F. Assign saving target to EACs	Energy Management Committee	

6 REEMs at UTM

228

Suruhanjaya Tenaga

No. Perakuan : PTE-0002-2013

BORANG C

AKTA BEKALAN ELEKTRIK 1990

RATURAN-PERATURAN PENGURUSAN TENAGA ELEKTRIK DENGAN CEKAP 2008

PERAKUAN PENDAFTARAN SEBAGAI PENGURUS TENAGA ELEKTRIK

[subperaturan 14(4)]

hurut subperaturan 14(2) Peraturan-Peraturan Pengurusan Tenaga Elektrik dengan ap 2008, perakuan pendaftaran ini dikeluarkan kepada

MASILAH BINTI BANDI

(Nama pemegang)

d Pengenalan : 680919-01-5956 Tarikh Lahir : 19/09/1968

memberi kuasa kepada pemegangnya untuk menjalankan fungsi dan kewajipan rang pengurus tenaga elektrik berdaftar selama tempoh 1 tahun* dari tarikh akuan ini dikeluarkan sebagaimana yang dinyatakan di bawah. Perakuan ini eluarkan kepada orang yang tersebut di atas dan tidak boleh digunakan oleh mana-na orang lain.

TAN, JIKA ADA :

RAT-SYARAT(sila lihat di muka surat belakang) :

dikeluarkan : 18/12/2012

h habis tempoh : 17/12/2013

M 100

KETUA PEGAWAI EKSEKUTIF SURUHANJAYA TENAGA MALAYSIA

Suruhanjaya Tenaga

Suruhanjaya Tenaga

www.st.gov.my

Suruhanjaya Tenaga (Energy Commission)
No. 12, Jalan Tun Hussein, Precinct 2,
62100 Putrajaya, Malaysia.
T: +603 8870 8500 F: +603 8888 8637
Toll Free : 1-800-2222-78

Ruj. Kami : ST(IP/PTPI/DSM) 10/21 JLD. 9 (51)

Tarikh : 26 Disember 2013

En. Saiful Sukri Bin Suarni
Tkt 3 Blk PA
Unit Selenggaraan, PHB, UTMKL
Jalan Semarak
54100 Kuala Lumpur

Tuan,

KEPUTUSAN TEMUDUGA PERMOHONAN PENDAFTARAN SEBAGAI PENGURUS TENAGA ELEKTRIK DI BAWAH PERATURAN-PERATURAN PENGURUSAN TENAGA ELEKTRIK DENGAN CEKAP 2008

Perkara di atas adalah dirujuk.

2. Sukacita dimaklumkan bahawa permohonan tuan untuk didaftarkan sebagai Pengurus Tenaga Elektrik telah **DILULUSKAN**.

tarikh untuk mendapatkan Sijil Perakuan Elektrik yang akan dikeluarkan oleh kehendaki untuk menjelaskan bayaran jaya Tenaga dalam bentuk cek/wang pos l Pertama peraturan tersebut bagi tujuan

makluman dan tindakan tuan.

Suruhanjaya Tenaga

No. Perakuan : PTE-0055-2013

BORANG C

KALAN ELEKTRIK 1990

GURUSAN TENAGA ELEKTRIK DENGAN CEKAP 2008

DAFTARAN SEBAGAI PENGURUS ENAGA ELEKTRIK

[subperaturan 14(4)]

uran-Peraturan Pengurusan Tenaga Elektrik dengan ini dikeluarkan kepada

'AH RAFIDAH BINTI WAN ALWI

(Nama pemegang)

No Kad Pengenalan : 811010-13-5486 Tarikh Lahir : 10/10/1981

dan memberi kuasa kepada pemegangnya untuk menjalankan fungsi dan kewajipan seorang pengurus tenaga elektrik berdaftar selama tempoh 1 tahun* dari tarikh perakuan ini dikeluarkan sebagaimana yang dinyatakan di bawah. Perakuan ini dikeluarkan kepada orang yang tersebut di atas dan tidak boleh digunakan oleh mana-mana orang lain.

SEKATAN, JIKA ADA :

SYARAT-SYARAT(sila lihat di muka surat belakang) :

Tarikh dikeluarkan : 6/11/2013

*Tarikh habis tempoh : 5/11/2014

FI : RM 100

KETUA PEGAWAI EKSEKUTIF SURUHANJAYA TENAGA MALAYSIA

Suruhanjaya Tenaga

00289

Suruhanjaya Tenaga

No. Perakuan : PTE-0063-2013

BORANG C

AKTA BEKALAN ELEKTRIK 1990

PERATURAN-PERATURAN PENGURUSAN TENAGA ELEKTRIK DENGAN CEKAP 2008

PERAKUAN PENDAFTARAN SEBAGAI PENGURUS TENAGA ELEKTRIK

[subperaturan 14(4)]

Menurut subperaturan 14(2) Peraturan-Peraturan Pengurusan Tenaga Elektrik dengan Cekap 2008, perakuan pendaftaran ini dikeluarkan kepada

MOHAMMAD YUSRI BIN HASSAN

(Nama pemegang)

No Kad Pengenalan : 640524-04-5801 Tarikh Lahir : 24/05/1964

dan memberi kuasa kepada pemegangnya untuk menjalankan fungsi dan kewajipan seorang pengurus tenaga elektrik berdaftar selama tempoh 1 tahun* dari tarikh perakuan ini dikeluarkan sebagaimana yang dinyatakan di bawah. Perakuan ini dikeluarkan kepada orang yang tersebut di atas dan tidak boleh digunakan oleh mana-mana orang lain.

SEKATAN, JIKA ADA :

SYARAT-SYARAT(sila lihat di muka surat belakang) :

Tarikh dikeluarkan : 04/12/2013

*Tarikh habis tempoh : 03/12/2014

FI : RM 100

KETUA PEGAWAI EKSEKUTIF SURUHANJAYA TENAGA MALAYSIA

Suruhanjaya Tenaga

Professional Energy Manager

AEMAS

ASEAN Energy Management Scheme

Professional Energy Manager

This Certificate is awarded to

Masilah Bandi

In recognition of his outstanding achievements as an Energy Manager and fulfillment of all the obligations under the ASEAN Energy Management Scheme (AEMAS)

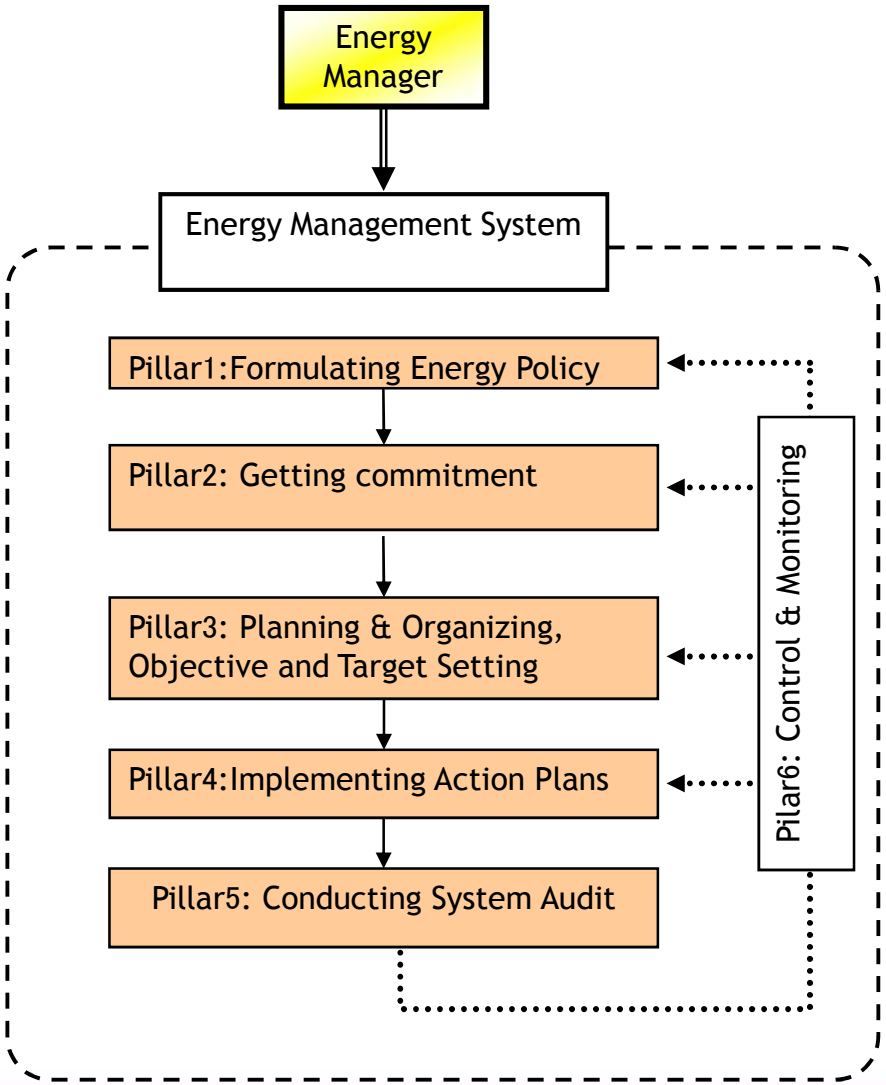
Ir. Ahmad Hadri Haris
Chief Executive Officer
Malaysian Green Technology Corporation

Ahmad Zairin Ismail
Country Coordinator – AEMAS Malaysia
Malaysian Green Technology Corporation

Green Tech

2 years program to train as country expert on Energy Management System

Responsibilities of the Energy Manager and Its Team



A properly trained Energy Manager is crucial because:

- **Know current baseline**
- **Know which project to prioritize**
- **Can get commitment from Top Management**
- **Able to check proposer credentials**
- **Understand the mechanism of M&V and EPC**
- **Able to monitor and verify achievement or claimed savings**

Continual Improvement – Sustainability – Improved profitability

UTM Energy Management Committee (As of Jan 2014)

EPC Pre-requisite 2: Getting Commitment of Critical Units from the Top Management

EM is not the monopoly of the "Techies" !!

Timbalan Naib Canselor (Pembangunan)

Advisor:
Prof Dr Zainuddin Manan

Energy Manager (REEM)

Ketua BPU

Timbalan Bendahari

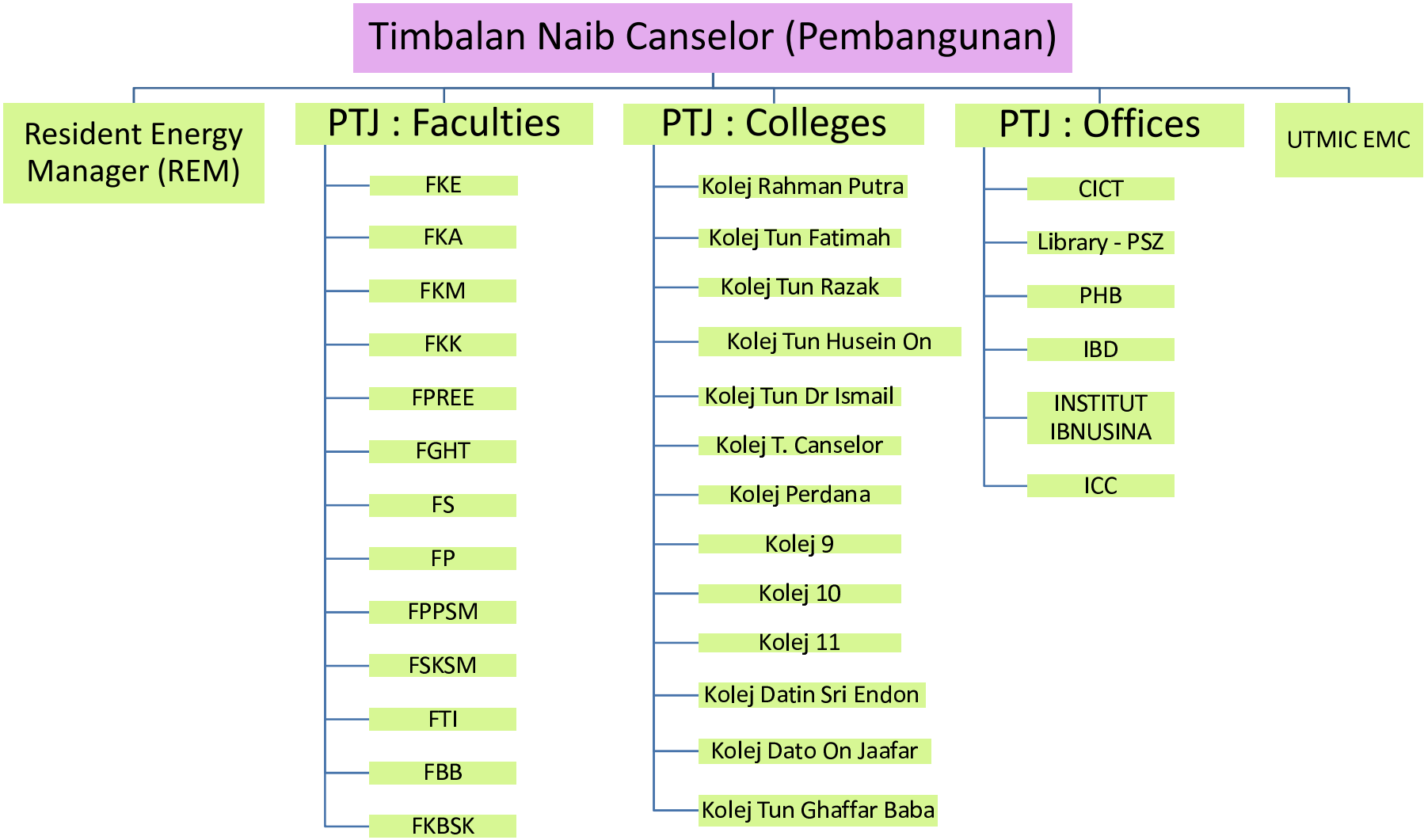
Timbalan Pendaftar

Pengarah Kerja

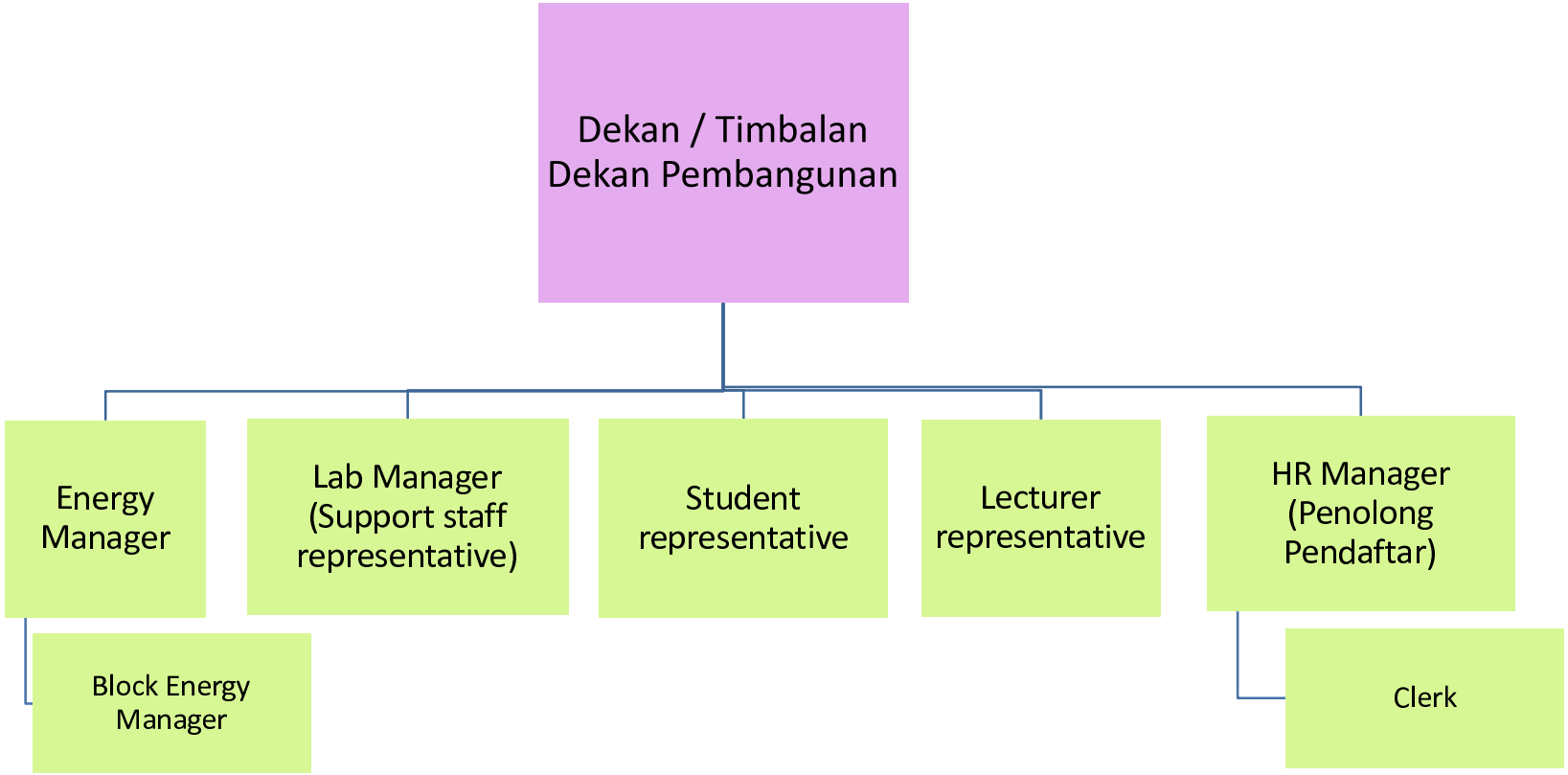
PTJ EMC

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

Overall-UTM PTJ Energy Mgmt Committee



PTJ Energy Management Committee (typical)

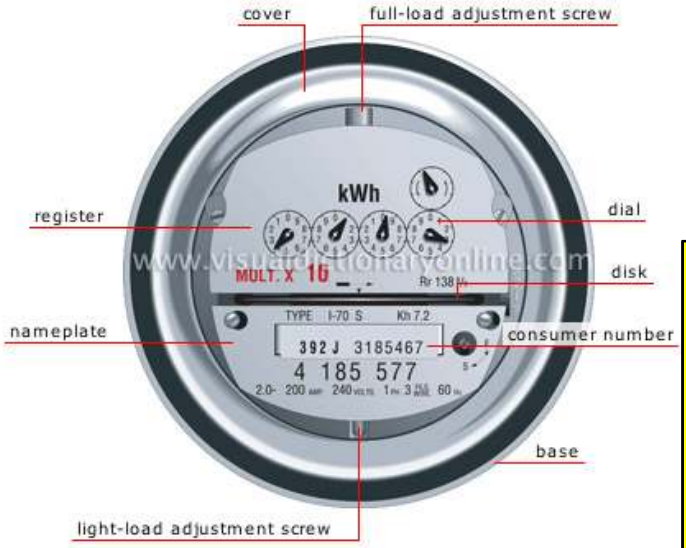


Where and How to Start?

Element 2.

Developing the infrastructure

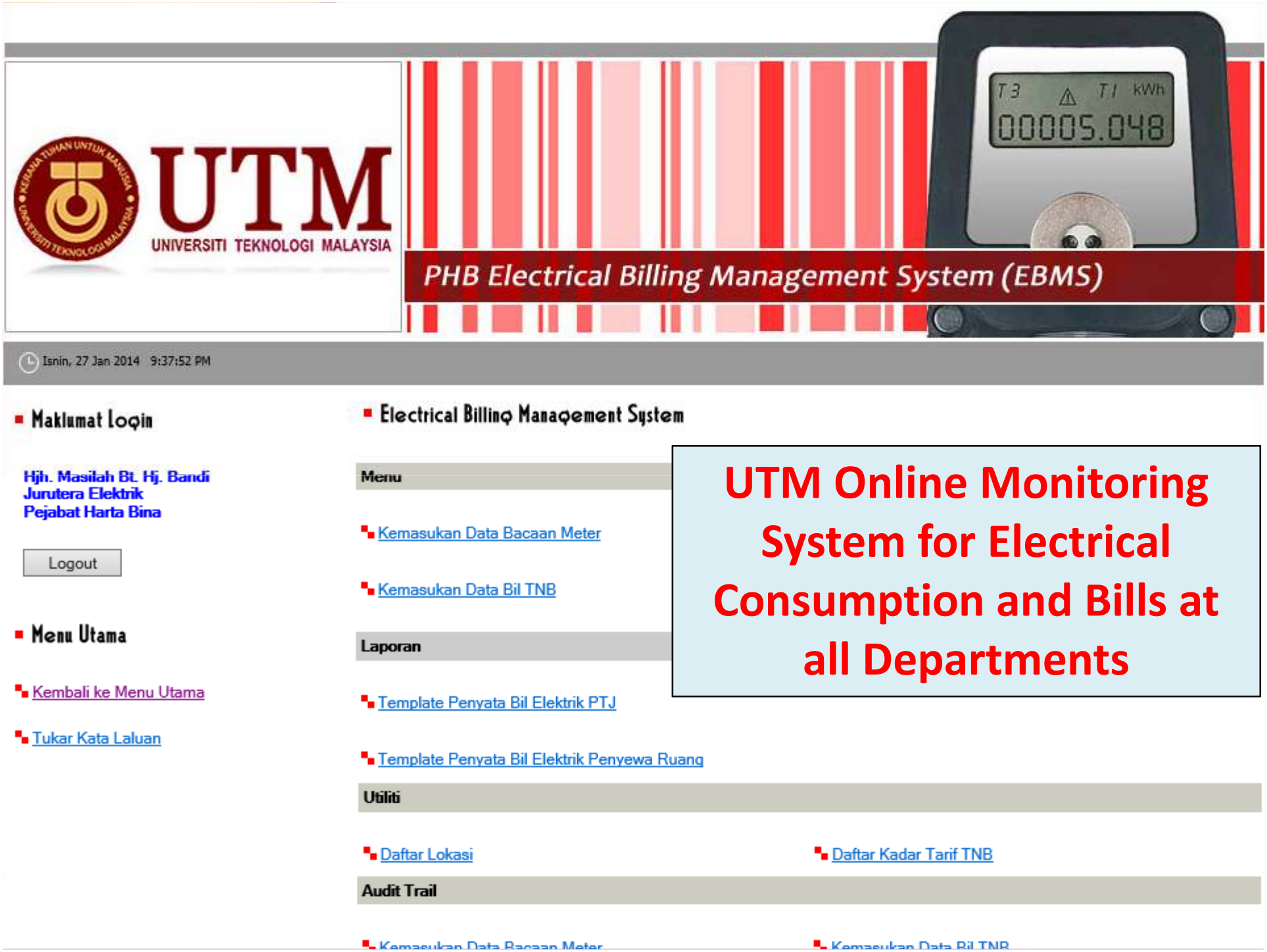
UTM has installed >600 metres



Important!

1. For determining your baseline
2. Control and Monitoring
3. Know your SEU
4. Measurement and Verification

EPC Pre-requisite 2: Ensure you understand proper M&V and able to cross-verify by having proper knowledge and equipment


UTM
UNIVERSITI TEKNOLOGI MALAYSIA
PHB Electrical Billing Management System (EBMS)
T3 T1 kWh
00005.048
Isnin, 27 Jan 2014 9:37:52 PM
Maklumat Login
Hjh. Masilah Bt. Hj. Bandi
Jurutera Elektrik
Pejabat Harta Bina
Logout
Menu Utama
Kembali ke Menu Utama
Tukar Kata Laluan
Electrical Billing Management System
Menu
Kemasukan Data Bacaan Meter
Kemasukan Data Bil TNB
Laporan
Template Penyata Bil Elektrik PTJ
Template Penyata Bil Elektrik Penyewa Ruang
Utiliti
Daftar Lokasi
Daftar Kadar Tarif TNB
Audit Trail
Kemasukan Data Bacaan Meter
Kemasukan Data Bil TNB
UTM Online Monitoring System for Electrical Consumption and Bills at all Departments

NEW IMPROVED EBMS

Laporan

- Template Penyata Bil Elektrik PTJ
- Template Penyata Bil Elektrik Penyewa Ruang
- Bayaran Bil Elektrik TNB (RM)
- Penggunaan Tenaga Elektrik TNB (kWh)
- Trend Penggunaan Elektrik Di Pejabat (RM)
- Trend Penggunaan Elektrik Di Pejabat (kWh)
- Trend Penggunaan Elektrik Di Fakulti (RM)
- Trend Penggunaan Elektrik Di Fakulti (kWh)
- Trend Penggunaan Elektrik Di Kolej (RM)
- Trend Penggunaan Elektrik Di Kolej (kWh)
- Trend Penggunaan Elektrik Oleh Penyewa Ruang (RM)
- Trend Penggunaan Elektrik Oleh Penyewa Ruang (kWh)
- Laporan Bil Elektrik Mengikut Lokasi Penyewa Ruang
- Top # Pejabat (RM, kWh)
- Top # Fakulti (RM, kWh)
- Top # Kolej (RM, kWh)
- Energy Efficiency Index (EEI) Bagi Keseluruhan UTM
- Energy Efficiency Index (EEI) Bagi Pejabat
- Energy Efficiency Index (EEI) Bagi Fakulti
- Energy Efficiency Index (EEI) Bagi Kolej
- Senarai Meter Mengikut Pencawang
- Senarai Meter Mengikut Pejabat/Fakulti/Kolej
- Perincian Bil Elektrik Mengikut Blok
- Formula Pengiraan Penggunaan Elektrik Mengikut PTJ

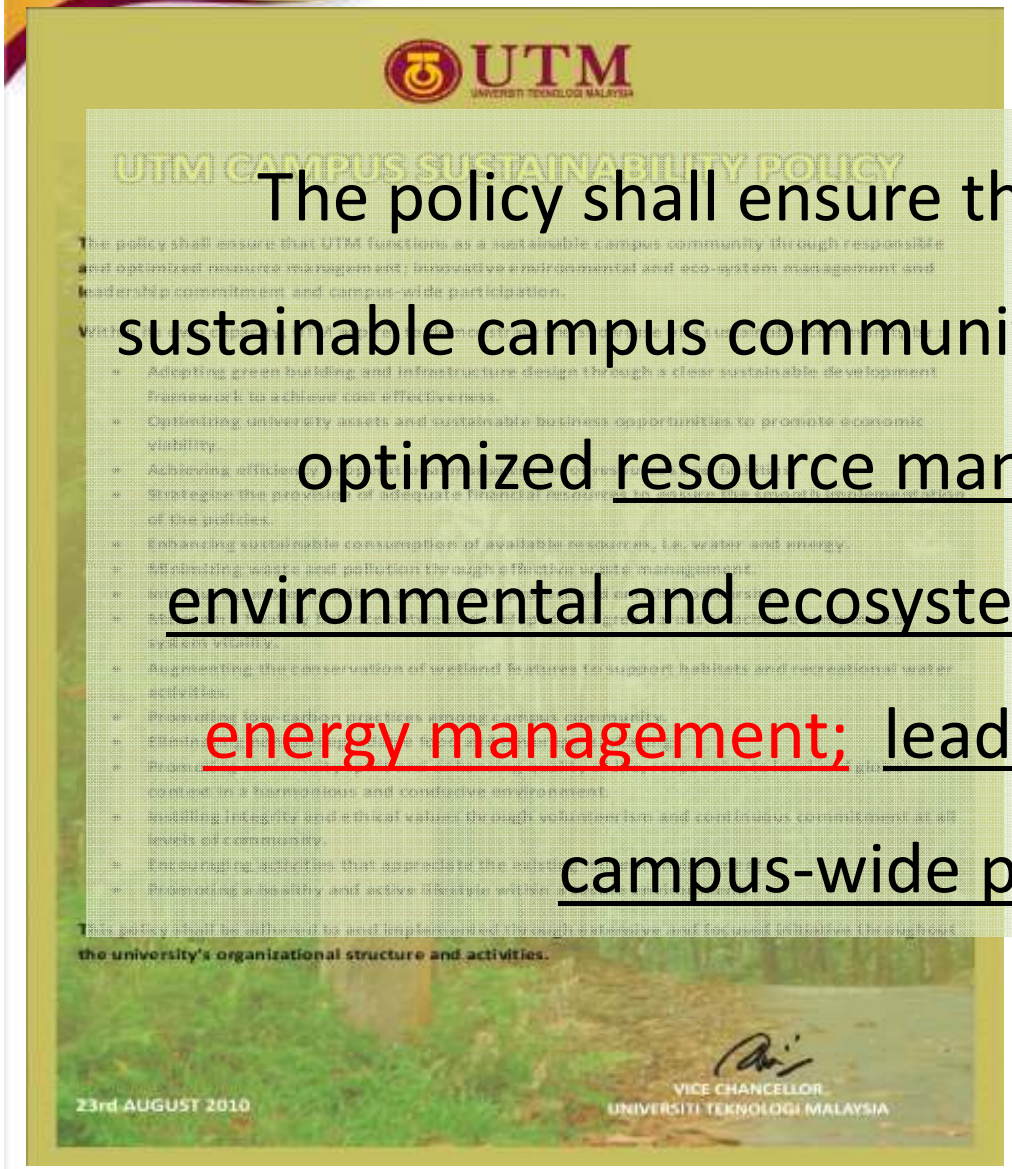
NEW IMPROVED EBMS

Utiliti

- Daftar Lokasi
- Daftar Meter
- Daftar Keluasan Bangunan/Blok
- Daftar Penyewa Ruang Arked
- Daftar Acara
- Senarai Energy Conservation Measures (ECM)
- Senarai Lawatan
- Senarai Pelajar
- Daftar Kadar Tarif TNB
- Daftar Jenis Bil TNB
- Daftar Jam Operasi
- Kemaskini Status Bayaran Penyewa Ruang Arked
- Senarai Energy Manager
- Senarai Training
- Senarai Laporan
- Senarai Minit Mesyuarat

Element 3. Lock Energy Sustainable Management System (SEM) into your company's business practice

UTM Sustainability & Energy Policy



The policy shall ensure that UTM functions as a sustainable campus community through responsible and optimized resource management; innovative environmental and ecosystem management; efficient energy management; leadership commitment and campus-wide participation.

UTM Green Procurement Policy and Life Cycle Costing (LCC) Tool

EPC Pre-requisite 3: Proper system for evaluating EPC

UTM GREEN PROCUREMENT POLICY

1.0 Purpose

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Microsoft Excel - LCCA_Tool

File Edit View Insert Format Tools Data Window Help

Life Cycle Cost Analysis Tool

Calculate Life Cycle Cost, Energy Consumption and CO2

ICLEI Local Governments for Sustainability

Introduction

What is Life Cycle Cost Analysis?

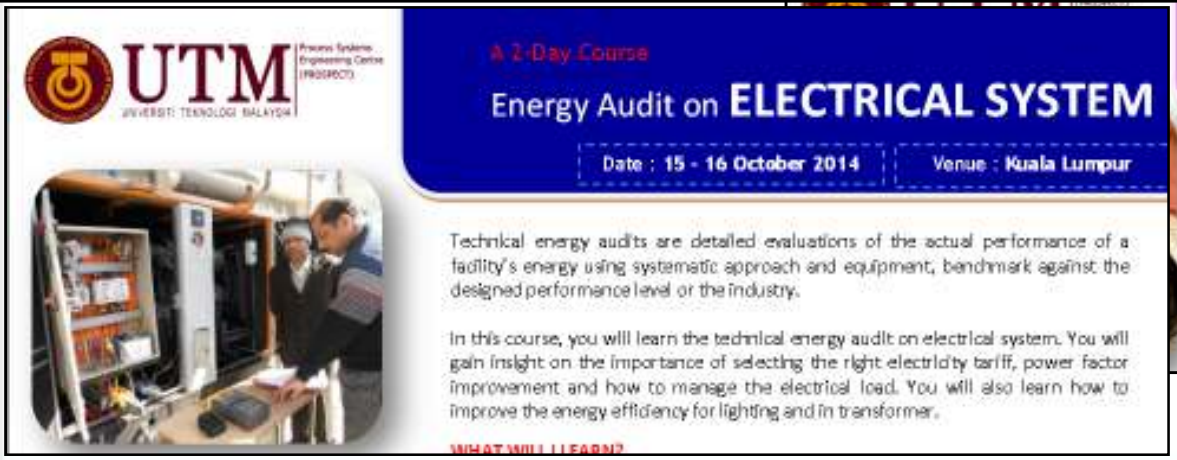
Life Cycle Cost Analysis (LCCA) is a methodology that enables you to compare the cost of different products on the basis of

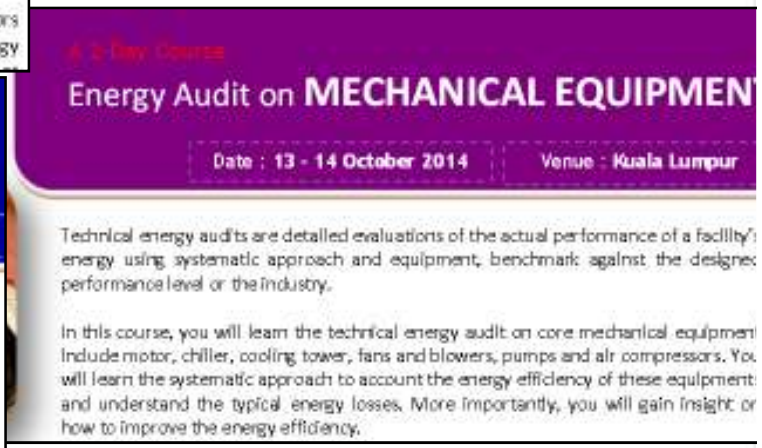
Energy Management Masterplan 2012-2020

Energy Management Masterplan 2012 - 2020

No	Description	Budget in RM	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Energy management review										
	- bi-monthly	-	-	-	-	-	-	-	-	-	-
	- yearly workshop	15,000/year	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
2	Organization										
	- clerk or research officer/assistant	20,000/year	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
3	Motivation										
	- EMWP book & brochures publish	10,000/year	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
	- EM group GOP / conferrence / seminar / training	100,000/year	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
	- EM group website, facebook	-	-	-	-	-	-	-	-	-	-
	- Energy Awards (RM12K)	1,000/month	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
	- EM testing gear (RM20K)	5,000/year	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
4	Informaton system										
	- Integrate HT Scada system to current EBMS/ system upgrade	10,000/year	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
	- Completed remote monitoring for the meters	100,000/year	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
	- Job creation on comprehensive systems that can set targets, monitor consumption, identified faults, quantifies savings & provides budget tracking.	12,000 / year	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
5	Marketing - Awareness Campaign										
	- Energy awareness program at PTJ	500/month	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
	- CPD Energy Management training provider	income	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000	-10,000
	- AEMAS EMGS	-	-	-	-	-	-	-	-	-	-
	- Visits from other organization	-	-	-	-	-	-	-	-	-	-
6	Energy Conservation Measures										
	- Retrofit 40,000 Energy saving T5 lamps (RM1.3 million*)	1,300,000/3 years	433,333	433333	433333	400,000	400,000	400,000	400,000	400,000	400,000
	- Retrofit 3000 Energy saving LED lamps (RM900K*)	900,000/3 years	300,000	300000	300000	300,000	300,000	300,000	300,000	300,000	300,000
	- Retrofit 500 motion sensors (RM175K*)	175,000/3 years	58,333	58,333	58,333	60,000	60,000	60,000	60,000	60,000	60,000
	- Street Lightings tariff optimization (RM150K*)	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
	- Retrofit LED Street Lightings (RM150K*)	50 SL nos/year	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
	- Airconditioning inventory and usage analysis at college										

EPC Pre-requisite 4: Ensure proper training and awareness is given before and after the installation of EPC





BANNER
ENERGY SAVING CAMPAIGN

ENERGY SAVING PLEDGE FORM

ENERGY MANAGEMENT WORKING PROCEDURE VERSION 3.0

EPC Pre-requisite 5: Ensure EMWP is updated after the installation of EPC

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ENERGY MANAGEMENT WORKING PROCEDURE VERSION 3.0

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ENERGY SAVING WORKING PROCEDURE

Following are working procedure for good management of energy :

Air-conditioning Management

- Set air-conditioning temperature at 24°C or at comfortable level without the need to use jacket.
- For centralized unit air-conditioning - Switch on at 8am and switch off at 4.30pm.
- Keep door and window closed when air-conditioning is in used.
- Switch off light and air-conditioning when not in room for more than 15 minutes e.g. going to classes/meetings.

Light management

- Turn off light at the area where the office/lab is unoccupied.
- When working in a specific area such as a desk, use small area lamps intead of overhead light that illuminate the entire laboratory.
- If the building design allows, maximize the use of sunlight to illuminate the office/lab.
- Switch off corridor light during daytime.

Desktop/Laptop and Monitors Management

- Set computer/laptop in hibernate mode when not in room for more than 15 minutes e.g. going to classes/meetings.
- Set your monitor to go to sleep mode after 20 min of inactivity. (Start Menu > Control Panel > Power Options).
- Turn off computers at the end of the day. (Leave on one night per week for updates).
- Ditch the screen savers.
- Use a laptop instead of a desktop.
- Use the power save mode on office equipment.

Electrical Equipments

- Turn off power strips and unplug unused devices to stop electricity "phantom loads".

Fume Hood Management

- Keep sash completely closed on a VAV hood when on stanby.
- Open fume hood only enough for a hand to go through (2 inch).
- Do not store chemicals under fume hoods. Use appropriately designed storage cabinets.
- Switch off fume hood when not in use.
- Inspect fume hood sashes periodically.
- Do not block the fume hood sash.

Refrigeration/Freezer Management

- Provide freezers/refrigerator with proper spacing (2-3 inches minimum clearance from wall or obstructions) and defrost freezers at least once per year.
- Clean freezer/refrigerator filters and coils every six months.
- Eliminate unnecessary freezers/refrigerators by getting rid of unnecessary items and combining contents into fewer freezers/refrigerators.
- Instead of buying a freezer/refrigerator for additional space, elimate old samples, solutions etc. from existing freezers/refrigerators.
- Keep refrigerators and freezers organized (give each person a section) so that clean up/removal of old samples is easier. Before a person moves on from a lab, ask them to get rid of unnecessary samples and condense their items into the smallest space possible.
- For researchers with walk-in cooler or freezer, you should properly load the unit. Overloaded refrigeration units result in disrupted airflow, while under loaded units are using more energy than needed.

Future purchasing of new electrical equipment

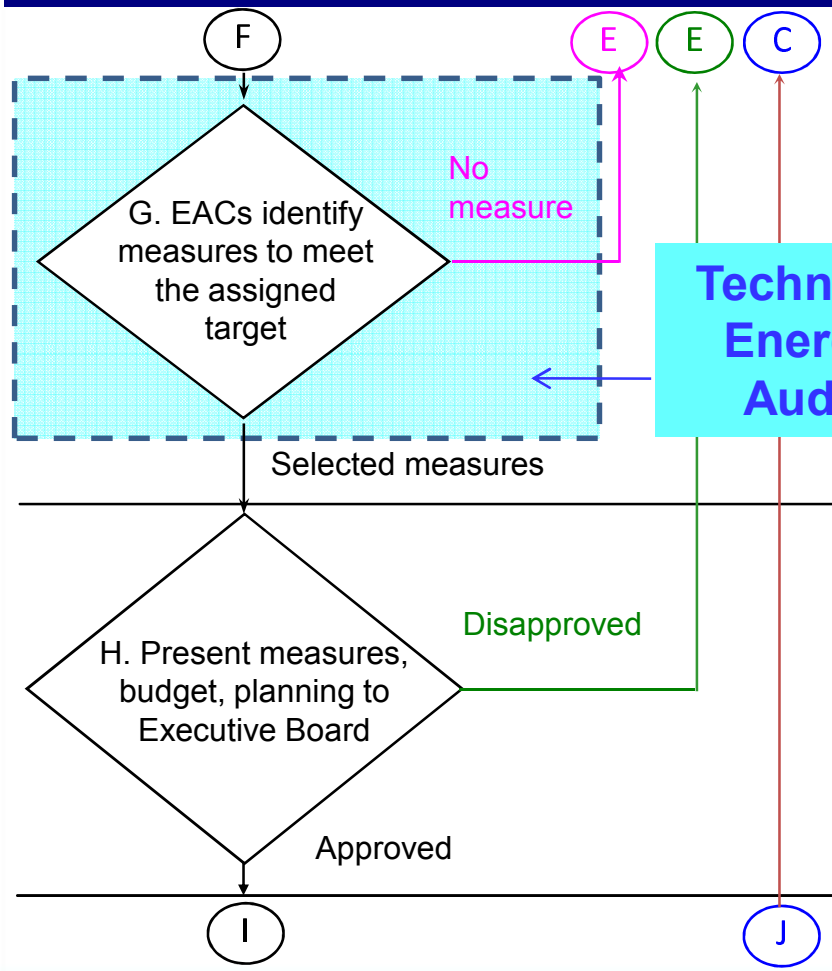
- Before purchasing new equipment, look into sharing various pieces of equipment between laboratories.
- Consider energy consumption factors when making new equipment purchases.
- Buy equipment with an ENERGY STAR label.

ENERGY STAR

Energy Management Work Procedure

Energy Management Working Procedures (EM-WP)	Responsibilities	Tools
A. Assign Energy Manager	Executive Board	
B. Set up EM Committee	Executive Board and Energy Manager	
C. Evaluate EM Status	Executive Board and Energy Management Committee	Energy Management Matrix, Energy Efficiency Index
D. Set up or Review EM Components	Executive Board and Energy Management Committee	
E. Set or Revise ET&P	Executive Board and Energy Management Committee	Energy Efficiency Index, Working manual and tools
F. Assign saving target to EACs	Energy Management Committee	

Energy Management Work Procedure

Energy Management Working Procedures (EM-WP)	Responsibilities	Tools
	Energy Accounting Centres Energy Management Committee and Energy Accounting Centres	Recommended working procedures for each EAC, Operational Guideline (OG), Process Mapping (PM), Work Instruction (WI), Log Sheet (LS) and Calculation Sheet (CS)

UTM EM-Matrix

before SEMP implementation status in April 2012

	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 saving not reported effectively to users	Programme of staff awareness and regular publicity campaigns	Some payback criteria employed as for all other investment
2	Unadopted 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 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

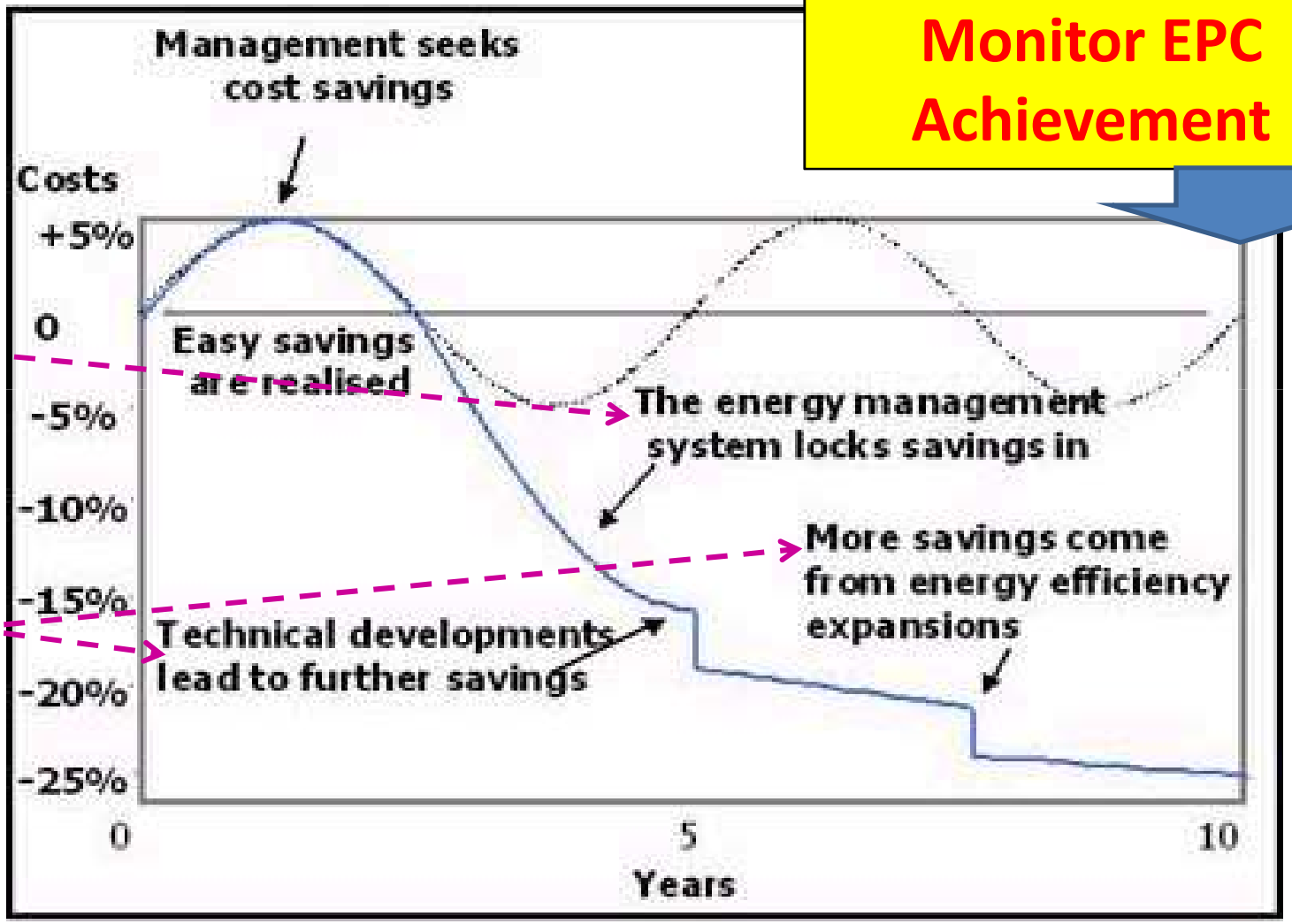
Policy Committee Communication Information System Marketing Investment

..with Sustainable Energy Management System (SEM)

EPC Pre-requisite 6: Monitor EPC Achievement

SEM Locks Savings

Innovations Lead to continuous Savings



Conclusions

To transform,

- ***Break Old Patterns!*** **Move from technical audit to holistic implementation of SEM – Which will also aid for EPC project!**
- **Start at the heart of the organisation – build the people and the culture**
- **Develop proper infrastructure**
- **Lock SEM into an organisation's business practice**

Thank you!

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