SEMINAR PERUNDANGAN PENGGALAKKAN PENGGUNAAN TENAGA ELEKTRIK SECARA CEKAP – SURUHANJAYA TENAGA

SHAH ALAM CONVENTION CENTER

20 MEI 2015

Meeting Energy Management System Standard & Regulation

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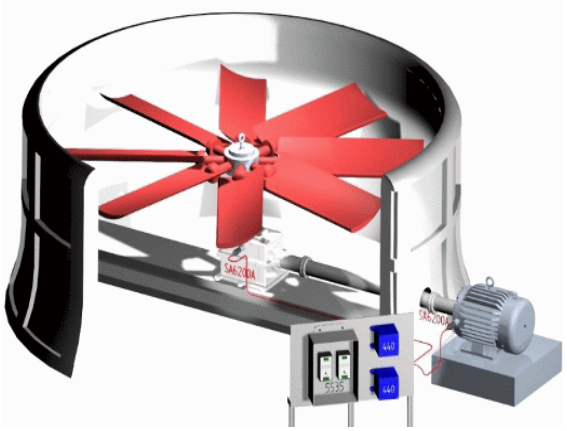


INTRODUCTION

Energy

Measure of the ability of a body or system to do work or produce a change, expressed usually in joules or kilowatts hours (kWh).

The two basic types of energy are:

1. **Potential: energy associated with the nature or state. e.g. chemical energy, electrical energy, nuclear energy**
2. **Kinetic: energy associated with motion. e.g. moving car or a spinning wheel.**

Energy Efficiency

Percentage of total energy input to a machine or equipment that is consumed in useful work and not wasted as useless heat.

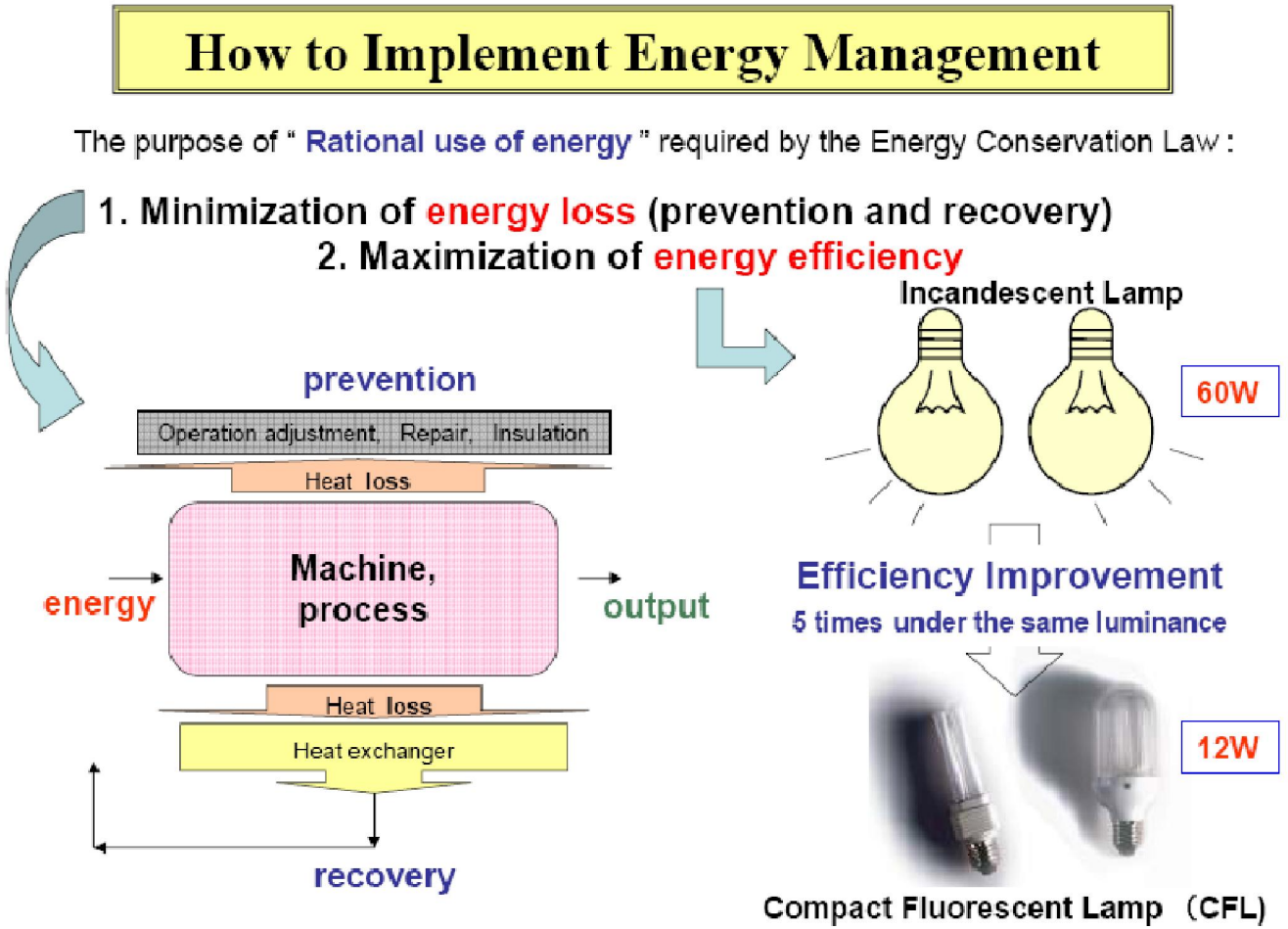
Energy Efficiency and Energy Conservation

- Energy efficiency involves the use of technology that requires less energy to perform the same function.

- Energy conservation is any behavior that results in the use of less energy .

Two ways to consume less energy…

1. **Have and do less = conservation**
2. **Improve performance = efficiency**



Energy Management Standard

- Energy Management System EnMS ISO 50001: 2011

- Energy efficiency and use of renewable energy for non-residential buildings – Code of practice (Second revision) – MS 1525: 2014

Energy Efficiency in Buildings

MS1525: Energy Efficiency and use of renewable in non residential building- Code of practice

* to be incorporated in UBBL 84

Brief History

- Building guidelines 1989
- MS 1525 : 2000
- MS 1525 : 2007 (1st Revision)
- MS 1525 : 2014 (2nd Revision)

To purchase : Http:// www. msonline.gov.my

or through SIRIM's Library

Energy Management Regulations

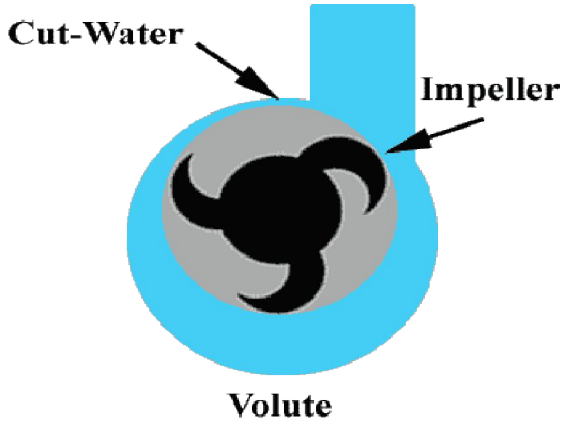
- Electricity Supply Act 1990
- Efficient Management of Electrical Energy Regulation (EMEER) 2008

ISO 50001:2011

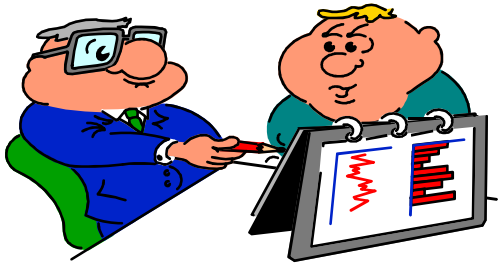
Energy Management System Standard

What is ISO 50001?

ISO 50001 is a newly developed international standard for an energy management system (EnMS). It's provides a framework for establishing energy management best practice to help organizations to improve their energy efficiency in a logical, controlled and systematic way. If appropriate can integrate an energy management system (EnMS) with their existing management system(s).



ISO 50001:2011



Foreword
Introduction
1. **Scope**
2. Normative reference
3. **Trem and definitions**
4. Energy management system requirements

4.1 General requirements

4.2 Management responsibility

4.2.1 Top management
4.2.2 Management representative

4.3 Energy policy

4.4 Energy planning

4.4.1 General
4.4.2 Legal requirements and others requirements
4.4.3 Energy Review
4.4.4 Energy Baseline
4.4.5 Energy performance indicators (EnPI)
4.4.6 Energy objectives, energy targets and energy management action plans

4.5 Implementation and operation

4.5.1 General
4.5.2 Competence, training and awareness
4.5.3 Communication
4.5.4 Documentation
4.5.5 Operational control
4.5.6 Design
4.5.7 Procurement of energy services, products, equipment and energy

4.6 Checking

4.6.1 Monitoring, measurement and analysis
4.6.2 Evaluation of compliance with legal requirements and other requirements
4.6.3 Internal audit EnMS
4.6.4 Nonconformities, correction, corrective action and preventive action
4.6.5 Control of records

4.7 Management review

4.7.1 General
4.7.2 Input to management review
4.7.3 Output to management review

Energy Management

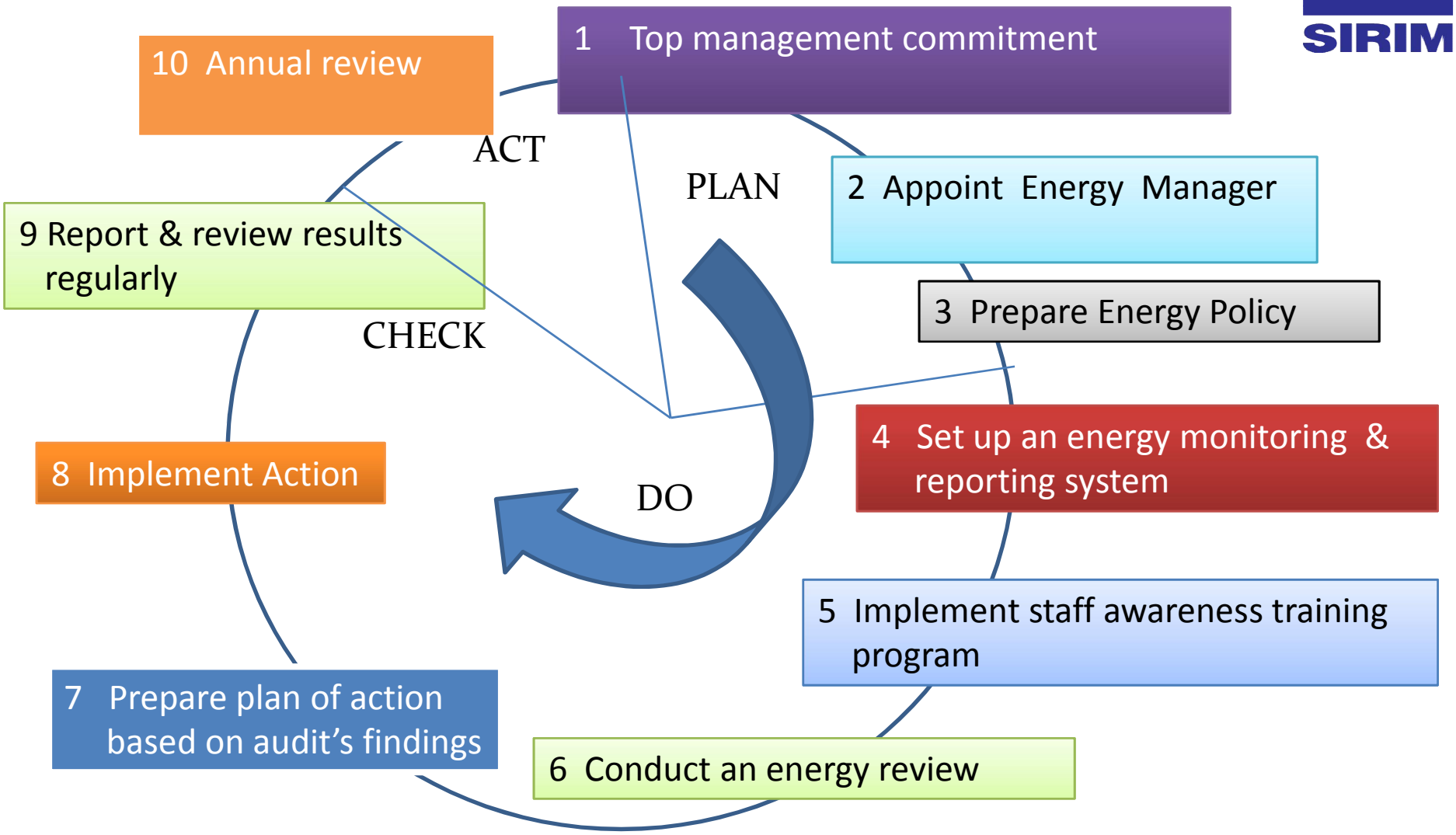
Key factor for the effectiveness of energy management:

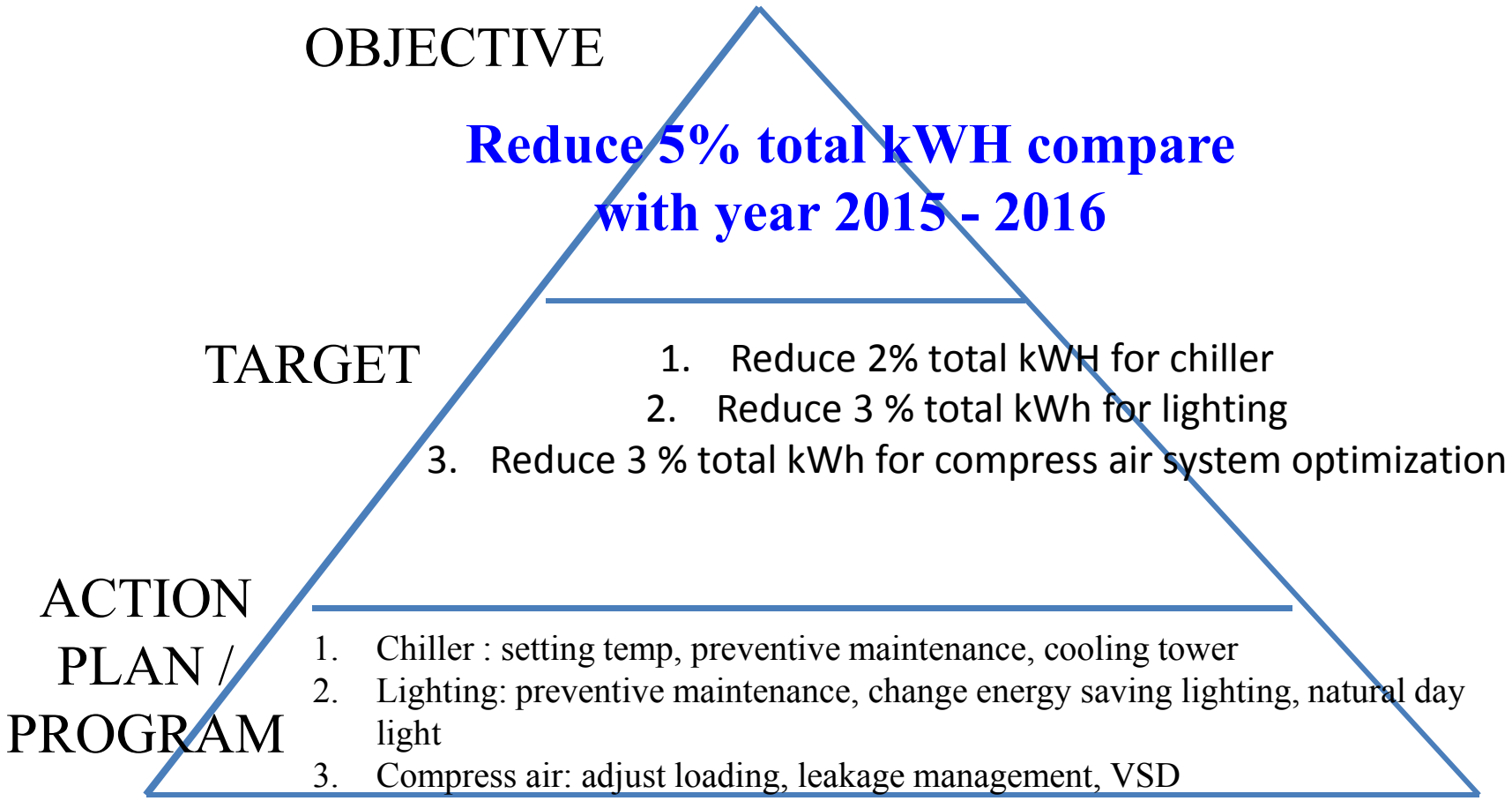
COMMITMENT FROM THE TOP MANAGEMENT

What are the benefits to implements Energy Management System as per ISO 50001?

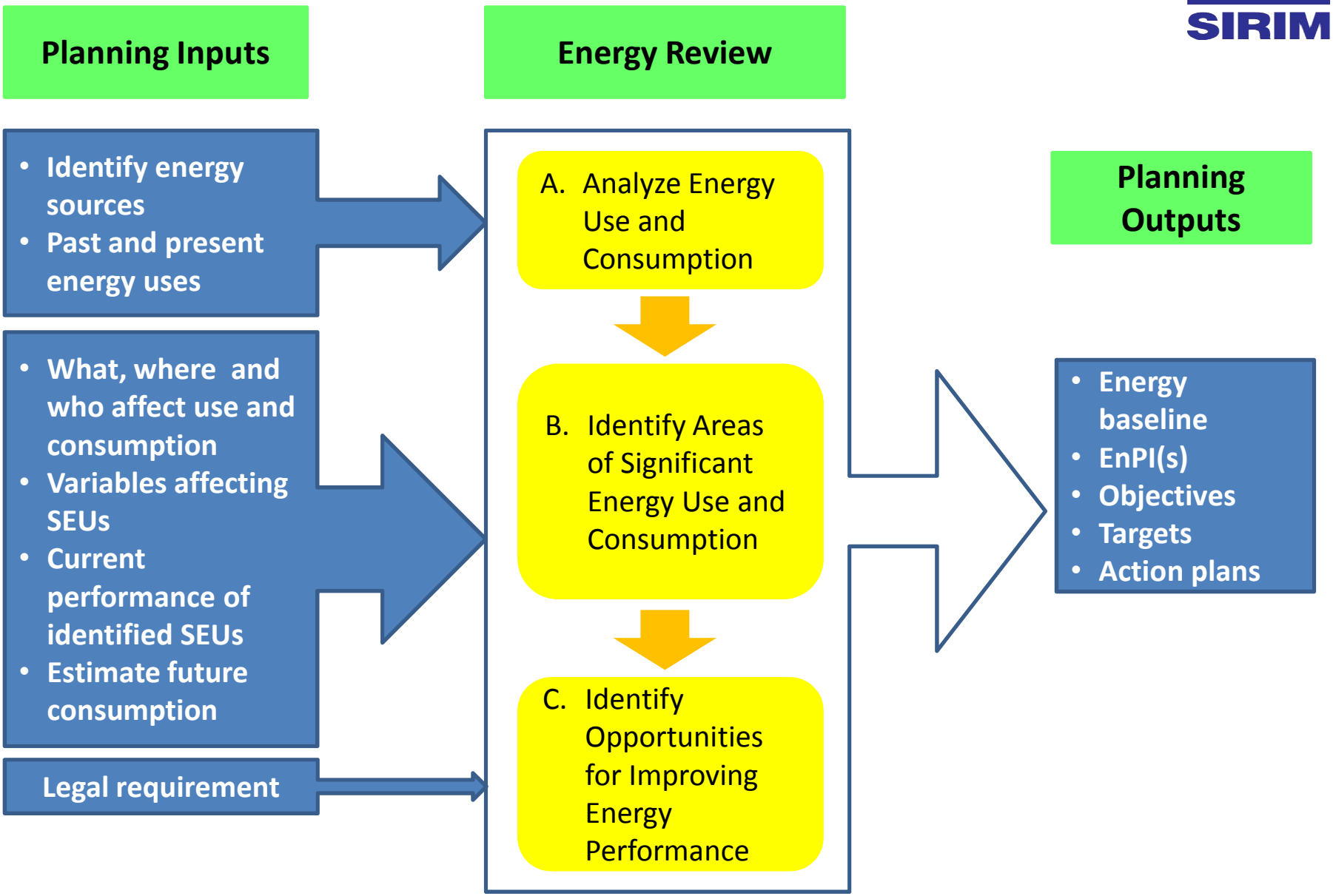
- Energy cost saving
- Reduced greenhouse-gas emissions and carbon footprint
- Increased energy awareness among staff
- Greater knowledge of equipment efficiency
- Informed decision making processes from system design through to operation
- Structured approach to the Right First Time methodologies
- Improve corporate image and credibility among stake holder, regulators, customers, prospective clients and the public
- Improved operational efficiencies
- Improved maintenance practices

Energy Management System Strategic Plan




OBJECTIVE
Reduce 5% total kWH compare with year 2015 - 2016
TARGET
1. Reduce 2% total kWH for chiller
2. Reduce 3 % total kWh for lighting
3. Reduce 3 % total kWh for compress air system optimization
ACTION PLAN / PROGRAM
1. Chiller : setting temp, preventive maintenance, cooling tower
2. Lighting: preventive maintenance, change energy saving lighting, natural day light
3. Compress air: adjust loading, leakage management, VSD

Basic Concept of Energy Planning Process



Energy System Components

- Heating, Ventilation and Air Conditioning (HVAC)
- Lighting
- Electrical Devices
- Office Equipment

SIGNIFICANT ENERGY USED (SEUs)

- Heating, Ventilation and Air Conditioning (HVAC)
- Furnace (industrial)

Three phases of energy management

Planning

Implementing

Monitoring and Evaluation

Legal and other requirements

Energy Review

Energy Performance Metrics

Objectives, Targets & Action Plans

ENERGY REVIEW / AUDIT

What is Energy Audit / Review?

- **A study of energy use and ways to reduce energy consumption**
- **Snapshot of energy / mass balance in energy use system**
- **Identify and analyse the energy use and consumption through current use and management pratices;**
- **Identify the significant energy use of its process or activities or facilities and variables affecting the use and consumption;**
- **Estimate the future energy use and consumption;**
- **Identify and propose energy conservation or energy efficiency opportunities in reducing energy use and consumption;and**
- ***Client preparation – requirement for Energy Management System ISO 50001 certification.***

Category of Energy Audit

Level 1 - Preliminary

•Duration: 2 – 3 weeks

•Approach:

–Review of drawings

–O&M manuals

–commissioning reports

–equipment test reports

–3 years of electric and water bills,

–CMMS system reports

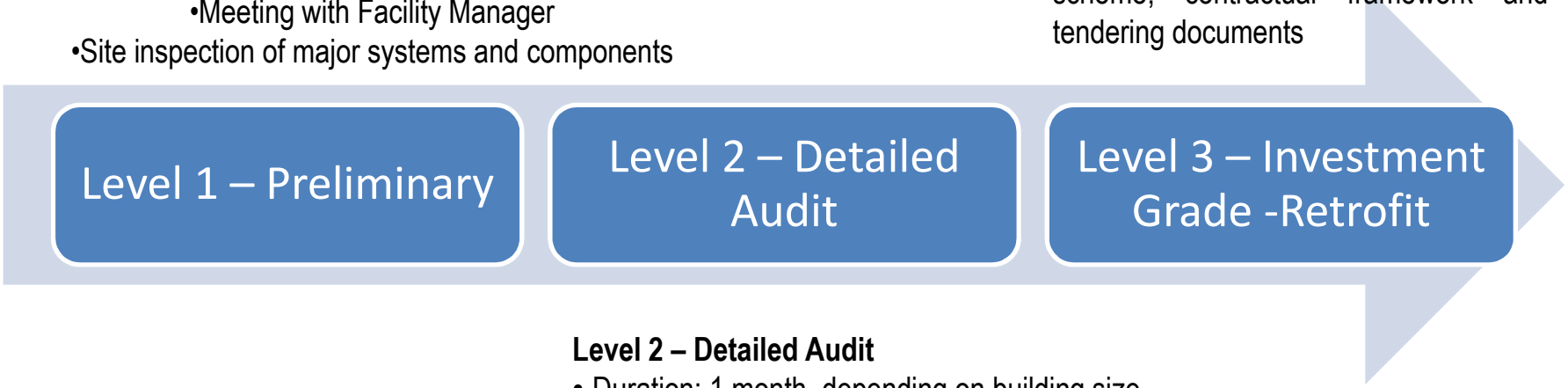
–BMS trend reports.

•Meeting with Facility Manager

•Site inspection of major systems and components

Level 3 – Investment Grade - Retrofit

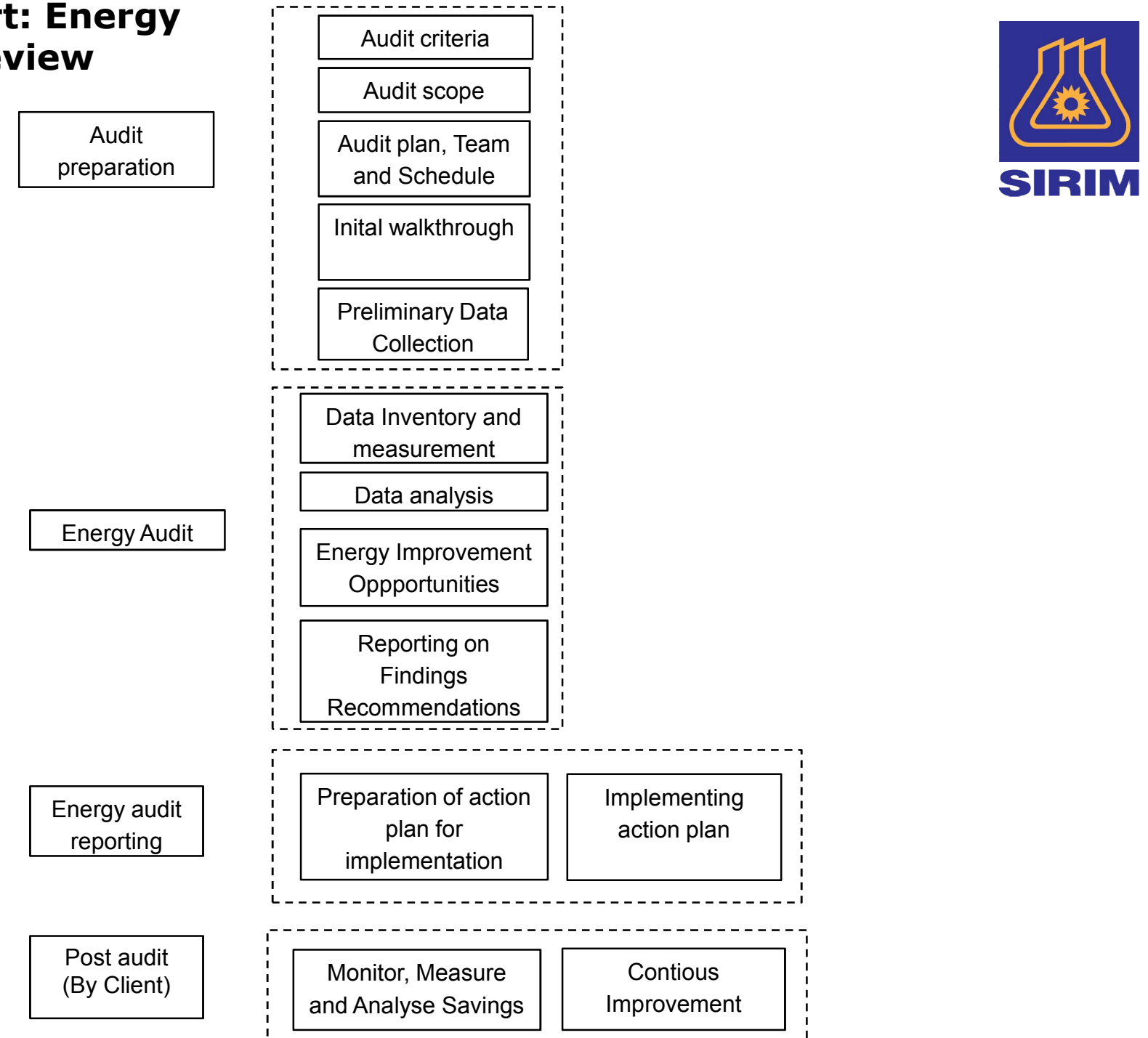
- Technical part - Concept design, Guarantee of saving and Payback Period
- Financial part - financing scheme, contractual framework and tendering documents

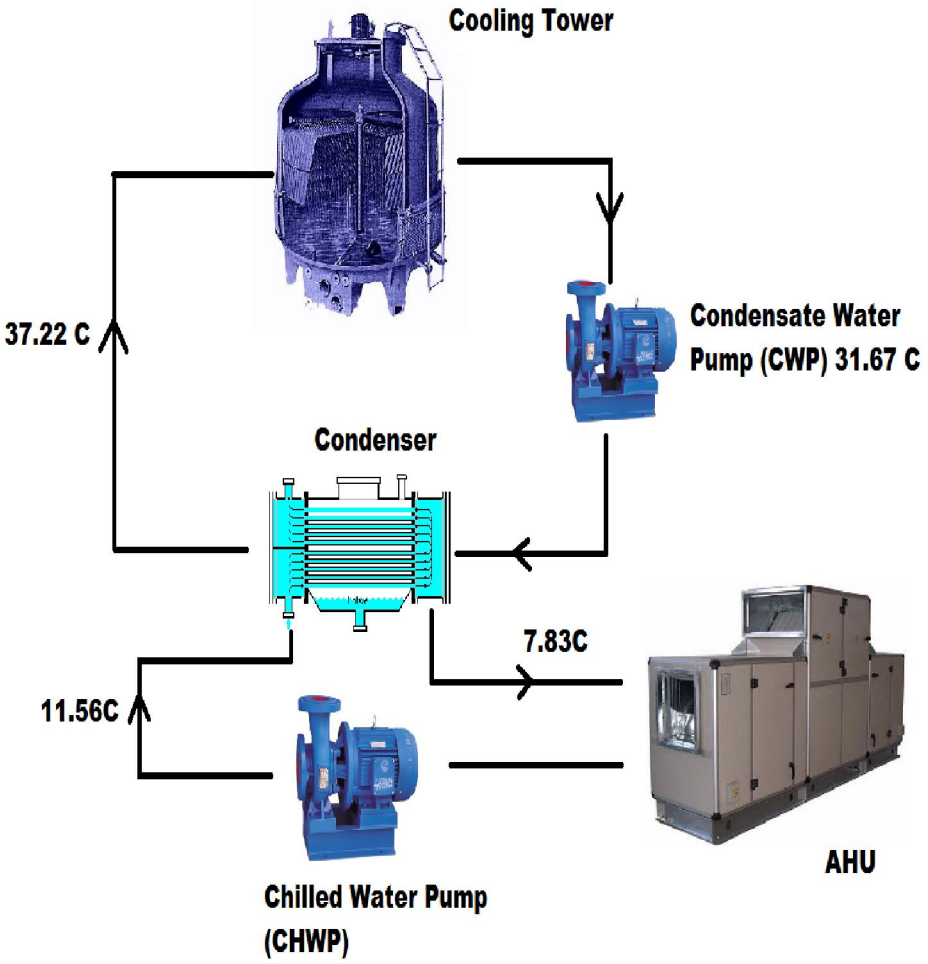


Level 2 – Detailed Audit

- Duration: 1 month, depending on building size
- Use of measuring equipment to collect energy and usage information at 1 minute interval
- Data analysis input from the clients
- Identify significant energy used (SEUs)
- Detailed energy and cost analysis
- Output: Capital Intensive energy saving opportunities

Flowchart: Energy Audit/Review Process





Basic Chiller Water System Cycle – Measured Data Performance for Chiller YORT 320 TR

Table 24. ACMV system components, electrically driven[1] for water chillers: Standard rating conditions - cooling[2]

Conditions		Water Chilling Package
Leaving chilled water temperature °C (°F)		6.67 (44)
Entering chilled water temperature °C (°F)		12.22 (54)
Leaving condenser water temperature °C (°F)		36.11 (97)
Entering condenser water temperature °C (°F)		30.55 (87)
Fouling factor, water[c]		
Condenser	m^2 K/kW	0.044
Evaporator	m^2 K/kW	0.018
Condenser, ambient Temperature		
Air-cooled	°C	35.0 DB
Evaporatively-cooled	°C	24.0 WB

NOTES:

1. Data in this Table apply to the following types of ACMV System Components: Centrifugal or Rotary or Reciprocating water-chilling packages complying to MS 2449.
2. Air-cooled unit ratings shall be rated at sea level at Barometric Pressure of 101.3 kPa.

MS1525: 2014 Code of Practice on Energy Efficiency and Use Renewable Energy for Non Residential Building (2nd Revision)

ENERGY EFFICIENCY RATING (EER) - ACSU

Measure of the relative (and not overall) efficiency of the a cooling or heating appliance or equipment, expressed as the ratio of output, (BTU) per hour to the energy consumed (in Watts).

EER = Btu/kWe

COEFFICIENT OF PERFORMANCE (COP) - CHILLER

Ratio of work or useful output to the amount of work or energy input, used generally as a measure of the energy efficiency of air conditioning in, space heaters another cooling and heating devices.

COP equals heat delivered (output) in BTU per hour divided by heat equivalent of the electric input (1 Watt = 3.413 Btu/hr.) or alternatively, energy efficiency ratio divided by 3.413. Higher the COP, higher the efficiency of the equipment.

COP = kWRT / kWe

Energy Efficiency Ratio = kWe / RT

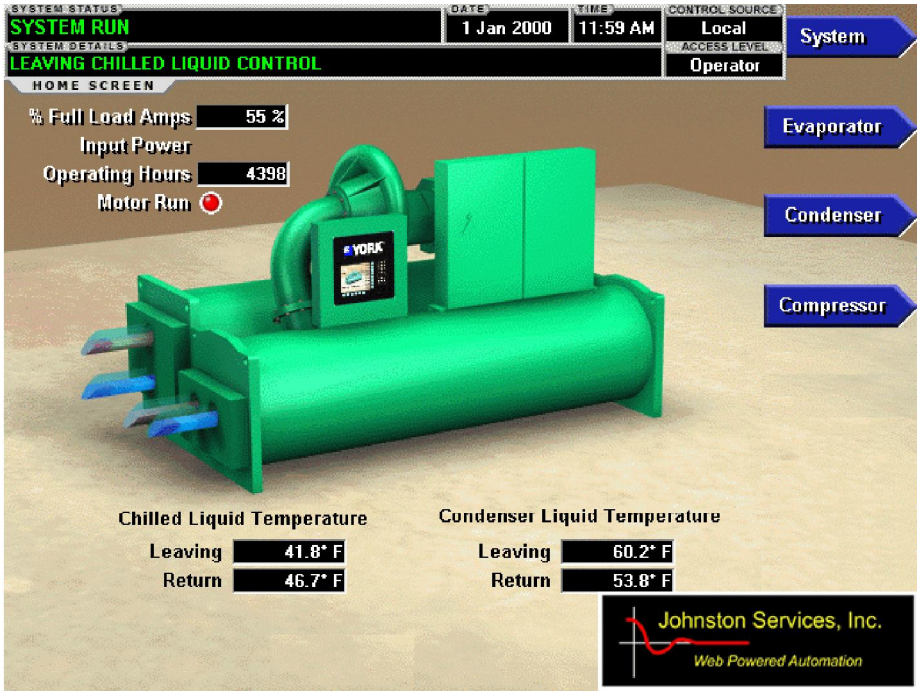
SITE AUDIT & MEASUREMENT

Chiller: 320RT x 2 unit

Cooling Tower: 2 unit

CHILLER

CHILLER PERFORMANCE



MS1525: Code of Practice on Energy Efficiency and Used of Renewable Energy for Non-Residential Building

e.g. 320RT Water Cooled Centrifugal Chiller

		Measured Data	MS1525
Water Cooled Centrifugal Chiller ≥ 1060kWRT (300 - 600RT)	**COP = kWRT / kWe**	**5.740**	**5.86**
	EER = kWe / RT	**0.613**	**0.60**

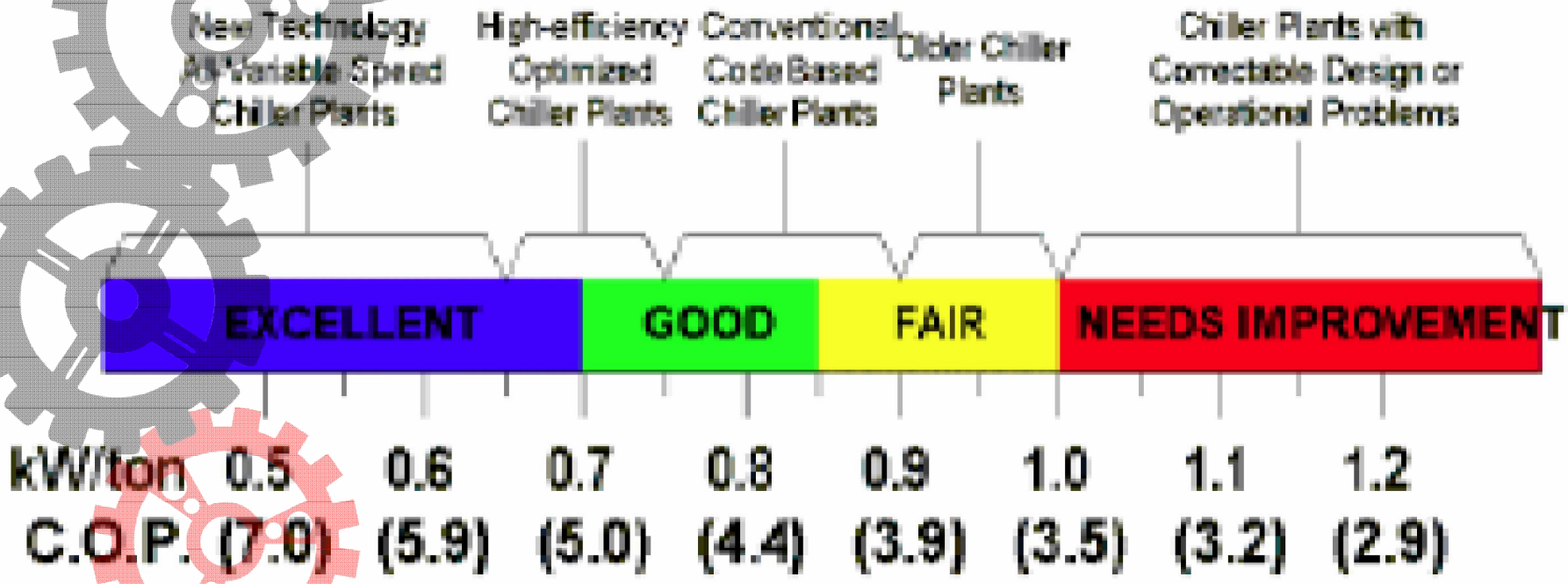
Chiller design: 320RT EER = kWe/RT = 196/320 = 0.613 **1RT = 3.516kW(KJ/s)**

Measured input power: 196kWe COP = kWRT/kWe = (320X3.516)/196 = 5.740

The energy consumed by the external water pumps circulating chilled water, and the heat rejecting device (cooling tower or heat exchanger) are not included in the COP consideration for the ACMV system component, unless the device (i.e. air-cooled condenser) is integrally incorporated into the package by the manufacturer.

Table 25. Water chilling packages, electrically driven: Chiller energy performance rating

Equipment	Size	[1]COP at 100 % Load At M'sian test Conditions		[a]MPLV at MS Std Conditions		[2]COP at 100 % Load at Std AHRI test Conditions		[b]IPLV at AHRI Std Conditions	
		Minimum COP	Maximum kWe/RT	Minimum COP	Maximum kWe/RT	Minimum COP	Maximum kWe/RT	Minimum COP	Maximum kWe/RT
Air cooled, with condenser	< 105 kWr (30 RT)	2.79	1.26	3.20	1.10	2.79	1.26	3.66	[illegible]
	≥ 105 kWr and < 530 kWr (150 RT)	2.79	1.26	3.20	1.10	2.79	1.26	3.66	[illegible]
	≥ 530 kWr and < 1060 kWr (300 RT)	2.79	1.26	3.35	1.05	2.79	1.26	3.74	0.94
	≥ 1060 kWr (300 RT)	2.79	1.26	3.35	1.05	2.79	1.26	3.74	0.94
Water cooled, positive Displacement (Reciprocating, scroll, Rotary screw)	(< 260 kWr) (< 75 RT)	4.34	0.81	4.14	0.85	4.51	0.78	5.58	0.63
	> 260 < 530 kWr (150 RT)	4.34	0.81	4.14	0.85	4.51	0.78	5.67	0.62
	≥ 530 kWr and < 1060 kWr (300 RT)	4.95	0.71	4.45	0.79	5.17	0.68	6.06	0.58
	≥ 1060 kWr (300 RT)	5.41	0.65	4.82	0.73	5.67	0.62	6.51	0.54
Water cooled, Centrifugal	< 1060 kWr (300 RT)	5.33	0.66	5.02	0.70	5.58	0.63	5.86	0.60
	≥ 1060 kWr (300 to 600 RT)	5.86	0.60	5.41	0.65	6.06	0.58	6.39	0.55
	> 600 RT	5.96	0.59	5.58	0.63	6.17	0.57	6.51	0.54



AVERAGE ANNUAL CHILLER PLANT EFFICIENCY IN KW/TON (C.O.P.)
(input energy includes chillers, condenser pumps and tower fans)

Based on electrically driven centrifugal chiller plants in comfort conditioning applications with 42F (5.6C) nominal chilled water supply temperature and open cooling towers sized for 85F (29.4C) maximum entering condenser water temperature. Local climate adjustment for North American climates is +/- 0.05 kW/ton

Testimonial – ISO 50001

1. SIME DARBY PROPERTIES
   i. KLGCC
   ii. Wisma Sime Darby
   iii. Sime Darby Convention Center
4. YTL PERAK HANJUNG CEMENT
5. YTL PAHANG CEMENT
6. YTL SLAG CEMENT JOHOR
7. YTL SLAG CEMENT WESTPORT
8. SEMASA SERVICE SDN BHD (MRCB) – KL Sentral
9. INDAH WATER CONSURTIOM (IWK)
10. MPSP
11. HEAVEABOARD
12. COFRETH (M) SDN BHD

On GOING…??

FUTURE??
YOU…

EPP 9: Improving Energy Efficiency

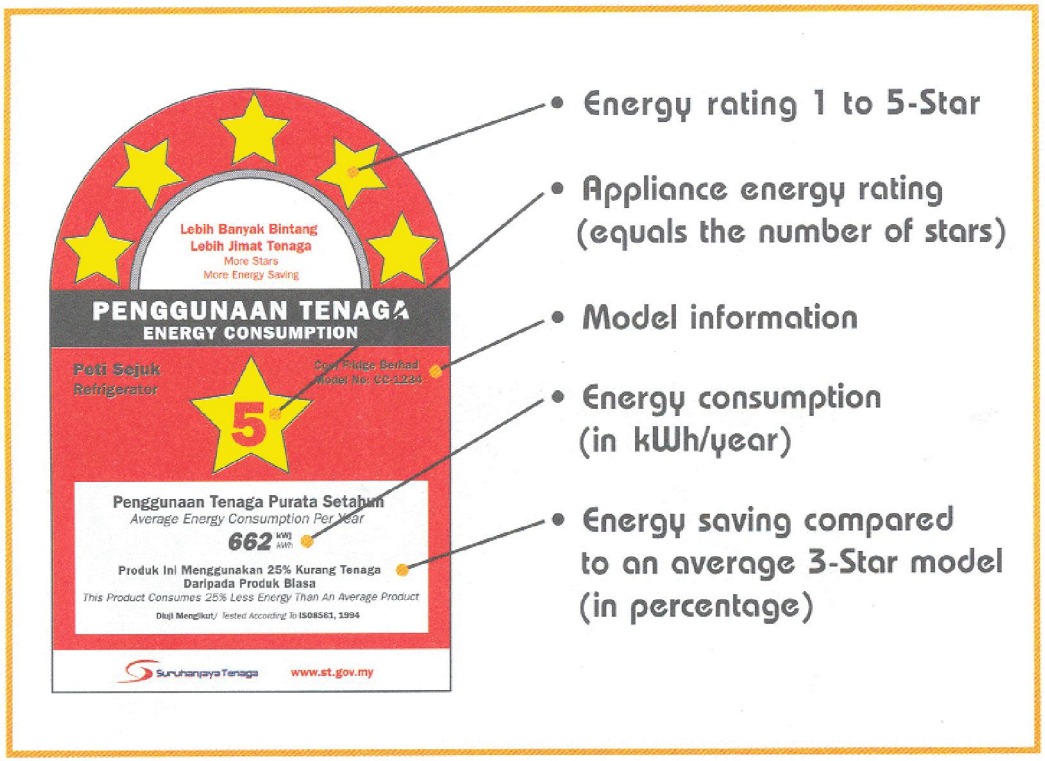
5 Levels/initiatives were identified to improve energy efficiency in Malaysia:

1. Government to take the lead in energy efficiency practices & philosophy,
2. **Stimulate sales of energy-efficient appliances,**
3. Government to work with TNB to make co-generation viable,
4. Regulate better insulated buildings and
5. Stimulate the sale of energy efficient vehicles

EPP: Entry Point Projects

Energy Labelling for refrigerators

Minimum Energy Performance Standard (MEPS)



Energy Rating Label

Endorsement Label

The more stars the more energy efficient the product is. A 5-Star indicate that it is the most energy efficient model. Information on energy consumption is also indicated MS ISO 8561:2000

Official Launching of Energy Rating Label for Energy Efficient Refrigerators in Malaysia *March 2006*

ENERGY EFFICINECY - DOMESTIC ELECTRIC FANS

Performance Indicator and Testing Standard

Coefficient of Performance (COP) based on **air delivery** measurement done in accordance with requirement of the standard

Testing standard: MS1220: 2001

(Based on ST Guideline – for calculation of Energy Efficiency parameters)

The Coefficient of Performance is calculated as follows:

$$\text{COP} = \frac{\text{Measured Air Delivery } (m^3/min)}{\text{Input Power (W)}}$$

Note :
For Total Air Delivery measurement, at least two (2) test-run will be conducted

Silver Blue

Beige

Flame Red

KB-404 (40cm/16")
RCP: RM 121.00 (EM)
RCP: RM 119.00 (WM)
3 speed on / off push button switch
Full automatic oscillation with clutch control
Efficient cooling and quiet operation
Condenser motor

SIRIM

Model	: **KB-404**
RPM	: Low 774 – 946 High 1103 – 1349
Capacity	: 2225 CFM (63.06m^3/min)
Motor W	: Low 38.9 – 47.5 High 49.9 – 60.9
Motor HP	: 0.08
Motor Type	: 4 Pole Condenser
Noise Level (dB)	: < 60
Net Weight (kg)	: 4.30

COP = Air Delivery (m^3/min) / Input Power (W)

COP = 63.06m^3/min / 60.9W
= 1.04

*** 2 Star**

Sizes - MS 1220 : 2010

- Sizes of Ceiling Fan : 900 mm, 1400 mm, 1500 mm and 1800 mm. (35”-55”-60”-70”)
- Sizes, no. of min. speeds and type of table/cabin fans

Size of fan (mm)	Min. number of regulated speeds	Type
200 (8”)	1	Non-oscillating
250 (10”)	1	Oscillating or non-oscillating
300 (12”)	2	
350 (14”)	3	
400 (16”)	3	

- Sizes, no. of min. speeds and type of Pedestal type fans

Size of fan (mm)	Min. number of regulated speeds	Type
300 (12”)	2	Oscillating or non-oscillating
400 (16”)	2	
500 (19-20”)	2	
600 (23-24”)	2	

Type of Fans

AVAILABLE TEST EQUIPMENT

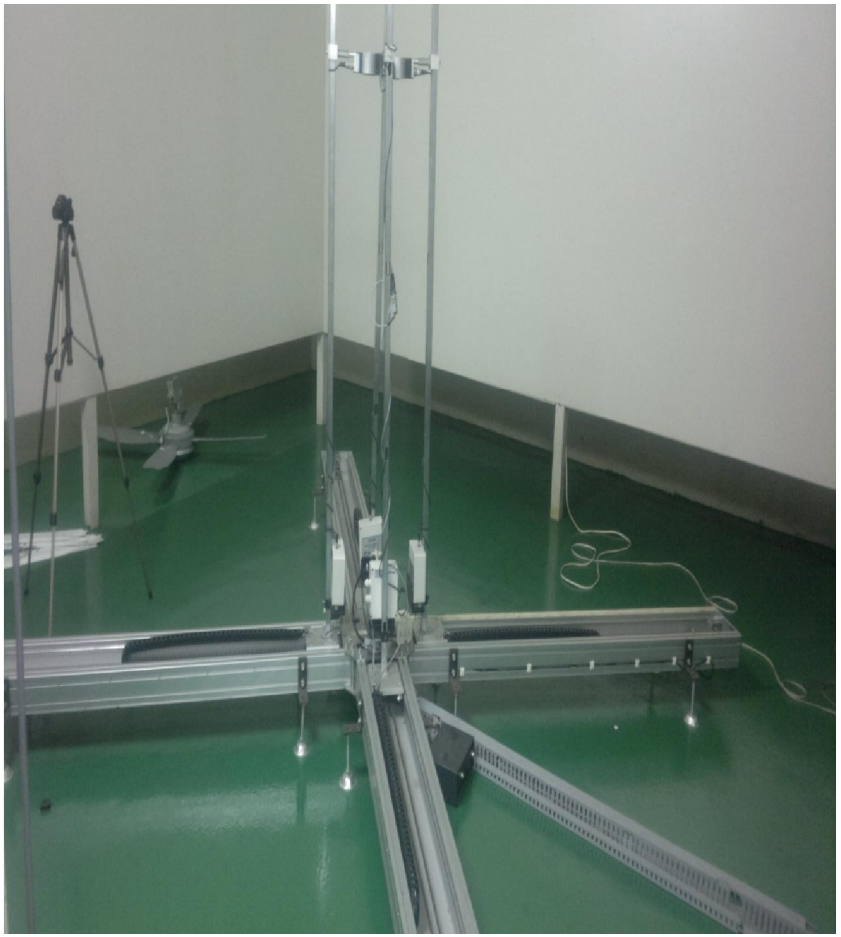
Air delivery test system ;consists of

-Anemometer
-Power meter
-Controller
-Data acquisition system
-PC – to monitor results
-Power supply system

Air Delivery Test system

Fan testing facilities – Air Delivery System for Ceiling Fan

Fan testing facilities – Air Delivery System for Ceiling Fan



EXAMPLE OF AIR DELIVERY RESULTS – CEILING FANS

The COP values for the various star ratings are as shown below

a) Ceiling Fans

STAR rating	COP (m3/min/W)
5	≥ 3.00
4	2.74 – 2.99
3	2.66 – 2.73
2	2.58 – 2.65
1	2.50 – 2.57

b) Pedestal, Wall and Table/Desk Fans

STAR rating	COP (m3/min/W)
5	≥ 1.20
4	1.12 – 1.19
3	1.08 – 1.11
2	1.04 – 1.07
1	1.00 – 1.03

The ST proposed MEPS value is at 2 STAR

AIR CONDITIONERS

Performance Indicator and Testing Standards

Energy Efficiency Ratio (EER) based on tests done in accordance the standard. The tested capacity value must be at least 90% of that declared by the manufacturer

TESTING STANDARD

MS ISO 5151: 2004 - (Non-ducted air conditioners and heat pumps : Testing and rating for performance)

TESTING METHOD (1W = 3.412 btu/h)

As specified under Cl.6 of MS ISO 5151 Standard

- Calorimeter Cooling capacity test
- Indoor Air-Enthalpy capacity test

Balanced ambient room-type calorimeter system

Testing method of the cooling and heating capacity:

Room calorimeter method .

The balanced ambient type: 2 walls separating the rooms from the outside, with air between them maintained at the same dry bulb temperature as inside the room. This balanced ambient type is much more accurate as heat losses through the walls are almost zero

Psychrometric Chamber -

Control Panel

The EER is calculated as shown below:
(Based on ST Guideline – for calculation of Energy Efficiency parameters)

1) Non-Inverter type:

$$\text{Energy Efficiency Rating (EER)} = \frac{\text{Cooling Capacity (Btu/hr)}}{\text{Power Input (W)}}$$

2) Inverter type;

$$\text{Weighted (EER)} = \frac{0.4 \times \text{Capacity (100\% load)}}{\text{Power Input (100\% load)}} + \frac{0.6 \times \text{Capacity (50\% load)}}{\text{Power Input (50\% load)}}$$

Where,

Rated cooling capacity

i) <4500 BTU/h

(Rated cooling capacity <4.5kW)

Star Rating	EER values
5 star	**EER** >11.94
4 star	11.16-11.93
3 star	10.37-11.15
2 star	9.56-10.36
1 star	**EER** ≤ 9.55

ii) 4500-7100 BTU/h

(4.5kW≤Rated cooling capacity ≤ 7.1kW)

Star Rating	EER values
5 star	**EER** >10.71
4 star	9.83-10.70
3 star	8.94-9.82
2 star	8.03-8.93
1 star	**EER** ≤ 8.02

The ST proposed MEPS value is at 2 STAR for both ranges

Wall Mounted JN Series

Simplicity at its Best

The JN series plays a fundamental role for your comfort at home as well as at work. Not only it is the right air conditioning for you and your family, it is also the air conditioner to increase indoor air quality. More importantly its white flat panel blends perfectly with all interiors.

Model :
AWM 10/15/20/25 JN

Cooling Capacity :
10,000 BTU/h - 24,000 BTU/h

Power Input :
0.98 kW - 2.68 kW

Models:

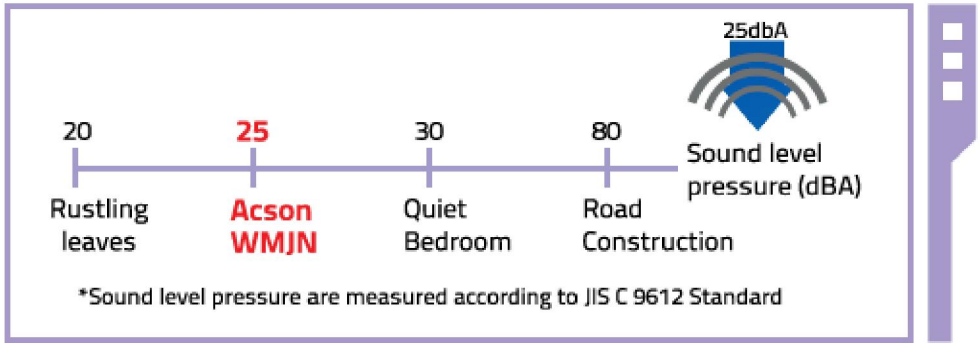
AWM 10JN / ALC 10CN ~ 10,000 BTU/h
AWM 15JN / ALC 15C ~ 13,000 BTU/h
AWM 20JN / ALC 20CN ~ 18,000 BTU/h
AWM 20JN / ALC 20C ~ 19,500 BTU/h
AWM 25JN / ALC 20C ~ 21,000 BTU/h
AWM 25JN / ALC 25C ~ 24,000 BTU/h

Outdoor Units

ALC 10CN/15C

- Silent Mode
When serenity and tranquility state is desired, QUIET mode will bring down the sound level to an unobstructive 25dBA.

**Applicable to JN Series*

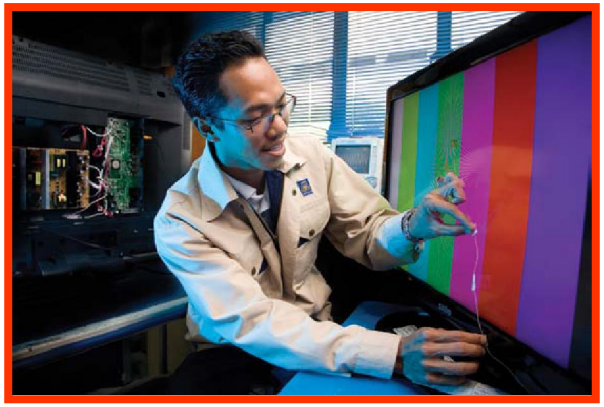


Wall Mounted JN & 311 Series

Model				AWM 10JN	AWM 15JN	AWM 20JN	AWM 20JN	AWM 25JN	AWM 25JN	AWM 311
		Outdoor Unit		ALC 10CN	ALC 15C	ALC 20CN	ALC 20C	ALC 20C	ALC 25C	ALC 31C2
Nominal Capacity			BTU/h	10, 000	13, 000	18, 000	19, 500	21, 000	24, 000	28, 000
			W	2, 930	3, 810	5, 280	5, 720	6, 153	7, 030	8, 210
Nominal Total Input Power			W	980	1, 230	1, 630	1, 880	2, 017	2, 675	3, 150
Nominal Running Current			A	4.38	5.27	7.16	8.06	8.47	12.00	13.10
EER			BTU/h/W	10.20	10.57	11.04	10.37	10.41	8.97	8.89
			W/W	2.99	3.10	3.24	3.04	3.05	2.63	2.61
Power Source			V/Ph/Hz	220 - 240 / 1 / 50						
Indoor Unit	Control	Air Discharge		AUTO LOUVER (UP & DOWN) & GRILLE (LEFT & RIGHT)						
		Operation		WIRELESS AND WIRED						
	Air Flow	High	l/s (CFM)	161 (342)	168 (355)	251 (531)		290 (614)		349 (740)
		Medium	l/s (CFM)	133 (282)	141 (298)	224 (474)		253 (537)		307 (650)
		Low	l/s (CFM)	106 (225)	114 (242)	199 (422)		224 (474)		245 (520)
	Sound Pressure Level (H/M/L/SL)		dBA	38 / 33 / 27 / 25	40 / 35 / 29 / 28	42 / 39 / 36 / 34		46 / 43 / 40 / 37		49 / 47.5 / 46
	Unit Dimension	Height	mm (in)	288 (11.3)		310 (12.2)				360 (14.2)
		Width	mm (in)	800 (31.5)		1, 065 (41.9)				1, 200 (47.2)
		Depth	mm (in)	206 (8.1)		224 (8.8)				200 (7.9)
	Packaging Dimension	Height	mm (in)	344 (13.5)		386 (15.2)				420 (16.5)
		Width	mm (in)	874 (34.4)		1, 136 (44.7)				1, 267 (49.9)
		Depth	mm (in)	274 (10.8)		314 (12.4)				260 (10.2)
	Unit Weight		kg (lb)	9 (19.8)		14 (30.8)				17 (37.5)
Outdoor Unit	Air Flow		l/s (CFM)	321 (680)	453 (960)	614 (1, 300)			755 (1, 600)	741 (1, 570)
	Sound Pressure Level		dBA	45	49	52	51		52	56
	Unit Dimension	Height	mm (in)	494 (19.4)	540 (21.26)	654 (25.75)			756 / 29.8	756 / 29.8
		Width	mm (in)	600 (23.6)	700 (27.6)	855 (33.7)				
		Depth	mm (in)	245 (9.6)	250 (9.8)	328 / 12.9				
	Packaging Dimension	Height	mm (in)	535 (21.1)	596 (23.5)	693 / 27.3			793 / 31.22	810 / 31.9
		Width	mm (in)	721 (28.4)	803 (31.6)	990 / 39.0				
		Depth	mm (in)	330 (13.0)	323 (12.7)	415 / 16.3				
	Unit Weight		kg (lb)	25	28	43			50	57
	Pipe Connection	Type		FLARE VALVE						
		Size	Liquid mm (in)	6.35 (1/4)					9.52 (3/8)	
			Gas mm (in)	9.52 (3/8)	12.70 (1/2)	15.88 (5/8)				
	Refrigerant			R22						

1. All specifications are subjected to change by the manufacturer without prior notice.
2. Nominal Cooling Capacity are based in the conditions below:
   Cooling - 27°C DB / 19°C WB indoor and 35°C DB / 24°C WB outdoor
3. Sound Pressure Level are according to JIS C 9612 standard. Position of the measurement point is 1m in front and 0.8m below the unit.
4. Units are tested & comply to international standards such as ISO5151 and AHRI 210/240.

Minimum Energy Performance Standard (MEPS) – Star Rating



We want to reduce utility operating cost?

RM = RM/kWh X kWh

We want to reduce utility operating cost.

The utility rate is controlled by power service company, which depend on the oil price.

To lower the utility operating cost, we have to lower the kWh since utility rate is non controllable by us.

2014
Increase by 4.99 cent / kWh

14.89%

ESO - Examples

Measures	Examples
No cost 	•resetting controls •switch off when not required •reschedule loads/usage/running hour
Low cost 	•maintenance •meters •repairing leakage •simple controls •insulation •training end users
High cost 	•heat recovery systems •cogeneration of heat and power •fuel conversion •energy management systems

Energy Saving Opportunities

Switch off power supply (13A) after office hour / out of office
SIRIM HQ: No. of PC / Notebook – more than 1000 units

Estimate 60% out of no. of PC are not switch power supply (13A) after hour.

P = Voltan x Amp x power factor (single phase)
= 240 x 0.135A x 0.85
= 0.028kW
= 0.028kW x RM0.312 / kWh TNB's Tariff x 15hrs (6pm – 8am) x 600 unit computer (did not switch off power supply 13A)
= RM77.33 / day x 25 days / month
= RM1,933 / month
= RM23,19 / year

NO INITIAL COST / NO INVESTMENT… just attitude!!!

Office equipment – Printer Rating amp: 4A

Semasa printing berfungsi (3.47A)

Semasa printing rehat (tidak berfungsi 0.07A) tetapi power supply 13A tidak OFF

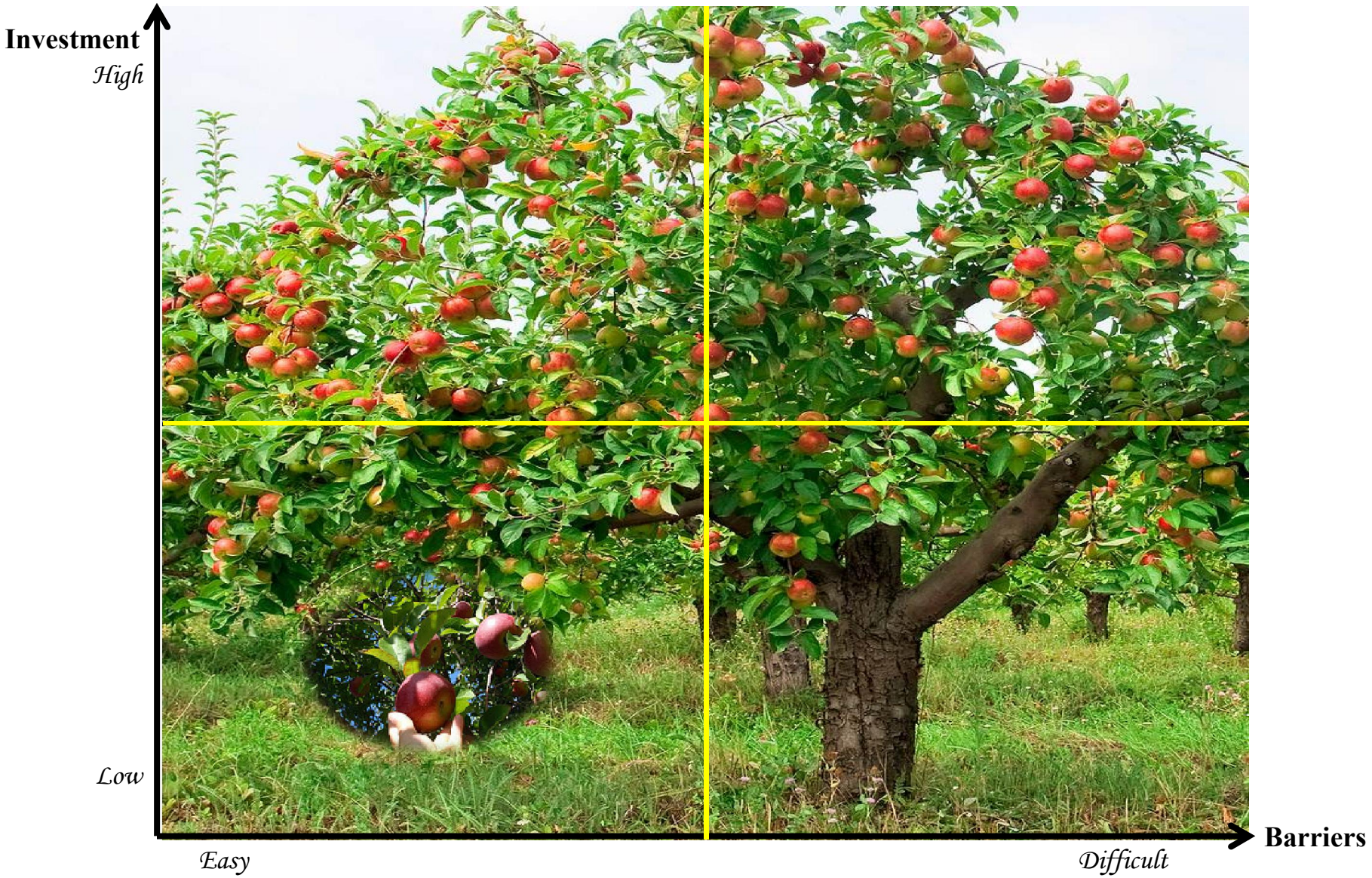
Power supply 13A: OFF

Water Dispenser

P = VIpf
= (240 x 3.25 x 0,85)/1000
= 0.663kW x 15hrs (5 pm – 8am)
= 9.95kWhr x RM0.36/kWh
= RM3.6/day
= RM107 / month
= RM1,314 / year

Water dispenser tidak bertugas (rehat 3.25A) tapi power supply 13A tidak OFF

Prioritization of Opportunities



Energy Audit Equipment

Power Analyzer

Portable Thermo hygrometer

CO2 Meter

Portable Lux Meter

Hand held power analyzer

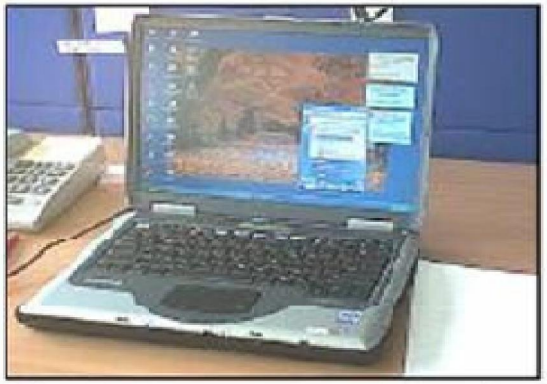
Anemometer

SITE MEASUREMENT

Energy Efficient Office Equipment

PC with CRT monitor
Power Consumption:
~120 - 180 W

PC with LCD monitor
Power Consumption:
~70 - 90 W



Notebook / Laptop
Power Consumption:
~15 - 35 W

- Laptop is the least energy consuming in comparison to PC with CRT monitor and PC with LCD monitor.
- 80 % of the PC used in the ZEO Building is laptop.

Energy Management Regulations

- Electricity Supply Act 1990
- Efficient Management of Electrical Energy Regulation (EMEER) 2008

Legal And Regulatory Framework

Acts of Parliament

1. Energy Commission Act 2001
2. Electricity Supply Act, 1990

Regulations – Power of the Minister to make regulations

3. Electricity Regulations, 1994
4. Licensee Supply Regulations, 1990
5. Electricity Supply (Exemption) Notification 1994
6. Efficient Management Of Electrical Energy Regulations 2008

Licences – Issued by Energy Commission and approved by Minister

7. Licences issued to generators, distributors and suppliers

Licence Conditions

Industry Codes and guidelines – Issued By Energy Commission

9. Grid Code, Distribution Code, Guidelines provide guidance for industry

Agreements – Between Industry Players

10. Power Purchase Agreements
11. Fuel Supply Agreements

Source: Suruhanjaya Tenaga

ELECTRICITY SUPPLY ACT 1990
EFFICIENT MANAGEMENT OF ELECTRICAL ENERGY REGULATIONS 2008

[P.U.(A)444]

ARRANGEMENT OF REGULATIONS

PART III
REGISTERED ELECTRICAL ENERGY MANAGER

PART IV
GENERAL

Application

3 (1) These Regulations shall apply to –

(a) any installation which receives electrical energy from a licensee or supply authority with a total electrical energy consumption equal to or exceeding 3,000,000 kWh as measured at one metering point or more over any period not exceeding six consecutive months; or

(b) any installation which is used, worked or operated by a private installation licensee with a total net electrical energy generation equal to or exceeding 3,000,000 kWh over any period not exceeding six consecutive months.

LIST OF INSTALLATION AFFECTED UNDER EMEER 2008

NO	NAMA SYARIKAT	BANDAR BARU BANGI
1	AMSTEEL & MEGASTEEL	BANTING
2	AMSTEEL MILLS SDN BHD	KLANG
3	A.P.M.C SDN BHD	BT ARANG
4	FREESCALE SEMICONDUCTOR	PETALING JAYA
5	NIPPON ELECTRIC GLASS	SHAH ALAM
6	BANDAR UTAMA CITY CORPORA	PETALING JAYA
7	GS PAPER & PACKAGING	BANTING
8	MOX-LINDE GASES SDN BHD	KLANG
9	MALAYSIA STEEL WORKS	KLANG
10	PERODUA MANUFACTURING SDN	RAWANG
11	NIPPON ELECTRIC GLASS (M)	SHAH ALAM
12	PUNCAK NIAGA (M) SDN BHD	BESTARI JAYA
13	MITSUI COPPER FOIL (M) SB	SHAH ALAM
14	CHUNGHWA PICTURE TUBES	SHAH ALAM
15	WESTERN DIGITAL (M) SDN B	PETALING JAYA
16	PROTON SDN BHD	SHAH ALAM
17	MOX GASES BERHAD	KLANG
18	SUNGAI HARMONI SDN BHD	BESTARI JAYA
19	MOX GASES SDN BHD	SHAH ALAM
20	S E H (SHAH ALAM) SDN BHD	SHAH ALAM
21	PUNCAK NIAGA (M) SDN BHD	BATU 9 CHERAS
22	SYARIKAT PENGELUAR AIR	BESTARI JAYA
23	NAIB CANSELOR U P M	SERDANG
24	NEC SEMICONDUCTORS (M)	BANTING
25	ITM (P)	SHAH ALAM
26	METTUBE SDN BHD	SHAH ALAM
27	KONSORTIUM ABASS SDN BHD	DENGKIL
28	CANON OPTO (M) SDN BHD	SHAH ALAM
29	U.K.M.	BDR BARU BANGI

LIST OF INSTALLATION AFFECTED UNDER EMEER 2008

No.	State	No. of Company / Agency
1	Perak	45
2	Penang	69
3	Selangor	216
4	Melaka	70
5	Negeri Sembilan	25
6	Terengganu	11
7	Kelantan	6
8	Johor	136
9	Perlis	7
10	Kedah	22
11	Pahang	19
12	Kuala Lumpur	99
13	Putrajaya	18
14	Sabah	55
	Total	**798**

Source: Suruhanjaya Tenaga_update Mei 2015

REGISTERED ELECTRICAL ENERGY MANAGER

Registered electrical energy manager of installation

11. (1) No person shall engage in, be employed or hold himself out as a registered electrical energy manager for the purposes of these Regulations unless the person has been registered by the Commission.

(2) Any person who fails to comply with sub regulation (1) commits an offence under these Regulations.

QUALIFICATION REQUIREMENTS

Regulation 12

- Malaysian citizen aged **23 years and above**; and
- is a **Professional Engineer** and possesses at **least six months** working experience in the efficient management of electrical energy, ***or***
- holds a degree in Science, Engineering, Architecture or its equivalent and possesses at least **one year working experience** in the efficient management of electrical energy; ***or***
- holds a certificate of competency as an Electrical Services Engineer or as a Competent Electrical Engineer as in the Electricity Regulations 1994 and possesses at least **nine months working experience** in the efficient management of electrical energy; ***and***
- Demonstrates knowledge of the requirements of the Act and these Regulations; ***and***
- The Commission may require the person to attend an interview

SCOPE OF KNOWLEDGE AND EXPERIENCE

The related acts and regulations in electricity supply

i. Efficient Management of Electrical Energy Regulations 2008

ii. Electricity Regulations 1994 and Electricity Supply Act 1990

- Safety requirements in working with electrical installations

Knowledge and experiences

i) Energy audit
   - Methodology to perform energy audit
   - Energy audit equipment and preparation of energy audit report

ii) Involvement in energy efficiency projects/programmes
   - Duration of involvement (month/year)
   - Type of involvement (management/ technical)
   - Responsibilities and tasks performed
   - List and description of projects/programmes involved

FUNCTIONS AND DUTIES OF ELECTRICAL ENERGY MANAGER

Regulation 16. The registered electrical energy manager shall have the following functions and duties:

(a) he shall be responsible –

(i) to audit and analyze the total electrical energy consumption or total net electrical energy generation at the installation, including the significant end use of electricity;

(ii) to advise the private installation licensee or consumer in developing and implementing measures to ensure efficient management of electrical energy at the installation; and

(iii) to monitor effective implementation of the measures referred to in subparagraph (ii);

(b) he shall supervise the keeping of records on efficient management of electrical energy at the installation and verify its accuracy; and

(c) he shall ensure that the private installation licensee or consumer submits the information and report under paragraphs 6(1)(c), (d) and (e) within the periods as specified in regulation 7.

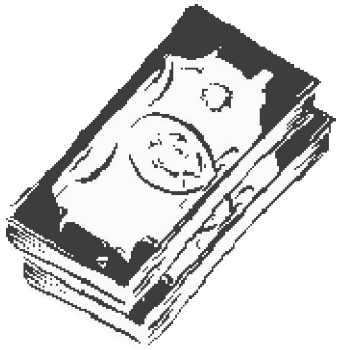
PART IV
GENERAL

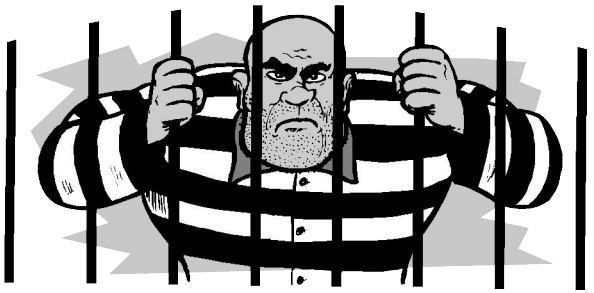
General penalty

22. Any person who commits an offence under these Regulations shall, on conviction, be liable to a fine not exceeding five thousand ringgit or to imprisonment for a term not exceeding one year or to both.

OFFENCE UNDER THESE REGULATIONS REGULATION 22

- **FINE** : not exceeding **RM 5,000.00**
- **IMPRISONMENT**: not exceeding one (1) year
- or **BOTH**





FIRST SCHEDULE
FEES
[regulation 4]

No.	Type of fees	Fees (RM)
1	Application for registration as an electrical energy manager	20.00 per application
2	Issuance/renewal of certificate of registration	100.00 per year
3	Application for replacement of certificate of registration	50.00 per copy
4	Application for certified true copy of certificate of registration	10.00 per copy

HOW TO APPLY?

i) Please submit:
- Completed application form, FORM ST(DSM/PTE/2009) available at www.st.gov.my
- Report on energy efficiency project*
- Information and supporting documents as stated in the application form
- Processing fee

*** Energy Efficiency Project Report**
- At least one project report (the report must be submitted according to the format as provided in the application form)
- Only electrical energy related project (thermal energy related project can be submitted as additional)

Type of project
- Implemented project – from the conceptual ideas, implementation and to reporting on savings achieved; or
- Energy audit/feasibility study

ROUTE TO BE REGISTERED ELECTRICAL ENERGY MANAGER

1. SURUHANJAYA TENAGA

- fulfilled qualification requirement
- fee: RM20 (application fee) + RM100/year

2. MAESCO (Malaysia Association Energy Service Company)

- Attending a class room – 5 days with quiz/test and finale presentation and interview (if applicable)

3. AEMAS (Asean Energy Management Scheme)

- Attending a class room – 5 days with quiz/test and finale presentation and interview (if applicable)

ALL CERTIFICATIONS WILL BE ISSUED BY SURUHANJAYA TENAGA

PTE - 0039 - 2013
PTE - 0038 - 2013 TERHAD
PTE - 0050 - 2013 AEMAS
PTE - 0112 - 2014 MAESCO

LIST OF REGISTERED ELECTRICAL ENERGY MANAGER

	State	No.
1	Penang	52
2	Kedah	22
3	Kelantan	2
4	Pahang	17
5	Johor	52
6	Melaka	12
7	Negeri Sembilan	23
8	Sabah	9
9	Sarawak	1
10	Putrajaya	11
11	Kuala Lumpur	57
12	Wilayah Persekutuan	7
12	Terengganu	10
13	Perak	26
14	Selangor	209
15	Perlis	3

TOTAL: 513

Source: Suruhanjaya Tenaga Mei 2015 2014

OTHERS LEGAL REQUIREMENTS

REGISTERATION OF ENGINEER

SIRIM

LEMBAGA JURUTERA MALAYSIA
Tingkat 17, Ibu Pejabat JKR, Kompleks Kerja Raya Malaysia
Jalan Sultan Salahuddin, 50580 Kuala Lumpur, MALAYSIA.

Rev. No.: 2
Date: 3.12.2011

BEM/CL/APP/06

PENDAFTARAN JURUTERA SISWAZAH

Seksyen 24A (1), Akta Pendaftaran Jurutera 1967

"No person shall employ a person, sole proprietorship, partnership or body corporate, other than a registered Engineer or an Engineering consultancy practice, to perform professional engineering services"

Warganegara Malaysia yang ingin memohon untuk Pendaftaran Jurutera Siswazah di bawah Seksyen 10(1) Akta Pendaftaran Jurutera 1967 hendaklah menggunakan BORANG A dan disertakan:

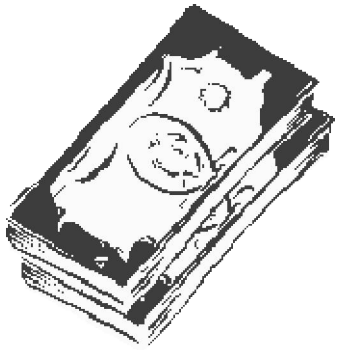
25. (1) General penalty. [Act A1288]

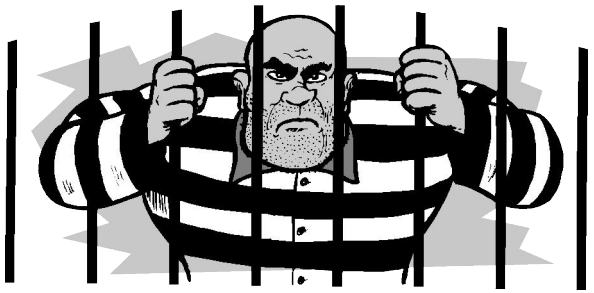
Any person, sole proprietorship, partnership or body corporate who contravenes this Act or any regulations made thereunder shall be guilty of an offence and shall, where no penalty is expressly provided therefor, be liable, on conviction, to a fine not exceeding ten thousand ringgit or to imprisonment for a term not exceeding one year, or to both.

PENALTY who contravenes this Act Section 25 (1)

- **FINE** : not exceeding **RM10,000**
- **IMPRISONMENT:** not exceeding **one (1) year**
- or **BOTH**

REGISTRATION OF ENGINEERS
ACT 1967
(Incorporating amendments up to 2007)





DEVELOPED COUNTRY??

Statistics

Professional Engineer	**10403**
Graduate Engineer	**73332**
Temporary Engineer	**4**
Sole Proprietorship	**911**
Body Corporate	**886**
Partnership	**187**
Accredited Checker	**30**
Multidisciplinary	**19**

** Updated daily. Showing renewed and active records for the year **2014** only. Records shown excluding voluntary de-registered, cancelled, inactive & deceased engineers.*

Source: BEM

Criteria for developed country

- Ratio for Doctor 1:434
- (Malaysia 1:758)
- Engineer, scientists and researcher 1:138
- Malaysia ???

Source: Berita Harian 2/10/2013

Legal and other requirements

Factory Machinery Act 1967

- Certificated machinery e.g.; air compressor, lift, crane, unfired pressure vessel

Environmental Quality Act 1974

- Generator set
- Schedule waste

Energy Commissioning Act

- Gas piping, Generator set, Competent Person

Electricity Supply Act & Regulations

- Efficient Management of Electrical Energy Regulation
- Generator set, Metering DB

BOMBA Act

- Fire Extinguisher, Fire Certificate

Other requirements

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SIRIM TRAINING

SIRIM

SIRIM

SIRIM QAS INTERNATIONAL

SIRIM QAS International

CERTIFICATION • INSPECTION • TESTING

Energy Management
Training & consultancy
EnMS ISO 50001

Energy Audit/Review
Endorsement REEM energy report
Renewable Energy
- **Solar PV / Solar Thermal**
- **Wind turbine technology**
- **Hydro technology**
- **Biomass**

Waste water treatment / management

Certified Energy Mgt. System ISO 50001

TESTING ENERGY EFFICIENCY EQUIPMENT

NATIONAL ENERGY EFFICIENCY TEST LAB

Sirim opens RM8.2m energy efficiency lab

NSTP, 16 May

SHAH ALAM: Sirim Bhd has invested RM8.2 million to build an energy efficiency (EE) testing laboratory to support programmes and EE labeling of electrical equipment.

The EE testing laboratory, operated by its unit Sirim QAS International, will provide testing facilities for the local industry, especially manufacturers of air conditioners, refrigerators and lighting devices.

"This will ensure the local products meet the EE standards, allowing them to be marketed directly at the international level," Sirim chairman Datuk Jamaliah Kamis said.

The Pemandu has allocated RM30 million in 2011 and 2012 for the provision of laboratory equipment energy efficiency testing.

"The laboratory is ready to accept requests for EE testing of refrigerators, lamps and lighting devices," he said at the launch here yesterday. It was officiated by Energy, Green Technology and Water Minister Datuk Seri Peter Chin Fah Kui.

Jamaliah said Sirim QAS plays a key role in testing and verifiying energy-saving appliances.

The existing testing equipment include Integrating Sphere for testing the lights and Walk-In Humidity Chamber for testing refrigerators. The Balanced Type Calorimeter for testing air conditioners will be installed beginning mid-June and completed in October.

In the next phase, which is due for completion in January 2013, the lab will be equipped with equipment, such as photobiological hazards, goniophotometer and cycle chamber.

New Energy Efficiency Test facilities was officially launched by Minister of KeTTHA on 15th May 2012

Boosting energy efficiency

POWER TRANSFORMATION INITIATIVE: Companies, households to become more efficient in conserving energy

KUALA LUMPUR

MALAYSIA is serious in saving the planet and is embarking on various energy efficiency (EE) initiatives as part of efforts to power the national transformation initiative.

Malaysia is also aware that by improving EE, local companies will become more competitive and households can reduce electricity bills as well as lighten the cost of living for average Malaysians.

Before the country can become a high-income nation, it needs to improve EE at every level.

Sirim QAS International Malaysia, which is part of the country's certification and standard body Sirim, has embarked on a journey towards national economic transformation involving every household and energy-consumer.

Sirim QAS International launched the country's EE testing laboratory by Energy, Green Technology and Water Minister Datuk Seri Peter Chin Fah Kui yesterday.

EE is for all and improving it has been designated as one of the Entry Point Projects (EPPs) under the oil, gas and energy sector.

Malaysia has been found to be 34 per cent more energy-intensive than its peers. Therefore, this EPP can be of great help in moderating the country's power and fuel consumption.

The Economic Transformation Programme (ETP) is the government's plan to transform Malaysia into a high-income nation by the year 2020.

The ETP will lift Malaysia's gross national income (GNI) per capita from US$6,700 (RM23,700) in 2009 to more than US$15,000 (RM48,000) in 2020, propelling the nation to a level on par with other high-income nations.

This GNI growth of six per cent per annum will allow Malaysia to achieve the targets set under Vision 2020 under the oil, gas and energy New Key Economic Area of the ETP.

The government has identified 12 Entry EPPs and two business opportunities for the oil, gas and energy sector. These EPPs will contribute RM471 billion to GNI to meet 2020 targets.

One of the five initiatives identified for improving energy efficiency in Malaysia has targeted end-users through the retailers of electronic appliances.

The initiative is intended to stimulate the sales of energy efficient appliances and will generate up to RM5.1 billion of GNI by 2020.

Through the initiative, consumers will receive rebates on particular appliances that account for the biggest part of household electricity bills, namely refrigerators and air conditioners.

Sirim QAS International is playing an important role in this initiative through testing and verification of appliances to determine energy performance.

The Performance Management and Delivery Unit (Pemandu) has appointed Sirim QAS International to provide energy efficiency testing for refrigerators, air conditioners, lamps and lighting devices to support this initiative.

Sirim QAS International will ensure that targeted energy efficient appliances, including refrigerators, air conditioners, lamps and lighting devices sold in Malaysia, are thoroughly tested, meeting globally recognised energy efficiency standards and regulations.

Since the appointment in January 2011, Sirim QAS International has taken extensive steps to ensure the timely establishment of its EE testing laboratory facilities.

These efforts include the procurement of two factory lots in Section 16, Shah Alam, for the site of the laboratory.

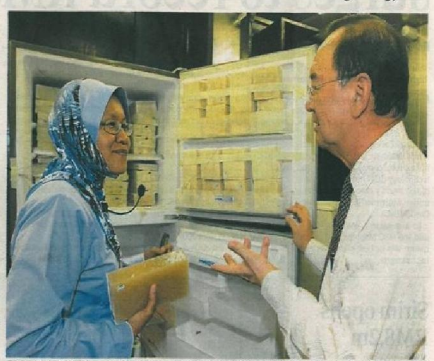
Today, the laboratory is ready to accept requests for energy efficiency testing of refrigerators, lamps and lighting devices.

By September, the laboratory will also offer energy efficiency testing for air conditioners.

The testing facility in Section 16, Shah Alam in Selangor adds to the existing range of Sirim QAS International's energy efficiency testing capabilities.

The existing laboratory, located at the headquarters of Sirim QAS International in Section 2, Shah Alam, currently conducts energy efficiency testing on domestically produced fans, televisions and ballasts for fluorescent lamps.

Sirim QAS International will gradually increase capabilities for the testing of other appliances in the future.



Energy, Green Technology and Water Minister ***Datuk Seri Peter Chin Fah Kui*** *(right) and Sirim QAS International testing services department senior general manager* ***Nur Fadhilah Muhammad*** *discussing the* ***energy efficient*** *testing services provided by the laboratory.* Pic by Osman Adnan

Measurement on Luminous Flux & Electrical Characteristics

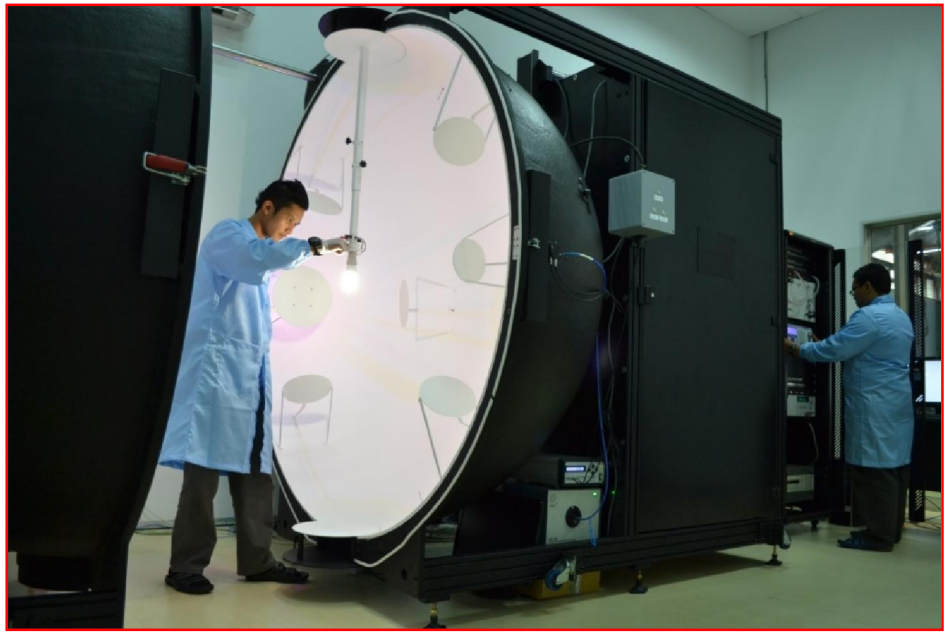
Testing required for MEPS by Suruhanjaya Tenaga (ST)

Measuring Method to:

- CIE (International Commission on Illumination) &
- IESNA (Illuminating Engineering Society of North America)

Measurements and reports include:

- Electrical parameter – P, I, V, PF
- Luminous flux
- Lumen Output
- Lamp efficacy
- Spectral radiant flux distribution graph
- Chromaticity chart
- Correlated Color Temperature (CCT)
- Color Rendering Index (CRI)



FOR TESTING SERVICES

Electrical & Electronic Section (EEST)
SIRIM QAS International Sdn Bhd
Block 12, Persiaran Dato' Menteri
P.O. Box 7035, Section 2,
40911 Shah Alam, MALAYSIA
Tel: 603-55446253, Fax : 603-55446272

Contact Person

1) M.Zamri Mustaffa
Tel: 03-55446251
email: zamri@sirim.my

2) Sharifah Jusoh
Tel: 03-55446266
email: sharifahj@sirim.my

www.sirim-qas.com.my

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