J04

Summary Workshop
PROMOTION OF ENERGY EFFICIENCY AND CONSERVATION
SOME-METI WORK PROGRAMME 2006-2007

Summary of Local Workshops and Energy Surveys in Buildings (2006-2007)

at

Brunei Darussalam, Philippines and Vietnam

Yoshitaka Ushio

The Energy Conservation Center, Japan

27th - 28th February 2007

Seria, Brunei Darussalam

ECCJ

Outline of Presentation

【1】 2000-2005 Activities
【2】2006-2007 Activities
【3】 ASEAN Energy Awards 2006
【4】 Topics of the Activity （4） Seminar-Workshop
【5】 Seminar - Workshop
【6】 Follow-up Surveys and Energy Audits
【7】 For Future Activities
【8】Conclusions

【1】2000-2005 Activity

- **2000, 2001 ：** Energy Audit
- **2002, 2003 ：**

(1) Energy Audit on a basis of OJT

(2) Workshops

- Introduction of technologies and experience for EE&C realized in Japanese buildings

- Explanation and discussion of result of energy audits

- DB/BM/GL development

- **2004 ：Indonesia, Cambodia, Thailand and Philippines**
- **2005 ：Myanmar, Malaysia, Lao PDR and Vietnam（Hanoi)**

(1) Energy Audit / Follow-up Survey on a basis of OJT

(2) Seminar-Workshops

- Introduction of technologies and experience for EE&C realized in Japanese buildings

- Explanation and discussion of result of energy audits

- Presentation of EE&C best Practices in ASEAN Countries

- DB/BM/GL development

- Development of EE&C Technical Directories

【2】 2006 – 2007 Activities

【1】 Activities in three countries, Brunei Darussalam, Philippines and Vietnam

(1) Follow-up Survey in one hotel (in Brunei Darussalam)

(2) Energy Audit in

Three offices (one in Brunei Darussalam and two in Philippines)

One hospital (Vietnam) and

One supermarket (Vietnam)

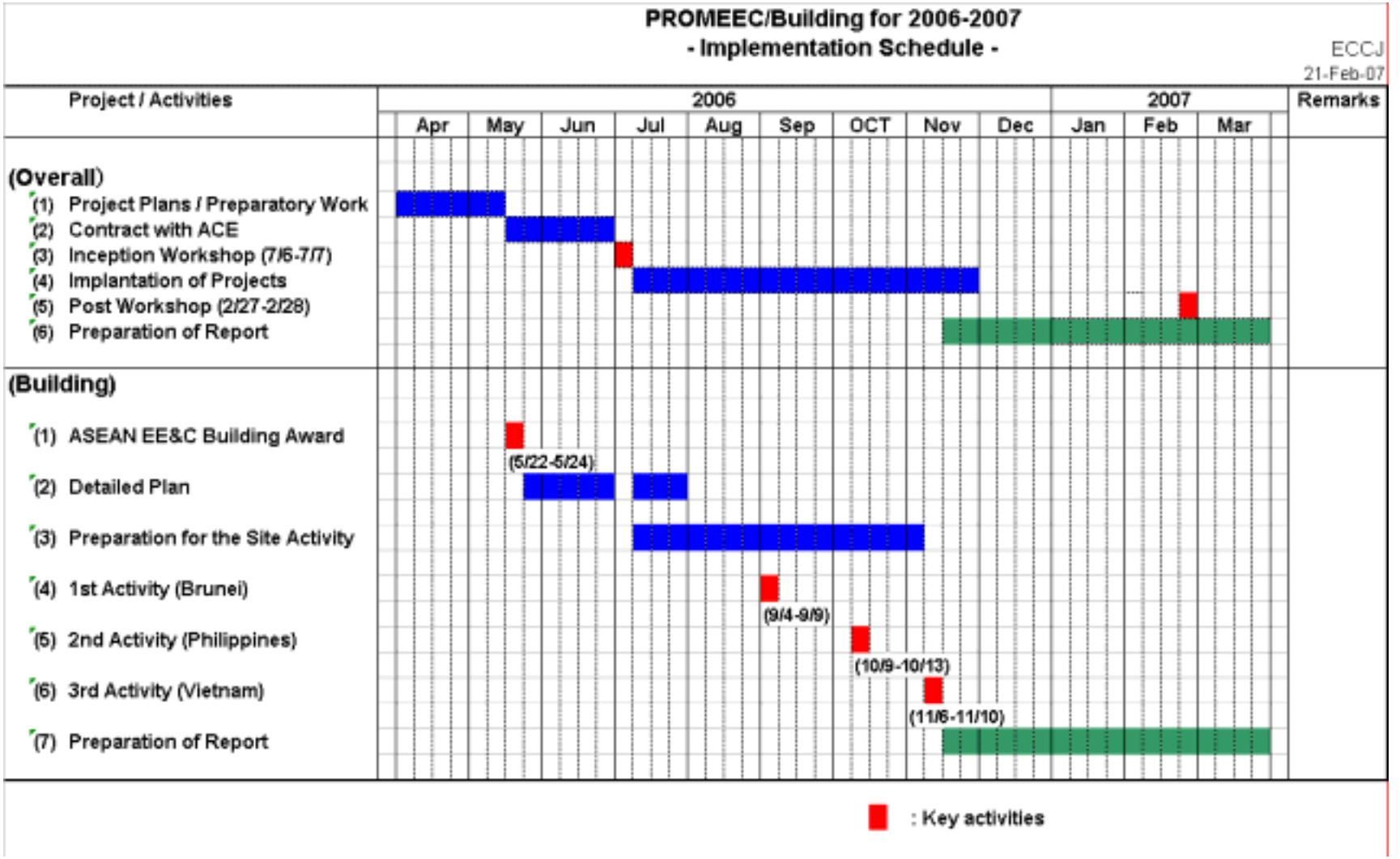
(3) Local Seminar - Workshop for EE&C Promotion and Dissemination

(4) Development of Technical Directory and Local DB / BM / GL

【2】 2006 – 2007 Activities

PROMEEC (Building)

Brunei Darussalam, Philippines, Vietnam



【3】 ASEAN Energy Awards 2006

ASEAN EE&C Best Practices Competition for Buildings

- Participation of the ECCJ Representatives to the meeting of the Board of Judges held in Lao PDR as Observers.

The Winners in each Category:

1. New and Existing Buildings: Low Energy Office (Malaysia)
2. Retrofitted Buildings : Tan Tock Seng Hospital (Singapore)
3. Tropical Buildings : Clarke Quay (Singapore)
4. Special Submission: Water Jet Nozzle to reduce the operation cost in AC unit (Indonesia)

Winner of New and Existing Building Category

In 2005

Low Energy Office in Malaysia

Detail of the buildings:

Type: Office Building (Government Building)

Grand Floor Area: 38,606㎡

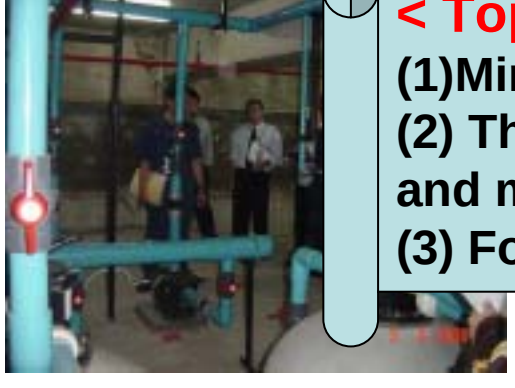
Air conditioning Area: 19,237㎡

Number of levels: 5 stories

Energy Efficiency Index *: 78.1kWh/㎡/yr

* EEI: Energy Consumption/AC Area

【4】 Topics of the Activity
in Brunei Darussalam



< Topics >

(1)Minister of Energy attended the Seminar/Workshop
(2) The lectures about the energy audit was implemented and many trainees attended the training
(3) Follow-up survey was successful (14.5% improved)

[4] Topics of the Activity (continued)

Activity in Philippines

< Topics >

(1) Energy Conservation Measures in Government Buildings (Grading System) are very effectively implemented.

(2) Pre-audit on the office building to be audited was implemented by the focal point and it made the audit successful.

(3) The Price of Darkness: The top management forced the employee to implement EE&C for saving lighting energy.

[4] Topics of the Activity (continued)

Activity in Vietnam

< Topics >

(1) Pre-audits on the two buildings to be audited in PROMEEC had been implemented and it made the audit activity successful.

(2) University of Tech. of HCMC participated and supported the PROMEEC activities

(3) ECC-HCMC is very active for the promotion of EE&C in the region.

【5】 Seminar-Workshop

(1) Number of the Participants

	Brunei	Philippines	Vietnam
Date of S-W	2006.9.09	2006.10.11	2006.11.09
Number of Participants	**60**	**60**	**85**
No. of Presentation by Host Countries	**2**	**3**	**1**
No. of Presentation by Other ASEAN	**4**	**4**	**3**
No. of Presentation by ECCJ & ACE	**4**	**4**	**4**

[5] Seminar-Workshop
(2) Presentations by the Guests from ASEAN

Presentation	Brunei	Philippines	Vietnam
EE&C Best Practices of Tan Tock Seng Hospital Building, Singapore	✔	✔	
Energy Efficiency & Conservation Best Practices of Buildings MSE Building, Philippines	✔		
Energy Efficiency & Conservation Best Practices of bUildings MSE Building, Green Belt 3 Mall and 6750 Office Tower, Philippines			✔
Energy Efficiency & Conservation Best Practices of Plaza BII Building, Indnaisia			✔
Energy Efficiency & Conservation Best Practices in Buildings Grha Wonokoyo, Indonesia and Water Jet Nozzle to reduce the operation Cost of residentioal AC units, Indonesian	✔		
Energy Efficiency & Conservation Best Practices for Buildings in Indonesia Grha Wonokoyo & Plaza II Building, Water Jet Nozzle to reducethe operation Cost of residentioal Air Conditioning units and Airconditioner equipped with Passive Heat pipe		✔	
Energy Efficiency & Conservation Best Practices of LEO (Low Energy Office)Building & Malaysia Electronics Material S/B, Malaysia	✔		
Energy Efficiency & Conservation Best Practices of LEO (Low Energy Office)Building, Malaysia		✔	
Energy Efficiency & Conservation Best Practices of LEO (Low Energy Office)Building & KL Airport, Malaysia			✔

Thank you very much for the supports

[5] Seminar-Workshop

(3) Presentations by Host Countries, ACE and ECCJ

< Presentation by Host Countries >

Brunei Darussaalam

(1) Overview EE&C Initiatives and Activities in Brunei
(2) Energy Efficiency & Conservation Best Practices of Royal Orchid Hotel in Brunei

Philippines

(1) Overview of Plans and Programs on EE&C in Philippines
(2) Experiences and application of EE&C in Makati Stock Exchange Building
(3) Experiences and application of EE&C in Green Belt 3 Mall

Vietnam

(1) Overview EE&C Initiatives and Activities in Vietnam

< Presentations by ECCJ and ACE >

The Energy Conservation Center, Japan

(1) Concept and Initiatives Towards Sustainable Buildings in Japan
(2)Advance Measures & Technology for EE&C for Buildings in Japan

ASEAN Center for Energy

(1) Overview of ASEAN EE&C Program
(2) Development of a Technical Directory (Proposal for Further Step)
(3) Development of a Database/ Benchmarking/ Guideline for Buildings

【6】 Energy Audit and Follow-up Survey

(1) Number of the Participants

2005

	Myanmar		Malaysia	Lao PDR		Vietnam	
	FS-1	FS-2	EA-1	EA-1	EA-2	EA-1	FS-1
Host Country	15	4	8	15	13	6	10
ECCJ & ACE	4	3	3	4	4	5	5

2006

	Brunei		Philippines		Vietnam	
	FS-1	EA-2	EA-1	EA-2	EA-1	EA-2
Host Country	16	20	11	10	15	14
ECCJ & ACE	4	4	5	5	4	5

[6] Follow-up Survey and Energy Audit

(2) Previous Activities

	Bru	Ca	Ina	Lao	Mas	Mya	Phi	Sin	Thai	Vn
2000								2000	2000	
2001		2001	2001				2001			
2002						2002				2002
2003	2003			2003	2003					
Hotel	H1	H1		H1		H1				H2
Office			O1		O1	O1	O1	O1	O1	
2004		2004	2004				2004		2004	
Follow		H1					O1		O1	
New		H1	H2				O1			
2005				2005	2005	2005				2005
Follow						O1 H1				H2
New				H2	O1					H1
2006	2006						2006			2006
Follow	H1									
New	O1						O2			M1,HP1

Phase 1

Phase 2

[6] Follow-up Survey and Energy Audit

(3) Energy Audit Activities in 2006-2007

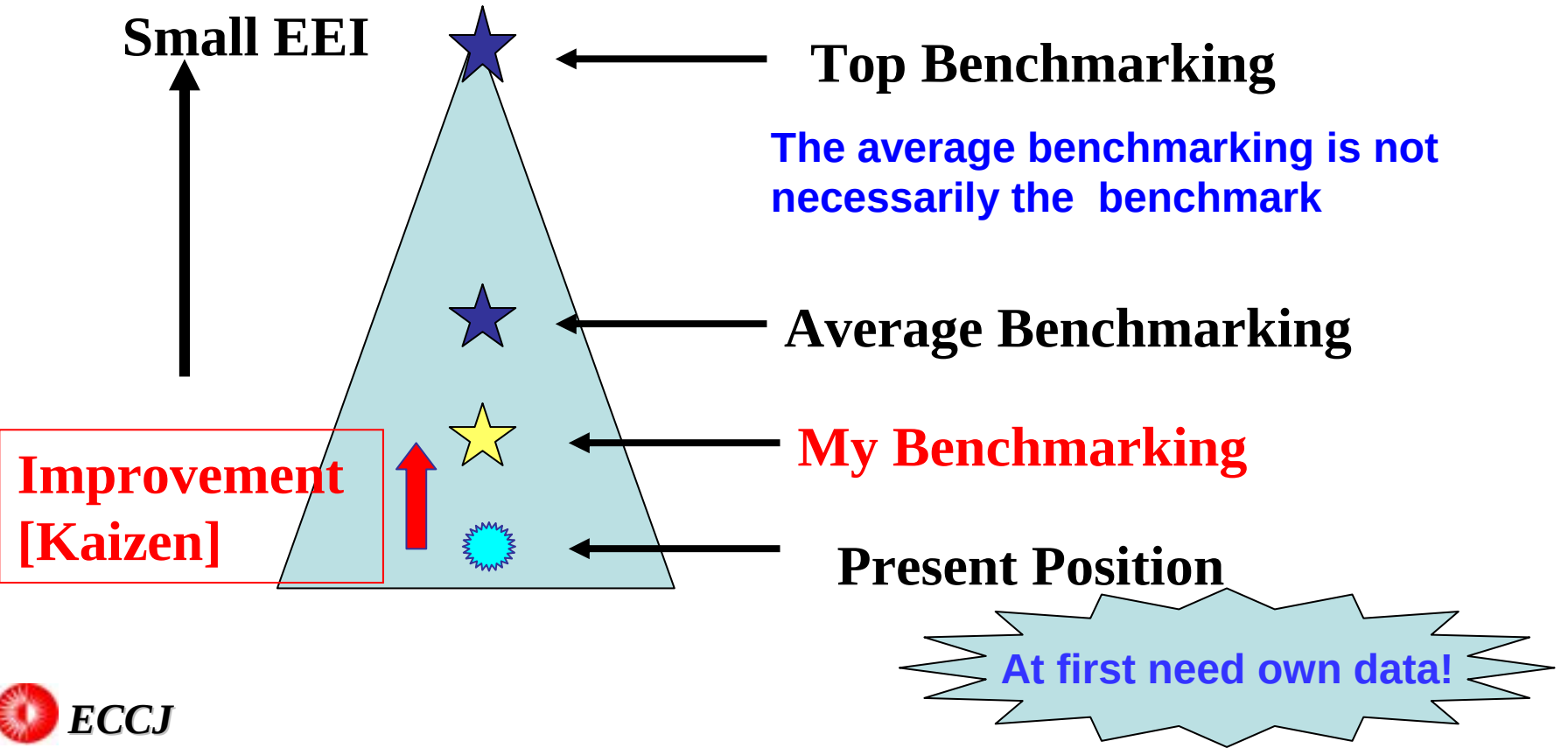
- **OJT for the local engineers (More involvement of the local engineers)**
- **Identification of the present energy consumption and their own Benchmark (Target)**
- **Identification of barriers and advice on measures to improve, through the follow-up survey and the new audit, on the actual status of implementation of EE&C activities and measures for the improvement**
- **Further recommendations for EE&C by ECCJ experts**
- **Identification of the barriers and measures**

[6] Follow-up Survey and Energy Audit

(4) Importance of Energy Data Collection

Setting the own target

- **My Benchmarking**

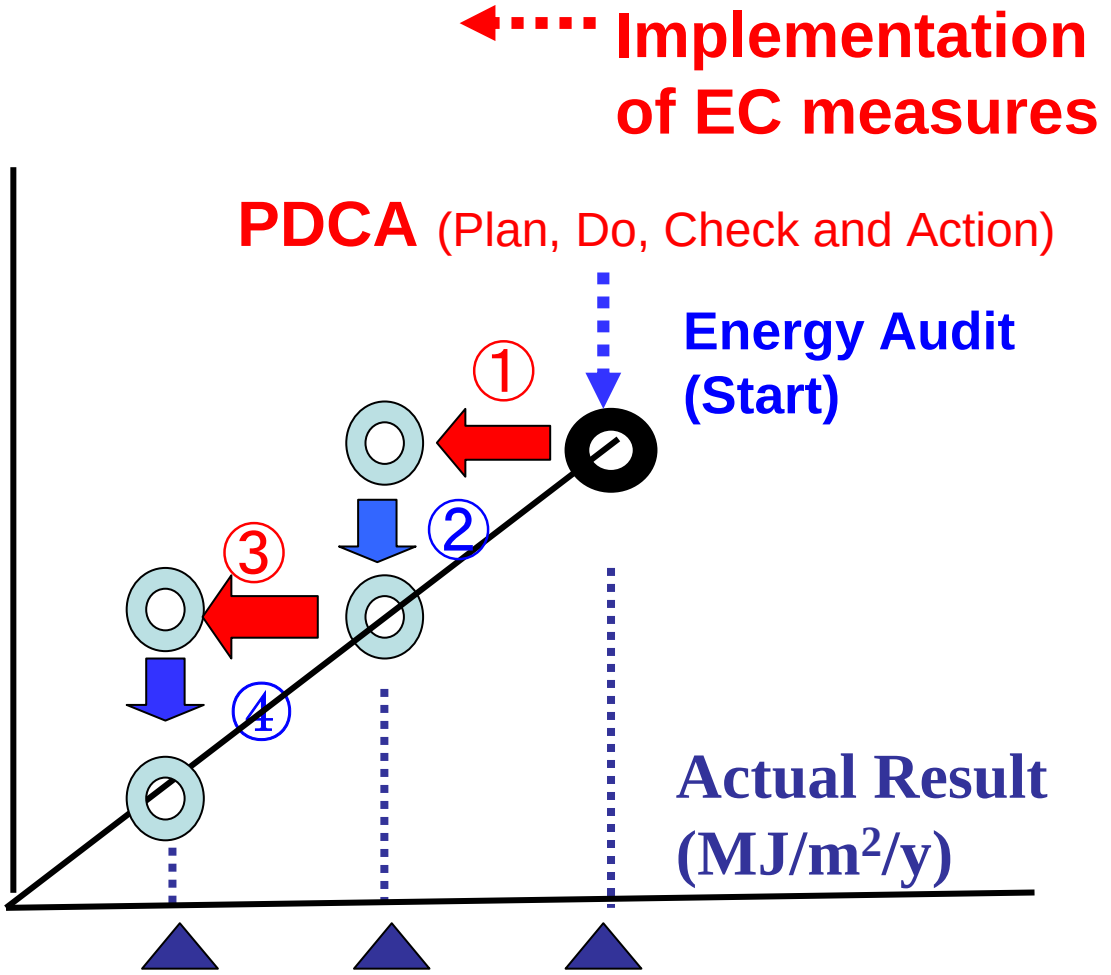


【6】Follow-up Survey and Energy Audit (4)

(4) Importance of Energy Data Collection

PDCA and Energy Audit

The results of the Energy Audit (the EEI Management Tool) (kWh/m²/y)



[6] Follow-up Survey and Energy Audit

(4) Importance of Energy Data Collection

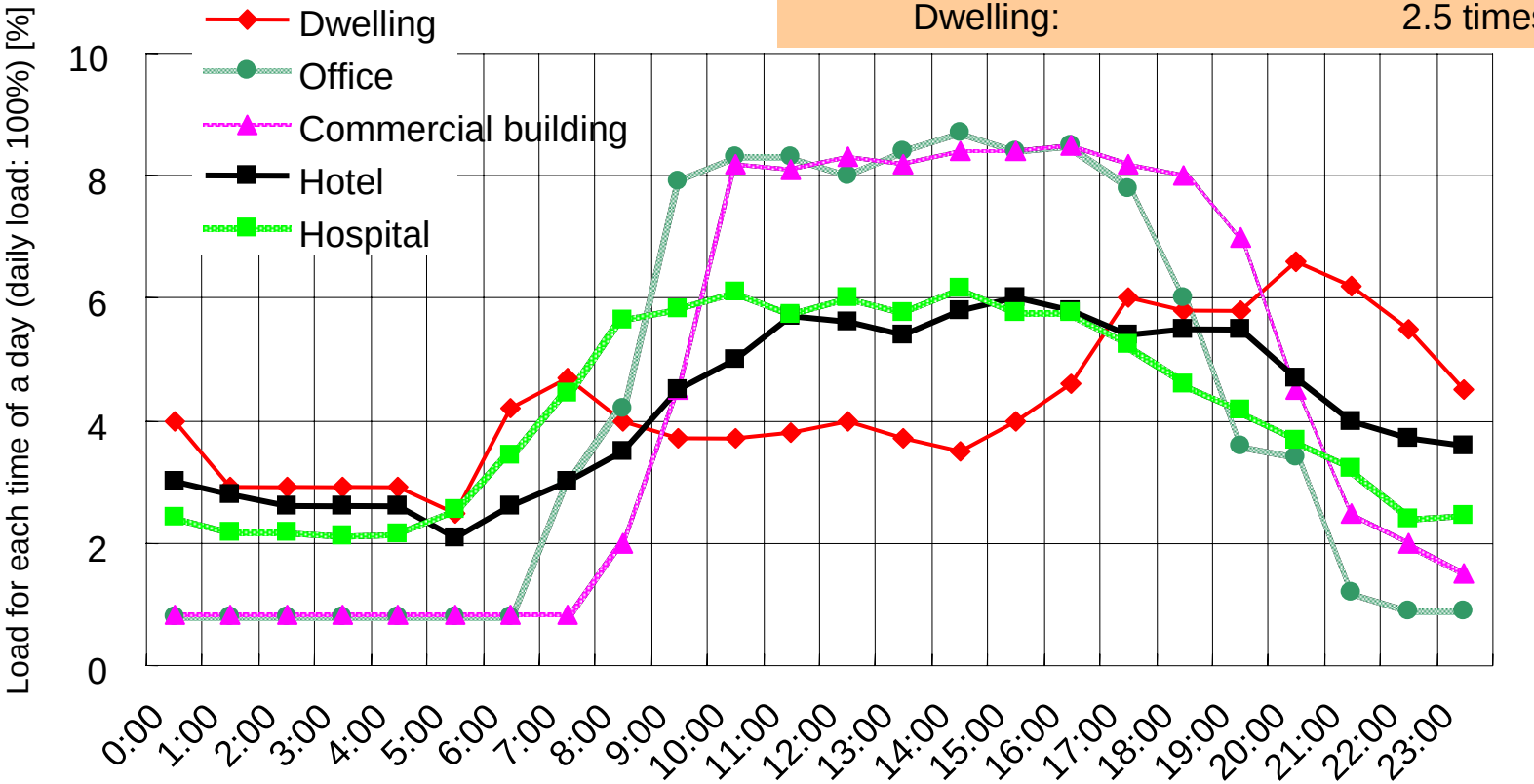
Energy Data Collection Situations in the Buildings Audited in PROMEEC 2006

	Monthly Energy Consumption data	Hourly and daily Energy Consumption data	Remarks
Brunei (Hotel)	Only Power bill	None	
Brunei (Office)	Only Power bill	None	
Philippines (Office)	Collecting	None	
Philippines (Office)	Collecting (From 2006)	None	
Vietnam (Hospital)	Only power bill	None	
Vietnam (Hospital)	Only power bill	None	

(4) Importance of Energy Data Collection

Reference: Hourly Energy Consumption Data

Electrical Power Consumption Characteristics by Building Type Summer



Difference between day and night

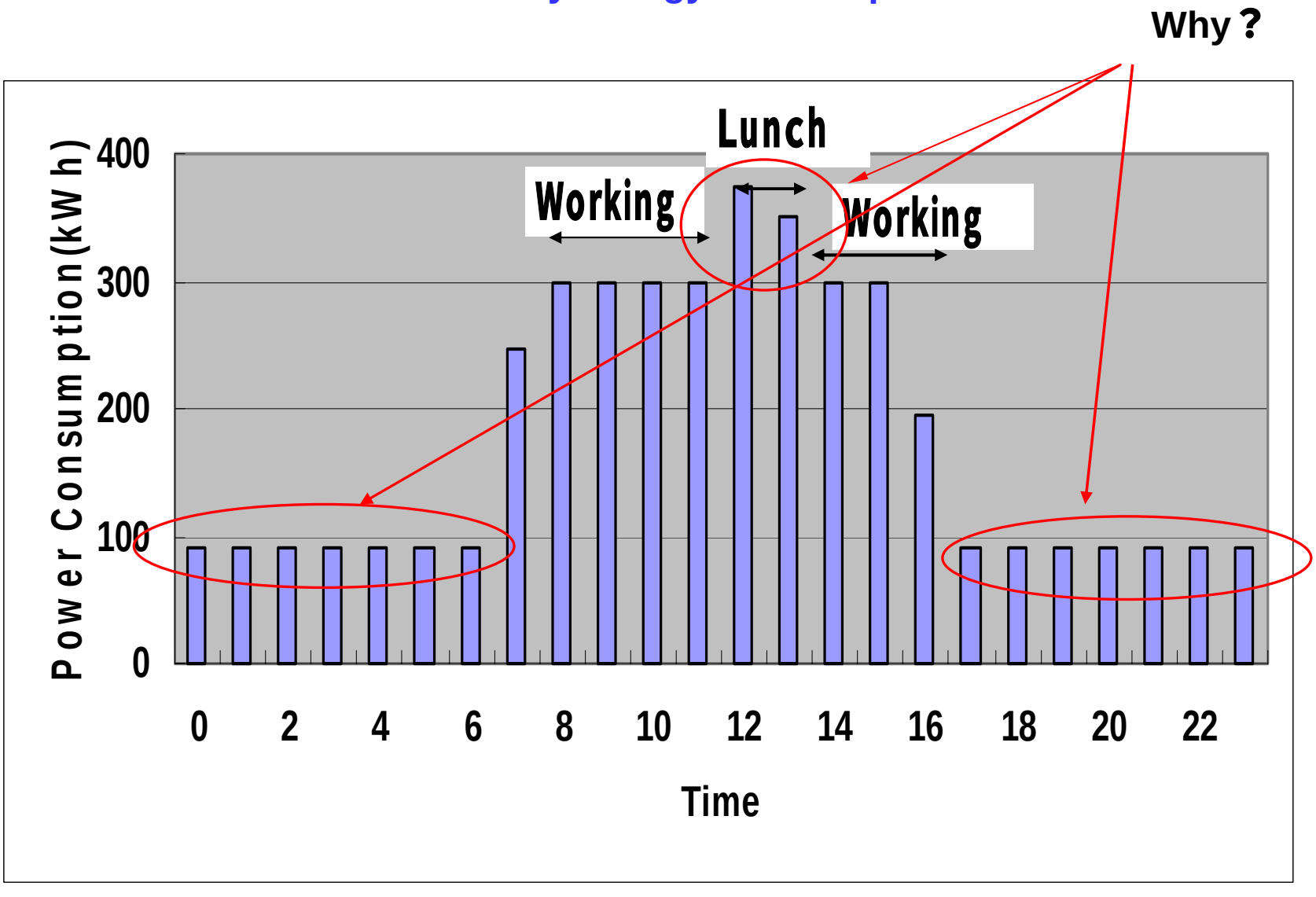
Office, commercial building:	8 times
Hotel, hospital:	2 times
Dwelling:	2.5 times

Source: Handbook of Heating, Air-Conditioning and Sanitary Engineers, the 13th edition, and the Energy Conservation Center's 2003 Building Energy Survey

(4) Importance of Energy Data Collection

Reference: Data Collection during the audit

< Hourly Energy Consumption >



(4) Importance of Energy Data Collection

Reference: Recommended New Log Sheets

Electricity Record
Sep 2006

Date _____ **Manager** _____

		Reading	Consumption	Accumulation	Operator Initials	Time	Supervisor
		kWh	kWh	kWh			
1	Fri	A1	A2-A1	A2-A1	Akira	8:02	
2	Sat	A2	A3-A2	(A2-A1)+(A3-A2)	Akira	8:03	
3	Sun	A3					
4	Mon						
5	Tue	12345	11111	11111	Akira	8:02	
6	Wed	23456	11111	22222	Akira	8:03	
7	Thu	34567					
8	Fri						
9	Sat						
10	Sun						

[6] Follow-up Survey and Energy Audit

(5) The Follow-up Survey Results in PROMEEC

Building Information: Brunei Darussalam

BD-1 Hotel

155 rooms

B1F-10F

GFA: 20121m2

7 yrs

Annual Electricity Consumption: 3,845,914Wh/yr

EEI(2005): 191Kwh/m2/yr

1st Energy Audit: 2003

(5) The Follow-up Survey Results in PROMEEC

<Hotel in Brunei>

No	Recommended in 2003	Saving [kWh]	%
1	Repair of the BAS System		
2	Optimization of AHU operating time	Depend on the time	
3	Intermittent use of FCU	Depend on the time	
4	Raise indoor setting temperature (2℃)	145,322	3.2%
5	Thermal insulation of hot water pipes	9,855	0.2%
6	Optimization of the Receiving transformer	2,310	0.1%
7	Adoption of Efficient lamps	25,930	0.6%
8	Reduction of filter pomp operating time (swimming pool)	6,424	0.1%
	Total	189,841	4.2%
	Electricity consumption /year	4,498,145	

	Implemented since last audit	Saving (kWh)	
2	Control of operation time: Cesar Grand Hall AHU and Cesar 1 & 2 AHU	486,337	10.8%
	Turn off AC of Vanda Restaurant at midnight	8,176	0.2%
	Turn off heaters of the lobby, back office and restaurants	210,240	4.7%
	Switch off the car park fan at 22:30 -6:30	87,366	1.9%
4	Raising indoor setting temperature (1℃)	72,661	1.6%
7	Replace high efficient lamps	25,930	0.6%
8	Reduce filer pomp operation time	6,424	0.1%
	Total	909,768	18.0%

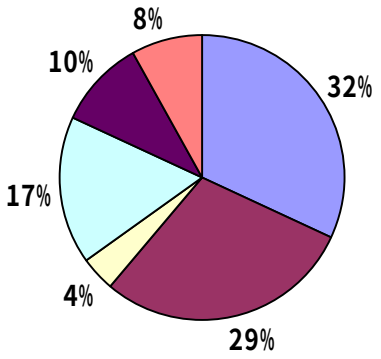
Power Consumption 14.5% Reduction

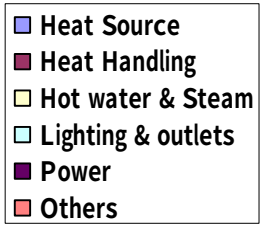
(5) The Follow-up Survey Results in PROMEEC

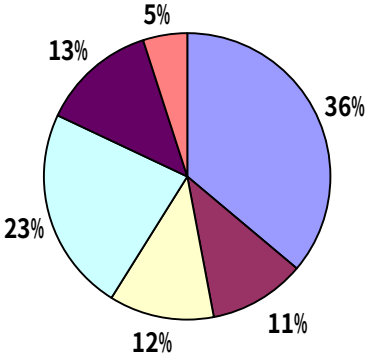
Energy Consumption Structure and Energy Efficiency Index (EEI)

Hotel

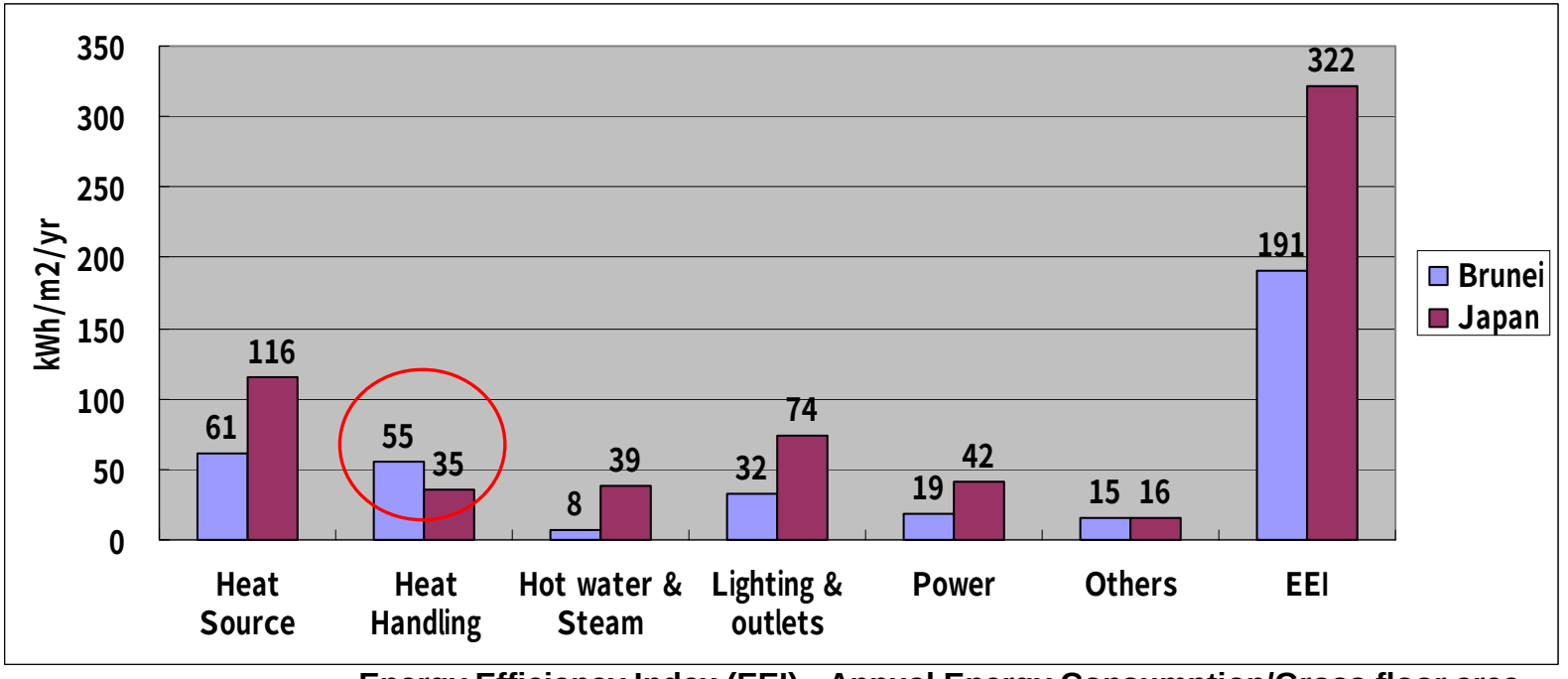
Brunei







Japan



Energy Efficiency Index (EEI) : Annual Energy Consumption/Gross floor area

[6] Follow-up Survey and Energy Audit

(6) The Energy Audit Results in PROMEEC 2006

Building Information: Brunei Darussalam

BD-2 Office

No. of floors: 6F

GFA: 4,826m2

Age: 12 yrs

Annual Electricity Consumption: 864,820kWh/yr

EEI(AC Area): 179Kwh/m2/yr

[6] Follow-up Survey and Energy Audit

(6) The Energy Audit Results in PROMEEC 2006

Building Information: Philippines

Ph-1 Office

Usage: Office (Bank)
No. of floors: 1BF & 35F
GFA: 66,638m2
ACA: 51,608m2
Age: 4 yrs
Annual Electricity Consumption: 8,821,528kWh
EEI (AC Area): 171kWh/m2/yr

Ph-2 Office

Usage: Office (Bank)
No. of flrs: 1F, 3F, 5F, 6F, 8F &17F
Complex (six buildings)
GFA: 156,249m2
Age: 36yrs
Annual Electricity Consumption: 20,776,582kWh(estimated)
EEI(AC Area): 133Kwh/m2/yr

[6] Follow-up Survey and Energy Audit

(6) The Energy Audit Results in PROMEEC 2006

Building Information: Vietnam (HCMC)

VN-1 Hospital:

800 beds
No. of Floors: 5F
GFA:23,921m^2
Age: 3 Years
Annual Electricity Consumption: 3,831,283kWh

EEI(AC Area): 160Kwh/m2/yr

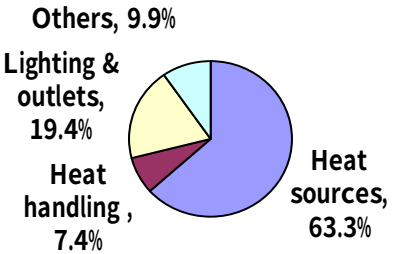
VN-2 Supermarket:

No. of Floors: 3F
GFA: 6,600 m2
Age: 5 years
Annual Electricity Consumption: 2,052,689kWh
EEI(AC Area): 311 kWh/m2/yr

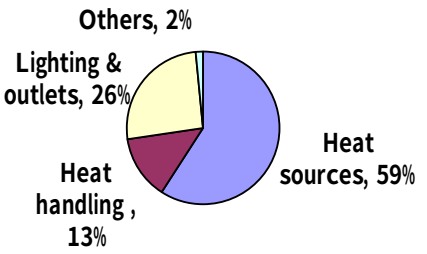
(6) The Energy Audit Results in PROMEEC 2006

Energy Consumption Structure and Energy Efficiency Index (EEI)

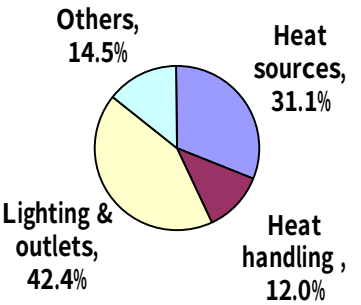
Office Building



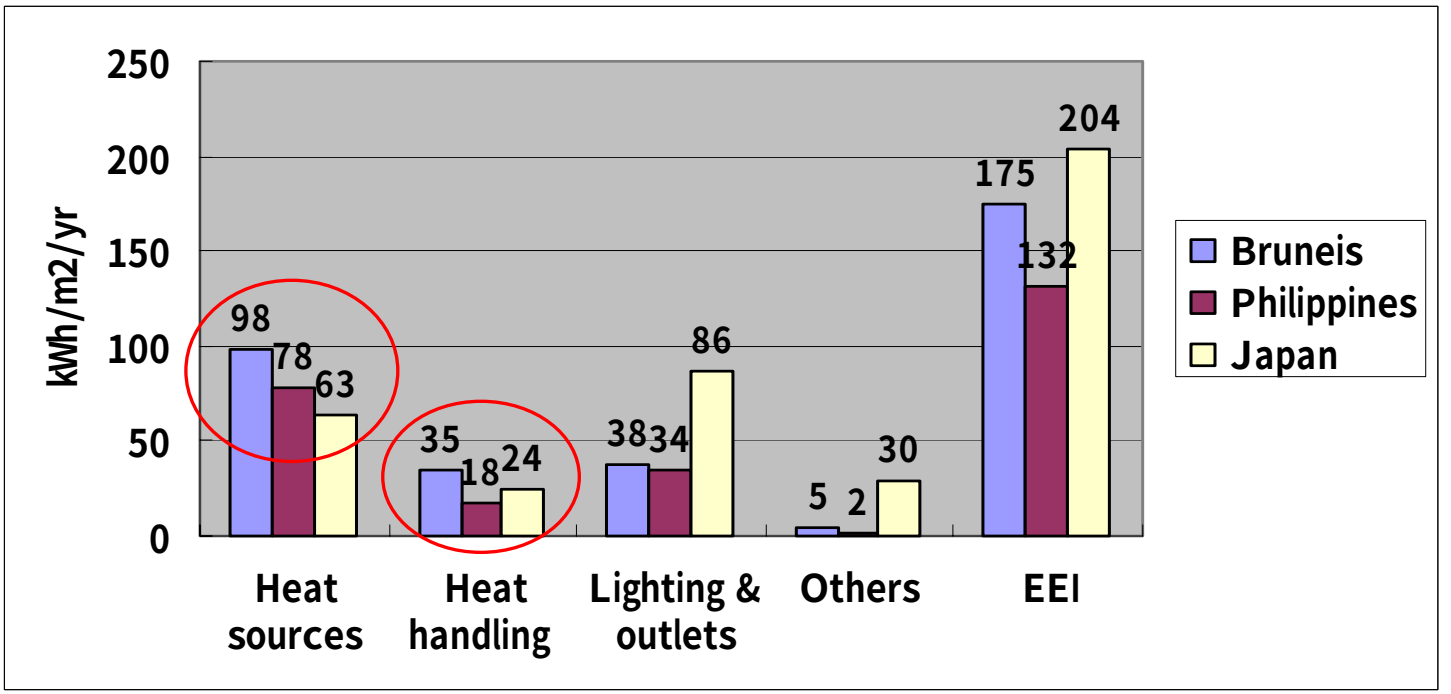
Brunei



Philippines



Japan (ECCJ Data)



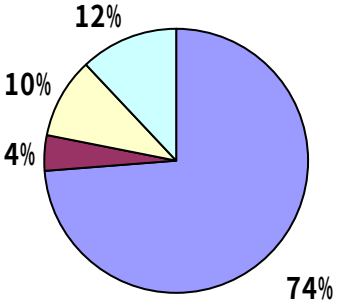
Energy Efficiency Index (EEI) : Annual Energy Consumption/Gross floor area

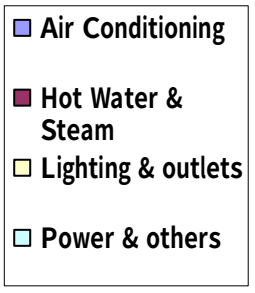
(6) The Energy Audit Results in PROMEEC 2006

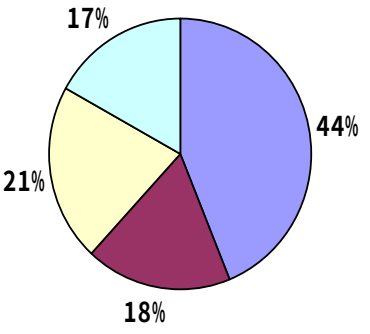
Energy Consumption Structure and Energy Efficiency Index (EEI)

Hospital

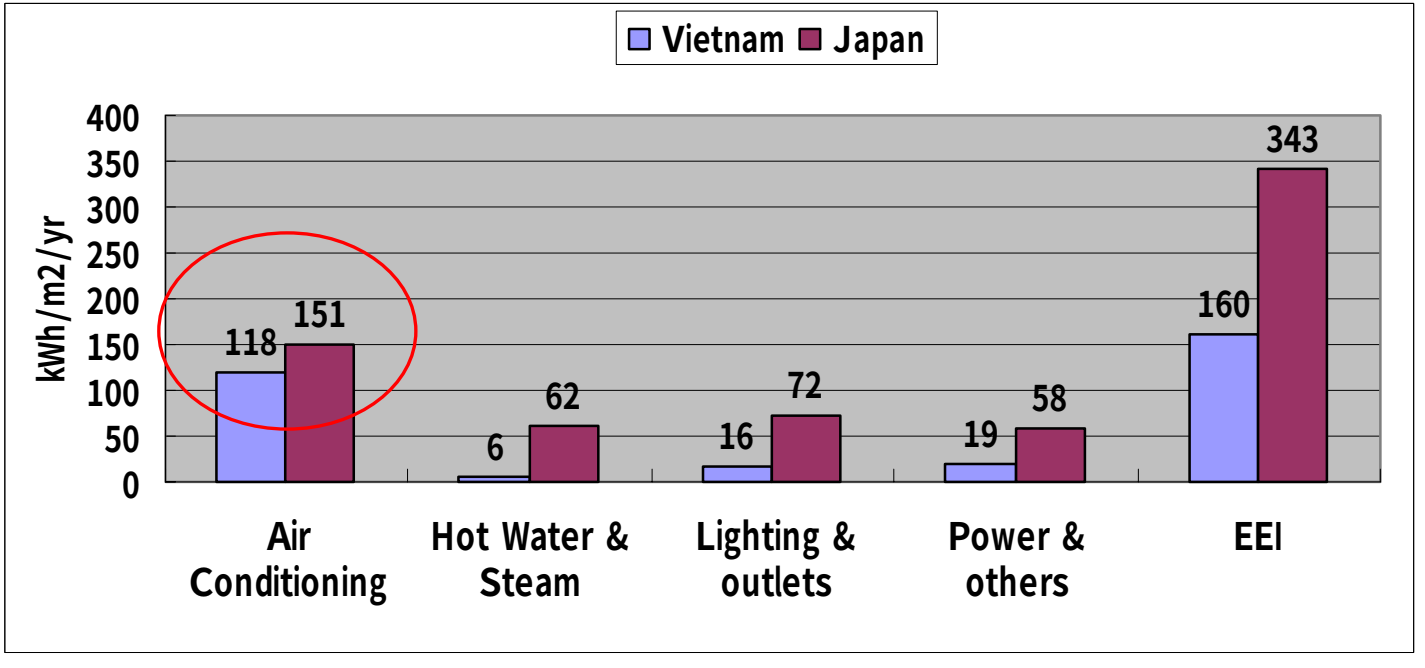
Vietnam







Japan



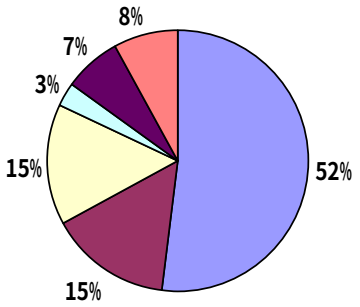
Energy Efficiency Index (EEI) : Annual Energy Consumption/Gross floor area

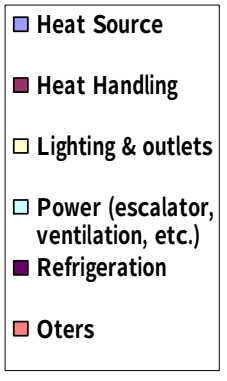
(6) The Energy Audit Results in PROMEEC 2006

Energy Consumption Structure and Energy Efficiency Index (EEI)

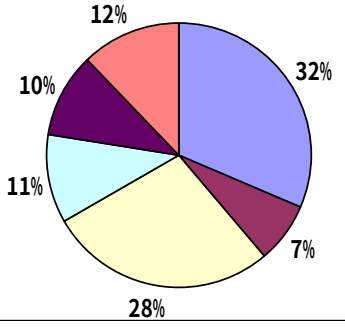
Supermarket

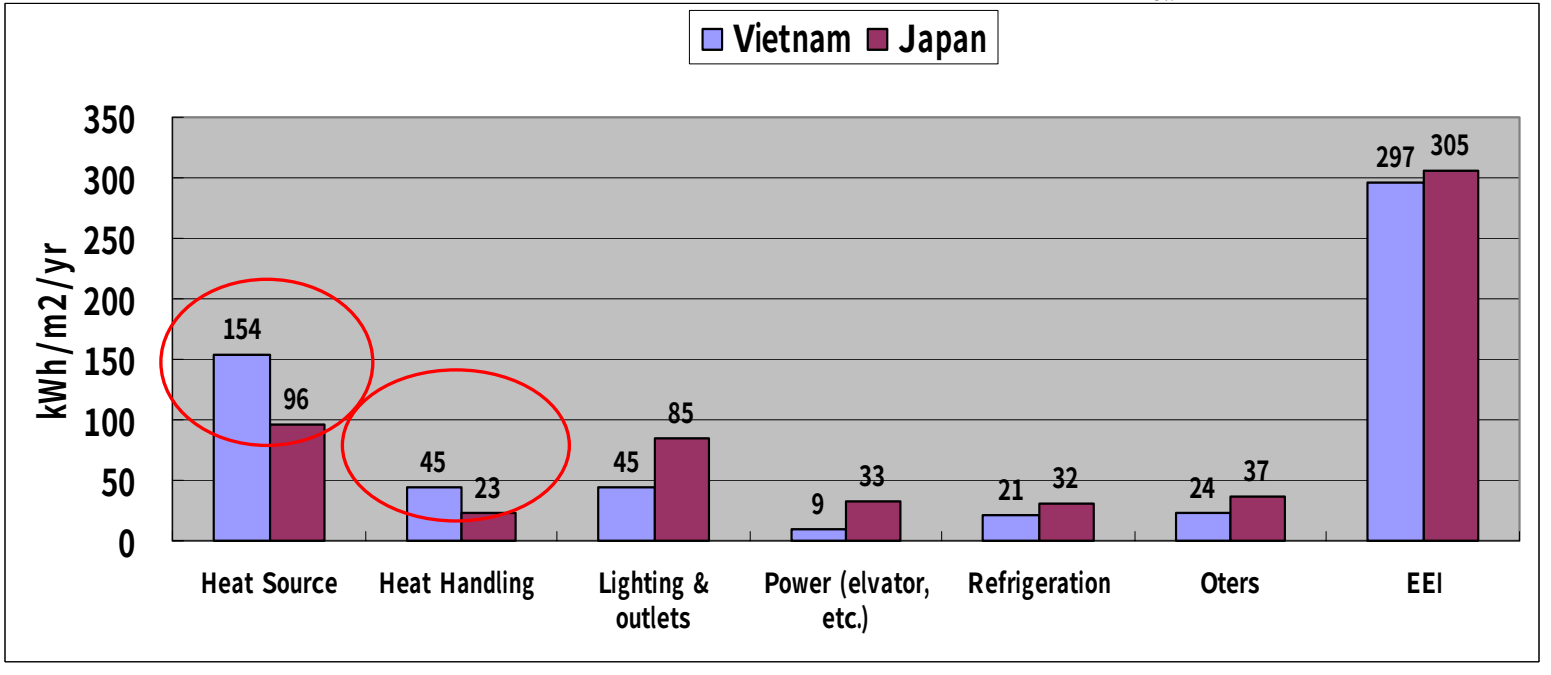
Vietnam





Japan





Energy Efficiency Index : Annual Energy Consumption/Gross floor area

(6) The Energy Audit Results in PROMEEC 2006

Estimated Saving (kWh) by the Recommendation

Energy Saving (kWh/year) by the implementation of the recommendations provided by the audits

Building / Type of Building	BR-2 Office	%	PH-1 Office	%	PH-2 Office	%	VN-1 Hospital	%	VN-2 Market	%	Total	%
Annual Energy Consumption (kWh/year)	864,820	100%	8,821,528	100%	20,776,582	100%	3,831,283	100%	1,959,152	100%	36,253,365	100.0%
1. Energy Management	268,928	31%					191,564	5%			460,492	1.3%
(1) Data collection and analysis (BMS)	98,400	11%									98,400	0.3%
(3) General management for EE&C	170,528	20%					191,564	5%			362,092	1.0%
2. Air Conditioning	64,800	7%	472,332	5%	3,189,543	15%	454,118	12%	64,442	3%	4,245,235	11.7%
(1) Temperature setting			364,573	4%	925,850	4%					1,290,423	3.6%
(2) Chiller Operation	64,800	7%			741,087	4%	454,118	12%	64,442	3%	1,324,447	3.7%
(3) Cooling Water Supply			107,759	1%							107,759	0.3%
(4) AHU, FCU, etc.					1,522,606	7%					1,522,606	4.2%
3. Lighting & outlets	12,200	1%	418,851	5%			31,045	1%	52,153	3%	514,249	1.4%
(1) High Efficient Lamps	12,200	1%	38,691	0%			31,045	1%	27,042	1%	108,978	0.3%
(2) Sensor, IIC., etc									25,111	1%	25,111	0.1%
(3) CRT to LCD for PC			380,160	4%							380,160	1.0%
Total Saving (kWh/year)	345,928	40%	891,183	10%	3,189,543	15%	676,727	18%	116,595	6%	5,219,976	14.4%

【7】For Future Activities

(1) For the Improvement of Energy Audit OJT Activities for the Local Engineers

- **Sufficient Information and Data for Fruitful Energy Audits**

(1) Sufficient information and data to be provided with to the experts in advance of the energy audits

(2) Pre-audits were very effective for the successful audits

(3) Excellent preparation by Philippines (one office) & Vietnam for the energy audits

- **More involvement of the local participants to the energy audit work**

(1) The participants to carry out the analysis of the results of the audits (measurement, calculation, analysis, making recommendations and to make presentation of the audit results for the building owner)

(2) The pre-audits should be carry out before the activities.

(3) More detail and exact data should be collected before the audits

(2) For the Improvement of the Seminar/Workshop

- **More Local (Host-country) presenters**

(1) Two successful cases were presented in Philippines.

(2) The audit results obtained from the their own audits to be presented

【8】 Conclusions

To remove the identified barriers step by step through the PROMEEC（Building) Activities

Main identified Barriers in Buildings

- Lack of awareness of the owners and the architects on EE&C
- Inadequate Information and data of EE&C
- Limited technical and managerial capability of the local engineers and managers
- Financial barriers

Step by Step

Continued

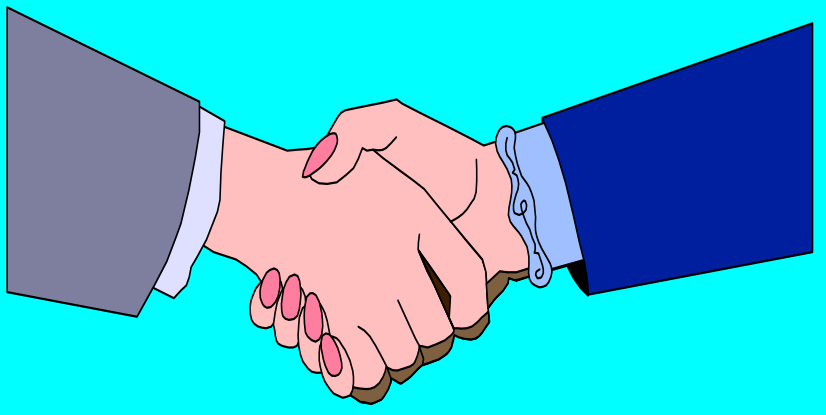
PROMEEC Activities

- Energy audit and energy audit OJT for the local engineers & managers
- Seminar–workshop for promotion and dissemination of EE&C
- Development of Technical Directories
- Establishment of DB/BM/GL
- ASEAN Award for EE&C Best Practices of Buildings

Continuous Cooperation !

Thank You

Very Much



More information is available by accessing ECCJ's Internet Home Page at:
http://www.eccj.or.jp/index_e.html

The Energy Conservation Center, Japan