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Economic Cooperation

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Agenda: D2 4

Economy Update – Thailand: Compliance Activities on Energy Efficiency in Thailand

Submitted by: Thailand

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Compliance Activities on Energy Efficiency in Thailand

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Presentation Outline

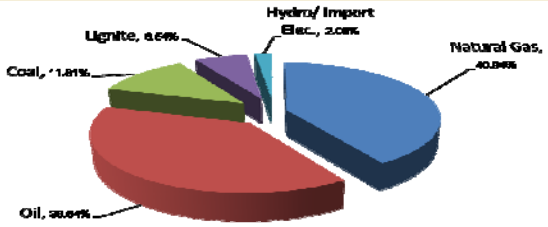
- 1. Thailand's Energy Situation
- 2. Energy Conservation Law in Thailand
- 3. Designated Buildings / Factories
  (for Existing Building / Factories)
- 4. Building Energy Code
  (for New or Retrofitted Buildings)
- 5. Energy Efficiency Standard & Labeling
  (Materials / equipments for Building / Factories / Residential)

Thailand's Energy Situation

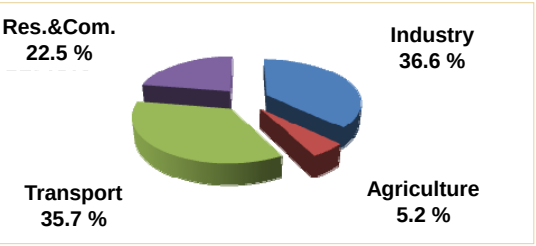
Energy Consumption in 2009

In 2009, Energy Expenses 47 billion USD (import 58%)
Total Commercial Energy Use 1.656 million barrels (oil equivalent) of per day

Commercial Energy Consumption by fuel



Energy Use by sector



Thailand's Energy Situation

Energy Use by Residential & Commercial Sector

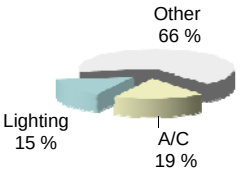
No.of Houses+Buildings : 20,089,221

(Refer to the registered households under Department of Local Administration, Ministry of Interior (2007))

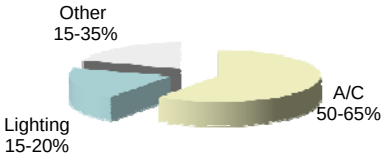
Energy Use by Res&Com 14,969 ktoe (22.5%)

- Electricity 76,946 GWh 6617.4 ktoe) (~230,000 millionbaht of Electricity Cost)
- Increase ~ 6%/yr

Electricity Use by Residential & Commercial Building



Residential

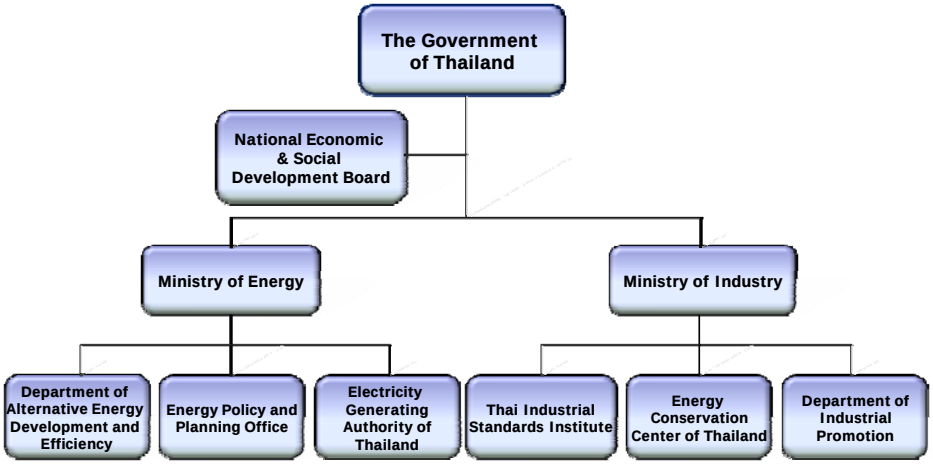


Commercial*

*Energy Use Vary to Bld.Type

Energy Conservation Law in Thailand

Existing National Energy Efficiency Institutions



Energy Conservation Law in Thailand

Energy Conservation Promotion ACT 1992

Objectives

- **Establish Energy Conservation Promotion Fund**
- **Set up Compulsory Program for Designated Facilities**
- **Set up Energy Performance Standards**
- **Set up Promotional Activities for EC**

Target groups

Designated Factories

Designated Buildings

Manufactures of EE Equipments

Energy Conservation Law in Thailand

Development of EC Law

Energy Conservation Promotion Act (ECP Act)
(Has been enacted in 1992)

↓

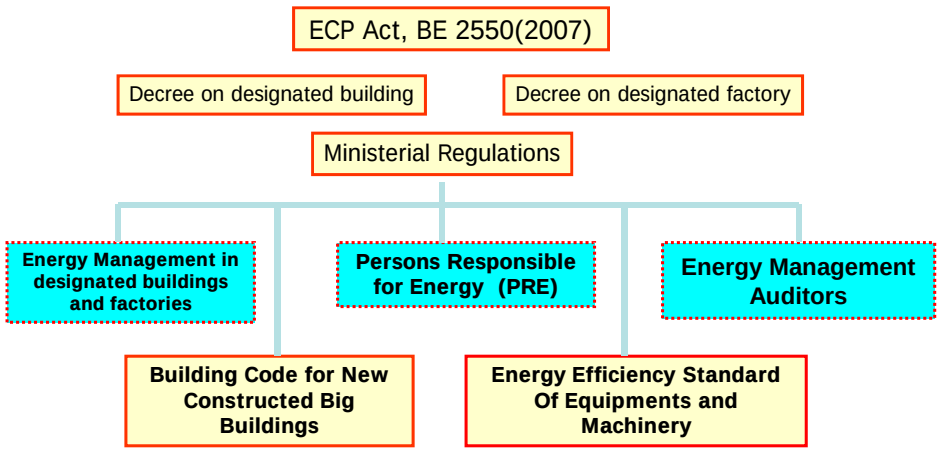
Energy Conservation Promotion Act
(First revision in 2003 : Minor change)

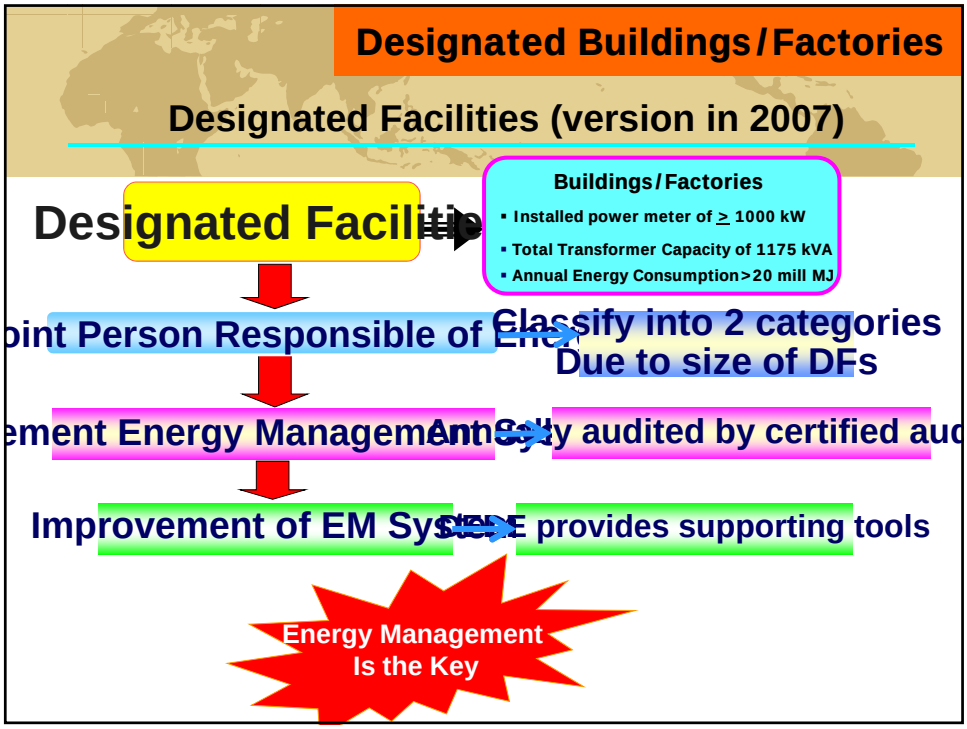
↓

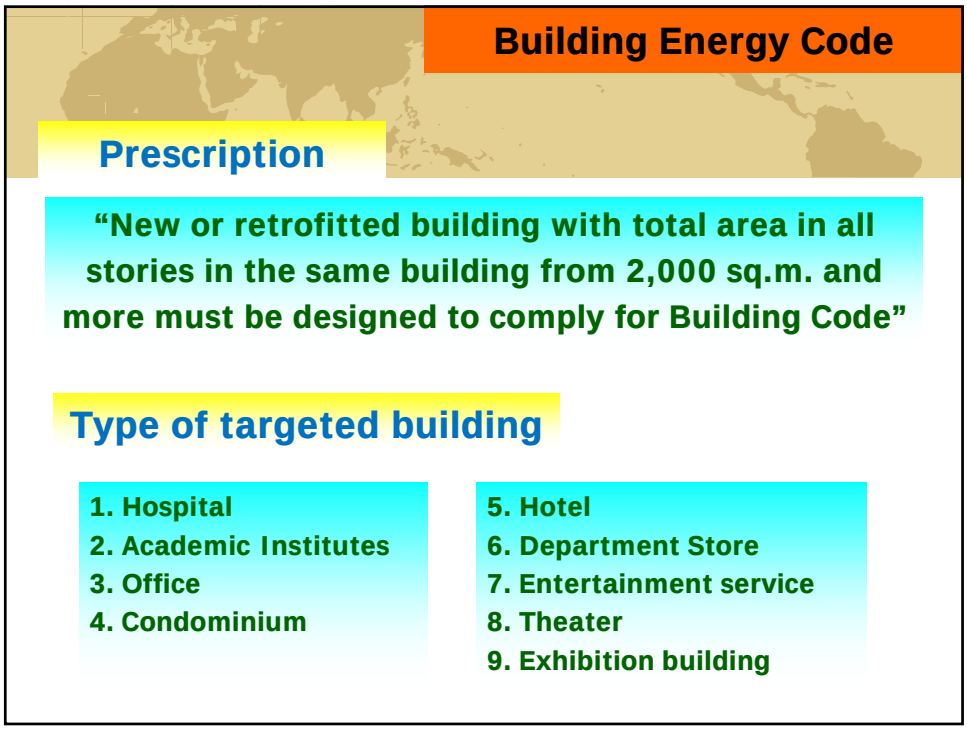
Energy Conservation Promotion Act
(Second revision in 2007 : Major change)
(Effective on 1st June 2008)

Energy Conservation Law in Thailand

Overall structure of ECP Act (version 2007)




Designated Buildings / Factories
Designated Facilities (version in 2007)
Designated Facilities
Buildings / Factories
▪ Installed power meter of ≥ 1000 kW
▪ Total Transformer Capacity of 1175 kVA
▪ Annual Energy Consumption > 20 mill MJ
oint Person Responsible of Ene
Classify into 2 categories
Due to size of DFs
ement Energy Management
Annually audited by certified aud
Improvement of EM Syst
DEDE provides supporting tools
Energy Management
Is the Key


Building Energy Code
Prescription
"New or retrofitted building with total area in all stories in the same building from 2,000 sq.m. and more must be designed to comply for Building Code"
Type of targeted building
1. Hospital
2. Academic Institutes
3. Office
4. Condominium
5. Hotel
6. Department Store
7. Entertainment service
8. Theater
9. Exhibition building

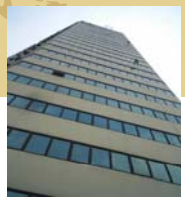
Building Energy Code

Building Code Components

1. Building Envelope
2. Lighting system
3. Air-conditioning system
4. Hot water generating system
5. Renewable energy utilization
6. Whole building performance

Building Energy Code

1. Building Envelope : (A/C Area)



Design of building envelopes which will affect the energy requirements for cooling and heating

Type of Building	OTTV (Watt/ sq.m.)	RTTV (Watt/ sq.m.)
Academic Institute /Office	50	15
Entertainment /Department store/ Theatre/Exhibition Building	40	12
Hotel/Hospital/Condominium	30	10

(OTTV : Overall Thermal Transfer Value)
(RTTV : Roof Thermal Transfer Value)

Building Energy Code

2. Lighting System

Energy Performance requirements for lighting Inside building excluding car park area

Type of Building	max.rated power (Watt / sq.m.)
Academic Institute /Office	14
Entertainment /Department store/ Theatre/Exhibition Building	18
Hotel/Hospital/Condominium	12

Building Energy Code

3. Air-conditioning System

- Apply for small and large size of A/C system
- All energy performance requirement is set by announcement of Energy Minister

Small size A/C : Spilt type

Size of A/C (Watt)	COP (Watt/Watt)	EER (Btu/hr/watt)
Less than 12,000	3.22	11

Building Energy Code

3. Air-conditioning System

Large size A/C : Chiller

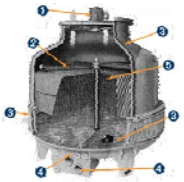
Type of Chiller		Cooling Capacity (ton refrigeration)	KW/TR
Cooling system	Compressor type		
Air-cooled	all types	< 300	1.33
		> 300	1.31
Water-cooled	Reciprocating	all sizes	1.24
	Rotary, Screw, Scroll	< 150	0.89
		> 150	0.78
	Centrifugal	< 500	0.78
		> 500	0.62

Building Energy Code

3. Air-conditioning System

Large size A/C : Absorption Chiller

Type of Absorption Chiller	COP
Single effect absorption chiller	0.65
Double effect absorption chiller	1.10



Building Energy Code

4. Hot water generating System

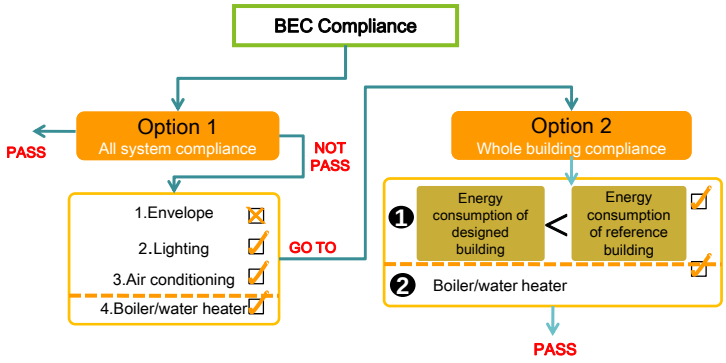
Steam Boiler / Hot water Boiler

Type	Min. Eff.
Oil fired steam boiler	85
Oil fired hot water boiler	80
Gas fired steam boiler	80
Gas fired hot water boiler	80

Building Energy Code

5. Whole building performance

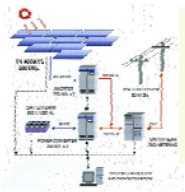
- The building which fails to comply with any one of major codes (Building envelope, Lighting system, A/C system) has to comply for the whole building performance
- The overall energy consumption of the proposed building must less than the over consumption of reference building



Building Energy Code

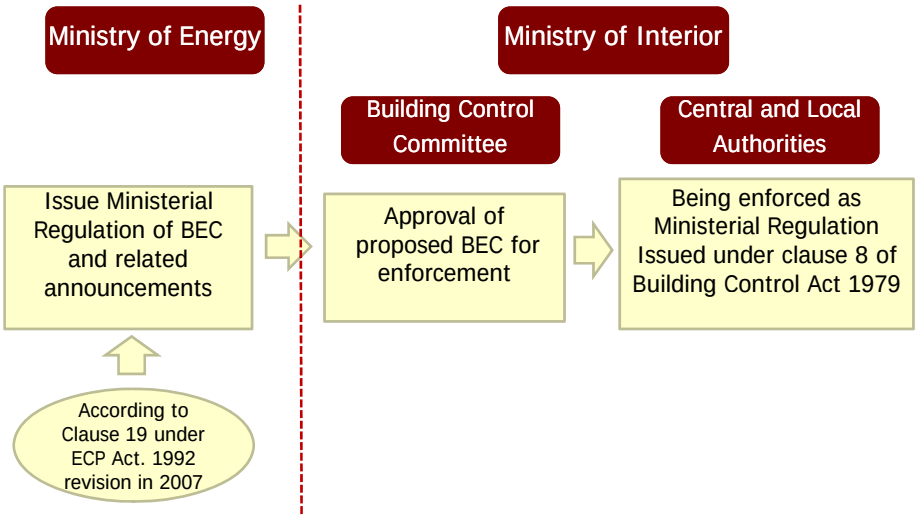
6. Use of Renewable Energy

- Use of Daylighting can be taken as a credit for the reduction of lighting equipments in lighting system under the following conditions;
  - Dedicated lighting control switches for luminaries covering area within 1.5 times height of window
  - Glass with effective shading coefficient not less than 0.3
  - Light to solar gain more than 1.0
- Energy generated from Solar used in the building can be taken as a credit for the reduction in whole building performance

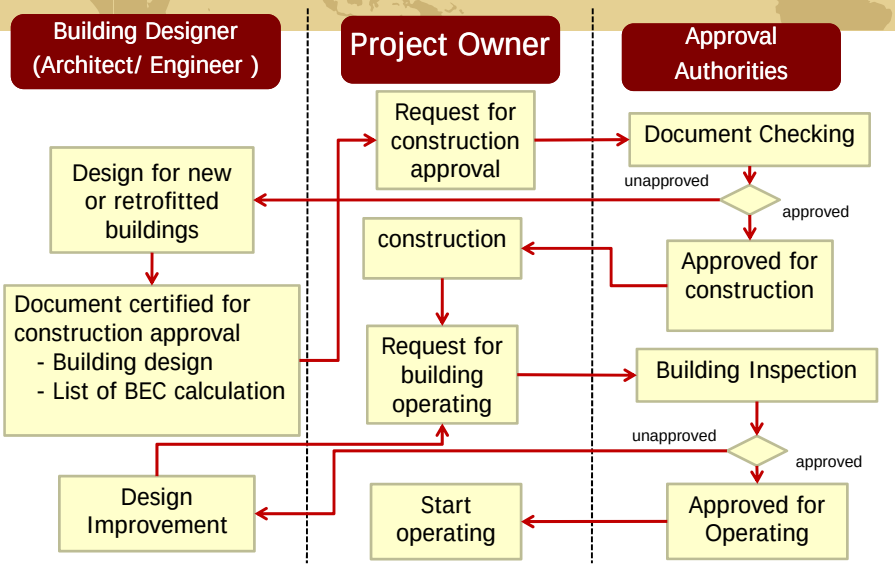

Building Energy Code

Process of Law Enforcement



Building Energy Code

Implementing process



Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Energy Efficiency standard & Labeling

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Introduction to EE S&L Measures

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Current Status: HEPS

1. Air conditioners
2. Refrigerators
3. AC electric fans
4. Chillers
5. Glazing
6. Electric water eaters
7. Rice cookers
8. Electric kettles

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Labeling and Promotion

Lebeling and Promotion

Labeling for Electric Products

Energy Consumption (kWh/year)

Efficiency (BTU/hr/Watt)

EGAT : Electricity Generating Authority of Thailand

Ministry of Energy

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Lebeling and Promotion

Labeling for Non-electric Products

Number 5 is shown the highest efficiency mark

Authority

Name of Product

Energy Saving

High Efficiency

Percentage of Efficiency Value

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DEDE : Department of Alternative Energy Development and Efficiency

Lebeling and Promotion

Labeling Schemes for Appliances

Appliances	MEPS	HEPS
1. Refrigerator (1994)	✓	✓
2. Air conditioner (1995)	✓	✓
3. Compact Fluorescent Lamp (1996)	✓	×
4. Electromagnetic Ballast (1998)	✓	×
5. Electric Fan (2001)	✓	✓
6. Automatic Rice Cooker (2003)	✓	✓
7. Lighting Luminare (2003)	×	×

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Lebeling and Promotion

Labeling Schemes for Appliances

Appliances	MEPS	HEPS
8. T5 (2009)	×	×
9. Electronic Ballast (2009)	✓	×
10. Double-oscillating Fan (2009)	✓	×
11. T5 Luminare (2010)	×	×
12. Exhaust Fan (2010)	×	×
13. Standby 1 Watt – Television (2010)	✓	×
14. Standby 1 Watt – Monitor (2010)	✓	×

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Lebeling and Promotion

Labeling Schemes for Non-electric products

Non-electric Products	MEPS	HEPS
1. LPG Stove (2008)	✓	×
2. Variable Speed Drive (VSD) (2008)	✓	×
3. Glazing (2008)	×	✓
4. Fiber Glass Insulation (2008)(draft)	×	×
5. Roof tile (on going)	×	×
6. Gypsum board (on going)	×	×
7. Precast concrete wall (on going)	×	×
8. Lightweight concrete (on going)	×	×

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Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

Energy Efficiency standard & Lebeling

3

Energy Efficient Testing Standards

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Energy Efficient Testing standards

Energy Efficient Testing Standards for Some Appliances

Appliance	Testing standards
1. Air conditioner	TISI 2134-2545
2. Refrigerator	TISI 2186-2547
3. Electric fan	TISI 92-2536 or TISI 127-2536
4. Electric water heater	(Draft) Ministerial Regulation
5. Electric rice cooker	Ministerial Regulation
6. Electric kettle	(Draft) Ministerial Regulation

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Energy Efficient Testing standards

Energy Efficient Testing Standards for Building Materials

Material	Testing standards
1. Glazing	ISO 9050, ISO 10292
2. Fiber glass insulation	ISO 8301
3. Roof tile	ASTM E903, ASTM C1371
4. Gypsum board	ISO 8301
5. Precast concrete wall	ISO 8301, ISO 8302
6. Lightweight concrete	ISO 8301, ISO 8302

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EE Testing Laboratory Network

Objectives

- to centralize and contribute information of EE Testing Laboratory Network
- to interconnect between members of the network

Accreditation requirement according to laboratory type

Type	Laboratory Organization	Accreditation Requirement
1	Government Organization	TIS – 17025 or TISI – R – TL - 01
2	Private Organization	TIS - 17025

Note: TIS – 17025 is equivalent to ISO/IEC 17025

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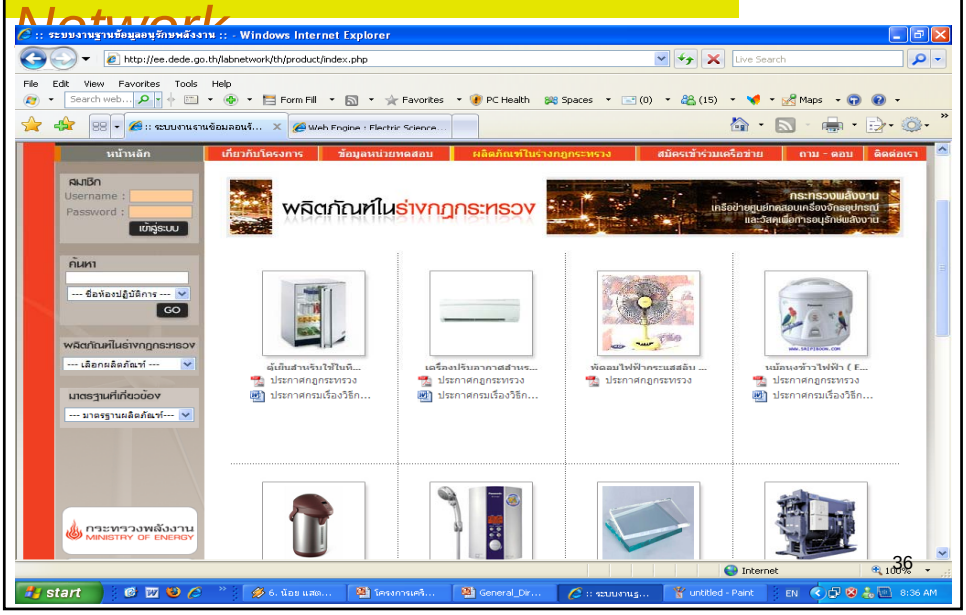
Website of the Energy Lab Network



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EE Testing Laboratory Network

Current status of testing Laboratories

Total number of testing laboratories, currently, are 28 laboratories.

- 4 laboratories have been certified by ISO 17025
- 8 laboratories are not yet certified either by ISO 17025 or TISI-R-TL-01 (documents preparation).
- 16 laboratories are not ready for accreditation.

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EE Testing Laboratory Network

Certified laboratories (ISO 17025)

1.Bitwise (Thailand) Co., Ltd.
- Air conditioner

2.TÜV SÜD PSB (Thailand) Ltd.
- Refrigerator
- Electric rice cooker
- Electric kettle

3.Electrical and Electronics Institute
- Air conditioner
- Refrigerator
- Electric fan

4.Intertek Testing Service (Thailand) Ltd.
- Refrigerator

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EE Testing Laboratory Network

Laboratories which are not certified by ISO 17025 yet (8 laboratories)

1. Electrical and Electronic Product Testing Center (PTEC)
   - Refrigerator
   - Electric fan
   - Electric rice cooker
   - Electric kettle
   - Electric water heater
2. Mitsubishi Electric Consumer Products
   - Air conditioner
3. Faculty of Engineering, Mahanakhon University
   - Electric fan
4. Thailand Institute of Scientific and Technological Research
   - Electric fan
   - Electric rice cooker
   - Electric kettle
   - Electric water heater

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EE Testing Laboratory Network

Laboratories which are not certified by ISO 17025 yet (8 laboratories: continued)

5. Department of Science Service (DSS)
   - Electric fan
   - Electric rice cooker
   - Electric kettle
   - Glazing
6. Faculty of Engineering, KMUTT
   - Electric fan
7. Spectrophotometer Laboratory, School of Energy, Environment and Material, KMUTT
   - Glazing
8. Division of Energy Management Technology, School of Energy, Environment and Materials, KMUTT
   - Air conditioner

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Current status of testing Laboratories

In the near future, one testing laboratory is expected to be certified by ISO 17025 and also one more laboratory will be certified by TISI-R-TL-01.

- PTEC will be certified by ISO 17025 for testing of
  - Electric fan and
  - Refrigerator.
- Spectrophotometer lab of KMUTT will be certified by TISI-R-TL-01 for
  - Glazing.

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EE Testing Laboratory Network

Laboratories for 8 Ministerial Regulations

Products	No.	Organization
1. Air-conditioner	2	1. Electrical and Electronics Institute 2. Bitwise (Thailand) Co., Ltd.
2. Refrigerator	3	1. Electrical and Electronics Institute 2. TÜV SÜD PSB (Thailand) Ltd. 3. Intertek Testing Service (Thailand) Ltd.
3. Electric fan	1	1. Electrical and Electronics Institute
4. Chiller	-	In the process of testing result acceptance from producers
5. Glazing	-	Spectrophotometer lab of KMUTT will be certified by TISI-R-TL-01 for glazing.
6. Electric water heater	-	In the process of finding certified laboratory
7. Electric rice cooker	1	1. TÜV SÜD PSB (Thailand) Ltd.
8. Electric thermal pot	1	1. TÜV SÜD PSB (Thailand) Ltd.

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Problems and Barriers

- Low testing price and limited testing samples
- Investment cost : a high investment cost for some instrument will be longer payback period time.
- Teaching purposes : especially the laboratories that belong to institution or university are used for teaching, research purposes, rather than testing services.
- Personal : a limitation of person to deal with ISO 17025 and also quite a long time taken for the accreditation.
- Etc.

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Thank you
for your kind attention

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