

Chapter 7

Result of the Implementing Standard Format

The Energy Conservation Center of Thailand implemented the standard format of the energy audit report to 12 auditors who make the energy audit report as this list

ECC: Energy Conservation Centre of Thailand

ARU: Arunchaiseri consulting Engineers Company Limited

RAN: Rangsit University

EMC: Energy Management and Consultant Company Limited

GRE: Green Energy Company Limited

IAN: I.A. Holding Company Limited

PSA: Psat Engineering Company Limited

PLA: Plan Engineering Company Limited

ITE: ITEM Company Limited

PUE: FUEAMGSIRI Engineering Company Limited

WAT: Watt Consultant Company Limited

CHI: Chin Siam Company Limited

In the same time ECCT used 6 reviser for revising the energy audit report from auditor as this list.

KU: Kua-anan Tachato,

SA: Sanguan Salee,

AK: Akkchai Thitiwitayakul

IT: Itisak Maomesam,

WI: Wichean Chompatana,

PR: Prapas Pojana

7.1 Time for Reviewing

After the Energy Conservation Center of Thailand implements the standard format with checkpoint box to the 12 auditors, 70 building, and 6 reviser. The consumed days for each report revision of each reviser was recorded in the table 7-1

From the table 7-1, the average consumed time for first revising is 4.8 days. The average consumed time for second revising is 3.1 days. So the total average consumed time for report revising is 7.3 days.

7.2 Mistake from Reviewing

Record the mistake from the energy audit report after implemented the standard format. It was found that the mistake reduced in every point as shown in table 7-2 .

Table 7-1 The Consumed Time for Reviewing Report in 1999

No.	Building	Auditor	Revision 1			Revision 2				Total Days	
			Reviser 1	Start	Finish	Days	Reviser 2	Start	Finish		Days
1	Banbuatong Municipal	ECC	WI	1/6/99	2/6/99	2	KU	2/6/99	2/6/99	1	3
2	Khet Pravet	ECC	WI	3/6/99	3/6/99	1	KU	7/6/99	7/6/99	1	2
3	Khet Klong Toei	ECC	PR	3/6/99	7/6/99	5	KU	7/6/99	7/6/99	1	6
4	Cha um Hospital	ARU	AT	21/1/99	23/1/99	3	SA	23/1/99	28/1/99	6	9
5	Rachanavee Samosorn	ARU	PR	21/1/99	28/1/99	8	SA	1/2/99	3/2/99	3	11
6	Rachaborikanukrao School	ARU	SA	25/3/99	NA	NA	NA	NA	NA	NA	-
7	College of General Technical Ratchaburi	ARU	SA	25/3/99	NA	NA	NA	NA	NA	NA	-
8	Pathum Thani Metropolis Land Office	RAN	SA	16/2/99	17/2/99	2	SA	17/2/99	18/2/99	2	4
9	Sara Buri Metropolis Land Office	RAN	WI	22/2/99	23/2/99	2	SA	22/2/99	23/2/99	2	4
10	Sara Buri Wittayakom 1 school	RAN	NA	NA	NA	NA	NA	NA	NA	NA	-
11	Sara Buri Technical College	RAN	SA	NA	7/4/99	NA	NA	NA	NA	NA	-
12	Naval Construction Department	PSA	NA	NA	NA	NA	NA	NA	NA	NA	-
13	Chai Nat Agriculture and Technology College	PSA	NA	NA	NA	NA	NA	NA	NA	NA	-
14	Nong Chang Hospital	PSA	SA	7/3/99	25/3/99	19	NA	NA	NA	NA	-
15	Tup Tun Hospital	PSA	WI	12/2/99	16/2/99	5	SA	16/2/99	17/2/99	2	7
16	Boromrachininarch Ratcha Wittayalai School	ARU	NA	NA	NA	NA	NA	NA	NA	NA	-
17	Ratchaburi Nursing College	ARU	NA	NA	NA	NA	NA	NA	NA	NA	-

Table 7-1 The Consumed Time for Reviewing Report in 1999

No	Building	Auditor	Revision 1				Revision 2				Total Days
			Reviser 1	Start	Finish	Days	Reviser 2	Start	Finish	Days	
18	Ratchaburi Agriculture and Technology College	ARU	NA	NA	NA	NA	NA	NA	NA	NA	-
19	Sing Buri Vocational college	RAN	WI	NA	NA	NA	SA	NA	NA	NA	-
20	Inburi Hospital	RAN	PR	NA	NA	NA	SA	NA	NA	NA	-
21	Pathum Thani Technical College	RAN	NA	NA	NA	NA	NA	NA	NA	NA	-
22	Peruk Sa Mata Wittaya School	PLA	SA	NA	NA	NA	SA	4/5/99	7/5/99	4	-
23	Bang Len Hospital	PLA	SA	NA	NA	NA	NA	NA	NA	NA	-
24	Phetchaburi Vocational College	PLA	NA	NA	NA	NA	NA	NA	NA	NA	-
25	Phetchaburi Technical College	PLA	NA	NA	NA	NA	NA	NA	NA	NA	-
26	Phra Nakhon Si Ayutthaya Metropolis Land Office	ITE	PR	9/2/99	15/2/99	7	NA	NA	NA	NA	-
27	Lop Buri Metropolis Land Office	ITE	AT	9/2/99	11/2/99	3	KU	12/2/99	15/2/99	4	7
28	Kok Sumrong Hospital	ITE	PR	25/5/99	NA	NA	NA	NA	NA	NA	-
29	Phra Nakhon Si Ayutthaya Technical College	ITE	NA	NA	NA	NA	NA	NA	NA	NA	-
30	Benjamathep Utit School	FUE	PR	9/2/99	16/2/99	8	AK	17/2/99	18/2/99	2	10
31	Prommanusorn School	FUE	AK	15/3/99	16/3/99	2	NA	NA	NA	NA	-
32	Dairy Farming Promotion Organization (Southern)	FUE	AK	8/4/99	9/4/99	2	NA	NA	NA	NA	-
33	Sam Roi Yod Hospital	FUE	WI	16/3/99	18/3/99	3	AK	18/3/99	19/3/99	2	5
34	College of General Technical Metropolitan	WAT	AK	17/2/99	18/2/99	2	NA	NA	NA	NA	-

Table 7-1 The Consumed Time for Reviewing Report in 1999

No.	Building	Auditor	Revision 1				Revision 2				Total Days
			Reviser 1	Start	Finish	Days	Reviser 2	Start	Finish	Days	
35	Sulk Buri Hospital	WAT	AK	5/3/99	5/3/99	1	WI	5/3/99	8/3/99	4	5
36	Hao Hin Hospital	WAT	AK	10/5/99	11/5/99	2	NA	NA	NA	NA	-
37	Prachuap Khirikhan Technical College	WAT	AK	17/6/99	21/6/99	5	NA	NA	NA	NA	-
38	Wiset Chaichan Hostel	ENE	AK	17/5/99	18/5/99	2	AK	18/5/99	NA	NA	-
39	Department of Land Development Institute	ENE	NA	NA	NA	NA	NA	NA	NA	NA	-
40	Office of the National Economic and Social Development Board	GRE	NA	NA	NA	NA	NA	NA	NA	NA	-
41	Samchuk Ruttanapokaram School	GRE	WI	19/3/99	24/3/99	6	KU	24/3/99	29/3/99	6	12
42	Suphun Buri Vocational College	GRE	PR	26/3/99	29/3/99	4	AT	30/3/99	31/3/99	2	6
43	Suphun Buri Technical College	GRE	WI	8/3/99	19/3/99	12	NA	NA	NA	NA	-
44	Khanjana Nukrao School	EMC	WI	21/1/99	23/1/99	3	AT	23/1/99	8/2/99	17	20
45	The Police station of Kanchanaburi	EMC	WI	21/1/99	23/1/99	3	AT	23/1/99	23/1/99	1	4
46	Kanchanburi Technical College	EMC	NA	NA	NA	NA	AT	29/4/99	30/4/99	2	-
47	Samut Sakhon Metropolis Land Office	EMC	NA	NA	NA	NA	AT	3/5/99	4/5/99	2	-
48	Banna Hospital	CHI	AT	5/4/99	4/5/99	NA	NA	NA	NA	NA	-
49	Nakhonnayok Technical College	CHI	WI	18/5/99	24/5/99	7	NA	NA	NA	NA	-
50	Prajin Rassdorn Umrung School	CHI	WI	23/2/99	2/3/99	8	AT	2/3/99	3/3/99	2	10
51	Prachin Buri Technical College	CHI	AT	17/5/99	21/5/99	5	NA	NA	NA	NA	-

Table 7-1 The Consumed Time for Reviewing Report in 1999

No.	Building	Auditor	Revision 1				Revision 2				Total Days
			Reviser 1	Start	Finish	Days	Reviser 2	Start	Finish	Days	
52	Rayong Metropolis Land Office	IAH	AT	12/2/99	17/2/99	6	KU	17/2/99	17/2/99	1	7
53	Office of the Teacher Civil Service Commission	IAH	AT	NA	26/4/99	NA	PR	26/4/99	27/4/99	2	-
54	Benjamarachutich School	IAH	WI	7/4/99	16/4/99	10	PR	19/4/99	19/4/99	1	11
55	Sriyanusorn School	IAH	AT	1/4/99	9/4/99	9	NA	NA	NA	NA	-
56	Naphalai Hospital	PLA	NA	NA	NA	NA	NA	NA	NA	NA	-
57	School of King Bhumipol College	PLA	NA	NA	NA	NA	NA	NA	NA	NA	-
58	Sumut Songkhram Technical College	EMC	PR	19/5/99	21/9/99	3	NA	NA	NA	NA	-
59	Bor Rai Hospital	IAH	PR	17/5/99	17/5/99	1	NA	NA	NA	NA	-
60	Trat Technical College	IAH	PR	24/5/99	26/5/99	3	AT	26/5/99	28/5/99	3	6
61	Naval Transportation Department	GRE	PR	NA	NA	NA	NA	NA	NA	NA	-
62	Bang Pa Kong Hospital	GRE	AT	17/5/99	21/5/99	5	NA	NA	NA	NA	-
63	Chachoengsao Technical College	GRE	AT	29/5/99	8/6/99	11	NA	NA	NA	NA	-
64	Benja Rach Rungsrit School	GRE	AK	18/5/99	20/5/99	3	NA	NA	NA	NA	-
65	Office of the Board of Investment in East and South Coarse	ECC	PR	3/2/99	4/2/99	2	NA	NA	NA	NA	-
66	Naval Welfare Department	ECC	NA	NA	NA	NA	NA	NA	NA	NA	-
67	The Revenue Khet 8	ECC	WI	12/4/99	16/4/99	5	KU	17/4/99	19/4/99	3	8
68	Khet Suan Luang	ECC	PR	27/4/99	28/4/99	2	KU	29/4/99	1/5/99	3	5

Table 7-1 The Consumed Time for Reviewing Report in 1999

No.	Building	Auditor	Revision 1				Revision 2				Total Days	
			Reviser 1	Start	Finish	Days	Reviser 2	Start	Finish	Days		
69	Satri Wittaya School	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	
70	National Intelligence Agency	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	
Total					192						79	162
Average					4.8						3.1	7.3

Abbreviation Description of Reviewer

KU: Kua-anan Tachato
 SA: Sanguan Salee
 AK: Akkchai Thitiwitayakul
 IT: Itisak Maomesam
 WI: Wichean Chompatana
 PR: Prapas Pojana

Abbreton Description of Auditor

ECC: Energy Conservation Centre of Thailand
 ARU: Arunchaiseri consulting Engineers Company Limited
 RAN: Rangsit University
 EMC: Energy Management and Consultant Company Limited
 GRE: Green Energy Company Limited
 IAN: I.A. Holding Company Limited
 PSA: Psat Engineering Company Limited
 PLA: Plan Engineering Company Limited
 ITE: ITEM Company Limited
 PUE: FUEAMGSIRI Engineering Company Limited
 WAT: Watt Consultant Company Limited
 CHI: Chin Siam Company Limited

Abbreviation Description

NA: Not Available

Table 7-2 The frequency of the mistake from 50 energy audit report reviewing

No	Mistake	Item Location	Frequency before implemented the standard format	Frequency after implemented the standard format
116	cost of special reflector luminary	Appendix E	5	2
117	list in the potential of energy conservation	4	7	0
118	payback period and EIRR in the air conditioning system	5	26	7
119	payback period and EIRR of each measures in the lighting system	5	28	10
120	payback period and EIRR in the lighting system	5	28	8
121	the column of saving	5	4	1
122	scope of labor cost in air conditioning system	5	34	9
123	scope of material cost in air conditioning system	5	34	12
124	scope of labor cost in air lighting system	5	32	12
125	scope of material cost in lighting system	5	32	12
126	scope of material cost in building	5	32	12
127	the word of the cost of investment	5	2	0
128	the detail of the lighting system improvement	5	1	0
129	payback period for air conditioner	5.1	7	2
130	remark of the table of the list in the new air conditioner	5.1	6	1
131	table of the new air conditioner	5.1	4	1
132	the remark of the table of the new air conditioner	5.1	1	0
133	the simulation lux in the table of new reflector luminary	5.2	19	7
134	the existing lux in the table of new reflector luminary	5.2	1	0
135	actual load of transformer	A.1.2	1	1
136	picture of the switching device	A.1.3	2	0
137	number of audited air conditioner	A.2	22	6
138	data from the EER calculation	A.2.2	13	3

Table 7-2 The frequency of the mistake from 50 energy audit report reviewing

No	Mistake	Item Location	Frequency before implemented the standard format	Frequency after implemented the standard format
93	finishing and miscelleneouse cost for insulating measures	3.1.4	14	11
94	flat area for real ceramic coating	3.1.5	11	2
95	area for real ceramic coating	improvement drawing	14	4
96	color of ceramic coating	3.1.5	2	0
97	area for saving calculation in the ceramic coating measures	3.1.5	12	3
98	drain area for real ceramic coating	3.1.5	1	0
99	area for ceramic coating	3.1.5	11	3
100	type of calculation in the software for lighting simulation	3.2.1	3	0
101	meaning of saving in compact fluoesent measures	3.2.1	2	0
102	type of new fluoesent	3.2.1	6	1
103	lifetime of fluoesent in education institute	3.2.1	1	0
104	EIRR in new fluoesent measures	3.2.1	9	1
105	the replacement of the existing reflector luminary	3.2.2	4	1
106	saving from changing 32 watt to 12 watt luminary	3.2.2	20	5
107	the complete set of new luminary	3.2.2	5	2
108	the hanging of the luminary	3.2.2	1	0
109	the size of new luminary	3.2.2	10	0
110	new lay out of the lighting system	improvement drawing	18	2
111	formullar for saving calculation from new reflector luminary measures	3.2.2	27	5
112	the illumination on the working plane	Appendix E	10	2
113	miscellaneous of the reflector luminare retrofitting	Appendix E	8	4
114	labor cost for the lamp replacement	Appendix E	6	1
115	the finishing cost for reflector luminary retrofitting	Appendix E	7	1

Table 7-2 The frequency of the mistake from 50 energy audit report reviewing

No	Mistake	Item Location	Frequency before implemented the standard format	Frequency after implemented the standard format
70	source of water using	2.3	1	0
71	cost of existing air conditioner removing	3.1.2	4	1
72	example of saving calculation from air conditioner	3.1.2	19	4
73	operating factor of air conditioning system	3.1.2	25	6
74	fomular of saving calculation from air conditioner	3.1.2	22	12
75	energy consumption (kw/ton) for saving calculation from thermostat	3.1.2	18	7
76	Btu for calculation in air conditioning measures	3.1.2	26	11
77	saving from air conditioning system	3.1.2	21	11
78	cost of investment for air conditioning system retrofitting	3.1.2	23	5
79	area of glass for film coating	3.1.3	20	4
80	area for saving calculation in film coating measures	3.1.3	14	2
81	hours for saving calculation in film cocting measures	3.1.3	4	1
82	energy consumption (kW/ton) for saving calculation in film coating measures	3.1.3	2	0
83	reflectance of new film coating	3.1.3	6	1
84	cost of investment for film coating	3.1.3	6	1
85	area for real film coating	3.1.3	16	10
86	existing film removing	3.1.3	2	0
87	EIRR for film coating measures	3.1.3	12	8
88	area for RTTV calculation	3.1.4	7	0
89	sequence of measures of ceramic coating and insulating	3.1.4	24	7
90	the appropriate of the ceramic coating and insulating	3.1.4	24	7
91	kW/ton for saving calculation in the insulating measures	3.1.4	8	4
92	area for real insulating	improvement drawing	20	2

Table 7-2 The frequency of the mistake from 50 energy audit report reviewing

No	Mistake	Item Location	Frequency before implemented the standard format	Frequency after implemented the standard format
47	characteristic of building	1.2	16	5
48	name of building in the detail of opaque wall	1.2.1	27	11
49	color of opaque wall	1.2.1	7	2
50	material of opaque wall	1.2.1	5	1
51	type of transparent wall	1.2.2	10	7
52	type of overhang	1.2.2	6	2
53	type of roof	1.2.3	4	2
54	the area proportion of the transparent wall to the overall wall of each side	1.2.4	13	6
55	picture of building	1.3	14	7
56	peak load	2.1	5	2
57	data of transformer	2.1	4	0
58	using energy in building	2.1	2	0
59	proportion of the energy in each system	2.2	38	11
60	name of building in the energy using of air conditioning system	2.2.3	25	10
61	number of table of air conditioning system	2.2.3	17	4
62	air conditioning system index from auditing	2.2.3	9	1
63	summary table of the air conditioning system	2.2.3	6	1
64	summary data of the air conditioning system	2.2.3	8	2
65	the energy using per year	2.2.3	2	2
66	the age of air conditioner	2.2.3	6	0
67	lighting system index	2.2.4	27	11
68	the loss from ballast	2.2.4	9	2
69	water using index	2.3	1	0

Table 7-2 The frequency of the mistake from 50 energy audit report reviewing

No	Mistake	Item Location	Frequency before implemented the standard format	Frequency after implemented the standard format
24	data of lighting system at 100% operating	comparison table before and after lighting improvement	23	4
25	total saving from all energy conservation measures	abstract	41	20
26	total cost of investment	abstract	39	13
27	name of air conditioner retrofitting measure	abstract	4	0
28	The completion of measures	abstract	19	0
29	cost of investment for lighting systems	abstract	21	10
30	saving from lighting system improvement	abstract	19	9
31	EIRR of lighting system improvement	abstract	21	10
32	cost, saving, and EIRR of the luminary increasing	abstract	27	11
33	value of improved OTTV	abstract	18	7
34	value of OTTV and RTTV	abstract	13	4
35	value of improved RTTV	abstract	16	7
36	name of electronic thermostat in the content	content	4	0
37	list of energy conservation plan	content	19	5
38	budget of improvement for heating system	content	12	2
39	sequence of improvement in the energy audit report	content	19	10
40	sequence of existing luminary picture	content	11	3
41	the software for OTTV and RTTV calculation	content	21	6
42	the completion of the data for the energy conservation in government or stated-owned building	content	1	0
43	input of OTTV and RTTV	content	3	0
44	the long distance telephone code	1.1	21	8
45	number of bed for patient	1.1	12	2
46	the title of the cooperater	1.1	2	0

Table 7-2 The frequency of the mistake from: 50 energy audit report reviewing

No	Mistake	Item location	Frequency before implemented the standard format	Frequency after implemented the standard format
1	factor F (overhead profit)	bill of quantity	8	0
2	lifetime of the equipment	3	10	4
3	size of new air conditioner	bill of quantity	14	8
4	lumen per lamp in easylux program	3	7	1
5	sequence of the report	content	11	2
6	sequence of improvement drawing	improvement drawing	22	5
7	cover of the improvement drawing	improvement drawing	7	0
8	detail drawing	improvement drawing	5	0
9	name of system and room in the heading block of the improvement drawing	improvement drawing	11	5
10	signature of the engineer in the improvement drawing	improvement drawing	20	6
11	symbol of air conditioning system	improvement drawing	6	1
12	symbol of lighting system	improvement drawing	14	4
13	software for improvement drawing	improvement drawing	1	0
14	scale of the improvement drawing	improvement drawing	5	2
15	name of building and contract number	cover	1	0
16	improved lighting index	Technical data table	6	3
17	obstacle of roof and glass improvement	Technical data table	17	6
18	cost of investment from all energy conservation measures	bill of quantity	43	20
19	finishing cost	bill of quantity	28	3
20	material cost and labor cost conclusion	bill of quantity	9	1
21	electrical phase of air conditioner	bill of quantity	26	5
22	list of new air conditioner	bill of quantity	14	3
23	data of lighting system at percent of real operating	comparison table before and after lighting improvement	23	4