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**FROM COMFORT TO KILOWATTS:
AN INTEGRATED ASSESSMENT OF ELECTRICITY CONSERVATION
IN THAILAND'S COMMERCIAL SECTOR**
(Doctoral Dissertation)†

Volume 2: Technical Appendix

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DRAFT THERMAL COMFORT SURVEYGeneral Information for Respondents:

We are working as part of a research project with King Monkut's Institute of Technology, Thonburi and the University of California, Berkeley (USA) to determine how people respond to the thermal environment inside buildings. We have prepared a short questionnaire which we hope you will take the time to fill out. After you have filled out the questionnaire form, we will taking some measurements of the environment close to your work area. The whole process should take less than 15 minutes.

Our plan is to survey each building during each of three seasons over this year (e.g. hot, rainy, and cool seasons), so you may be approached to fill out the questionnaire again in a few months. Please understand that your participation is entirely voluntary and that your reponses are anonymous and strictly confidential. Thank you for taking part in our study.

Please read each item carefully and mark your responses clearly.

===== OFFICE USE ONLY =====

Name of person administering the survey:

Building:

Date:

Time:

I. Subjective Responses:

1. Rate how you feel **at this moment** by marking an "X" at any tick mark along the scale shown below:

2. Right now I would like to be:

Warmer

No Change (circle one)

Cooler

3. Rate how comfortable your office work area is **RIGHT NOW** in terms of air movement by marking an "X" at any tick mark along the scale below.

4. Rate how comfortable your office work area is **RIGHT NOW** in terms of humidity by marking an "X" at any tick mark along the scale below.

-----|-----|-----|-----|-----|-----|-----|
parched too slightly just slightly too moist
 dry dry right humid humid

5. What do you do when you are too warm here in the office?

6. What do you do when you are too cool here in the office?

II. Activity Responses:

7. Please put an "X" in the box next to the most appropriate answer to each question, within the last 15 minutes.....

a) Have you eaten a snack or meal? YES [] NO []

b) Have you drunk anything.....

HOT? YES [] NO []

COLD? YES [] NO []

CAFFEINATED? YES [] NO []

c) Have you smoked a cigarette? YES [] NO []

III. Clothing Responses:

8. Please circle any items from the list below which you are NOW wearing.

WOMEN

lightweight blouse
warm blouse
pullover
light sweater
heavy sweater
jacket
light long skirt
heavy long skirt
light short skirt
heavy short skirt

light long dress
heavy long dress
light short dress
heavy short dress

half slip
full slip
stockings
socks
shoes
briefs
other _____

MEN

short-sleeve shirt
long-sleeve shirt
vest
light thin sweater
heavy sweater
jacket
light thin pants
heavy pants
socks
shoes
undershirt
briefs
other _____

IV. Demographics

Please tell us a little about yourself by answering the following questions.

9. Name (optional) _____

10. Age _____

11. Sex MALE ☐ FEMALE ☐

12. Job Position _____

13. Is your office air-conditioned?
 YES ☐ NO ☐

14. Do you use air-conditioning in your home?
 YES ☐ NO ☐

15. How would you rate your own sensitivity to temperature
compared to the average person?
 MORE ☐ LESS ☐ SAME ☐

16. How would you rate your own sensitivity to air movement
compared to the average person?
 MORE ☐ LESS ☐ SAME ☐

17. How would you rate your own sensitivity to humidity
compared to the average person?
 MORE ☐ LESS ☐ SAME ☐

18. Is there anything else you would like to tell us about
the thermal comfort of your office area?

A-7

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เรื่อง ขอความร่วมมือสำรวจโครงการวิจัย

เรียน ผู้ใช้อาคาร

ถึงที่สมรท้าว แบบสำรวจโครงการวิจัยสำรวจความรู้สึกของผู้ใช้สอยอาคารต่อภาวะ
ความร้อนของอากาศ ในอาคาร จำนวน 1 ชุด

ตามที่โครงการวิจัยอาเซียน-ยูเนสโก สถาบันเทคโนโลยีพระจอมเกล้าธนบุรี
ร่วมกับมหาวิทยาลัยแห่งแคลิฟอร์เนีย ณ เมือง เบิร์กลีย์ ประเทศสหรัฐอเมริกา ได้จัดทำ
โครงการสำรวจความรู้สึกของผู้ใช้สอยอาคารต่อภาวะความร้อนของอากาศในอาคาร
โดยที่แผนงานวิจัยจะทำการสำรวจในอาคารในแต่ละฤดู (ฤดูร้อน, ฤดูฝนและฤดูหนาว)
ระยะเวลา 1 ปี เพื่อเป็นข้อมูลสำหรับแนวทางการประหยัดพลังงาน นั้น

โครงการวิจัยอาเซียน-ยูเนสโก สถาบันเทคโนโลยีพระจอมเกล้าธนบุรี จึงใคร่
ขอความร่วมมือจากท่านในการตอบคำถามเหล่านี้ด้วยความสมัครใจของท่านเอง และ
โครงการวิจัยฯ ถือว่าค่าตอบแทนของท่านเป็นความลับ

จึงเรียนมาเพื่อโปรดทราบ และหวังเป็นอย่างยิ่งว่าจะได้รับความ
ร่วมมือจากท่านเป็นอย่างดี จึงขอโอกาสขอขอบคุณมา ณ ที่นี้ด้วย

ขอแสดงความนับถือ

ร. ๖๖.๖๖.๖๖

(รศ. ดร. เพ็ญศรี หังสพฤกษ์)

หัวหน้าโครงการวิจัยฯ

=====สำหรับเจ้าหน้าที่เท่านั้น=====

ชื่อผู้ทำการสำรวจ

อาคาร

วันที่

เวลา

หมายเลข

I. คำตอบเกี่ยวกับความคิดเห็นของผู้ตอบ

1. โปรดทำเครื่องหมาย "x" บนขีดที่สอดคล้องกับความรู้สึกของท่านในขณะนี้

-3	-2	-1	0	1	2	3
หนาว มาก	หนาว	หนาวเล็กน้อย	กลาง	ร้อนเล็กน้อย	ร้อน	ร้อน มาก

2. ในขณะนี้ท่านอยากจะให้สภาพของอากาศ (วงกลมคำตอบข้อใดข้อหนึ่ง)

ร้อนขึ้น

ไม่เปลี่ยนแปลง

เย็นลง

3. โปรดระบุถึงความสบายในท้องทางานเกี่ยวกับเรื่องของการเคลื่อนไหวของอากาศ
โดยทำเครื่องหมาย "x" บนขีดที่สอดคล้องกับความรู้สึกของท่านในขณะนี้

-3	-2	-1	0	1	2	3
อากาศ เย็นมาก	อากาศเย็น	อากาศเย็นเล็กน้อย	กำลังพอดี	อากาศ เคลื่อนเล็กน้อย	อากาศ เคลื่อน	อากาศ เคลื่อนมาก

4. โปรดระบุถึงความรู้สึกสบายใจในห้องทำงานเกี่ยวกับเรื่องความชื้นของอากาศโดยทำเครื่องหมาย "x" บนขีดที่สอดคล้องกับความรู้สึกของท่านในขณะนี้

5. ท่านหาอย่างไรเมื่อท่านรู้สึกว่ที่ทำงานของท่านร้อนเกินไป

.....

.....

.....

6. ท่านหาอย่างไรเมื่อท่านรู้สึกว่ที่ทำงานของท่านหนาวเกินไป

.....

.....

.....

11. คำตอบเกี่ยวกับกิจกรรมของผู้สอยอาคาร

โปรดทำเครื่องหมาย "x" ในช่องหลังคำตอบที่เหมาะสมที่สุดของคุณ ในแถวต่อไปนี้
ในช่วงเวลา 15 นาที ที่ผ่านมา ท่านได้ทำอะไรบ้างในต่อไปนี้

ก) ท่านได้รับประทานอาหารของว่างหรืออาหารหรือไม่?

ได้รับประทานอาหาร ☐

ไม่ได้รับประทานอาหาร ☐

ข) ท่านได้ดื่มเครื่องดื่มร้อนหรือไม่?

ได้ดื่ม ☐

ไม่ได้ดื่ม ☐

จ) ท่านได้ดื่มเครื่องดื่มเย็นหรือไม่?

ได้ดื่ม ☐

ไม่ได้ดื่ม ☐

ด) ท่านได้ดื่มเครื่องดื่มที่มีสารคาเฟอีน เช่น น้ำชา, กาแฟ, โคล่า ฯลฯ

ได้ดื่ม ☐

ไม่ได้ดื่ม ☐

ฉ) ท่านได้สูบบุหรี่หรือไม่?

ได้สูบ ☐

ไม่ได้สูบ ☐

III. คำตอบเกี่ยวกับเสื้อผ้าที่ใช้

โปรดทำเครื่องหมายวงกลมรอบรายการใด ๆ จากรายการที่แสดงไว้ข้างล่าง ซึ่งท่านกำลังสวมใส่อยู่ขณะนี้ โปรดดูรายการทั้งหมดก่อนตอบ

สุภาพสตรี

เสื้อขาว
เสื้อหนา
เสื้อยืค
เสื้อเสวตเตอร์บาง
เสื้อเสวตเตอร์หนา
เสื้อแจ็กเก็ต
เสื้อหนาว อื่น ๆ
กระโปรงยาวบาง
กระโปรงยาวหนา
กระโปรงสั้นบาง
กระโปรงสั้นหนา
เสื้อกระโปรงยาวบาง
เสื้อกระโปรงยาวหนา
เสื้อกระโปรงชุดสั้นบาง
เสื้อกระโปรงชุดสั้นหนา
สลิคเส้น
สลิคยาว
ถุงนอน
ถุงเท้า
รองเท้า
อื่น ๆ (โปรดระบุ)

สุภาพบุรุษ

เสื้อเชิ้ตแขนสั้น
เสื้อเชิ้ตแขนยาว
เสื้อซาฟารี
เสื้อพระราชทาน
เสื้อกั๊ก
เสื้อเสวตเตอร์บาง
เสื้อเสวตเตอร์หนา
เสื้อนอก
เสื้อแจ็กเก็ต
กางเกงขาสั้น
กางเกงขาสั้นยาวหนา
ถุงเท้า
รองเท้า
เสื้อชั้นใน
อื่น ๆ (โปรดระบุ)

IV ข้อมูลเกี่ยวกับตัวท่านผู้ตอบคำถาม

โปรดให้ข้อมูลเล็กน้อยเกี่ยวกับตัวท่านโดยตอบคำถามต่อไปนี้

1. ชื่อ (แล้วแต่ความสมัครใจ)
2. อายุ (ปี)
3. เพศ ชาย ☐ หญิง ☐
4. ตำแหน่ง (ก.ก.)
5. สถานะ (ข.ม.)
6. ตำแหน่งการงาน
 เจ้าหน้าที่ ☐ ผู้บริหารระดับรอง ☐ ผู้บริหารระดับสูง ☐
7. การศึกษาสูงสุด
 มัธยมศึกษา หรือประกาศนียบัตรวิชาชีพ ☐
 ปริญญาตรี ☐ ปริญญาโทและเอก ☐
8. สถานที่ทำงานอยู่ประจำมีเครื่องปรับอากาศหรือไม่
 มี ☐ ไม่มี ☐
9. ท่านใช้เครื่องปรับอากาศในบ้านของท่านหรือไม่
 ใช้เพียงเล็กน้อย ☐ ใช้เพียงบางเวลา ☐
 ใช้ตลอดเวลาที่อยู่บ้าน ☐ ไม่ใช้ ☐

18. ท่านคิดว่าท่านมีความรู้สึกที่ไวต่ออุณหภูมิมากน้อยเพียงใด เมื่อเปรียบเทียบกับคน
 รอยเฉลี่ยทั่ว ๆ ไป

น้อยกว่า [] พอ ๆ กัน [] มากกว่า []

19. ท่านคิดว่าท่านมีความรู้สึกที่ไวต่อการเคลื่อนไหวของอากาศมากน้อยเพียงใดเมื่อ
 เปรียบเทียบกับคนรอยเฉลี่ยทั่ว ๆ ไป

น้อยกว่า [] พอ ๆ กัน [] มากกว่า []

20. ท่านคิดว่าท่านมีความรู้สึกที่ไวต่อความชื้นมากน้อยเพียงใด เมื่อเปรียบเทียบกับ
 คนรอยเฉลี่ยทั่ว ๆ ไป

น้อยกว่า [] พอ ๆ กัน [] มากกว่า []

21. ยังมีข้อมูลสิ่งใดที่ท่านอยากจะแจ้งให้ทราบเกี่ยวกับภาวะของอากาศ ที่คน
 จะรู้สึกสบายของสถานที่ทำงานของท่านหรือไม่ (โปรดคำอธิบายละเอียด)

.....

Structure of Comfort Database Survey Questionnaire Data (COMFQUES.DBF)				
Number	Field Name	Type	Width	Decimal
1	ID	Character	5	
2	DATE	Date	8	
3	TIME	Character	4	
4	BLDG	Character	20	
5	SURVEYOR	Character	15	
6	ASHRAE	Numeric	4	1
7	MCINTYRE	Numeric	2	
8	AIRFLO_SCL	Numeric	2	
9	HUMID_SCL	Numeric	2	
10	TOO_WARM	Memo	10	
11	TOO_COOL	Memo	10	
12	EAT	Numeric	1	
13	HOT_DRINK	Numeric	1	
14	COLD_DRINK	Numeric	1	
15	CAFFEINE	Numeric	1	
16	SMOKE	Numeric	1	
17	MET	Numeric	5	1
18	CLOTHING	Memo	10	
19	CLO	Numeric	5	2
20	NAME	Character	15	
21	AGE	Numeric	2	
22	SEX	Numeric	1	
23	WEIGHT	Numeric	3	
24	HEIGHT	Numeric	3	
25	POSITION	Numeric	1	
26	EDUCATION	Numeric	1	
27	OFFICE_AC	Numeric	1	
28	HOME_AC	Numeric	1	
29	TEMP_SENS	Numeric	2	
30	WIND_SENS	Numeric	2	
31	HUMID_SENS	Numeric	2	
32	COMMENTS	Memo	10	

Structure of Comfort Database Physical Measurements Data (COMFMEAS.DBF)				
Number	Field Name	Type	Width	Decimal
1	ID	Character	5	
2	Date	8		
3	Time	Character	5	
4	BLDG	Character	20	
5	AIR_SPEED	Numeric	5	2
6	T_DB	Numeric	5	1
7	T_GLOBE	Numeric	5	1
8	REL_HUMID	Numeric	5	1
9	T_OUT_AVG	Numeric	5	1
10	T_OUT_HI	Numeric	5	1

Structure of Comfort Database Calculated Indices (COMFANAL.DBF)				
Number	Field Name	Type	Width	Decimal
1	ID	Character	5	
2	VAPOR_PRE	Numeric	6	2
3	MRT	Numeric	6	2
4	ET_STAR	Numeric	6	2
5	SET_STAR	Numeric	6	2
6	DISC	Numeric	6	2
7	TSENS	Numeric	6	2
8	PMV_GAGGE	Numeric	6	2
9	PMV_STAR	Numeric	6	2
10	HSI	Numeric	6	2
11	PMV_FANGER	Numeric	6	2
12	PPD_FANGER	Numeric	6	2

Structure of Comfort Database Combination of Survey, Measurements, and Indices (COMFSTAT.DBF)				
Number	Field Name	Type	Width	Decimal
1	ID	Character	5	
2	ASHRAE	Numeric	4	1
3	MCINTYRE	Numeric	2	
4	AIRFLO_SCL	Numeric	2	
5	HUMID_SCL	Numeric	2	
6	CLO	Numeric	5	2
7	AGE	Numeric	2	
8	SEX	Numeric	1	
9	POSITION	Numeric	1	
10	EDUCATION	Numeric	1	
11	OFFICE_AC	Numeric	1	
12	HOME_AC	Numeric	1	
13	TEMP_SENS	Numeric	2	
14	WIND_SENS	Numeric	2	
15	HUMID_SENS	Numeric	2	
16	AIR_SPEED	Numeric	5	2
17	T_DB	Numeric	5	1
18	T_OUT_AVG	Numeric	5	1
19	T_OUT_HI	Numeric	5	1
20	VAPOR_PRE	Numeric	6	2
21	MRT	Numeric	6	2
22	ET_STAR	Numeric	6	2
23	SET_STAR	Numeric	6	2
24	DISC	Numeric	6	2
25	TSENS	Numeric	6	2
26	PMV_GAGGE	Numeric	6	2
27	PMV_STAR	Numeric	6	2
28	HSI	Numeric	6	2
29	PMV_FANGER	Numeric	6	2
30	PPD_FANGER	Numeric	6	2

J. BUSCH

26 July 1988

**A FIELD MANUAL:
PROCEDURES FOR THAI THERMAL COMFORT SURVEY**

John F. Busch
Energy & Resources Group
University of California, Berkeley

INTRODUCTION

This manual is intended to serve as a guide for the field assistants in our field survey of thermal comfort in Thai office environments. In here we explain the most important procedures to follow while collecting the measured data, handing out the questionnaires, and processing the data afterwards.

Special Precautions

- o One of our instruments, the Kurz 430DC hot-wire anemometer, is rather fragile and expensive, and there is no equipment available in Thailand to replace it if it does break. Hence, it is very important that you be careful not to bump the tip of the instrument up against anything. We suggest that when finished taking a measurement, that you put the red protective cap back on the tip.
- o Research on the psychology of questionnaire-taking has shown that the subject often will answer a question to please the surveyor if they can figure out what is the "right" answer. For this reason it is extremely important that you don't say anything that will influence their choices to any questions. We have tried to make the questions self-explanatory and it is better if you just politely decline to give guidance unless the question they have is purely mechanical in nature, such as, "Should I only put the 'x' on the tick mark (e.g. the '|' on the scale)?" The answer to that one is yes, by the way. Besides, there are no "right" or "wrong" answers in our survey, only opinions.

MORNING EQUIPMENT SET-UP

- o Retrieve the Data Acquisition System (DAS) box from the place where it is stored in the building.

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Unplug the battery charger from the wall and disconnect the leads to the battery. Check the voltage of the battery and make sure that it is above 12 volts. If not, proceed anyway, but contact John Busch as soon as possible so that it can be replaced. Also check that the water level in the battery is sufficient and refill with the bottle of distilled water to the upper level line if not.

- o Then connect the leads of the Kurz 430DC to the battery: RED connects to "+"; GREEN connects to "-". Slightly tighten the terminals with the screw driver.
- o Next check the clock on the Campbell Scientific 21 datalogger (CR21). First press "* 5 A A". The number occupying the 2 far right columns is the hour. If it is okay, then simply press "A". If it is wrong, then enter the correct hour and press "A". The number now showing in the two far-right columns is the minute. If it is okay, then press "A". If it is wrong, then enter the correct minute and press "A".
- o Now start the CR21 logging data by pressing "* 0". It is best to leave the CR21 in this mode while collecting data. You will know that it is in this mode because the display will show: "99:HHMM", where the "99" means that the CR21 is logging data and the time of day is displayed in hours (i.e. HH) and in minutes (MM).
- o Put a fresh tape into the tape player. Make sure the TAPE SPEED switch is "OFF". Advance the tape a few revolutions to get to the recordable portion. Now make the connections from the SC235 adapter mounted on top of the CR21 to the tape player: the small jack goes into the hole marked "REMOTE"; the large jack goes into the hole marked "MIC". Set the VOLUME control to about 6. Set the counter to "000" on the tape player. Press the record button on the side of the tape player by pressing both the red and large black buttons together. Remember, the tape will not advance right away because it is being controlled by the CR21.
- o Check to make sure that you have enough survey forms for the next two days (~100). If not, contact John Busch to copy more.

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- o Now you are ready to go out and collect some data!

COLLECTING DATA

It is envisioned that the data will be collected in teams of two or three people. For these people, there are two basic roles. The surveyor distributes our questionnaire to the office workers, and the measurer takes the physical measurements of the environment at the workers' desks. These tasks are described below.

Distributing the Questionnaires

- o It is the responsibility of the surveyor (i.e. the person handing out the questionnaires) to the people who will participate in the study. We are trying to get a representative sample of Thai office workers to participate in our survey. We want a balance of ages, sexes, job positions, and locations within the buildings. Therefore, try to get older and younger people, men and women, lower and higher level workers, and people seated in different parts of the rooms.
- o Because we are not measuring the metabolism of our subjects, it is very important that they have been sitting at their desk before they are given the questionnaire. Therefore the surveyor is responsible for asking each person whether they have been sitting in their present location for at least 15 minutes, and only after getting a positive reply is the survey to be handed to them. Please also ask the subject to fill out the form or at least the first two pages of the form before they leave their desk otherwise we can't use their responses.
- o The surveyor should fill out the bottom portion of the front page of the questionnaire prior to handing it out. He or she should put their own name, the name of the building, the date, the time that the physical measurements start (see below), and the code number of the subject. The code number consists of two letters followed by three digits. The first letter is the code for the building: "P" for pilot study at KMIT; "T" for Thai Farmer's Bank; "S" for Sathorn Thani; "M" for the Ministry of Science, Technology, and Energy; "D" for the Dept. of Science Services. The second

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letter is the season: "H" for hot season; "W" for wet season; "C" for cool season. The three digits are chosen by the surveyor, numbered sequentially. So the first person studied in the pilot study was coded "PH001", and so on.

- o While the subject is answering the questions, it is best if you are not standing over them--you might make them nervous! Also, if their friends are looking over their shoulder offering advice, mention that we are seeking individual responses to the questions, not group responses.
- o Because it generally takes people longer to answer the questionnaire than it takes to do the measurements, the surveyor should watch the progress of the respondents and start a new subject answering the questionnaire before the last one has finished. The surveyor should take care not get too far ahead of the measurer, though as well.
- o After the subject has completed the questionnaire, the surveyor should check through it and confirm that he or she has answered all of the questions in the proper manner. If there are any irregularities it is best to bring them to the attention of the subject right away and get them to complete it then.

Taking Physical Measurements

- o The DAS box should be rested as close to the spot on the desk in front of where the person has been sitting and working.
- o Wait for about one minute for the sensors to respond to the conditions in the new spot.
- o On the keyboard of the CR21 press "* D", followed by the code number (without the letters) of the subject being surveyed, and finally press "A". This code number should be verified each time with the surveyor so that there is no confusion. You will then see the data flash across the CR21 display. If not, just press "A" again. Sometimes it is hard to get the attention of the CR21, such as when there is data flashing across the screen en route to internal storage or to tape. Just keep hitting the "*" until you get all zeros on the display, then do as above. Some data will

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then flashed by the display and should return to the data logging mode again.

- o Then pull the cap off of the anemometer tip and position it in the air stream at chest level of the subject (or where it was if they have left). Try to get the slot at the tip of the Kurz 430DC into the path of the flow of air that is impinging on the subject. It is not always so easy because the flow can be slight and it is generally turbulent, but do the best you can. There is a thread taped to the Kurz 430DC to help determine the direction of flow.
- o Tell the surveyor the time that you begin the measurements (from the display on the CR21; remember 99:HHMM) for them to write down on the bottom of the front page of the questionnaire. (The "* D" procedure puts a time stamp in the measured data file and that is used with the time written on the questionnaire to match up the two data sets).
- o Continue to take measurements here for at least 4 minutes.
- o At the end of 4 minutes put the cap back on the anemometer tip and move the DAS box out of the way and on to the next subject.
- o The measurer should watch the progress of the tape in the tape player because at some point in the day they will have to flip the tape over. A safe procedure is to flip the tape after lunch before starting the afternoon measurements. Follow the procedure below for dumping the data in the CR21 memory to the tape before flipping it over (so that you don't lose any data should it try to send it to the tape player while you are flipping it). IMPORTANT: press "* 0" when finished flipping the tape.

EVENING EQUIPMENT BREAK-DOWN

- o At the end of each day, the DAS box should be put in a safe room already arranged by John Busch ahead of time.
- o We now want to transfer the data still stored in the CR21 to the tape player. Press "* 8 A" on the CR21 keyboard and wait a few seconds for the tape

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player to be activated. The tape will stop periodically for a moment and resume again so wait until you see the "08" in the ID portion of the CR21 display (i.e. the two far left columns) and the tape no longer runs. Altogether it should take a few minutes to transfer all of the data to the tape. If for some reason you are having trouble getting the data to transfer, DO NOT DISCONNECT THE TAPE PLAYER OR TURN IT OFF, but wait and contact John Busch first. After the data transfer is completed now hit the STOP button on the tape player. **The tape and the tape player should both be taken to the data processing site at the end of each day so that the data can be checked for errors and if necessary, corrective action taken before the next day.**

- o Now disconnect the Kurz 430DC wire leads from the battery. Then connect the two leads from the battery charger to the battery: RED goes to "+"; BLACK goes to "-". Please do not mix these up. Lastly, plug the battery charger into the wall socket.

DATA PROCESSING AND STORAGE

At the end of each day we suggest that the data be processed and checked so that any errors can be quickly detected and corrected, but also so the job doesn't get so huge that we don't want to tackle it! The questionnaire and measured data are each processed differently and are explained in two separate sections below.

Processing Questionnaire Data

- o Code the questionnaire survey forms by marking along the right margin of the form for later key-punching onto the computer. There is a master coding sheet that explains the appropriate codes for each question. Where the subjects have answered questions with a written response in Thai, these answers need to be translated into English. It is not necessary to translate their comments word for word--we only need a general summation of their comments. Usually a summation of 6 or so words suffices. The clothing section requires that you calculate the clo value for each person. This is done by summing the value of the individual garments and using the equations shown

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on the master coding sheet (one each for men and women) and then displaying the result in the lower right corner. Note that undergarments are assumed in the equations already and that neckties do not contribute thermally so they can be ignored. All of this goes quite fast, eventually taking only a few minutes per questionnaire.

- o Enter each day's coded questionnaire survey data into a unique DBASE file using the following procedure. First enter the database program called DBASE by typing "dbase". Make sure the CAPS LOCK key is on. The program normally starts up in ASSIST mode which can be cumbersome for simple tasks like ours, so get out of it by hitting the ESC key. Now we want to create a file for this day's data using a prototype database file called QUESXXX.DBF. Type "USE QUESXXX". Next type "COPY STRU TO QUES---" (filling in the "---" with the Julian date). Then type "USE QUES---". Finally, type "APPEND" and an entry form will appear on the screen and we are ready to start entering data.

Entering the data is straightforward, except for the MEMO fields explained below. MEMO fields can hold a lot of text, so we use them here to store the previously translated summation of comments of the subjects. To enter MEMO data, press the "CTRL PGDN" keys simultaneously. Then type in the comments in English. When finished type the "CTRL W" keys simultaneously and proceed entering the rest of the data. Note that there is no data as yet for the field MET so it should be skipped by hitting the ENTER key. When finished entering data, press the "CTRL END" keys simultaneously to save your work and get back to the command line.

Once the data has been entered, it should be printed out and checked for errors. This is done by typing "REPORT FORM QUES TO FILE QUES---" (where as always the "---" is the Julian date) which creates a print file with a .TXT extensor. Then you get out of DBASE by typing "QUIT" at the command line and enter another program called SIDEWAYS by typing "sideways". Change the size setting on the screen by moving the cursor to that field and hitting the space bar until "Tiny" appears. Then fill in the name of the drive\path of the print file and the name of the file itself (i.e. QUES---.TXT) and hit return and the file

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should start printing. If any errors are found, just get back into DBASE, get out of ASSIST mode by hitting the "ESC" key, type "USE QUES---", type APPEND, then PGUP to the record you want to change and insert the correct data.

Processing Measured Data

- o The measured data first needs to be transferred from the recording tape to computer. This is done using the gold Campbell Scientific A235 interface box which converts the sounds recorded on the tape into numbers. Make the connections between the tape recorder and the A235 with the double jack cord, connecting MONITOR to MONITOR and REMOTE to REMOTE. Then connect the RS232 plug into the TERMINAL outlet on the A235 and the 9-pin end into the communications port on the computer. Make sure the switches on the front of the A235 have the following settings: BPS=1200; PARITY=EVEN; PLAYBACK; POLARITY=NORMAL.

Next, start the communications program CROSSTALK on the computer by typing "xtalk". At the first screen hit ENTER key and then type "1" and hit ENTER. Next turn on the A235 making sure that the switches are set correctly as mentioned above. Make sure that the VOLUME on the tape player is set to 7 or so and that the TAPE SPEED is set to OFF. Press the PLAY button on the tape recorder and then hit "CTRL Q" and wait a few seconds for the data to start scrolling across the screen. When you get to the end of that day's data on that side of the tape, just stop the tape recorder, flip the tape, rewind, and press PLAY again. When all of the data has been played, press "CTRL P" and type "quit" and you will return to MS-DOS on the computer. There will be a new ASCII file called RAWCSXXX.DAT which you rename to RAWCS---.DAT, where as usual the "---" is the Julian date. It is this data which should be sent to John Busch who will do the rest of the measured data processing.

Below is an example of what the data in the RAWCS---.DAT should look like. The 01, 02, 03, 04, 05, 06 are the field numbers, each paired with data to its right. The 0222 associated with the 01 field is an identifier used by a custom FORTRAN program to pick out the 10-second data. The data

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associated with 02 is the air flow data in units of volts. Note that when it is negative is when the cap is over the tip of the sensor. The data associated with the rest of the fields is, respectively, dry-bulb air temperature, globe temperature, reference air temperature for the humidity sensor, and the relative humidity.

You can see the pattern of the data below. Every set of 6 ten-second data packets is followed by a time stamp record indicated by a 0001 in the 01 field and followed by the Julian date and the time in HHMM format. The third line shows what happens when the *D function is used in the measuring process. Instead of the familiar 0222 in the 01 field, is the number of the subject being measured keyed in at his or her desk, followed by the time in the 02 field. The FORTRAN program mentioned above looks for a number different from 0222 to start averaging, so the *D function is very important in processing the data.

```

01 0222. 02 -.038 03 30.95 04 31.01 05 30.52 06 69.72
01 0222. 02 -.038 03 30.89 04 31.01 05 30.64 06 070.0
01 0069. 02 1012. 03 -.036 04 30.89 05 31.01 06 30.83
07 070.1 08
09 0.000
01 0001. 02 0206. 03 1013.
01 0222. 02 -.042 03 30.89 04 31.01 05 30.83 06 69.92
01 0222. 02 1.458 03 30.83 04 31.01 05 30.70 06 69.84
01 0222. 02 0.912 03 30.83 04 31.01 05 30.76 06 69.82
01 0222. 02 0.726 03 30.83 04 31.01 05 30.76 06 69.82
01 0222. 02 1.000 03 30.76 04 31.01 05 30.83 06 69.86
01 0222. 02 0.498 03 30.76 04 30.95 05 30.83 06 69.80
01 0001. 02 0206. 03 1014.
01 0222. 02 0.242 03 30.76 04 30.95 05 30.89 06 69.84
01 0222. 02 0.292 03 30.76 04 30.95 05 30.89 06 69.84
01 0222. 02 0.638 03 30.76 04 30.95 05 30.95 06 69.82
01 0222. 02 0.472 03 30.76 04 31.01 05 30.95 06 69.82
01 0222. 02 0.530 03 30.83 04 31.01 05 30.95 06 69.82
01 0222. 02 0.906 03 30.83 04 31.01 05 31.01 06 69.79
01 0001. 02 0206. 03 1015.

```

- o The RAWCS---.DAT file is processed by a fortran program called CSProg.FOR. This program reads the RAWCSXXX.DAT file, accumulates measurements from each subject and takes averages over a 3 minute period and then prints out two ASCII files, called

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MEASXXX.OUT and CSPRGXXX.ERR. The former file is imported directly into a DBASE file called COMFMEAS.DBF, while the latter file is a list of each subject and the number of ten-second measurements that went into the accumulations for that subject and is used for error checking.

Thus, after processing all of the data from both the questionnaires and the datalogger, there are two DBASE data files for use in analysis: COMFQUES.DBF (and its associated text file COMFQUES.DBT) and COMFMEAS.DBF.

PROGRAMMING THE DATALOGGER

The CR21 datalogger should be left on during the study period because otherwise it needs to be re-programmed if turned off and besides, the batteries last several months. However, if by chance the datalogger is turned off, the following explains the series of keystrokes to use in programming the datalogger. More general and detailed programming information is contained in the CR21 Micrologger Operator's Manual.

You key	The CR21 displays	Comment
*4A	11:0000	Program input table
1A	12:0000	Input program #1 (DC volts)
2A	13:0000	Multiplier for Kurz
.006A	21:0000	Offset for Kurz
7A	22:0000	Input program #7 (Model 101
thermister probe)		
1A	23:0000	Multiplier for DB air
temperature		
A	31:0000	Offset (=zero)
7A	32:0000	Input program #7
1A	33:0000	Multiplier for globe
temperature		
A	41:0000	Offset
7A	42:0000	Input program #7
1A	43:0000	Multiplier for RH sensor
temperature		
A	51:0000	Offset

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8A	52:0000	Input program #8 (Model 201 RH
probe)		
1A	53:0000	Multiplier
A	61:0000	Offset
*1A	03:0000	Program output table
1A	11:0000	One minute output
64A	12:0000	Fast output program
10A	13:0000	10 second output interval
222A	21:0000	Identifier number for fast
output		
51A	22:0000	Output program #51 (averaging)
1A	23:0000	Channel #1
A	31:0000	Skip
51A	32:0000	Output program #51 (averaging)
2A	33:0000	Channel #2
A	41:0000	Skip
51A	42:0000	Output program #51
3A	43:0000	Channel #3
A	51:0000	Skip
51A	52:0000	Output program #51
4A	53:0000	Channel #4
A	61:0000	Skip
51A	62:0000	Output program #51
5A	63:0000	Channel #5
A	71:0000	Skip
*5A	91:0000	Set clock
###	92:0000	Julian date
##	93:0000	Hour (24 hour time)
##	05:	Minute
*0	99:####	Start logging data

Note that the columns of numbers on the right of the colon are all zeros when keying in the program the **first** time. Thereafter, those columns will display the numbers already entered. To see this you can "walk" through the program by entering each function with the *# and pressing A repeatedly.

1985 HANAUER W. SOLAR MONTHLY WEATHER DATA SUMMARY

DOE-2.1

LATITUDE = 13.70

LONGITUDE = -100.60

TIME ZONE = -7

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (CRYBULB)	80.1	83.0	84.7	85.3	83.7	83.2	81.6	82.5	81.3	80.6	81.2	78.0	82.1
AVG. TEMP. (F) (METBULB)	72.5	75.7	76.2	77.6	77.9	76.7	75.7	76.3	76.3	76.0	75.2	69.1	75.4
AVG. DAILY MAX. TEMP.	90.0	91.5	93.7	94.7	91.5	89.2	88.1	89.0	88.2	87.2	88.2	88.0	89.9
AVG. DAILY MIN. TEMP.	72.2	76.6	77.6	78.3	77.7	78.5	76.6	77.4	76.5	75.9	75.6	69.0	76.0
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEATING DEG. DAYS (BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEATING DEG. DAYS (BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEATING DEG. DAYS (BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COOLING DEG. DAYS (BASE 80)	38.0	113.0	176.5	197.0	142.0	115.5	75.0	99.0	73.0	54.0	61.0	55.5	1179.5
COOLING DEG. DAYS (BASE 75)	189.5	253.0	331.5	345.5	297.0	265.5	229.0	254.0	220.5	203.0	207.0	130.5	2926.0
COOLING DEG. DAYS (BASE 70)	344.5	393.0	486.5	495.5	452.0	415.5	384.0	409.0	370.5	358.0	357.0	266.0	4731.5
COOLING DEG. DAYS (BASE 65)	499.5	533.0	641.5	645.5	607.0	565.5	539.0	564.0	520.5	513.0	507.0	419.0	6554.5
HEATING DEG. HRS./24 (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
HEATING DEG. HRS./24 (BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
HEATING DEG. HRS./24 (BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
HEATING DEG. HRS./24 (BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COOLING DEG. HRS./24 (BASE 80)	84.9	104.5	159.5	172.9	130.8	102.1	78.8	96.7	69.8	60.8	74.3	65.9	1201.0
COOLING DEG. HRS./24 (BASE 75)	175.7	225.5	300.9	310.6	269.4	245.2	204.6	233.8	187.8	173.7	189.2	145.8	2662.5
COOLING DEG. HRS./24 (BASE 70)	311.8	363.4	454.7	460.4	424.3	395.0	359.5	388.7	337.6	328.2	337.3	261.8	4422.9
COOLING DEG. HRS./24 (BASE 65)	466.6	503.4	609.7	610.4	579.3	545.0	514.5	543.7	487.6	483.2	487.3	404.2	6234.9
MAXIMUM TEMP.	93	95	96	102	102	103	93	93	91	93	92	103	103
MINIMUM TEMP.	68	71	70	69	73	68	74	74	74	73	70	51	51
NO. DAYS MAX. 90 AND ABOVE	19	26	31	27	21	12	8	15	9	6	8	12	194
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
AVG. WIND SPEED (MPH)	3.2	6.1	6.6	5.6	4.7	7.0	4.7	5.6	3.4	1.8	2.6	3.0	4.5
AVG. WIND SPEED (DAY)	4.9	7.5	7.5	6.1	5.1	8.5	5.8	7.5	4.2	2.5	3.6	3.9	5.7
AVG. WIND SPEED (NIGHT)	1.9	5.0	5.7	5.0	5.4	5.4	3.6	3.8	2.6	1.1	1.7	2.3	3.4
AVG. TEMP. (DAY)	84.5	87.0	88.7	88.7	86.5	85.4	84.1	85.4	84.0	83.2	84.2	80.6	85.2
AVG. TEMP. (NIGHT)	76.7	79.8	81.2	82.1	80.9	80.9	79.2	79.9	78.7	78.1	78.6	75.9	79.3
AVG. SKY COVER (DAY)	5.8	6.3	7.3	7.1	8.6	9.2	9.0	9.1	9.1	8.9	8.0	4.1	7.8
AVG. REL. HUM. AT 6AM	87.5	88.3	87.7	84.9	90.8	82.8	87.2	85.0	89.1	91.1	88.4	77.4	86.2
AVG. REL. HUM. AT 10AM	70.0	66.2	62.8	64.3	71.9	69.5	70.0	68.1	73.7	75.9	69.7	67.0	69.1
AVG. REL. HUM. AT 4PM	64.4	53.3	50.4	55.4	65.0	68.1	69.1	65.1	68.8	71.7	64.0	50.2	60.9
AVG. REL. HUM. AT 10PM	76.8	81.4	77.5	79.8	83.5	78.9	82.8	82.5	86.7	88.4	82.6	66.4	80.6

1965 BAN-NUA SOLAR MONTHLY WEATHER DATA SUMMARY

DOE-2.1

DESIGN TEMPERATURES ----- SUMMER ----- WINTER

PER CENT	T (DRY)	T (WET)	T (DRY)
1.0	91	80	65
2.5	90	79	67
5.0	89	79	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0	75.3	79.1	81.0	81.8	80.5	80.6	79.0	79.8	78.4	77.6	77.9	75.1	78.8
1	74.5	78.8	80.5	81.3	79.8	80.4	78.3	79.5	78.1	77.5	77.8	74.2	78.4
2	73.9	78.4	80.0	80.8	79.6	80.1	78.0	79.2	77.9	77.1	77.3	73.4	78.0
3	73.7	77.9	79.5	80.3	79.3	79.8	77.8	78.7	77.5	77.1	76.9	72.8	77.6
4	73.2	77.6	78.9	79.9	78.9	79.5	77.5	78.4	77.2	76.8	76.6	71.6	77.2
5	72.8	77.0	78.1	79.4	78.4	79.3	77.3	78.2	77.0	76.4	76.0	70.5	76.7
6	72.6	76.7	78.1	79.5	78.8	80.0	77.7	78.9	77.4	76.8	76.0	70.0	76.9
7	73.6	78.2	80.5	82.2	81.5	82.1	80.2	81.5	79.6	79.4	78.2	71.3	79.0
8	77.6	82.0	84.3	84.9	84.1	84.2	82.2	83.5	81.9	81.3	81.2	74.8	81.8
9	81.7	85.5	87.3	87.9	86.4	85.8	84.1	85.5	83.8	83.2	83.6	76.5	84.2
10	84.7	87.4	89.3	89.8	87.3	86.7	85.6	86.7	84.9	84.1	85.3	79.9	86.0
11	86.7	89.3	90.9	91.3	88.5	86.6	86.3	87.5	85.8	85.4	86.3	81.5	87.2
12	88.2	90.1	92.0	91.9	89.4	87.7	86.9	88.3	86.2	86.1	87.3	83.5	88.1
13	89.1	90.7	92.6	93.0	89.9	87.6	86.9	88.2	86.7	85.5	87.5	84.3	88.5
14	89.3	90.8	92.9	92.8	89.6	88.0	86.7	88.3	87.0	85.1	86.9	85.2	88.5
15	89.1	90.6	92.4	92.7	89.5	87.0	84.9	87.2	86.2	84.2	86.3	85.9	88.0
16	88.0	89.2	90.6	90.1	87.7	85.7	84.2	85.1	84.4	83.6	85.2	85.4	86.6
17	84.8	86.1	87.8	88.2	86.0	84.0	83.1	82.6	82.5	82.4	82.4	84.0	84.6
18	81.8	83.0	84.7	85.6	83.8	82.9	81.9	81.4	80.8	80.5	81.9	81.8	82.5
19	80.2	81.6	83.3	84.3	82.8	82.2	80.9	80.5	80.0	79.7	81.0	80.5	81.4
20	79.0	80.9	82.6	83.4	82.5	81.9	80.1	80.6	79.4	79.1	80.4	79.2	80.8
21	78.2	80.5	82.2	82.8	81.9	81.6	79.8	80.5	79.4	78.7	79.4	78.1	80.3
22	77.3	80.1	81.5	82.3	81.4	81.2	79.5	80.6	79.1	78.3	79.0	76.2	79.7
23	76.0	79.8	81.0	82.0	81.0	80.9	79.3	80.2	78.8	77.9	78.4	75.8	79.2

GROUND TEMPERATURES	530.0	530.0	531.0	532.0	532.0	533.0	534.0	535.0	534.0	533.0	532.0	530.0	
CLEARNESS NUMBERS	1.06	1.05	1.03	1.01	0.99	0.97	0.99	0.98	1.00	1.00	1.04	1.05	

1985 BANGKOK W. SOLAR MONTHLY WEATHER DATA SUMMARY

DOE-2.1

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AUG. DAILY DIRECT NORMAL SOLAR	489.7	543.7	660.2	723.6	823.8	1009.8	876.4	964.1	854.6	725.3	550.5	389.8	718.3
AUG. DAILY TOTAL HORIZONTAL SOLAR	1490.6	1738.1	1788.8	1772.2	1614.6	1430.0	1518.6	1622.3	1458.0	1236.6	1336.0	1437.5	1535.7
MAX. DAILY DIRECT NORMAL SOLAR	702.0	948.0	924.0	1115.0	1151.0	1289.0	1231.0	1355.0	1144.0	992.0	781.0	623.0	1355.0
MAX. DAILY TOTAL HORIZONTAL SOLAR	1893.0	2184.0	2163.0	2296.0	2298.0	2225.0	2278.0	2235.0	2102.0	2031.0	1907.0	1830.0	2298.0
MIN. DAILY DIRECT NORMAL SOLAR	260.0	268.0	457.0	393.0	525.0	505.0	419.0	0.0	552.0	446.0	197.0	160.0	0.0
MIN. DAILY TOTAL HORIZONTAL SOLAR	807.0	852.0	956.0	524.0	665.0	505.0	772.0	0.0	797.0	472.0	718.0	624.0	0.0
MAX. HRLY DIRECT NORMAL SOLAR	132.0	150.0	161.0	158.0	167.0	220.0	194.0	194.0	185.0	158.0	141.0	105.0	220.0
MAX. HRLY TOTAL HORIZONTAL SOLAR	291.0	300.0	326.0	361.0	317.0	368.0	317.0	326.0	326.0	317.0	300.0	255.0	361.0
AUG. MAX. HRLY DIRECT NORMAL SOLAR	74.6	81.7	95.3	103.1	118.5	155.8	137.4	143.3	136.0	114.4	88.1	62.7	109.3
AUG. MAX. HRLY TOTAL HORIZONTAL SOLAR	234.0	267.7	266.6	272.4	249.1	230.1	240.3	256.0	249.5	219.5	225.3	237.0	245.5
LATITUDE - 13.70 LONGITUDE - -100.60 TIME ZONE - -7													
AUG. DAILY TOTAL VERTICAL SOLAR	678.3	786.5	777.6	839.6	860.5	741.2	819.6	701.9	534.4	444.3	568.4	685.4	702.8
MAX. DAILY TOTAL VERTICAL SOLAR	1034.6	1176.8	1207.3	1154.8	1010.6	816.7	919.3	985.5	906.0	786.1	895.1	958.0	986.5
MIN. DAILY TOTAL VERTICAL SOLAR	1403.7	1444.1	1185.1	889.6	642.5	430.9	541.2	619.5	751.4	883.5	1197.1	1401.8	946.6
MAX. HRLY TOTAL VERTICAL SOLAR	1008.3	1209.1	1205.8	1174.8	1016.3	770.5	889.9	940.5	878.4	769.9	878.9	1085.2	984.5
LATITUDE - 13.70 LONGITUDE - -100.60 TIME ZONE - -7													
MAX. DAILY TOTAL VERTICAL SOLAR	913.1	1125.4	1057.0	1282.7	1402.1	1433.3	1509.2	1323.5	991.0	855.8	985.6	905.7	1509.2
MAX. HRLY TOTAL VERTICAL SOLAR	1464.8	1621.5	1547.2	1647.5	1639.2	1556.6	1586.4	1517.3	1411.2	1295.7	1379.4	1259.2	1647.5
MIN. DAILY TOTAL VERTICAL SOLAR	1730.5	1833.3	1623.3	1384.3	1206.1	1022.6	1154.0	1105.7	1297.6	1587.9	1808.7	1807.7	1833.3
MAX. HRLY TOTAL VERTICAL SOLAR	1274.5	1658.3	1517.5	1643.9	1618.2	1479.3	1632.7	1606.7	1347.8	1455.7	1398.2	1422.0	1658.3
LATITUDE - 13.70 LONGITUDE - -100.60 TIME ZONE - -7													
MAX. DAILY TOTAL VERTICAL SOLAR	143.7	154.4	152.1	165.7	178.2	193.5	198.0	183.4	157.3	145.7	140.5	130.8	198.0
MAX. HRLY TOTAL VERTICAL SOLAR	246.1	228.2	235.7	247.9	254.9	234.5	236.2	243.1	251.4	224.4	206.3	195.1	254.9
MIN. DAILY TOTAL VERTICAL SOLAR	278.2	258.4	259.9	195.1	167.4	155.9	170.0	171.9	220.9	249.0	269.4	252.4	278.2
MAX. HRLY TOTAL VERTICAL SOLAR	225.5	266.1	248.7	240.6	324.1	277.1	259.9	306.2	280.3	250.6	262.1	363.6	363.6

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$ ..... $
$ DOE-2 INPUT FILE: PROTOTYPE THAI OFFICE BUILDING
$ (BASED ON THAI FARMER'S BANK, BANGKOK)
$ PROJECT: "AN INTEGRATED ASSESSMENT OF AIR-CONDITIONING IN THAILAND"
$ CREATED: 24 JAN 88
$ UPDATED: 20 OCT 89
$ J. BUSCH
$ ..... $
$ POST-PROCESSOR PARTIAL
$ ..... $
$ LOADS
$ ..... $
$ INPUT LOADS
$ INPUT-UNITS=ENGLISH
$ OUTPUT-UNITS=METRIC
$ TITLE LINE-1 'THAI OFFICE PROTOTYPE'
$ LINE-2 'Bangkok 05'
$ LINE-3 'Base rnts'
$ LINE-4 '
$ ..... $
$ DIAGNOSTIC WARNINGS
$ ABORT ERRORS
$ RUN-PERIOD JAN 1 1985 THRU DEC 31 1985
$ BUILDING-LOCATION LAT=13.7 LON=100.6 T-Z=-7 ALT=12
$ ATM-MOISTURE=
$ 11.3, 1.3, 1.3, 1.3, 1.3, 1.3, 1.3, 1.3, 1.3, 1.3
$ ATM-TURBIDITY=
$ 1.67, .67, .67, .67, .67, .67, .67, .67, .67, .67
$ LAT=13.7 LON=100.6 T-Z=-7 ALT=12
$ SUNDAYS A2=90
$ DAYLIGHT-SAVINGS=NO
$ ..... $
$ LOADS PARAMETERS
$ ..... $
$ PARAMETER
$ SUNDAYS INFIL=1
$ SUNDAYS LOADST=73
$ SUNDAYS LITEPWR=2.25
$ SUNDAYS EQUIPWR=1.75
$ SUNDAYS GLASCON=1.64 SPPG CHROMATIC SOLARCOOL (1) BRONZES
$ SUNDAYS RWALL= 0001 SR-VALUE OF INSULATION ONLY
$ SUNDAYS BRICK-TH = .33 SBase
$ SUNDAYS ROOF=2.78 SBase Case
$ SUNDAYS CONC-TH = .33 SBase
$ SUNDAYS SC= 34 SBase PPG CHROMATIC SOLARCOOL (1) BRONZES
$ SUNDAYS WWR= 5
$ SUNDAYS WALLABS= 5
$ SUNDAYS ROOFABS= 5 WHITE BUILT-UP ROOFINGS
$ ..... $
$ OCCUPANCY SCHEDULE
$ ..... $
$ PEOPLE-WD-DAY-SCHEDULE
$ (1,6)(10) (7)(13) (8,12)(11) (13)(15) (14,17)(11)
$ (18,19)(11) (20,22)(105) (23,24)(10)
$ PEOPLE-SAT-DAY-SCHEDULE (1,6)(10) (7)(13) (8,12)(11) (13)(15)
$ (14,19)(11) (20,22)(105) (23,24)(10)
$ PEOPLE-SH-DAY-SCHEDULE (1,24)(10)
$ PEOPLE-WK-WEEK-SCHEDULE
$ (WD)PEOPLE-WD (SAT)PEOPLE-SAT (SUN,HOLI)PEOPLE-SH
$ PEOPLE-SCHEDULE THRU DEC 31 PEOPLE-WK
$ ..... $
$ LIGHTING SCHEDULE
$ ..... $
$ LIGHTS-WD-DAY-SCHEDULE
$ (1,6)(106) (7)(15) (8)(134) (9,17)(11) (18)(195) (19)(171)
$ (20)(156) (21)(144) (22)(133) (23)(116) (24)(107)
$ LIGHTS-SAT-DAY-SCHEDULE
$ (1,6)(106) (7)(15) (8)(134) (9,12)(11) (13)(171) (14)(156)
$ (15)(144) (16)(131) (17)(116) (18,24)(106)
$ LIGHTS-SH-DAY-SCHEDULE (1,24)(10)
$ LIGHTS-WK-WEEK-SCHEDULE
$ (WD)LIGHTS-WD (SAT)LIGHTS-SAT (SUN,HOLI)LIGHTS-SH
$ LIGHTS-SCHEDULE THRU DEC 31 LIGHTS-WK
$ ..... $
$ INFILTRATION SCHEDULE
$ ..... $
$ INFIL-WD-DAY-SCHEDULE (1,6)(11) (7,18)(10) (19,24)(11)
$ INFIL-SAT-DAY-SCHEDULE (1,6)(11) (7,13)(10) (14,24)(11)
$ INFIL-SH-DAY-SCHEDULE (1,24)(11)
$ INFIL-WK-WEEK-SCHEDULE
$ (WD)INFIL-WD (SAT)INFIL-SAT (SUN,HOLI)INFIL-SH
$ INFIL-SCHEDULE THRU DEC 31 INFIL-WK
$ ..... $
$ WINDOW MGMT SCHEDULE
$ ..... $
$ SH-1755 SHADE-MULT-SCHEDULE THRU DEC 31 (ALL) (1,24) (15)
$ TRANS-MULT-SCHEDULE THRU DEC 31 (ALL) (1,24) (135)
$ SC-1405 CLOSE-SHADE-SCHEDULE THRU DEC 31 (ALL) (1,24) (140)
$ SUNDAYS REOPEN-PROB-SCHEDULE THRU DEC 31 (ALL) (1,24) (15)
$ ..... $
$ CONSTRUCTION
$ ..... $
$ BRICK-MATERIAL COND= 47 DENS=109 TH=1 S-H= 2
$ PLASTER-MATERIAL COND= 31 DENS=99 TH= 033 S-H= 2
$ EXPANDED POLYSTYRENE THICKNESS CALCULATED BELOW AS .02 X RWALL
$ INSUL-MATERIAL COND= 02 DENS=1 TH=1 S-H= 29
$ CONCRETE-MATERIAL COND= 7576 DENS=140 TH=1 S-H= 2
$ ..... $
$ CURTAIN WALL CONSTRUCTION
$ FRAMING FOR GLASS CURTAIN WALL CONSTRUCTION
$ EXTWALLER1-LAYERS MAT=(AS01,AL21,IN35,AS01) I-F-R=0.68

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$ ..... $
$ TYPICAL MASONRY CONSTRUCTION BASED ON THAI OTTV DOCUMENTS
$ EXTWALLER2-LAYERS MAT=(PLASTER,BRICK,INSUL,PLASTER)
$ THICKNESS=(.033,BRICK-TH,RWALL TIMES .02,.033) I-F-R=0.68
$ INTWALLER1-LAYERS MAT=(CH03,BK04,BK04,AL21,WD11) I-F-R=0.68
$ ROOFER-LAYERS MAT=(BR01,CONCRETE,INSUL,AL33,AC02)
$ TH=1.0313,CONC-TH,ROOF TIMES .02,1,.0625) I-F-R=0.68
$ FLOORER-LAYERS MAT=(CC03) I-F-R=0.68
$ CEILINGER-LAYERS MAT=(AC02) I-F-R=0.68
$ ..... $
$ ROOF1-CONSTRUCTION LAYERS=ROOFER ABS=ROOFABS
$ EXW125 EXTWL-CONSTRUCTION LAYERS=EXTWALLER2 ABS=WALLABS
$ INTW1-CONSTRUCTION LAYERS=INTWALLER1 S BT UN- 4 COND. SPACES $
$ INTW2-CONSTRUCTION U-VALUE=0.32 S GYP BOARD W/ METAL STUDS $
$ INTW3-CONSTRUCTION U-VALUE=1.5 S CONVECTIVE COUPLING $
$ FLR1-CONSTRUCTION LAYERS=FLOORER S ONLY FLOOR--NOT CEILING $
$ CLG1-CONSTRUCTION LAYERS=CEILINGER
$ ..... $
$ GLAZING=GLASS-TYPE SHADING-COEF=SC GLASS-CONDUCTANCE=GLASCON
$ ..... $
$ FENESTRATION
$ ..... $
$ SET-DEFAULT FOR WINDOW
$ WIDTH=21
$ HEIGHT=WWR TIMES 16.4
$ GLASS-TYPE = GLAZING
$ MAX-SOLAR-SCH = CLOSE-SHADE
$ WIN-SHADE-TYPE = MOVABLE-INTERIOR
$ SHADING-SCHEDULE = SHADE-MULT
$ VIS-TRANS-SCH = TRANS-MULT
$ OPEN-SHADE-SCH = REOPEN-PROB
$ SUNDAYS SUN-CTRL-PROB = .5
$ Overhang depth is expressed as a fraction of window height
$ which in turn is function of WWR (see above) e.g. 1/6=16.4"
$ Sfin depth is expressed as a fraction of window width (e.g. 2/21=21")
$ ..... $
$ SPACE DESCRIPTIONS
$ ..... $
$ SET-DEFAULT FOR SPACE
$ ZONE-TYPE=CONDITIONED
$ TEMPERATURE=(LOADST)
$ INF-METHOD=AIR-CHANGE
$ INF-SCHEDULE=INFILSCH
$ AIR-CHANGES/Hr=INFIL
$ FLOOR-WEIGHT=0
$ EQUIPMENT-W/SOFT-EQUIPWR
$ EQUIP-SCHEDULE=PEOPLE
$ PEOPLE-SCHEDULE=PEOPLE
$ PEOPLE-HG-SENS=230
$ PEOPLE-HG-LAT=190
$ LIGHTING-W/SOFT-LITEPWR
$ LIGHT-TO-SPACE=1.0
$ LIGHTING-TYPE=REC-FLUOR-MV
$ LIGHTING-SCHEDULE=LIGHTS
$ LIGHT-REF-POINT1=(10,13,2.5)
$ MAX-GLARE=22
$ ..... $
$ MID-WEST-SPACE
$ VOLUME=13056 AREA=1280
$ AREA/PERSON=130 FLOOR-MULTIPLIER=11
$ MID-WEST-EXTWL-EXTERIOR-WALL
$ AZIMUTH=180 HEIGHT=16.4 WIDTH=84 CONSTRUCTION=EXTWL
$ MID-WEST-WNDW1-WINDOW X=0
$ MID-WEST-WNDW2-WINDOW X=21
$ MID-WEST-WNDW3-WINDOW X=42
$ MID-WEST-WNDW4-WINDOW X=63
$ MID-WEST-INTWL1-INTERIOR-WALL INT-WALL-TYPE=STANDARD
$ CONSTRUCTION=INTWL1 AREA=288 NEXT-TO MID-SOUTH
$ MID-WEST-INTWL2-I-W I-W-TYPE=STANDARD CONS=INTWL2
$ A=224 N-T MID-CORE
$ MID-WEST-INTWL3-I-W I-W-TYPE=AIR CONS=INTWL3
$ A=224 N-T MID-CORE
$ MID-WEST-INTWL4-I-W I-W-TYPE=STANDARD CONS=INTWL2
$ A=288 N-T MID-NORTH
$ MID-WEST-FLR-I-W A=1280 TILT=180 CONS=FLR1
$ I-W-TYPE=ADIABATIC
$ MID-WEST-CLG-I-W A=1280 TILT=0 CONS=CLG1
$ I-W-TYPE=ADIABATIC
$ ..... $
$ MID-NORTH-SPACE
$ LIKE MID-WEST
$ MID-NORTH-EXTWL-E-W LIKE MID-WEST-EXTWL AZ=270
$ MID-NORTH-WNDW1-WINDOW LIKE MID-WEST-WNDW1
$ MID-NORTH-WNDW2-WINDOW LIKE MID-WEST-WNDW2
$ MID-NORTH-WNDW3-WINDOW LIKE MID-WEST-WNDW3
$ MID-NORTH-WNDW4-WINDOW LIKE MID-WEST-WNDW4
$ MID-NORTH-INTWL1-I-W LIKE MID-WEST-INTWL2
$ MID-NORTH-INTWL2-I-W LIKE MID-WEST-INTWL3
$ MID-NORTH-INTWL3-I-W LIKE MID-WEST-INTWL4 N-T MID-EAST
$ MID-NORTH-FLR-I-W LIKE MID-WEST-FLR
$ MID-NORTH-CLG-I-W LIKE MID-WEST-CLG
$ ..... $
$ MID-EAST-SPACE
$ LIKE MID-WEST
$ MID-EAST-EXTWL-E-W LIKE MID-WEST-EXTWL AZ= 0
$ MID-EAST-WNDW1-WINDOW LIKE MID-WEST-WNDW1
$ MID-EAST-WNDW2-WINDOW LIKE MID-WEST-WNDW2
$ MID-EAST-WNDW3-WINDOW LIKE MID-WEST-WNDW3
$ MID-EAST-WNDW4-WINDOW LIKE MID-WEST-WNDW4
$ MID-EAST-INTWL1-I-W LIKE MID-WEST-INTWL1
$ MID-EAST-INTWL2-I-W LIKE MID-WEST-INTWL2

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MID-EAST-INTWL3-I-W LIKE MID-WEST-INTWL3
MID-EAST-FLR-I-W LIKE MID-WEST-FLR
MID-EAST-CLG-I-W LIKE MID-WEST-CLG

MID-SOUTH-SPACE
ZONE-TYPE=UNCONDITIONED LIGHTING-W/SOFT=1.0 EQUIPMENT-W/SOFT=0
DAYLIGHTING=NO A/P=250 A=1280 V=13056 F-M=11
MID-SOUTH-EXTWL-E-W LIKE MID-WEST-EXTWL AZ=90
MID-SOUTH-WNDW-WINDOW W=84
MID-SOUTH-INTWL1-I-W N-T MID-CORE CONS-INTWL1 A=449
MID-SOUTH-FLR-I-W LIKE MID-WEST-FLR A=6430
MID-SOUTH-CLG-I-W LIKE MID-WEST-CLG A=6430

MID-CORE-SPACE
X=20 Y=20 A/P=70 A=1936 V=19747 F-M=11
A-C=0.3 DAYLIGHTING=NO
MID-CORE-FLR-I-W LIKE MID-WEST-FLR A=1936
MID-CORE-CLG-I-W LIKE MID-WEST-CLG A=1936

TOP-WEST-SPACE
LIKE MID-WEST F-M=1
TOP-WEST-EXTWL-E-W LIKE MID-WEST-EXTWL
TOP-WEST-WNDW1-WINDOW LIKE MID-WEST-WNDW1
TOP-WEST-WNDW2-WINDOW LIKE MID-WEST-WNDW2
TOP-WEST-WNDW3-WINDOW LIKE MID-WEST-WNDW3
TOP-WEST-WNDW4-WINDOW LIKE MID-WEST-WNDW4
TOP-WEST-INTWL1-I-W LIKE MID-WEST-INTWL1 N-T TOP-SOUTH
TOP-WEST-INTWL2-I-W LIKE MID-WEST-INTWL2 N-T TOP-CORE
TOP-WEST-INTWL3-I-W LIKE MID-WEST-INTWL3 N-T TOP-CORE
TOP-WEST-INTWL4-I-W LIKE MID-WEST-INTWL4 N-T TOP-NORTH
TOP-WEST-FLR-I-W LIKE MID-WEST-FLR
TOP-WEST-ROOF-ROOF TILT=0 Z=16.4 HEIGHT=20 WIDTH=64
CONSTRUCTION=ROOF1

TOP-NORTH-SPACE
LIKE MID-NORTH F-M=1
TOP-NORTH-EXTWL-E-W LIKE MID-NORTH-EXTWL
TOP-NORTH-WNDW1-WINDOW LIKE MID-NORTH-WNDW1
TOP-NORTH-WNDW2-WINDOW LIKE MID-NORTH-WNDW2
TOP-NORTH-WNDW3-WINDOW LIKE MID-NORTH-WNDW3
TOP-NORTH-WNDW4-WINDOW LIKE MID-NORTH-WNDW4
TOP-NORTH-INTWL1-I-W LIKE MID-NORTH-INTWL1 N-T TOP-CORE
TOP-NORTH-INTWL2-I-W LIKE MID-NORTH-INTWL2 N-T TOP-CORE
TOP-NORTH-INTWL3-I-W LIKE MID-NORTH-INTWL3 N-T TOP-EAST
TOP-NORTH-FLR-I-W LIKE MID-NORTH-FLR
TOP-NORTH-ROOF-ROOF LIKE TOP-WEST-ROOF

TOP-EAST-SPACE
LIKE MID-EAST F-M=1
TOP-EAST-EXTWL-E-W LIKE MID-EAST-EXTWL
TOP-EAST-WNDW1-WINDOW LIKE MID-EAST-WNDW1
TOP-EAST-WNDW2-WINDOW LIKE MID-EAST-WNDW2
TOP-EAST-WNDW3-WINDOW LIKE MID-EAST-WNDW3
TOP-EAST-WNDW4-WINDOW LIKE MID-EAST-WNDW4
TOP-EAST-INTWL1-I-W LIKE MID-EAST-INTWL1 N-T TOP-SOUTH
TOP-EAST-INTWL2-I-W LIKE MID-EAST-INTWL2 N-T TOP-CORE
TOP-EAST-INTWL3-I-W LIKE MID-EAST-INTWL3 N-T TOP-CORE
TOP-EAST-FLR-I-W LIKE MID-EAST-FLR
TOP-EAST-ROOF-ROOF LIKE TOP-WEST-ROOF

TOP-SOUTH-SPACE
LIKE MID-SOUTH F-M=1
TOP-SOUTH-EXTWL-E-W LIKE MID-SOUTH-EXTWL
TOP-SOUTH-WNDW-WINDOW LIKE MID-SOUTH-WNDW
TOP-SOUTH-INTWL1-I-W LIKE MID-SOUTH-INTWL1 N-T TOP-CORE
TOP-SOUTH-FLR-I-W LIKE MID-SOUTH-FLR
TOP-SOUTH-ROOF-ROOF LIKE TOP-WEST-ROOF

TOP-CORE-SPACE
LIKE MID-CORE F-M=1
TOP-CORE-FLR-I-W LIKE MID-CORE-FLR
TOP-CORE-ROOF-ROOF LIKE TOP-WEST-ROOF H=44 W=44

BUILDING-RESOURCE VERT-TRANS-FM=66 VERT-TRANS-SCH=PEOPLE

LOADS-REPORT
SUMMARY=LS-A,LS-C,LS-D,LS-F1
RPG=REPORT-BLOCK
VARIABLE-TYPE=GLOBAL
VARIABLE-LIST=(3,4,11,14,15)
RBB=REPORT-BLOCK
VARIABLE-TYPE=BUILDING
VARIABLE-LIST=(21,22,23,24,25,26,28,30,32,33)
RBBW=REPORT-BLOCK
VARIABLE-TYPE=MID-WEST-WNDW1
VARIABLE-LIST=(12,13,14,15,16)
RBBWS=REPORT-BLOCK
VARIABLE-TYPE=MID-SOUTH-WNDW
VARIABLE-LIST=(12,13,14,15,16)
LDSREPSCH=SCHEDULE
THRU DEC 31 (ALL) (1,24) (0)
LDSHRLY=HOURLY-REPORT
REPORT-BLOCK=(LABB)
REPORT-SCHEDULE=LDSREPSCH

END
COMPUTE LOADS
*****
SYSTEMS
*****
INPUT SYSTEMS
INPUT-UNITS= ENGLISH
OUTPUT-UNITS= METRIC

```

```

SYSTEMS-REPORT VERIFICATION = (SV-A)
SUMMARY = (SS-A,SS-C,SS-D,SS-F,SS-H,SS-K,SS-N)

-----
SYSTEMS PARAMETERS
-----
PARAMETER
$APT245 T-COOL=75.2
$RESET COOL CONTROL PARAMETERS
OUTHI = 90
SUPLO = 45
OUTLO = 77
SUPHI = 55

-----
SYSTEMS SCHEDULES
-----
FAN-SCH = SCHEDULE THRU DEC 31
$prcnos (MON,FRI) (1,6) (0) (7,17) (1) (18,24) (0)
$prcnos (SAT) (1,6) (0) (7,12) (1) (13,24) (0)
(SUN,HOL) (1,24) (0)

HEAT-SCH = SCHEDULE THRU DEC 31 (ALL) (1,24) (0)
COOL-SCH = SCHEDULE THRU DEC 31 (ALL) (1,24) (0)

MINAIR-SCH = SCHEDULE THRU DEC 31 (ALL)
(1,6) (0) (7,17) (-999) (18,24) (0)

TEMP-SCH = SCHEDULE THRU DEC 31
$prcnos (MON,FRI) (1,6) (99) (7,17) (T-COOL) (18,24) (99)
$prcnos (SAT) (1,6) (99) (7,12) (T-COOL) (13,24) (99)
(SUN,HOL) (1,24) (99)

DRES1=DAY-RESET-SCH
OUTSIDE-HI-OUTH1 SUPPLY-LO-SUPLO
OUTSIDE-LO-OUTLO SUPPLY-HI-SUPHI
RES1=RESET-SCHEDULE THRU DEC 31 (ALL) DRES1

NV-1 = DAY-SCHEDULE (1,6) (1) (7,17) (0) (18,24) (0)
NV-2 = DAY-SCHEDULE (1,24) (1)
NV-3 = DAY-SCHEDULE (1,6) (1) (7,12) (0) (13,24) (0)
NVW-1 = WEEK-SCHEDULE (WD) NV-1 (SAT) NV-3 (SUN,HOL) NV-2
NV-SCH = SCHEDULE THRU DEC 31 NVW-1

-----
ZONE DESCRIPTION
-----
SET-DEFAULT FOR ZONE
ZONE-TYPE = CONDITIONED SIZING-OPTION = ADJUST-LOADS
$oa 195 OA-CFM/PER = 15 $Bbase
$apt245 D-C-T=75 D-H-T = 72
COOL-TEMP-SCH = TEMP-SCH
THERMOSTAT-TYPE = PROPORTIONAL
THROTTLING-RANGE = 2

MID-WEST = ZONE
MID-NORTH = ZONE
MID-EAST = ZONE
MID-CORE = ZONE
MID-SOUTH = ZONE
Z-TYPE = UNCONDITIONED S-O = FROM-LOADS ASSIGNED-CFM = 0
D-H-T = 72 D-C-T = 85 EXHAUST-CFM = 11520

TOP-WEST = ZONE
TOP-NORTH = ZONE
TOP-EAST = ZONE
TOP-CORE = ZONE
TOP-SOUTH = ZONE
Z-TYPE = UNCONDITIONED S-O = FROM-LOADS ASSIGNED-CFM = 0
D-H-T = 72 D-C-T = 85 EXHAUST-CFM = 11520

-----
SYSTEM CONTROL
-----
$CONTROL-1 = SYSTEM-CONTROL
$nat145 MIN-SUPPLY-T = 60 $Bbase
$nat145 MAX-SUPPLY-T = 105
$cccnos COOL-CONTROL = CONSTANT $Bbase
COOL-RESET-SCH = RES1
HEATING-SCHEDULE = HEAT-SCH
COOLING-SCHEDULE = COOL-SCH

-----
SYSTEM FANS
-----
$FANS-1 = SYSTEM-FANS
FAN-SCHEDULE = FAN-SCH
$ic145 FAN-CONTROL = CONSTANT-VOLUME $Bbase
$stap25 SUPPLY-STATIC = 2.0 $Bbase
$stoffs SUPPLY-EFF = 0.4 $Bbase
NIGHT-VENT-SCH = NV-SCH
NIGHT-CYCLE-CTAL = STAT-OFF

-----
SYSTEM AIR
-----
$AIR-1 = SYSTEM-AIR
MIN-AIR-SCH = MINAIR-SCH
$oa145 OA-CONTROL = FIXED $Bbase

```


MULTIPLIER=12 FLOOR-MULTIPLIER=9
 NO-GUEST-EXTWL1=EXTERIOR-MALL
 HEIGHT=9.2 WIDTH=14.0 AZIMUTH=180 CONSTRUCTION-EXTWL1
 NO-GUEST-WNDW1=WINDOW
 H=9.0 H-WNR TIMES 14.3
 OVERHANG-W-WNR TIMES 14.3 OVERHANG-D=1.0
 RIGHT-FIN-H=9.0 RIGHT-FIN-D=0
 LEFT-FIN-H=9.0 LEFT-FIN-D=0
 W=14.0 H-WNR TIMES 9.2
 sonhq015 OVERHANG-W=14.0 OVERHANG-D-WNR TIMES 9 SBase

NO-GUEST-INTWL1=INTERIOR-MALL INT-MALL-TYPE-STANDARD
 CONSTRUCTION-INTWL1 AREA=103 NEXT-TO CORRIDOR
 S TWO INTERIOR WALLS BETWEEN IDENTICAL SPACES INPUT FOR
 S CUSTOM WEIGHTING FACTORS
 NO-GUEST-INTWL2=I-W I-W-TYPE-ADIABATIC A=472 CONS-INTWL1
 NO-GUEST-FLR-I-W A=364 TILT=180 CONS-FLR1
 I-W-TYPE-ADIABATIC
 NO-GUEST-CLG-I-W A=364 TILT=0 CONS-CLG1 I-W-TYPE-ADIABATIC

SO-GUEST-SPACE
 LIKE NO-GUEST AZ=0
 SO-GUEST-EXTWL1=E-W LIKE NO-GUEST-EXTWL1
 W1 LIKE NO-GUEST-WNDW1
 SO-GUEST-INTWL1=I-W LIKE NO-GUEST-INTWL1
 SO-GUEST-INTWL2=I-W LIKE NO-GUEST-INTWL2
 SO-GUEST-FLR-I-W LIKE NO-GUEST-FLR
 SO-GUEST-CLG-I-W LIKE NO-GUEST-CLG

NE-CNR-GUEST-SPACE
 LIKE NO-GUEST A=468 V=4251 H=1
 NE-CNR-EXTWL1=E-W LIKE NO-GUEST-EXTWL1 W=18.0
 NE-CNR-WNDW1=W1 W=18.0 H-WNR TIMES 9.2
 sonhq015 OH-W=18.0 OH-D-WNR TIMES 9 SBase

NE-CNR-EXTWL2=E-W LIKE NO-GUEST-EXTWL1 W=26.0 AZ=270
 NE-CNR-WNDW2=W1 W=26.0 H-WNR TIMES 9.2
 sonhq015 OH-W=26.0 OH-D-WNR TIMES 9 SBase

NE-CNR-INTWL1=I-W LIKE NO-GUEST-INTWL1 A=132
 NE-CNR-INTWL2=I-W LIKE NO-GUEST-INTWL1 A=236
 NE-CNR-CLG-I-W LIKE NO-GUEST-CLG A=468
 NE-CNR-FLR-I-W LIKE NO-GUEST-FLR A=468

SE-CNR-GUEST-SPACE
 LIKE NE-CNR-GUEST AZ=0
 SE-CNR-EXTWL1=E-W LIKE NE-CNR-EXTWL1
 W1 LIKE NE-CNR-WNDW1
 SE-CNR-EXTWL2=E-W LIKE NE-CNR-EXTWL2 AZ=90
 W1 LIKE NE-CNR-WNDW2
 SE-CNR-INTWL1=I-W LIKE NE-CNR-INTWL1
 SE-CNR-INTWL2=I-W LIKE NE-CNR-INTWL2
 SE-CNR-CLG-I-W LIKE NE-CNR-CLG
 SE-CNR-FLR-I-W LIKE NE-CNR-FLR

SW-CNR-GUEST-SPACE
 LIKE NE-CNR-GUEST AZ=0
 SW-CNR-EXTWL1=E-W LIKE NE-CNR-EXTWL1
 W1 LIKE NE-CNR-WNDW1
 SW-CNR-EXTWL2=E-W LIKE NE-CNR-EXTWL2
 W1 LIKE NE-CNR-WNDW2
 SW-CNR-INTWL1=I-W LIKE NE-CNR-INTWL1
 SW-CNR-INTWL2=I-W LIKE NE-CNR-INTWL2
 SW-CNR-CLG-I-W LIKE NE-CNR-CLG
 SW-CNR-FLR-I-W LIKE NE-CNR-FLR

NW-CNR-GUEST-SPACE
 LIKE NE-CNR-GUEST
 NW-CNR-EXTWL1=E-W LIKE NE-CNR-EXTWL1
 W1 LIKE NE-CNR-WNDW1
 NW-CNR-EXTWL2=E-W LIKE NE-CNR-EXTWL2 AZ=90
 W1 LIKE NE-CNR-WNDW2
 NW-CNR-INTWL1=I-W LIKE NE-CNR-INTWL1
 NW-CNR-INTWL2=I-W LIKE NE-CNR-INTWL2
 NW-CNR-CLG-I-W LIKE NE-CNR-CLG
 NW-CNR-FLR-I-W LIKE NE-CNR-FLR

CORRIDOR-SPACE
 V=14924 A=2036 F-M=9
 S-C-GUEST-CONDOS
 I-SCH=INFSCH-2 N-O-P=2 L-W=5 E-W=0
 L-SCH=CRDR-LITSCH
 CRDR-NO-EXTWL1=E-W LIKE NO-GUEST-EXTWL1 AZ=0
 W1 LIKE NO-GUEST-WNDW1
 CRDR-SO-EXTWL1=E-W LIKE NO-GUEST-EXTWL1 AZ=180
 W1 LIKE NO-GUEST-WNDW1
 CRDR-EA-EXTWL1=E-W LIKE NO-GUEST-EXTWL1 AZ=90 W=6.0
 CRDR-EA-WNDW1=W1 H-WNR TIMES 9.2 W=6.0
 sonhq015 OH-W=6.0 OH-D-WNR TIMES 9 SBase

CRDR-WE-EXTWL1=E-W LIKE CRDR-EA-EXTWL1 AZ=270
 W1 LIKE CRDR-EA-WNDW1
 CRDR-FLR-I-W LIKE NO-GUEST-FLR A=2036
 CRDR-CLG-I-W LIKE NO-GUEST-CLG A=2036 CONS-CLG2

TOP-NO-GST-SPACE
 LIKE NO-GUEST F-M=1
 TOP-NO-EXTWL1=E-W LIKE NO-GUEST-EXTWL1
 W1 LIKE NO-GUEST-WNDW1
 TOP-NO-INTWL1=I-W LIKE NO-GUEST-INTWL1 N-T TOP-CORRIDOR
 TOP-NO-INTWL2=I-W LIKE NO-GUEST-INTWL2
 TOP-NO-FLR-I-W LIKE NO-GUEST-FLR
 TOP-NO-ROOF-ROOF TILT=0 AZ=0 CONS-ROOF1 H=26 W=14

TOP-SO-GST-SPACE
 LIKE SO-GUEST F-M=1
 TOP-SO-EXTWL1=E-W LIKE SO-GUEST-EXTWL1
 W1 LIKE NO-GUEST-WNDW1
 TOP-SO-INTWL1=I-W LIKE SO-GUEST-INTWL1 N-T TOP-CORRIDOR
 TOP-SO-INTWL2=I-W LIKE SO-GUEST-INTWL2
 TOP-SO-FLR-I-W LIKE SO-GUEST-FLR
 TOP-SO-ROOF-ROOF LIKE TOP-NO-ROOF

TOP-NE-CNR-SPACE
 LIKE NE-CNR-GUEST F-M=1
 TOP-NE-EXTWL1=E-W LIKE NE-CNR-EXTWL1
 W1 LIKE NE-CNR-WNDW1
 TOP-NE-EXTWL2=E-W LIKE NE-CNR-EXTWL2
 W1 LIKE NE-CNR-WNDW2
 TOP-NE-INTWL1=I-W LIKE NE-CNR-INTWL1 N-T TOP-CORRIDOR
 TOP-NE-INTWL2=I-W LIKE NE-CNR-INTWL2
 TOP-NE-FLR-I-W LIKE NE-CNR-FLR
 TOP-NE-ROOF-ROOF LIKE TOP-NO-ROOF W=18

TOP-SE-CNR-SPACE
 LIKE SE-CNR-GUEST F-M=1
 TOP-SE-EXTWL1=E-W LIKE SE-CNR-EXTWL1
 W1 LIKE NE-CNR-WNDW1
 TOP-SE-EXTWL2=E-W LIKE SE-CNR-EXTWL2
 W1 LIKE NE-CNR-WNDW2
 TOP-SE-INTWL1=I-W LIKE SE-CNR-INTWL1 N-T TOP-CORRIDOR
 TOP-SE-INTWL2=I-W LIKE SE-CNR-INTWL2
 TOP-SE-FLR-I-W LIKE SE-CNR-FLR
 TOP-SE-ROOF-ROOF LIKE TOP-NE-ROOF

TOP-SW-CNR-SPACE
 LIKE SW-CNR-GUEST F-M=1
 TOP-SW-EXTWL1=E-W LIKE SW-CNR-EXTWL1
 W1 LIKE NE-CNR-WNDW1
 TOP-SW-EXTWL2=E-W LIKE SW-CNR-EXTWL2
 W1 LIKE NE-CNR-WNDW2
 TOP-SW-INTWL1=I-W LIKE SW-CNR-INTWL1 N-T TOP-CORRIDOR
 TOP-SW-INTWL2=I-W LIKE SW-CNR-INTWL2
 TOP-SW-FLR-I-W LIKE SW-CNR-FLR
 TOP-SW-ROOF-ROOF LIKE TOP-NE-ROOF

TOP-NW-CNR-SPACE
 LIKE NW-CNR-GUEST F-M=1
 TOP-NW-EXTWL1=E-W LIKE NW-CNR-EXTWL1
 W1 LIKE NE-CNR-WNDW1
 TOP-NW-EXTWL2=E-W LIKE NW-CNR-EXTWL2
 W1 LIKE NE-CNR-WNDW2
 TOP-NW-INTWL1=I-W LIKE NW-CNR-INTWL1 N-T TOP-CORRIDOR
 TOP-NW-INTWL2=I-W LIKE NW-CNR-INTWL2
 TOP-NW-FLR-I-W LIKE NW-CNR-FLR
 TOP-NW-ROOF-ROOF LIKE TOP-NE-ROOF

TOP-CORRIDOR-SPACE
 LIKE CORRIDOR F-M=1
 TOP-CR-NO-EXTWL1=E-W LIKE CRDR-NO-EXTWL1
 W1 LIKE NO-GUEST-WNDW1
 TOP-CR-SO-EXTWL1=E-W LIKE CRDR-SO-EXTWL1
 W1 LIKE NO-GUEST-WNDW1
 TOP-CR-EA-EXTWL1=E-W LIKE CRDR-EA-EXTWL1
 W1 LIKE CRDR-EA-WNDW1
 TOP-CR-WE-EXTWL1=E-W LIKE CRDR-WE-EXTWL1
 W1 LIKE CRDR-EA-WNDW1
 TOP-CR-FLR-I-W LIKE CRDR-FLR
 TOP-CR-ROOF-ROOF LIKE TOP-NO-ROOF H=6 W=339 CONS-ROOF2

LOBBY-SPACE
 A=31000 V=372000
 S-C = GUEST-CONDOS
 F-M=70
 I-SCH = INFSCH-2
 S A/P based on ASHRAE 90 hotel assumption for lobby
 A/P=100 P-SCH=LOBBY-OCOSCH
 S LIGHTING & EQUIPMENT SCHEDULE BASED ON JUDGEMENT
 L-W=LOBBY-LIPWR L-SCH=LOBBY-LITSCH
 E-W=LOBBY-EOPWR E-SCH=LOBBY-EOPSCH
 LOBBY-EXTWL1=E-W AZ=180 H=12 W=248 CONS-EXTWL1
 LOBBY-WNDW1=WINDOW H-WNR TIMES 12.0 W=20 X=3
 sonhq015 OH-W=20.0 OH-D-WNR TIMES 1.2 SBase

W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 W1 LIKE LOBBY-WNDW1 X=60
 W1 LIKE LOBBY-WNDW1 X=80
 W1 LIKE LOBBY-WNDW1 X=100
 W1 LIKE LOBBY-WNDW1 X=120
 W1 LIKE LOBBY-WNDW1 X=140
 W1 LIKE LOBBY-WNDW1 X=160
 W1 LIKE LOBBY-WNDW1 X=180
 W1 LIKE LOBBY-WNDW1 X=200
 W1 LIKE LOBBY-WNDW1 X=220
 LOBBY-EXTWL2=E-W LIKE LOBBY-EXTWL1 AZ=90 W=125
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 W1 LIKE LOBBY-WNDW1 X=60
 W1 LIKE LOBBY-WNDW1 X=80
 W1 LIKE LOBBY-WNDW1 X=100
 LOBBY-INTWL1=I-W LIKE NO-GUEST-INTWL2 A=3096
 LOBBY-CLG-I-W LIKE CRDR-CLG A=31000
 LOBBY-FLR-UNDERGROUND-FLOOR A=31000 TILT=180 L-EFF=32
 CONS-FLR2

SHOPS=SPACE
 A=14000 V=168000
 S-C=GUEST-CONDS
 F-W=70
 I-SCH=INFSCH-4
 \$ People, lighting based on Thai prototype retail bldg
 A/P=200 P-SCH=SHOP-OCCSCH
 L-W=SHOP-LIPWR L-SCH=SHOP-LITSCH E-W=0
 SHOP-EXTWL1-E-W LIKE LOBBY-EXTWL1 M=80
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 W1 LIKE LOBBY-WNDW1 X=60
 SHOP-EXTWL2-E-W LIKE LOBBY-EXTWL1 AZ=270 M=310
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 W1 LIKE LOBBY-WNDW1 X=60
 W1 LIKE LOBBY-WNDW1 X=80
 W1 LIKE LOBBY-WNDW1 X=100
 W1 LIKE LOBBY-WNDW1 X=120
 W1 LIKE LOBBY-WNDW1 X=140
 W1 LIKE LOBBY-WNDW1 X=160
 W1 LIKE LOBBY-WNDW1 X=180
 W1 LIKE LOBBY-WNDW1 X=200
 W1 LIKE LOBBY-WNDW1 X=220
 W1 LIKE LOBBY-WNDW1 X=240
 W1 LIKE LOBBY-WNDW1 X=260
 W1 LIKE LOBBY-WNDW1 X=280
 SHOP-EXTWL3-E-W LIKE LOBBY-EXTWL1 AZ=0 M=70
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 SHOP-INTWL1-I-W LIKE NO-GUEST-INTWL2 A=3840
 SHOP-CLG-I-W LIKE CRDR-CLG A=5110
 SHOP-ROOF-ROOF LIKE TOP-CR-ROOF H=127 M=70
 SHOP-FLR2-I-W LIKE NO-GUEST-FLR A=14000

RESTAURANTS=SPACE
 A=23100 V=277100
 S-C=GUEST-CONDS
 F-W=70
 I-SCH=INFSCH-5
 \$ A/P based on ASHRAE 90 hotel assumption for dining/lounge
 A/P=20 P-SCH=RESTNT-OCCSCH
 L-W=REST-LIPWR L-SCH=RESTNT-LITSCH
 E-W=0
 RESTNT-EXTWL1-E-W LIKE LOBBY-EXTWL1 M=188
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 W1 LIKE LOBBY-WNDW1 X=60
 W1 LIKE LOBBY-WNDW1 X=80
 W1 LIKE LOBBY-WNDW1 X=100
 W1 LIKE LOBBY-WNDW1 X=120
 W1 LIKE LOBBY-WNDW1 X=140
 W1 LIKE LOBBY-WNDW1 X=160
 RESTNT-EXTWL2-E-W LIKE LOBBY-EXTWL1 AZ=90 M=121
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 W1 LIKE LOBBY-WNDW1 X=60
 W1 LIKE LOBBY-WNDW1 X=80
 W1 LIKE LOBBY-WNDW1 X=100
 RESTNT-INTWL1-I-W LIKE NO-GUEST-INTWL2 A=3708
 RESTNT-ROOF-ROOF LIKE TOP-CR-ROOF H=121 M=188
 RESTNT-FLR1-I-W LIKE NO-GUEST-FLR A=23100

MEETING=SPACE
 A=15400 V=184800
 S-C=GUEST-CONDS
 F-W=70
 I-SCH=INFSCH-3
 \$ A/P based on Central Plaza Hotel Ballroom attendance records
 A/P=50 P-SCH=MEET-OCCSCH
 L-W=MEET-LIPWR L-SCH=MEET-OCCSCH
 E-W=0
 MEET-EXTWL1-E-W LIKE LOBBY-EXTWL1 AZ=90 M=40
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 MEET-EXTWL2-E-W LIKE LOBBY-EXTWL1 AZ=0 M=258
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 W1 LIKE LOBBY-WNDW1 X=60
 W1 LIKE LOBBY-WNDW1 X=80
 W1 LIKE LOBBY-WNDW1 X=100
 W1 LIKE LOBBY-WNDW1 X=120
 W1 LIKE LOBBY-WNDW1 X=140
 W1 LIKE LOBBY-WNDW1 X=160
 W1 LIKE LOBBY-WNDW1 X=180
 W1 LIKE LOBBY-WNDW1 X=200
 W1 LIKE LOBBY-WNDW1 X=220
 W1 LIKE LOBBY-WNDW1 X=240
 MEET-EXTWL3-E-W LIKE LOBBY-EXTWL1 AZ=270 M=40
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 MEET-INTWL1-I-W LIKE NO-GUEST-INTWL2 A=3096
 MEET-CLG-I-W LIKE CRDR-CLG A=15400
 MEET-FLR-U-F LIKE LOBBY-FLR A=15400

OFFICE=SPACE
 A=12000 V=144000
 S-C=GUEST-CONDS
 F-W=70
 I-SCH=INFSCH-6
 A/P=150 P-SCH=OFF-OCCSCH
 L-W=OFF-LIPWR L-SCH=OFF-OCCSCH
 E-W=OFF-EOPWR E-SCH=OFF-OCCSCH
 OFF-EXTWL1-E-W LIKE LOBBY-EXTWL1 AZ=90 M=64
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 OFF-EXTWL2-E-W LIKE LOBBY-EXTWL1 AZ=0 M=188
 W1 LIKE LOBBY-WNDW1
 W1 LIKE LOBBY-WNDW1 X=20
 W1 LIKE LOBBY-WNDW1 X=40
 W1 LIKE LOBBY-WNDW1 X=60
 W1 LIKE LOBBY-WNDW1 X=80
 W1 LIKE LOBBY-WNDW1 X=100
 W1 LIKE LOBBY-WNDW1 X=120
 W1 LIKE LOBBY-WNDW1 X=140
 W1 LIKE LOBBY-WNDW1 X=160
 OFF-INTWL1-I-W LIKE NO-GUEST-INTWL2 A=3024
 OFF-CLG-I-W LIKE CRDR-CLG A=10872
 OFF-ROOF-ROOF LIKE TOP-CR-ROOF H=188
 OFF-FLR1-I-W LIKE NO-GUEST-FLR A=12000

BUILDING-RESOURCE
 VERT-TRANS-KW=150 VERT-TRANS-SCH=LIFT-SCH
 \$ HOT WATER LOADS BASED ON RMIT ANALYSIS OF OTHER HOTELS IN BANGKOK
 \$ PER 777
 \$ ASSUME HOT-WATER USE IN GUEST ROOMS DOESN'T CONTRIBUTE TO COOLING
 \$ LOADS BECAUSE OF CONSTANT EXHAUST FAN OPERATION IN BATHROOMS
 \$ HOT-WATER=200000 HW-SCHEDULE=HOTWTR
 \$ ELECTRICITY USED IN BASEMENT SERVICE AND OUTDOOR AREAS
 \$ ELEC-KW= ELEC-SCHEDULE=

 LOADS REPORTS

LOADS-REPORT
 SUMMARY=(LS-A,LS-C,LS-D,LS-F,LS-I)
 LABG=REPORT-BLOCK
 VARIABLE-TYPE=GLOBAL
 VARIABLE-LIST=(3,4,13,14,25)
 LABB=REPORT-BLOCK
 VARIABLE-TYPE=BUILDING
 VARIABLE-LIST=(19,20)
 LABS=REPORT-BLOCK
 VARIABLE-TYPE=NE-CNR-GUEST
 VARIABLE-LIST=(18,19,25,27,36,44)
 LDSREPSCH=SCHEDULE
 THRU MAY 31 (ALL) (1,24) (0)
 THRU JUN 1 (ALL) (1,24) (0)
 THRU DEC 31 (ALL) (1,24) (0)
 LDSHRLY=HOURLY-REPORT
 REPORT-BLOCK=(LABB)
 REPORT-SCHEDULE=LDSREPSCH

END
 COMPUTE LOADS
 \$
 \$ SYSTEMS
 \$

INPUT SYSTEMS
 INPUT-UNITS= ENGLISH
 OUTPUT-UNITS= METRIC
 DIAGNOSTIC WARNINGS
 ABORT ERRORS
 \$
 \$ SYSTEMS PARAMETERS
 \$

PARAMETER
 \$ HOURLY ZONE TEMPERATURE SCHEDULE \$
 \$ Sept 248 T-COOL=75.2
 \$ Oct 258 QACFMP=25
 \$ RESET COOL CONTROL PARAMETERS

OUTM1=90
 SUPLO=45
 OUTLO=77
 SUPHI=55
 \$
 \$ SYSTEMS SCHEDULES
 \$

FAN-SCH1= SCHEDULE THRU DEC 31 (ALL) (1,24) (1)
 FAN-SCH2= SCHEDULE THRU DEC 31 (ALL)
 (1,8) (1) (9,16) (0) (17,19) (1) (20,21) (0) (22,24) (1)

HEAT-1= SCHEDULE THRU DEC 31 (ALL) (1,24) (0)
 COOL-1= SCHEDULE THRU DEC 31 (ALL) (1,24) (1)

HVNAIR-1= SCHEDULE THRU DEC 31 (ALL) (1,24) (1-999)

TEMPSCH-1= SCHEDULE THRU DEC 31 (ALL)
 (1,8) (T-COOL) (9,16) (99) (17,19) (T-COOL)
 (20,21) (99) (22,24) (T-COOL)

TEMPSCH-2= SCHEDULE THRU DEC 31 (ALL) (1,24) (T-COOL)
 TEMPSCH-3= SCHEDULE THRU DEC 31

```

(MON,THU) (1,7)(99) (0,20)(T-COOL) (21,24)(99)
(FRI,HOL) (1,24)(99)
TEMPSCH-4 = SCHEDULE THRU DEC 31 (ALL)
(1,8)(99) (9,22)(T-COOL) (23,24)(99)
TEMPSCH-5 = SCHEDULE THRU DEC 31 (ALL)
(1,2)(T-COOL) (3,7)(99) (8,24)(T-COOL)
TEMPSCH-6 = SCHEDULE THRU DEC 31
(MON,SAT) (1,6)(99) (7,22)(T-COOL) (23,24)(99)
(SUN,HOL) (1,24)(99)

```

```

DRES1=DAY-RESET-SCH
OUTSIDE-HI-OUTH: SUPPLY-LO-SUPLO
OUTSIDE-LO-OUTLO SUPPLY-HI-SUPHI
RES1=RESET-SCHEDULE THRU DEC 31 (ALL) DRES1

```

```

----- $
$ ZONE DESCRIPTION $
----- $

```

```

SET-DEFAULT FOR ZONE
ZONE-TYPE=CONDITIONED
$apt24$ D-C-T=75 D-H-T = 72 $Base
COOL-TEMP-SCH = TEMPSCH-1
THERMOSTAT-TYPE = PROPORTIONAL
THROTTLING-RANGE = 2
NO-GUEST-ZONE EXHAUST-CFM=50
SO-GUEST-ZONE E-CFM=50
NE-CNR-GUEST-ZONE E-CFM=65
SE-CNR-GUEST-ZONE E-CFM=65
SW-CNR-GUEST-ZONE E-CFM=65
NW-CNR-GUEST-ZONE E-CFM=65
TOP-NO-GST-ZONE E-CFM=50
TOP-SO-GST-ZONE E-CFM=50
TOP-NE-CNR-ZONE E-CFM=65
TOP-SE-CNR-ZONE E-CFM=65
TOP-SW-CNR-ZONE E-CFM=65
TOP-NW-CNR-ZONE E-CFM=65
CORRIDOR-ZONE C-T-SCH=TEMPSCH-2 OA-CFM/PER-OACFMP
TOP-CORRIDOR-ZONE C-T-SCH=TEMPSCH-2 OA-CFM/PER-OACFMP
LOBBY-ZONE C-T-SCH=TEMPSCH-2 OA-CFM/PER-OACFMP
MEETING-ZONE C-T-SCH=TEMPSCH-3 OA-CFM/PER-OACFMP
SHOPS-ZONE C-T-SCH=TEMPSCH-4 OA-CFM/PER-OACFMP
RESTAURANTS-ZONE C-T-SCH=TEMPSCH-5 OA-CFM/PER-OACFMP
OFFICE-ZONE C-T-SCH=TEMPSCH-6 OA-CFM/PER-OACFMP

```

```

----- $
$ SYSTEM CONTROL $
----- $

```

```

$CONTROL-1 = SYSTEM-CONTROL
$mat18$ MIN-SUPPLY-T = 64.4 $Base
MAX-SUPPLY-T = 105
$cccon3$ COOL-CONTROL = CONSTANT
COOL-RESET-SCH = RES1
HEATING-SCHEDULE = HEAT-1
COOLING-SCHEDULE = COOL-1

```

```

----- $
$ SYSTEM FANS $
----- $

```

```

$FANS-1 = SYSTEM-FANS
FAN-SCHEDULE = FAN-SCH1
$cccv3$ FAN-CONTROL = CONSTANT-VOLUME $Base
$stpr23$ SUPPLY-STATIC = 2.0 $Base
$stff43$ SUPPLY-EFF = 0.4 $Base

```

```

----- $
$ SYSTEM AIR $
----- $

```

```

$AIR-1 = SYSTEM-AIR
MIN-AIR-SCH = MINAIR-1
$soacfx$ OA-CONTROL = FIXED

```

```

----- $
$ SYSTEM TERMINALS $
----- $

```

```

$TERMINAL-1 = SYSTEM-TERMINAL
$ccr103$ MIN-CFM-RATIO = 1
REHEAT-DELTA-T = 0

```

```

----- $
$ SYSTEM $
----- $

```

```

SYS1 = SYSTEM
$cnf11$ SYSTEM-TYPE = RHFS
SYSTEM-CONTROL = $CONTROL-1
SYSTEM-AIR = $AIR-1
SYSTEM-FANS = $FANS-1
SYSTEM-TERMINAL = $TERMINAL-1
RETURN-AIR-PATH = DUCT
ZONE-NAMES = (CORRIDOR, TOP-CORRIDOR, LOBBY, MEETING,
SHOPS, OFFICE, RESTAURANTS)

```

```

SYS2 = SYSTEM
$stpr23$ SYSTEM-TYPE = TPFC
HEATING-SCHEDULE = HEAT-1

```

```

COOLING-SCHEDULE = COOL-1
FAN-SCHEDULE = FAN-SCH1
$mat18$ MIN-SUPPLY-T = 64.4 $Base
MAX-SUPPLY-T = 105
MIN-AIR-SCH = MINAIR-1
ZONE-NAMES = (NO-GUEST, SO-GUEST,
NE-CNR-GUEST, SE-CNR-GUEST,
SW-CNR-GUEST, NW-CNR-GUEST,
TOP-NO-GST, TOP-SO-GST,
TOP-NE-CNR, TOP-SE-CNR,
TOP-SW-CNR, TOP-NW-CNR)

```

```

PL1 = PLANT-ASSIGNMENT SYSTEM-NAMES = (SYS1, SYS2)

```

```

SYSTEMS-REPORT VERIFICATION = (SV-A)
SUMMARY = (SS-A, SS-C, SS-H, SS-I, SS-J, SS-K, SS-N)
SYSRB1=REPORT-BLOCK
VARIABLE-TYPE=CORRIDOR
VARIABLE-LIST=(6,7,10,31)
SYSRB2=REPORT-BLOCK
VARIABLE-TYPE=SO-GUEST
VARIABLE-LIST=(6,7,10,31)
SYSRB3=REPORT-BLOCK
VARIABLE-TYPE=SYS1
VARIABLE-LIST=(2,3,4,6,25,70)
SYSRB4=REPORT-BLOCK
VARIABLE-TYPE=SYS2
VARIABLE-LIST=(2,3,4,6,25,70)
SYSREPSCH=SCHEDULE
THRU MAY 31 (ALL) (1,24) (0)
THRU JUN 1 (ALL) (1,24) (0)
THRU DEC 31 (ALL) (1,24) (0)
SYSHRLY=HOURLY-REPORT
REPORT-BLOCK=(SYSRB1, SYSRB2, SYSRB3, SYSRB4)
REPORT-SCHEDULE=SYSREPSCH

```

END

```

COMPUTE SYSTEMS
$ ***** $
$ PLANT $
$ ***** $

```

```

INPUT PLANT
INPUT-UNITS= ENGLISH
OUTPUT-UNITS= METRIC
DIAGNOSTIC WARNINGS
ABORT ERRORS
PLANT-REPORT SUMMARY = (PS-B, PS-C, PS-D, PS-G, PS-H, BEPS)
PL1 = PLANT-ASSIGNMENT

```

```

----- $
$ PLANT PARAMETERS $
----- $
PARAMETER
CTYPE = HERM-CENT-CHLR
EIR = 24 SONE-TIME MEASUREMENT BY MTRS

```

```

----- $
$ PLANT DESCRIPTION $
----- $
CHILLER1 = PLANT-EQUIPMENT
$cnch3$ TYPE = HERM-CENT-CHLR
SIZE = -999

```

```

PART-LOAD-RATIO
$cnch3$ TYPE = HERM-CENT-CHLR
$scop403$ E-I-R = .253 $Base

```

```

$stovers$ TOWER1 = PLANT-EQUIPMENT TYPE=COOLING-TWR SIZE=-999

```

```

PLANT-PARAMETERS
$stwd29$ TWR-DESIGN-WETBULB = 64 $Base

```

```

END
COMPUTE PLANT
$ ***** $
$ ECONOMICS $
$ ***** $

```

```

INPUT ECONOMICS
ECONOMICS-REPORT SUMMARY=(ES-E)

```

```

ENERGY-COST
RESOURCE-ELECTRICITY
ASSIGN-CHARGE=(RATES)

```

```

$ RATES ASSUME AN EXCHANGE RATE OF 25 BAHT/U.S. DOLLAR
RATES-CHARGE-ASSIGNMENT
RESOURCE-ELECTRICITY
TYPE-ENERGY
$ 1.23 BAHT
UNIFORM-CHARGE=0.05
TYPE-DEMAND
$ 229 BAHT
UNIFORM-CHARGE=9.16

```

```

$ NEED TO FIGURE OUT HOW TO MAKE THIS A MIN MONTHLY CHARGE
$ COST-PARAMETERS
$ DEM-RATCHET-T2=HIGHEST
$ DEM-RATCHET-FRC2= 6
$ DEM-PERIOD-T2=WHOLE-YEAR

```

```

$ *****
$ DOE-2 INPUT FILE: PROTOTYPE THAI RETAIL BUILDING
$ BASED ON CHARN ISSARA SHOPPING CENTER, BANGKOK
$
$ CREATED: 2 JUL 88
$ UPDATED: 26 MAR 90
$ J. BUSCH
$ *****
$ POST-PROCESSOR PARTIAL
$ *****
$ LOADS
$ *****
$ INPUT LOADS
$ INPUT-UNITS=ENGLISH
$ OUTPUT-UNITS=METRIC
$ TITLE LINE-1 'THAI RETAIL BLDG PROTOTYPE'
$ LINE-2 'Bangkok 85'
$ LINE-3 'base rafal ptac2'
$ LINE-4 '
$
$ DIAGNOSTIC WARNINGS
$ ABORT ERRORS
$ RUN-PERIOD JAN 1 1985 THRU DEC 31 1985
$ BUILDING-LOCATION LAT=13.7 LONG=100.6 T-Z=-7 ALT=12
$ ATM-MOISTURE=
$ (1.3,1.3,1.3,1.3,1.3,1.3,1.3,1.3,1.3,1.3,1.3,1.3)
$ ATM-TURBIDITY=
$ (1.67,.67,.67,.67,.67,.67,.67,.67,.67,.67,.67,.67)
$ SOWRIS AZ=180
$ DAYLIGHT-SAVINGS=NO
$
$ LOADS PARAMETERS
$
$ PARAMETER
$ S1p105 ACH=1.0 $Base
$ S1p255 LOADST=14
$ S1p205 LITPMR1=2.0 $Base
$ S1p695 LITPMRSH=6.9 $Base
$ S1p635 EQPMR1=0.0
$ S1p105 EQPMRSH=1.0 $Base
$ S1p125 GLASCON=1.64 $Base: THAI-ASHAI TINTED DARK COOL GRAY FLOAT 6MM
$ S1c.635 SC= 63 $Base: THAI-ASHAI TINTED DARK COOL GRAY FLOAT 6MM
$ S1w135 MMR= .35 $Base
$ S1w305 WALLABS= .30 $Base: WHITE SEMI-GLOSS PAINT
$ S1w655 ROOFABS= .65 $Base: UNTREATED CONCRETE
$ S1w135 RWall= .0001
$
$ OCCUPANCY SCHEDULE
$
$ PEOPLE-WD-DAY-SCHEDULE
$ (1,10)(1) (11,12)(1) (13,14)(1) (15,16)(1) (19)(1)
$ (20,24)(1)
$ PEOPLE-WH-DAY-SCHEDULE
$ (1,10)(1) (11,12)(1) (13,14)(1) (15,16)(1) (19)(1)
$ (20,24)(1)
$ PEOPLE-WK-WEEK-SCHEDULE (WD) PEOPLE-WD (WH) PEOPLE-WH
$ PEOPLE-SCHEDULE THRU DEC 31 PEOPLE-WK
$
$ LIGHTING SCHEDULE
$
$ LIGHTS-DAY-DAY-SCHEDULE
$ (1,9)(.05) (10,19)(1) (20,24)(.05)
$ LIGHTS-SCHEDULE THRU DEC 31 (ALL) LIGHTS-DAY
$
$ INFILTRATION SCHEDULE
$
$ INF-SCH-SCHEDULE THRU DEC 31 (ALL)
$ (1,9)(1) (10,19)(1) (20,24)(1)
$
$ WINDOW MGMT SCHEDULE
$
$ SHADE-MULT-SCHEDULE THRU DEC 31 (ALL) (1,24) (1.75)
$ TRANS-MULT-SCHEDULE THRU DEC 31 (ALL) (1,24) (1.35)
$ SE-SHADE-SCHEDULE THRU DEC 31 (ALL) (1,24) (1.00)
$ REOPEN-PROB-SCHEDULE THRU DEC 31 (ALL) (1,24) (1.5)
$
$ CONSTRUCTION
$
$ BRICK-MATERIAL COND= .47 DENS=109 TH=1 S-H= 2
$ PLASTER-MATERIAL COND= .176 DENS=116 TH=1 S-H= 2 SCH03
$ EXPANDED POLYSTYRENE THICKNESS CALCULATED BELOW AS .02 X RWall
$ INSUL-MATERIAL COND= .02 DENS=1 TH=1 S-H= 29
$ CONCRETE-MATERIAL COND=.10417 DENS=140 TH=1 S-H= 2 SCC14
$
$ EXTMALLER-LAYERS MAT=(INSUL,CONCRETE,PLASTER)
$ TH=(RWall TIMES .02, .3333, .0833) I-F-R=0.68
$ ROOFER-LAYERS MAT=(RPO3,CCL6,IM01,AL33,ACO2) I-F-R=0.68
$ FLOORER-LAYERS MAT=(CC14) I-F-R=0.68
$ CEILINGER-LAYERS MAT=(ACO2) I-F-R=0.68
$
$ ROOF1-CONSTRUCTION LAYERS=ROOFER ABS=ROOFABS
$ EXTM1-CONSTRUCTION LAYERS=EXTMALLER ABS=MALLABS
$ INTM1-CONSTRUCTION U-VALUE=1.5 SCONVECTIVE COUPLINGS
$ INTM2-CONSTRUCTION U-VALUE=1.02 $DISPLAY WINDOWS
$ INTM3-CONSTRUCTION U-VALUE=0.32 $GYF BOARD W/ METAL STUDS
$ FLR1-CONSTRUCTION LAYERS=FLOORER $ ONLY FLOOR--HOT CEILING
$ CLG1-CONSTRUCTION LAYERS=CEILINGER $SUSPENDED AC TILE CEILING
$
$ GLAZING-GLASS-TYPE SHADING-COEF-SC GLASS-CONDUCTANCE-GLASCON
$

```

```

$ FENESTRATION
$
$ SET-DEFAULT FOR WINDOW
$ HEIGHT = WNR TIMES 11.0
$ GLASS-TYPE = GLAZING
$ MAX-SOLAR-SCH = CLOSE-SHADE
$ MIN-SHADE-TYPE = MOVABLE-INTERIOR
$ SHADING-SCHEDULE = SHADE-MULT
$ VIS-TRANS-SCH = TRANS-MULT
$ OPEN-SHADE-SCH = REOPEN-PROB
$ SUN-CTRL-PROB = .5
$
$ Overhang width is expressed as a fraction of window height
$ Fin depth is expressed as a fraction of window width
$
$ SPACE DESCRIPTIONS
$
$ SET-DEFAULT FOR SPACE
$ TEMPERATURE = (LOADST)
$ INF-METHOD = AIR-CHANGE
$ INF-SCHEDULE = INF-SCH
$ AIR-CHANGES/HR = ACH
$ FLOOR-WEIGHT = 0
$ EQUIPMENT-W/SQFT = EQPMRSH
$ EQUIP-SCHEDULE = PEOPLE
$ AREA/PERSON = 200
$ PEOPLE-SCHEDULE = PEOPLE
$ PEOPLE-HQ-SENS = 230
$ PEOPLE-HQ-LAT = 190
$ LIGHTING-W/SQFT = LITPMRSH
$ LIGHT-TO-SPACE = 1.0
$ LIGHTING-TYPE = INCAND
$ LIGHTING-SCHEDULE = LIGHTS
$ LIGHT-SET-POINT1 = 50
$ MAX-GLARE = 22
$
$ MID-NORTH = SPACE
$ FLOOR-MULTIPLIER=3 AREA=4068 VOLUME=34578
$ MID-NO-EXTWL1-EXTERIOR-WALL
$ AZIMUTH=0 HEIGHT=11.0 WIDTH=244 CONSTRUCTION=EXTWL1
$ MID-NO-WNDW1-WINDOW WIDTH= 22 X=0
$ MID-NO-WNDW2-WI W=22 X=22
$ MID-NO-WNDW3-WI W=22 X=44
$ MID-NO-WNDW4-WI W=22 X=66
$ MID-NO-WNDW5-WI W=22 X=88
$ MID-NO-WNDW6-WI W=22 X=110
$ MID-NO-WNDW7-WI W=22 X=132
$ MID-NO-WNDW8-WI W=22 X=154
$ MID-NO-WNDW9-WI W=22 X=176
$ MID-NO-WNDW10-WI W=22 X=198
$ MID-NO-WNDW11-WI W=22 X=220
$ MID-NO-INTWL1-I-W I-W-TYPE=STANDARD CONS=INTWL2
$ A=1768 N-T MID-CORRIDOR
$ MID-NO-INTWL2-I-W I-W-TYPE=STANDARD CONS=INTWL3
$ A=216 N-T MID-EAST
$ MID-NO-INTWL3-I-W LIKE MID-NO-INTWL2 N-T MID-WEST
$ MID-NO-FLR1-I-W A=4068 TILT=180 CONS=FLR1
$ I-W-TYPE=ADIABATIC
$ MID-NO-CLG1-I-W A=4068 TILT=0 CONS=CLG1
$ I-W-TYPE=ADIABATIC
$
$ MID-SOUTH = SPACE
$ LIKE MID-NORTH
$ MID-SO-EXTWL1-E-W LIKE MID-NO-EXTWL1 AZ=180
$ MID-SO-WNDW1-WI LIKE MID-NO-WNDW1
$ MID-SO-WNDW2-WI LIKE MID-NO-WNDW2
$ MID-SO-WNDW3-WI LIKE MID-NO-WNDW3
$ MID-SO-WNDW4-WI LIKE MID-NO-WNDW4
$ MID-SO-WNDW5-WI LIKE MID-NO-WNDW5
$ MID-SO-WNDW6-WI LIKE MID-NO-WNDW6
$ MID-SO-WNDW7-WI LIKE MID-NO-WNDW7
$ MID-SO-WNDW8-WI LIKE MID-NO-WNDW8
$ MID-SO-WNDW9-WI LIKE MID-NO-WNDW9
$ MID-SO-WNDW10-WI LIKE MID-NO-WNDW10
$ MID-SO-WNDW11-WI LIKE MID-NO-WNDW11
$ MID-SO-INTWL1-I-W LIKE MID-NO-INTWL1
$ MID-SO-INTWL2-I-W LIKE MID-NO-INTWL2
$ MID-SO-INTWL3-I-W LIKE MID-NO-INTWL3
$ MID-SO-FLR1-I-W LIKE MID-NO-FLR1
$ MID-SO-CLG1-I-W LIKE MID-NO-CLG1
$
$ MID-EAST = SPACE
$ F-M=3 A=1404 V=11934
$ MID-EA-EXTWL1-E-W LIKE MID-NO-EXTWL1 W=96 AZ=-90
$ MID-EA-WNDW1-WI W=24 X=0
$ MID-EA-WNDW2-WI W=24 X=24
$ MID-EA-WNDW3-WI W=24 X=48
$ MID-EA-WNDW4-WI W=24 X=72
$ MID-EA-INTWL1-I-W LIKE MID-NO-INTWL1 A=510
$ MID-EA-FLR1-I-W LIKE MID-NO-FLR1 A=1404
$ MID-EA-CLG1-I-W LIKE MID-NO-CLG1 A=1404
$
$ MID-WEST = SPACE
$ LIKE MID-EAST
$ MID-WE-EXTWL1-E-W LIKE MID-NO-EXTWL1 W=96 AZ=90
$ MID-WE-WNDW1-WINDOW LIKE MID-EA-WNDW1
$ MID-WE-WNDW2-WINDOW LIKE MID-EA-WNDW2
$ MID-WE-WNDW3-WINDOW LIKE MID-EA-WNDW3
$ MID-WE-WNDW4-WINDOW LIKE MID-EA-WNDW4
$ MID-WE-INTWL1-I-W LIKE MID-NO-INTWL1 A=510
$ MID-WE-FLR1-I-W LIKE MID-NO-FLR1 A=1404
$ MID-WE-CLG1-I-W LIKE MID-NO-CLG1 A=1404

```

```

MID-CORRIDOR = SPACE
F-M=3 A=10176 V=86496 E-W-EQPMRC1 L-W-LITPMRC1
MID-CR-INTWL1-I-W I-W-TYPE-AIR CONS-INTWL1 A=2040
N-T ATRIUM
MID-CR-CLG-I-W LIKE MID-NO-CLG A=10176
MID-CR-FLR-I-W LIKE MID-NO-FLR A=10176

ATRIUM = SPACE
A=2304 V=93312 E-W-EQPMRC1 L-W-LITPMRC1
ATRIUM-FLR-I-W LIKE MID-NO-FLR A=2304
ATRIUM-ROOF-ROOF CONS-ROOF1 TILT=0 A2=180 H=24 W=96

TOP-NORTH = SPACE
LIKE MID-NORTH F-M=1
TOP-NO-EXTWL1-E-W LIKE MID-NO-EXTWL1
TOP-NO-WNDW1-W1 LIKE MID-NO-WNDW1
TOP-NO-WNDW2-W1 LIKE MID-NO-WNDW2
TOP-NO-WNDW3-W1 LIKE MID-NO-WNDW3
TOP-NO-WNDW4-W1 LIKE MID-NO-WNDW4
TOP-NO-WNDW5-W1 LIKE MID-NO-WNDW5
TOP-NO-WNDW6-W1 LIKE MID-NO-WNDW6
TOP-NO-WNDW7-W1 LIKE MID-NO-WNDW7
TOP-NO-WNDW8-W1 LIKE MID-NO-WNDW8
TOP-NO-WNDW9-W1 LIKE MID-NO-WNDW9
TOP-NO-WNDW10-W1 LIKE MID-NO-WNDW10
TOP-NO-WNDW11-W1 LIKE MID-NO-WNDW11
TOP-NO-INTWL1-I-W LIKE MID-NO-INTWL1 N-T TOP-CORRIDOR
TOP-NO-INTWL2-I-W LIKE MID-NO-INTWL2 N-T TOP-EAST
TOP-NO-INTWL3-I-W LIKE MID-NO-INTWL3 N-T TOP-WEST
TOP-NO-FLR-I-W LIKE MID-NO-FLR
TOP-NO-ROOF-ROOF LIKE ATRIUM-ROOF H=18 W=226

TOP-SOUTH = SPACE
LIKE MID-SOUTH F-M=1
TOP-SO-EXTWL1-E-W LIKE MID-SO-EXTWL1
TOP-SO-WNDW1-W1 LIKE MID-SO-WNDW1
TOP-SO-WNDW2-W1 LIKE MID-SO-WNDW2
TOP-SO-WNDW3-W1 LIKE MID-SO-WNDW3
TOP-SO-WNDW4-W1 LIKE MID-SO-WNDW4
TOP-SO-WNDW5-W1 LIKE MID-SO-WNDW5
TOP-SO-WNDW6-W1 LIKE MID-SO-WNDW6
TOP-SO-WNDW7-W1 LIKE MID-SO-WNDW7
TOP-SO-WNDW8-W1 LIKE MID-SO-WNDW8
TOP-SO-WNDW9-W1 LIKE MID-SO-WNDW9
TOP-SO-WNDW10-W1 LIKE MID-SO-WNDW10
TOP-SO-WNDW11-W1 LIKE MID-SO-WNDW11
TOP-SO-INTWL1-I-W LIKE MID-SO-INTWL1 N-T TOP-CORRIDOR
TOP-SO-INTWL2-I-W LIKE MID-SO-INTWL2 N-T TOP-EAST
TOP-SO-INTWL3-I-W LIKE MID-SO-INTWL3 N-T TOP-WEST
TOP-SO-FLR-I-W LIKE MID-SO-FLR
TOP-SO-ROOF-ROOF LIKE TOP-NO-ROOF

TOP-EAST = SPACE
LIKE MID-EAST F-M=1
TOP-EA-EXTWL1-E-W LIKE MID-EA-EXTWL1
TOP-EA-WNDW1-W1 LIKE MID-EA-WNDW1
TOP-EA-WNDW2-W1 LIKE MID-EA-WNDW2
TOP-EA-WNDW3-W1 LIKE MID-EA-WNDW3
TOP-EA-WNDW4-W1 LIKE MID-EA-WNDW4
TOP-EA-INTWL1-I-W LIKE MID-EA-INTWL1
TOP-EA-FLR-I-W LIKE MID-EA-FLR
TOP-EA-ROOF-ROOF LIKE TOP-NO-ROOF H=18 W=78

TOP-WEST = SPACE
LIKE MID-WEST F-M=1
TOP-WE-EXTWL1-E-W LIKE MID-WE-EXTWL1
TOP-WE-WNDW1-W1 LIKE MID-WE-WNDW1
TOP-WE-WNDW2-W1 LIKE MID-WE-WNDW2
TOP-WE-WNDW3-W1 LIKE MID-WE-WNDW3
TOP-WE-WNDW4-W1 LIKE MID-WE-WNDW4
TOP-WE-INTWL1-I-W LIKE MID-WE-INTWL1
TOP-WE-FLR-I-W LIKE MID-WE-FLR
TOP-WE-ROOF-ROOF LIKE TOP-EA-ROOF

TOP-CORRIDOR = SPACE
LIKE MID-CORRIDOR F-M=1
TOP-CR-INTWL1-I-W LIKE MID-CR-INTWL1
TOP-CR-FLR-I-W LIKE MID-CR-FLR
TOP-CR-ROOF-ROOF LIKE ATRIUM-ROOF H=60 W=170

BUILDING-RESOURCE VERT-TRANS-KW=38 VERT-TRANS-SCH=PEOPLE

LOADS-REPORT
SUMMARY=(LS-A,LS-C,LS-D,LS-F,LS-I)
LRBG = REPORT-BLOCK
VARIABLE-TYPE=GLOBAL
VARIABLE-LIST=(3,6,17,14,15)
LRBB=REPORT-BLOCK
VARIABLE-TYPE=BUILDING
VARIABLE-LIST=(21,22,23,24,25,36,26,20,30,32,33)
LRBWW=REPORT-BLOCK
VARIABLE-TYPE=ATRIUM
VARIABLE-LIST=(10,11,12,13,14,15,16)
LRBWS=REPORT-BLOCK
VARIABLE-TYPE=MID-SOUTH
VARIABLE-LIST=(10,11,12,13,14,15,16)
$ LDSREPSCH=SCHEDULE
$ THRU DEC 31 (ALL) (1,24) (0)
$ LDSHRLY=HOURLY-REPORT
$ REPORT-BLOCK=(LRBB)
$ REPORT-SCHEDULE=LDSREPSCH

```

```

END
COMPUTE LOADS
$ .....
$ ..... SYSTEMS .....
$ .....
INPUT SYSTEMS
INPUT-UNITS= ENGLISH
OUTPUT-UNITS= METRIC
SYSTEMS-REPORT VERIFICATION = (SV-A)
SUMMARY = (SS-A,SS-C,SS-H,SS-I,SS-J,SS-K,SS-N)
$ .....
$ ..... SYSTEMS PARAMETERS .....
$ .....
PARAMETER
$ap1258 T-COOL-77 SBase
$ RESET COOL CONTROL PARAMETERS
OUTHI = 90
SUPLO = 45
OUTLO = 77
SUPHI = 55
$oa_258 OACFMP = 25
$prcn03 T7=99 T8=99 T9=99 F7=0 F8=0 F9=0
$ .....
$ ..... SYSTEMS SCHEDULES .....
$ .....
FAN-SCH = SCHEDULE THRU DEC 31 (ALL)
(1,6) (0) (7,9) (F7,F8,F9) (10,21) (1) (22,24) (0)
HEAT-SCH = SCHEDULE THRU DEC 31 (ALL) (1,24) (0)
COOL-SCH = SCHEDULE THRU DEC 31 (ALL) (1,24) (1)
MINAIR-SCH = SCHEDULE THRU DEC 31 (ALL)
(1,10) (0) (11,19) (-999,.) (20,24) (0)
TEMP-SCH = SCHEDULE THRU DEC 31 (ALL)
(1,6) (99) (7,9) (T7,T8,T9) (10,22) (T-COOL) (23,24) (99)
DRES1-DAY-RESET-SCH
OUTSIDE-HI=OUTHI SUPPLY-LO=SUPLO
OUTSIDE-LO=OUTLO SUPPLY-HI=SUPHI
RES1-RESET-SCHEDULE THRU DEC 31 (ALL) DRES1
MV-SCH = SCHEDULE THRU DEC 31 (ALL)
(1,6) (1) (7,17) (0) (18,24) (1)
$ .....
$ ..... ZONE DESCRIPTION .....
$ .....
SET-DEFAULT FOR ZONE
DESIGN-COOL-T = 74 DESIGN-HEAT-T = 72
COOL-TEMP-SCH = TEMP-SCH
THERMOSTAT-TYPE = PROPORTIONAL
THROTTLING-RANGE = 2
MID-NORTH = ZONE
MID-SOUTH = ZONE
MID-EAST = ZONE
MID-WEST = ZONE
$ Fresh air is introduced to the public zones only.
$ but serves the public and shop areas both.
$ therefore it is based on occupancy by floor basically
MID-CORRIDOR = ZONE EXHAUST-CFM=67 O-A-CFM = OACFMP TIMES 100
ATRIUM = ZONE O-A-CFM = OACFMP TIMES 34
TOP-NORTH = ZONE
TOP-SOUTH = ZONE
TOP-EAST = ZONE
TOP-WEST = ZONE
TOP-CORRIDOR = ZONE E-CFM=200 O-A-CFM = OACFMP TIMES 100
$ .....
$ ..... SYSTEM CONTROL .....
$ .....
$CONTROL-1 = SYSTEM-CONTROL
$mat165 MIN-SUPPLY-T = 60.8 SBase
MAX-SUPPLY-T = 105
$cccn03 COOL-CONTROL = CONSTANT
COOL-RESET-SCH = RES1
HEATING-SCHEDULE = HEAT-SCH
COOLING-SCHEDULE = COOL-SCH
$ .....
$ ..... SYSTEM FANS .....
$ .....
$FANS-1 = SYSTEM-FANS
FAN-SCHEDULE = FAN-SCH
$tc_cvs FAN-CONTROL = CONSTANT-VOLUME SBase
$fspr28 SUPPLY-STATIC = 2.0 SBase
$feff48 SUPPLY-EFF = 0.4 SBase
NIGHT-VENT-SCH = MV-SCH
NIGHT-CYCLE-CTRL = STAY-OFF
$ .....
$ ..... SYSTEM AIR .....
$ .....
$AIR-1 = SYSTEM-AIR
MIN-AIR-UCH = MINAIR-SCH

```

```

Soacfas OA-CONTROL      = FIXED

$ ----- $
$          SYSTEM TERMINALS          $
$ ----- $

TERMINAL-1 = SYSTEM-TERMINAL
Smcr10$ MIN-CFM-RATIO   = 1.0
      REHEAT-DELTA-T    = 0

$ ----- $
$          SYSTEM                  $
$ ----- $

SYS1 = SYSTEM
Sncfals SYSTEM-TYPE      = RHFS
      SYSTEM-CONTROL     = SCNTROL-1
      SYSTEM-AIR         = SAIR-1
      SYSTEM-FANS        = SFANS-1
      SYSTEM-TERMINAL    = STERMINAL-1
      RETURN-AIR-PATH    = DUCT
      ZONE-NAMES         = (ATRIUM, MID-CORRIDOR, TOP-CORRIDOR)

SYS2 = SYSTEM
Sptac2$ SYSTEM-TYPE      = PTAC FAN-CONTROL = TWO-SPEED
Smat16$ MIN-SUPPLY-T     = 60.0 $Base
      MAX-SUPPLY-T       = 105
      HEATING-SCHEDULE   = HEAT-SCH
      COOLING-SCHEDULE   = COOL-SCH
      FAN-SCHEDULE2      = FAN-SCH
      ZONE-NAMES         = (MID-NORTH, MID-SOUTH, MID-EAST, MID-WEST,
                          TOP-NORTH, TOP-SOUTH, TOP-EAST, TOP-WEST)

PL1 = PLANT-ASSIGNMENT SYSTEM-NAMES = (SYS1,SYS2)

END
COMPUTE SYSTEMS
$ ..... $
$          PLANT                  $
$ ..... $
INPUT PLANT
  INPUT-UNITS= ENGLISH
  OUTPUT-UNITS= METRIC
PLANT-REPORT SUMMARY = (PS-B,PS-C,PS-D,PS-G,PS-H,BEPS)

PL1 = PLANT-ASSIGNMENT

CHILLER1 = PLANT-EQUIPMENT
Srecchs TYPE = HERM-REC-CHLR $Base
Soptchs SIZE = -999
Snrch2$ I-M = 2 M-N-A = 2 $Base

Srecchs PART-LOAD-RATIO TYPE = HERM-REC-CHLR
Scop34$ E-I-R = 292 $Base

PLANT-PARAMETERS
Saircr$ HERM-REC-COND-TYPE = AIR $Base

$Thermal Storage

END
COMPUTE PLANT
$ ..... $
$          ECONOMICS              $
$ ..... $
INPUT ECONOMICS
ECONOMICS-REPORT SUMMARY=(ES-E)

ENERGY-COST
RESOURCE-ELECTRICITY
ASSIGN-CHARGE=(RATES)

$ RATES ASSUME AN EXCHANGE RATE OF 25 BAHT/US DOLLAR
RATES-CHARGE-ASSIGNMENT
RESOURCE-ELECTRICITY
TYPE-ENERGY
$ : 23 BAHT
  UNIFORM-CHARGE=0.05
TYPE-DEMAND
$ : 229 BAHT
  UNIFORM-CHARGE=9.16

END
COMPUTE ECONOMICS
STOP

```

Notes on Benchmarking Thai Commercial Buildings to Electric Bills.

Central Plaza Hotel:

The electric billing for this hotel is under a special arrangement whereby it is charged only for energy (2.25 B/kWh and not for demand (so we had no information about demand). As of May 15 89, the DOE-2 simulation predicts 11,637 MWh whereas the 1987 electricity use was 10,686 MWh (a difference of 9%).

Possible reasons discrepancy:

- Different weather between 1987 and 1985, which is used for the simulation.
- Meeting Hall use poorly estimated since a true schedule was unavailable.
- Fan energy use probably over-estimated because of DOE-2 characterization not reflecting the diversity of use in guest rooms (DOE-2 has fans always on).
- Penthouse energy use is a total mystery since we were unable to survey it and describe it accurately for DOE-2.
- Lobby, shops, restaurants, and nightclub were lumped together into a single thermal zone because of the lack of resources to gather data in enough detail to differentiate them.

Thai Farmer's Bank:

For this building I was able to obtain the monthly electricity bills in kWh, kW, and Baht for all of 1987. As of May 9 89, the DOE-2 simulation predicts 12,573 MWh, peak annual kW of 4467, and total bill of 27,214,551 Baht, whereas the actual was 15,518 MWh, 4160 kW, and 30,676,088 Baht (or differences of -19%, 7%, and -11%, respectively).

Possible sources of discrepancy:

- Difference in weather year (1985 vs. 1987).
- Fan scheduling poorly described. They utilize many distributed package air-handling-units that they turn on and off separately over a day, whereas these were simulated as a central fan system with the whole system either on or off (a DOE-2 limitation) and I approximated the latter by arbitrarily assuming that more than 25% of the distributed fan capacity constitutes the central fan on condition, and otherwise not.
- Ground floor banking lobby was not specifically modeled and it is likely that the lighting levels and cooling were higher than in the typical office zones.
- The central computer floor was off limits to us and therefore not modeled.
- There were differences in space temperatures between floors and between zones on the same floor at times, probably due to the HVAC system operating in actuality without the aid of a thermostatic control system (it was deactivated). The control strategy chosen by the building operators was to control the supply air temperature to balance demand on the chillers and occupant complaints. DOE-2 does not offer such a control strategy and therefore was modeled in the conventional manner using thermostats set at average temperature levels measured in the spaces during the days we were there.

Charn Issara Shopping Center:

The billing arrangement with this building was that the landlord supplied cooling, lighting, and vertical transport to the public circulation areas, but each individual retail shop tenant paid for their own electricity use including that of their split-type air-conditioners within the rented space. He was unable to collect historical bills from all of the tenants; just only the building owner, and from him only the total cost in Baht and not the kWh

and kW breakdown. The monthly bills stretch from June 87 to May 88. Therefore I benchmarked this building to the bills for the public space, which constitutes 48% of the total floor space, and a simulated 36% of the total energy costs. The public space bill for the above period was 3,662,180 Baht whereas the 9 May 89 simulation predicts 3,359,532 Baht (a difference of -8%).

Possible explanations for the discrepancy:

- Different weather years (1985 and 1987/1988).
- The number of shoppers on a typical day was a wild guess by the building operator and possibly underestimated.
- It is possible that we underestimated the misc. equipment energy use in the public space by taking only a one-time measurement by for instance floor waxers or coffee brewers in the central atrium.
- Air exchange between the public space and outdoors could easily be higher from door opening, thus causing higher cooling loads.

Codes Used to Identify Parametric Simulations: Part 1†

Code	Description
base	base case building
<i>System Types:</i>	
rhfs#	reheat fan system
vavs#	variable air volume system
tpfc#	two-pipe fan coil
ptac#	packaged terminal a/c
cbvav	ceiling bypass vav
szrh	single zone reheat
szci	single zone ceiling induction
tpiu	two-pipe induction unit
<i>Architectural Parametrics:</i>	
wwr##	window to wall ratio (%)
sc_##	shading coefficient (%)
ohg##	window overhangs (% of window height)
fin##	window fins (% of window width)
cls##	close shade threshold (max glare number)
sunc#	hourly probability of re-opening shades (# times 10%)
shm##	shading device multiplier for glass shading coefficient (%)
wabs#	wall absorptance (# times 10%)
uwl##	u-value for walls (## divided by 10 in W/m ²)
wm###	wall thermal mass (kg/m ²)
rm###	roof thermal mass (kg/m ²)
rabs#	roof absorptance (# times 10%)
rrf##	r-value of roof (ft ² ·°F-hr/Btu)
ltp##	light power density (W/m ²)
ltsv#	lighting power density savings (# times 10%)
eqp##	equipment power density (W/m ²)
inf##	infiltration (air changes per hour divided by 10)
uncno	unconditioned zone of office oriented north
unce	unconditioned zone of office oriented east
uncwe	unconditioned zone of office oriented west
nsori	long axis of hotel north-south orientation
daylt	daylighting controls
tvsv##	visual transmittance of glass (%)
lmpf#	lighting minimum power factor (# times 10%)
lcst#	light control steps
lcpr#	light control probability (# times 10%)
spt##	set point temperature (°C)

† Note: All parametrics are described as modifications to the base case architectural and system combination.

Codes Used to Identify Parametric Simulations: Part 2†

Code	Description
<i>Air-Conditioning Parametrics:</i>	
ccwrn	cooling controlled by demand from warmest zone
ccres	cooling controlled by reset schedule
oactm	economizer temperature control
oacen	economizer enthalpy control
oa_##	outside air quantity (cfm per person)
prcwk	pre-cooling of building every day of week
prcmn	pre-cooling of building Mondays only
prc#h	number of hours of pre-cooling prior to occupancy
fspr#	fan static pressure (inches of water)
feff#	fan efficiency (# times 10%)
fcdis	discharge damper fan control
fcspd	variable speed fan control
nvcnd	night fan ventilation control: scheduled + demand
nvcws	night fan ventilation control: when scheduled only
nvdth	night fan indoor-outdoor temperature difference trigger
nvr##	night fan volume ratio of capacity
nvt##	night fan outdoor temperature trigger
mst##	minimum supply air temperature (°C)
cop##	coefficient of performance of chiller
recch	reciprocating chiller
nrch#	number of chillers
engch	gas-fired engine chiller
abgch	gas-fired absorption chiller
varsp	variable speed chilled water pumps
aircd	air-cooled condensor
tower	cooling tower
twb##	tower design wet bulb temperature (°C)
tf2sp	two-speed tower fans
siz##	non-chiller hvac oversizing ratio (## divided by 10)
sizco	non-chiller hvac sized to coincident loads
thmst	thermal cool storage
tspar	partial storage strategy
tsful	full storage strategy
tsdem	demand-limited strategy
ts_in	thermal storage tank located indoors
eneff	energy efficient package
stand	building energy standard package

† Note: All parametrics are described as modifications to the base case architectural and system combination.

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	base	rhfs	2075	434	897	3084	58199	0.915	1.146
			2075	434	897	3084	58199	0.915	1.146
			1826	429	767	3084	44959	0.782	0.98
base	rhfs	wmr05	1826	429	767	3084	44959	0.782	0.98
base	rhfs	wmr10	1852	430	781	3084	46237	0.797	0.998
base	rhfs	wmr20	1904	431	808	3084	48751	0.825	1.033
base	rhfs	wmr30	1959	432	837	3084	51412	0.853	1.069
base	rhfs	wmr40	2014	433	866	3084	54577	0.883	1.106
base	rhfs		2075	434	897	3084	58199	0.915	1.146
base	rhfs	wmr60	2135	435	927	3084	61666	0.946	1.185
base	rhfs	wmr70	2195	436	958	3084	65279	0.977	1.224
base	rhfs	wmr80	2253	437	987	3084	68863	1.007	1.262
base	rhfs	wmr90	2309	437	1016	3084	72396	1.036	1.299
base	rhfs	wmr95	2336	438	1030	3084	74061	1.051	1.317
base	rhfs	sc_10	1863	433	799	3084	48572	0.815	1.021
base	rhfs	sc_20	1948	433	838	3084	52020	0.854	1.071
base	rhfs	sc_30	2036	433	878	3084	56218	0.896	1.123
base	rhfs	sc_40	2127	434	919	3084	60553	0.938	1.175
base	rhfs	sc_50	2212	435	957	3084	64335	0.977	1.224
base	rhfs	sc_60	2310	436	997	3084	69552	1.017	1.274
base	rhfs	sc_70	2408	437	1044	3084	74943	1.065	1.334
base	rhfs	sc_80	2508	438	1083	3084	80580	1.105	1.385
base	rhfs	sc_90	2581	438	1116	3084	83424	1.138	1.426
base	rhfs	sc100	2685	439	1166	3084	89810	1.19	1.491
base	rhfs	ohg01	2045	433	882	3084	56652	0.899	1.127
base	rhfs	ohg02	2021	434	869	3084	55459	0.887	1.111
base	rhfs	ohg03	1996	433	858	3084	54095	0.875	1.096
base	rhfs	ohg04	1984	433	850	3084	53779	0.868	1.087
base	rhfs	ohg05	1971	433	844	3084	53279	0.861	1.078
base	rhfs	ohg06	1954	433	835	3084	52313	0.852	1.067
base	rhfs	ohg07	1943	433	830	3084	51883	0.847	1.061
base	rhfs	ohg08	1936	433	827	3084	51676	0.843	1.057
base	rhfs	ohg09	1925	433	822	3084	51157	0.839	1.051
base	rhfs	ohg10	1915	433	818	3084	50643	0.834	1.045
base	rhfs	fin01	2042	433	882	3084	56303	0.899	1.127
base	rhfs	fin02	2039	433	881	3084	56756	0.899	1.126
base	rhfs	fin03	2027	434	875	3084	55874	0.893	1.118

THAI OFFICE BLDG PROTOTYPE Bangkok 85

		Load	Cooling Latent	Peak	Hours	Fan	Chiller	Tower
		(MW)	(MW)	(kW)	Cooling	Capacity	Capacity	Capacity
						(Lit/sec)	(MW)	(MW)
base	rhfs	2022	434	873	3084	55713	0.891	1.116
base	rhfs	2020	434	873	3084	55586	0.89	1.115
base	rhfs	2015	434	870	3084	55539	0.888	1.112
base	rhfs	2013	434	869	3084	55482	0.887	1.111
base	rhfs	2016	434	870	3084	55897	0.887	1.112
base	rhfs	2015	434	869	3084	55845	0.887	1.111
base	rhfs	2013	434	869	3084	55836	0.886	1.111
base	rhfs	2027	434	873	3084	55864	0.891	1.116
base	rhfs	1988	434	855	3084	54072	0.872	1.092
base	rhfs	1964	433	844	3084	53058	0.861	1.078
base	rhfs	1946	433	834	3084	52360	0.851	1.066
base	rhfs	1933	433	828	3084	51926	0.845	1.059
base	rhfs	1921	433	822	3084	51525	0.838	1.05
base	rhfs	1907	433	815	3084	50860	0.831	1.041
base	rhfs	1896	433	810	3084	50407	0.826	1.035
base	rhfs	1884	433	804	3084	49846	0.82	1.028
base	rhfs	1870	432	798	3084	49058	0.814	1.02
base	rhfs	2062	433	887	3084	57473	0.905	1.134
base	rhfs	2083	434	900	3084	58562	0.918	1.15
base	rhfs	2084	434	898	3084	58774	0.916	1.148
base	rhfs	2082	434	900	3084	58718	0.918	1.15
base	rhfs	2068	434	893	3084	57548	0.911	1.142
base	rhfs	2063	434	892	3084	57095	0.909	1.14
base	rhfs	2063	434	892	3084	57260	0.91	1.14
base	rhfs	2051	434	887	3084	56477	0.905	1.134
base	rhfs	2009	433	867	3084	55383	0.885	1.108
base	rhfs	2025	433	874	3084	56043	0.892	1.118
base	rhfs	2042	433	882	3084	56765	0.9	1.127
base	rhfs	2058	433	889	3084	57487	0.907	1.137
base	rhfs	2075	434	897	3084	58199	0.915	1.146
base	rhfs	2092	434	904	3084	58921	0.922	1.156
base	rhfs	2112	434	913	3084	59897	0.931	1.167
base	rhfs	2132	434	922	3084	60930	0.94	1.178
base	rhfs	2154	434	931	3084	62052	0.95	1.19
base	rhfs	2070	433	892	3084	57741	0.91	1.14

THAI OFFICE BLDG PROTOTYPE Bangkok 85

		Cooling Load (MW)	Latent Cooling (MW)	Peak Cooling (kW)	Hours	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base	rhfs	uwl20	2065	433	887	3084	57279	0.905
base	rhfs	uwl15	2064	433	883	3084	57081	0.901
base	rhfs	uwl10	2062	433	880	3084	56831	0.897
base	rhfs	uwl05	2061	433	876	3084	56666	0.894
base	rhfs	uwl02	2060	432	874	3084	56548	0.892
base	rhfs	wn100	2113	435	912	3084	60576	0.93
base	rhfs	wn200	2072	433	892	3084	57840	0.91
base	rhfs	wn300	2050	432	878	3084	56067	0.896
base	rhfs	wn400	2041	432	870	3084	55053	0.888
base	rhfs	wn500	2040	432	867	3084	54638	0.884
base	rhfs	rm100	2078	434	899	3084	58388	0.917
base	rhfs	rm200	2076	434	898	3084	58218	0.915
base	rhfs	rm300	2074	434	896	3084	58081	0.914
base	rhfs	rm400	2073	433	895	3084	57991	0.913
base	rhfs	rm500	2073	433	895	3084	57940	0.913
base	rhfs	rabs2	2069	434	894	3084	57977	0.912
base	rhfs	rabs4	2073	434	896	3084	58114	0.914
base	rhfs	rabs6	2077	434	898	3084	58284	0.916
base	rhfs	rabs8	2081	434	900	3084	58444	0.918
base	rhfs	rrf00	2080	434	900	3084	58449	0.918
base	rhfs	rrf05	2073	434	896	3084	58100	0.914
base	rhfs	rrf10	2071	434	895	3084	57996	0.913
base	rhfs	rrf20	2070	434	894	3084	57911	0.912
base	rhfs	ltp05	1809	434	800	3084	49846	0.816
base	rhfs	ltp10	1883	434	827	3084	52251	0.844
base	rhfs	ltp15	1960	434	855	3084	54539	0.872
base	rhfs	ltp20	2035	434	882	3084	56770	0.9
base	rhfs	ltp30	2195	434	940	3084	61963	0.959
base	rhfs	eqp05	1899	434	831	3084	52534	0.848
base	rhfs	eqp10	1969	434	857	3084	54718	0.874
base	rhfs	eqp20	2112	434	911	3084	59411	0.929

THAI OFFICE BLDG PROTOTYPE Bangkok 85

		Cooling Load (MW)	Latent Cooling (MW)	Peak Cooling (kW)	Hours	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base	rhfs exp30	2261	434	966	3084	64340	0.985	1.234
base	rhfs inf02	2076	433	897	3084	58133	0.915	1.147
base	rhfs inf05	2075	433	897	3084	58133	0.915	1.146
base	rhfs	2075	434	897	3084	58199	0.915	1.146
base	rhfs inf20	2154	438	927	3084	64599	0.945	1.185
base	rhfs inf30	2250	442	963	3084	73703	0.982	1.231
base	rhfs uncno	2121	434	903	3084	60387	0.921	1.154
base	rhfs uncea	2075	434	890	3084	59336	0.908	1.137
base	rhfs uncwe	2052	433	861	3084	55421	0.878	1.101
base	rhfs spt18	3227	401	1295	3084	268341	1.321	1.655
base	rhfs spt19	2869	431	1160	3084	172342	1.183	1.482
base	rhfs spt20	2629	441	1099	3084	124190	1.121	1.404
base	rhfs spt21	2434	440	1032	3084	95885	1.052	1.318
base	rhfs spt22	2273	437	973	3084	77028	0.993	1.244
base	rhfs spt23	2203	436	947	3084	69873	0.966	1.21
base	rhfs spt24	2074	434	896	3084	58095	0.914	1.145
base	rhfs spt25	1956	431	849	3084	49105	0.866	1.086
base	rhfs spt26	1848	428	806	3084	42963	0.822	1.03
base	rhfs spt27	1750	426	765	3084	36573	0.781	0.978
base	rhfs spt28	1703	424	746	3084	34201	0.761	0.953
base	rhfs spt29	1608	421	706	3084	29856	0.721	0.903
base	rhfs spt30	1519	417	669	3084	26291	0.683	0.855
base	rhfs daylt tvs05 lmpf0	1944	434	837	3084	53223	0.853	1.069
base	rhfs daylt tvs05 lmpf1	1555	434	842	3084	53501	0.858	1.076
base	rhfs daylt tvs05 lmpf2	1965	434	846	3084	53732	0.863	1.082
base	rhfs daylt tvs05	1977	434	852	3084	54218	0.869	1.089
base	rhfs daylt tvs05 lmpf4	1989	434	858	3084	54595	0.875	1.096
base	rhfs daylt tvs05 lmpf5	2003	433	864	3084	55242	0.881	1.104
base	rhfs daylt tvs05 lcst1	2034	434	873	3084	55742	0.89	1.115
base	rhfs daylt tvs05 lcst2	1992	434	854	3084	54180	0.871	1.091
base	rhfs daylt tvs05 lcst3	1979	434	849	3084	53845	0.866	1.085
base	rhfs daylt tvs05 lcst4	1976	434	849	3084	53954	0.866	1.085
base	rhfs daylt tvs05 lcst5	1972	434	848	3084	53836	0.864	1.083
base	rhfs daylt tvs05 lcst1 lcpr5	2053	433	885	3084	57039	0.902	1.131

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				Cooling Load		Peak Cooling	Hours	Fan Capacity	Chiller Capacity	Tower Capacity
				(MW)	(MWh)	(kW)		(Lit/sec)	(MW)	(MW)
base	rhfs	daylt tvs07 ohg08	1851	432	788	3084	48950	0.803	1.007	
base	rhfs	daylt tvs09 ohg08	1835	433	781	3084	48256	0.797	0.998	
base	rhfs	daylt tvs11 ohg08	1830	433	780	3084	48195	0.796	0.997	
base	rhfs	daylt tvs13 ohg08	1827	433	780	3084	48195	0.796	0.997	
base	rhfs	daylt tvs03 sc_70 ohg02	2210	436	948	3084	66316	0.967	1.211	
base	rhfs	daylt tvs05 sc_70 ohg02	2183	436	941	3084	65010	0.96	1.202	
base	rhfs	daylt tvs07 sc_70 ohg02	2178	436	940	3084	64958	0.959	1.201	
base	rhfs	daylt tvs09 sc_70 ohg02	2171	436	939	3084	64246	0.958	1.2	
base	rhfs	daylt tvs11 sc_70 ohg02	2169	436	939	3084	64246	0.958	1.2	
base	rhfs	daylt tvs13 sc_70 ohg02	2179	436	943	3084	65189	0.962	1.206	
base	rhfs	daylt tvs03 sc_70 ohg04	2118	435	907	3084	60746	0.925	1.16	
base	rhfs	daylt tvs05 sc_70 ohg04	2099	435	902	3084	60402	0.921	1.153	
base	rhfs	daylt tvs07 sc_70 ohg04	2094	435	902	3084	60350	0.92	1.153	
base	rhfs	daylt tvs09 sc_70 ohg04	2092	435	902	3084	60350	0.92	1.152	
base	rhfs	daylt tvs11 sc_70 ohg04	2085	435	901	3084	59930	0.919	1.151	
base	rhfs	daylt tvs13 sc_70 ohg04	2088	435	899	3084	60232	0.917	1.149	
base	rhfs	daylt tvs03 sc_70 ohg06	2071	434	885	3084	58373	0.903	1.132	
base	rhfs	daylt tvs05 sc_70 ohg06	2053	435	878	3084	58251	0.896	1.123	
base	rhfs	daylt tvs07 sc_70 ohg06	2038	434	875	3084	57491	0.893	1.119	
base	rhfs	daylt tvs09 sc_70 ohg06	2036	435	874	3084	57534	0.892	1.117	
base	rhfs	daylt tvs11 sc_70 ohg06	2034	434	875	3084	57430	0.892	1.118	
base	rhfs	daylt tvs13 sc_70 ohg06	2036	435	875	3084	57746	0.893	1.119	
base	rhfs	daylt tvs03 sc_70 ohg08	2034	434	866	3084	56576	0.884	1.107	
base	rhfs	daylt tvs05 sc_70 ohg08	2007	434	856	3084	55760	0.873	1.094	
base	rhfs	daylt tvs07 sc_70 ohg08	2003	434	856	3084	55987	0.874	1.095	
base	rhfs	daylt tvs09 sc_70 ohg08	1998	434	855	3084	55765	0.872	1.092	
base	rhfs	daylt tvs11 sc_70 ohg08	1996	434	855	3084	55760	0.872	1.093	
base	rhfs	daylt tvs13 sc_70 ohg08	2003	434	859	3084	56430	0.876	1.097	
base	rhfs	eneff hrelc	1188	327	487	3084	16796	0.496	0.587	
base	rhfs	nrch1 thmst tspar hrelc	2075	434	897	3084	58204	0.469	0.587	
base	rhfs	engch hrelc	2075	434	897	3084	58204	0.915	1.573	
base	rhfs	stand hrelc	1457	192	605	3084	46242	0.617	0.754	

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	Cooling (MWh)	Fans & Pumps (MWh)	Lights (MWh)	Elev. (MWh)	Equip. (MWh)	Total Energy (MWh)	Peak Elec. (kW)	Peak Time (M/D/H)	Energy Cost (\$)	Demand Cost (\$)	Total Cost (\$)	Run Date	Run File
base rhfs	598	254	629	191	352	2024	706 5/ 6/15	191226	74655	175882	18-Aug-89	offlds1	
base rhfs wr05	526	199	629	191	352	1897	649 5/ 6/15	94841	69038	163879	18-Aug-89	offlds1	
base rhfs wr10	534	204	629	191	352	1910	655 5/ 6/15	95498	69612	165110	18-Aug-89	offlds1	
base rhfs wr20	549	215	629	191	352	1935	667 5/ 6/15	96777	70740	167518	18-Aug-89	offlds1	
base rhfs wr30	564	226	629	191	352	1962	679 5/ 6/15	98128	71922	170051	18-Aug-89	offlds1	
base rhfs wr40	580	239	629	191	352	1992	692 5/ 6/15	99591	73220	172812	18-Aug-89	offlds1	
base rhfs	598	254	629	191	352	2024	706 5/ 6/15	101226	74655	175882	18-Aug-89	offlds1	
base rhfs wr60	616	269	629	191	352	2056	719 5/ 6/15	102807	76049	178857	18-Aug-89	offlds1	
base rhfs wr70	633	283	629	191	352	2088	733 5/ 6/15	104426	77482	181909	18-Aug-89	offlds1	
base rhfs wr80	650	298	629	191	352	2120	747 5/ 6/15	106020	78996	184916	18-Aug-89	offlds1	
base rhfs wr90	666	313	629	191	352	2151	760 5/ 6/17	107553	80280	187834	18-Aug-89	offlds1	
base rhfs wr95	674	320	629	191	352	2166	766 5/ 6/17	108299	80954	189253	18-Aug-89	offlds1	
base rhfs sc 10	537	214	629	191	352	1923	664 5/ 6/15	96153	70389	166543	18-Aug-89	offlds1	
base rhfs sc 20	561	228	629	191	352	1962	680 5/ 6/15	98101	72031	170133	18-Aug-89	offlds1	
base rhfs sc 30	587	246	629	191	352	2005	697 5/ 6/15	100251	73847	174099	18-Aug-89	offlds1	
base rhfs sc 40	613	264	629	191	352	2049	715 5/ 6/15	102457	75656	178114	18-Aug-89	offlds1	
base rhfs sc 50	638	280	629	191	352	2089	732 5/ 6/15	104477	77365	181843	18-Aug-89	offlds1	
base rhfs sc 60	666	301	629	191	352	2139	750 5/ 6/15	106952	79425	186377	18-Aug-89	offlds1	
base rhfs sc 70	694	324	629	191	352	2190	771 5/ 6/15	109487	81517	191005	18-Aug-89	offlds1	
base rhfs sc 80	723	346	629	191	352	2242	791 5/ 6/15	112080	83713	195794	18-Aug-89	offlds1	
base rhfs sc 90	744	359	629	191	352	2274	804 5/ 6/15	113724	85197	198921	18-Aug-89	offlds1	
base rhfs sc100	774	385	629	191	352	2331	827 5/ 6/17	116536	87541	204077	18-Aug-89	offlds1	
base rhfs ohg01	589	248	629	191	352	2009	699 5/ 6/15	100461	74026	174488	19-Aug-89	offlds4	
base rhfs ohg02	583	243	629	191	352	1997	694 5/ 6/15	99878	73505	173384	19-Aug-89	offlds4	
base rhfs ohg03	575	237	629	191	352	1984	688 5/ 6/15	99229	72958	172187	19-Aug-89	offlds4	
base rhfs ohg04	572	236	629	191	352	1980	686 5/ 6/15	98982	72721	171704	19-Aug-89	offlds4	
base rhfs ohg05	568	233	629	191	352	1974	683 5/ 6/15	98686	72460	171147	19-Aug-89	offlds4	
base rhfs ohg06	563	229	629	191	352	1965	679 5/ 6/15	98235	72078	170313	19-Aug-89	offlds4	
base rhfs ohg07	560	228	629	191	352	1960	677 5/ 6/15	97992	71869	169861	19-Aug-89	offlds4	
base rhfs ohg08	558	227	629	191	352	1957	676 5/ 6/15	97846	71741	169587	19-Aug-89	offlds4	
base rhfs ohg09	555	225	629	191	352	1952	674 5/ 6/15	97582	71522	169104	19-Aug-89	offlds4	
base rhfs ohg10	552	222	629	191	352	1947	672 5/ 6/15	97335	71317	168653	19-Aug-89	offlds4	
base rhfs fin01	589	246	629	191	352	2007	699 5/ 6/15	100362	73943	174305	19-Aug-89	offlds4	
base rhfs fin02	588	248	629	191	352	2008	699 5/ 6/15	100404	73956	174360	19-Aug-89	offlds4	
base rhfs fin03	584	244	629	191	352	2001	696 5/ 6/15	100046	73658	173705	19-Aug-89	offlds4	

THAI OFFICE BLDG PROTOTYPE Bangkok			Fans &			Total Peak			Energy			Demand			Total			Run		
			Cooling (MWh)	Pumps (MWh)	Lights (MWh)	Elev. (MWh)	Equip. (MWh)	Energy (MWh)	Peak Elec. (kW)	Time (M/D/H)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Run Date	File	
base	rhfs	fin04	583	244	629	191	352	1999	695	5/ 6/15	99942	73575	173517	19-Aug-89	offlds4					
base	rhfs	fin05	582	243	629	191	352	1998	695	5/ 6/15	99892	73526	173418	19-Aug-89	offlds4					
base	rhfs	fin06	581	243	629	191	352	1996	694	5/ 6/15	99810	73459	173270	19-Aug-89	offlds4					
base	rhfs	fin07	580	243	629	191	352	1995	694	5/ 6/15	99768	73422	173191	19-Aug-89	offlds4					
base	rhfs	fin08	581	244	629	191	352	1998	694	5/ 6/15	99887	73510	173398	19-Aug-89	offlds4					
base	rhfs	fin09	581	244	629	191	352	1997	694	5/ 6/15	99856	73482	173339	19-Aug-89	offlds4					
base	rhfs	fin10	580	244	629	191	352	1996	694	5/ 6/15	99829	73456	173285	19-Aug-89	offlds4					
base	rhfs	ohg01 fin01	584	244	629	191	352	2001	695	5/ 6/15	100048	73650	173698	20-Sep-89	offlds7					
base	rhfs	ohg02 fin02	573	237	629	191	352	1982	688	5/ 6/15	99106	72840	171947	20-Sep-89	offlds7					
base	rhfs	ohg03 fin03	566	233	629	191	352	1971	683	5/ 6/15	98542	72353	170896	20-Sep-89	offlds7					
base	rhfs	ohg04 fin04	561	230	629	191	352	1963	679	5/ 6/15	98139	72000	170140	20-Sep-89	offlds7					
base	rhfs	ohg05 fin05	557	228	629	191	352	1957	677	5/ 6/15	97859	71749	169608	20-Sep-89	offlds7					
base	rhfs	ohg06 fin06	554	226	629	191	352	1952	674	5/ 6/15	97590	71505	169096	20-Sep-89	offlds7					
base	rhfs	ohg07 fin07	550	223	629	191	352	1945	671	5/ 6/15	97248	71219	168467	20-Sep-89	offlds7					
base	rhfs	ohg08 fin08	546	221	629	191	352	1940	669	5/ 6/15	96992	71002	167995	20-Sep-89	offlds7					
base	rhfs	ohg09 fin09	543	219	629	191	352	1934	667	5/ 6/15	96710	70770	167480	20-Sep-89	offlds7					
base	rhfs	ohg10 fin10	539	216	629	191	352	1927	664	5/ 6/15	96343	70474	166818	20-Sep-89	offlds7					
base	rhfs	cls20	594	251	629	191	352	2017	702	5/ 6/15	100876	74351	175227	16-Sep-89	offlds7					
base	rhfs	cls60	601	256	629	191	352	2028	707	5/ 6/15	101417	74788	176205	15-Sep-89	offlds7					
base	rhfs	sunc1	601	256	629	191	352	2029	707	5/ 6/15	101464	74841	176306	15-Sep-89	offlds7					
base	rhfs	sunc3	600	256	629	191	352	2029	707	5/ 6/15	101433	74810	176243	15-Sep-89	offlds7					
base	rhfs	sunc7	596	252	629	191	352	2020	704	5/ 6/15	100990	74471	175462	15-Sep-89	offlds7					
base	rhfs	sunc9	595	250	629	191	352	2017	703	5/ 6/15	100835	74338	175173	15-Sep-89	offlds7					
base	rhfs	shm50	595	250	629	191	352	2017	703	5/ 6/15	100858	74366	175224	15-Sep-89	offlds7					
base	rhfs	shm25	591	247	629	191	352	2011	700	5/ 6/15	100537	74116	174654	15-Sep-89	offlds7					
base	rhfs	wabs1	579	242	629	191	352	1994	693	5/ 6/15	99680	73355	173035	6-Oct-89	offlds2					
base	rhfs	wabs2	584	245	629	191	352	2001	696	5/ 6/15	100051	73665	173716	19-Aug-89	offlds2					
base	rhfs	wabs3	589	248	629	191	352	2009	699	5/ 6/15	100444	73996	174441	6-Oct-89	offlds2					
base	rhfs	wabs4	593	251	629	191	352	2017	702	5/ 6/15	100837	74327	175164	19-Aug-89	offlds2					
base	rhfs	wabs6	598	254	629	191	352	2024	706	5/ 6/15	101226	74555	175882	19-Aug-89	offlds2					
base	rhfs	wabs7	603	257	629	191	352	2032	709	5/ 6/15	101619	74990	176609	19-Aug-89	offlds2					
base	rhfs	wabs8	609	261	629	191	352	2042	713	5/ 6/15	102107	75403	177511	6-Oct-89	offlds2					
base	rhfs	wabs9	615	266	629	191	352	2052	717	5/ 6/15	102613	75828	178442	19-Aug-89	offlds2					
base	rhfs	wabs9	621	270	629	191	352	2063	721	5/ 6/15	103152	76279	179431	6-Oct-89	offlds2					
base	rhfs	uwl25	597	252	629	191	352	2021	704	5/ 6/15	101052	74470	175523	6-Oct-89	offlds6					

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	Cooling			Fans &			Total Peak			Energy Demand			Total			Run		
	(MWh)	Pumps (MWh)	Light E. (MWh)	(MWh)	Elev. (MWh)	Equip. (MWh)	Energy (MWh)	(kW)	Peak Time (M/D/H)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Run Date	File	Run
base rhfs uwl20	595	250	629	191	352	2018	701 5/ 6/15	100881	74274	175155	6-Oct-89	offlds6						
base rhfs uwl15	595	249	629	191	352	2016	700 5/ 6/15	100813	74163	174976	6-Oct-89	offlds6						
base rhfs uwl10	594	248	629	191	352	2014	699 5/ 6/15	100727	74039	174767	6-Oct-89	offlds6						
base rhfs uwl05	594	248	629	191	352	2013	697 5/ 6/15	100670	73941	174611	6-Oct-89	offlds6						
base rhfs uwl02	593	247	629	191	352	2012	697 5/ 6/15	100629	73876	174506	6-Oct-89	offlds6						
base rhfs uwl00	609	264	629	191	352	2045	713 5/ 6/15	102248	75528	177777	21-Aug-89	offlds6						
base rhfs uwl200	597	253	629	191	352	2022	704 5/ 6/15	101095	74499	175595	21-Aug-89	offlds6						
base rhfs uwl300	591	245	629	191	352	2008	697 5/ 6/15	100411	73811	174222	21-Aug-89	offlds6						
base rhfs uwl400	588	241	629	191	352	2001	694 5/ 6/15	100062	73422	173485	21-Aug-89	offlds6						
base rhfs uwl500	588	239	629	191	352	1999	692 5/ 6/15	99958	73256	173214	21-Aug-89	offlds6						
base rhfs rml100	599	255	629	191	352	2026	707 5/ 6/15	101315	74746	176062	21-Aug-89	offlds6						
base rhfs rml200	598	254	629	191	352	2025	706 5/ 6/15	101240	74672	175912	21-Aug-89	offlds6						
base rhfs rml300	598	254	629	191	352	2024	705 5/ 6/15	101187	74616	175804	21-Aug-89	offlds6						
base rhfs rml400	598	253	629	191	352	2023	705 5/ 6/15	101154	74582	175736	21-Aug-89	offlds6						
base rhfs rml500	597	253	629	191	352	2023	705 5/ 6/15	101136	74562	175698	21-Aug-89	offlds6						
base rhfs rabs2	597	253	629	191	352	2022	704 5/ 6/15	101097	74549	175647	19-Aug-89	offlds2						
base rhfs rabs4	598	254	629	191	352	2023	705 5/ 6/15	101179	74616	175796	19-Aug-89	offlds2						
base rhfs rabs6	599	255	629	191	352	2025	706 5/ 6/15	101273	74693	175967	19-Aug-89	offlds2						
base rhfs rabs8	600	255	629	191	352	2027	707 5/ 6/15	101364	74768	176132	19-Aug-89	offlds2						
base rhfs rrf00	600	255	629	191	352	2027	707 5/ 6/15	101346	74762	176108	19-Aug-89	offlds2						
base rhfs rrf05	598	254	629	191	352	2023	705 5/ 6/15	101179	74613	175792	19-Aug-89	offlds2						
base rhfs rrf10	597	253	629	191	352	2022	705 5/ 6/15	101127	74568	175696	19-Aug-89	offlds2						
base rhfs rrf20	597	253	629	191	352	2022	704 5/ 6/15	101085	74531	175617	19-Aug-89	offlds2						
base rhfs ltp05	522	219	184	191	352	1468	544 5/ 6/15	73385	56861	130247	19-Aug-89	offlds3						
base rhfs ltp10	544	229	311	191	352	1626	590 5/ 6/15	81317	61930	143248	19-Aug-89	offlds3						
base rhfs ltp15	565	239	438	191	352	1785	636 5/ 6/15	89254	66997	156252	19-Aug-89	offlds3						
base rhfs ltp20	587	248	566	191	352	1943	682 5/ 6/15	97169	72050	169220	19-Aug-89	offlds3						
base rhfs ltp30	632	270	820	191	352	2266	775 5/ 6/15	113276	82360	195636	19-Aug-89	offlds3						
base rhfs eqp05	548	230	629	191	100	1699	592 5/ 6/15	84961	62141	147103	19-Aug-89	offlds3						
base rhfs eqp10	568	239	629	191	201	1829	637 5/ 6/15	91441	67125	158566	19-Aug-89	offlds3						
base rhfs eqp20	609	259	629	191	402	2090	729 5/ 6/15	104518	77185	181704	19-Aug-89	offlds3						

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	Cooling			Fans &			Total			Peak Time	Energy Cost (\$)	Demand Cost (\$)	Total Cost	Run Date	Run File
	(MWh)	Pumps (MWh)	Lights (MWh)	Elev. (MWh)	Equip. (MWh)	Energy (MWh)	Elec. (kW)	(W/D/H)							
base	rhfs	daylt	tv03	577	239	535	191	352	1894	673 5/ 7/10	94702	69683	164385	20-Sep-89	offlds8
base	rhfs	daylt	tv05	570	237	490	191	352	1840	667 5/ 7/10	92016	68577	160593	20-Sep-89	offlds8
base	rhfs	daylt	tv07	566	236	463	191	352	1808	663 5/ 7/10	90424	68083	158508	20-Sep-89	offlds8
base	rhfs	daylt	tv09	564	235	449	191	352	1790	657 5/ 7/10	89499	67659	157159	20-Sep-89	offlds8
base	rhfs	daylt	tv11	563	235	441	191	352	1781	653 5/ 7/10	89068	67370	156438	20-Sep-89	offlds8
base	rhfs	daylt	tv13	562	235	436	191	352	1776	649 5/ 7/10	88795	67141	155937	20-Sep-89	offlds8
base	rhfs	daylt	tv03_sc_70	661	303	474	191	352	1980	713 5/ 7/10	99021	74126	173147	20-Sep-89	offlds8
base	rhfs	daylt	tv05_sc_70	655	300	444	191	352	1943	703 5/ 7/10	97133	73134	170267	20-Sep-89	offlds8
base	rhfs	daylt	tv07_sc_70	655	302	434	191	352	1934	701 5/ 1/17	96704	72799	169503	20-Sep-89	offlds8
base	rhfs	daylt	tv09_sc_70	654	301	428	191	352	1926	699 5/ 1/17	96285	72374	168659	20-Sep-89	offlds8
base	rhfs	daylt	tv11_sc_70	656	303	425	191	352	1927	700 5/ 1/17	96363	72262	168605	20-Sep-89	offlds8
base	rhfs	daylt	tv13_sc_70	652	299	423	191	352	1917	697 5/ 1/17	95842	71767	167610	20-Sep-89	offlds8
base	rhfs	daylt	tv03_ohg02	566	234	544	191	352	1886	668 5/ 7/10	94324	69335	163659	12-Oct-89	offlds9
base	rhfs	daylt	tv05_ohg02	560	232	499	191	352	1833	663 5/ 7/10	91629	68224	159853	12-Oct-89	offlds9
base	rhfs	daylt	tv07_ohg02	555	230	469	191	352	1797	658 5/ 7/10	89853	67607	157461	12-Oct-89	offlds9
base	rhfs	daylt	tv09_ohg02	553	229	453	191	352	1777	654 5/ 7/10	88851	67198	156049	12-Oct-89	offlds9
base	rhfs	daylt	tv11_ohg02	552	229	444	191	352	1767	650 5/ 7/10	88365	66931	155297	12-Oct-89	offlds9
base	rhfs	daylt	tv13_ohg02	551	228	438	191	352	1761	646 5/ 7/10	88033	66680	154714	12-Oct-89	offlds9
base	rhfs	daylt	tv03_ohg04	556	227	551	191	352	1876	663 5/ 7/10	93825	68774	162599	12-Oct-89	offlds9
base	rhfs	daylt	tv05_ohg04	550	225	507	191	352	1825	659 5/ 7/10	91251	67689	158941	12-Oct-89	offlds9
base	rhfs	daylt	tv07_ohg04	545	223	476	191	352	1786	654 5/ 7/10	89324	67083	156407	12-Oct-89	offlds9
base	rhfs	daylt	tv09_ohg04	543	222	457	191	352	1765	650 5/ 7/10	88263	66712	154976	12-Oct-89	offlds9
base	rhfs	daylt	tv11_ohg04	542	222	447	191	352	1754	647 5/ 7/10	87689	66445	154134	12-Oct-89	offlds9
base	rhfs	daylt	tv13_ohg04	541	222	441	191	352	1746	643 5/ 7/10	87310	66198	153509	13-Oct-89	offlds9
base	rhfs	daylt	tv03_ohg06	549	221	560	191	352	1872	660 5/ 7/10	93627	68518	162145	13-Oct-89	offlds9
base	rhfs	daylt	tv05_ohg06	543	219	519	191	352	1824	655 5/ 7/10	91189	67417	158606	13-Oct-89	offlds9
base	rhfs	daylt	tv07_ohg06	538	217	486	191	352	1784	651 5/ 7/10	89187	66763	155950	13-Oct-89	offlds9
base	rhfs	daylt	tv09_ohg06	535	217	465	191	352	1760	649 5/ 7/10	87997	66405	154403	13-Oct-89	offlds9
base	rhfs	daylt	tv11_ohg06	533	216	453	191	352	1744	645 5/ 7/10	87224	66070	153294	13-Oct-89	offlds9
base	rhfs	daylt	tv13_ohg06	533	216	445	191	352	1736	642 5/ 7/10	86811	65855	152667	13-Oct-89	offlds9
base	rhfs	daylt	tv03_ohg08	544	219	563	191	352	1869	658 5/ 7/10	93438	68366	161805	13-Oct-89	offlds9
base	rhfs	daylt	tv05_ohg08	538	216	524	191	352	1822	654 5/ 7/10	91105	67266	158371	13-Oct-89	offlds9

THAI OFFICE BLDG PROTOTYPE Bangkok

	Fans &			Total Peak			Energy			Demand			Total			Run		
	Cooling (MWh)	Pumps (MWh)	Lights Elev. (MWh)	Equip. (MWh)	Energy Elec. (kW)	Time (M/D/H)	Cost (\$)	Peak (MWh)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Cost (\$)	Run Date	File	
base rhfs daylt tvs07 ohg08	534	215	491	191	352	650 5/ 7/10	89112	1782	650 5/ 7/10	89112	66597	155710	13-Oct-89	offlds9				
base rhfs daylt tvs09 ohg08	529	212	468	191	352	646 5/ 7/10	87591	1752	646 5/ 7/10	87591	66062	153654	13-Oct-89	offlds9				
base rhfs daylt tvs11 ohg08	528	212	455	191	352	643 5/ 7/10	86869	1737	643 5/ 7/10	86869	65787	152657	13-Oct-89	offlds9				
base rhfs daylt tvs13 ohg08	527	212	447	191	352	640 5/ 7/10	86431	1729	640 5/ 7/10	86431	65581	152012	13-Oct-89	offlds9				
base rhfs daylt tvs03 sc_70 ohg02	637	287	480	191	352	703 5/ 7/10	97357	1947	703 5/ 7/10	97357	72854	170211	13-Oct-89	offlds10				
base rhfs daylt tvs05 sc_70 ohg02	629	282	447	191	352	691 5/ 7/10	95042	1901	691 5/ 7/10	95042	71650	166692	13-Oct-89	offlds10				
base rhfs daylt tvs07 sc_70 ohg02	628	282	435	191	352	684 5/ 1/17	94390	1888	684 5/ 1/17	94390	71128	165518	13-Oct-89	offlds10				
base rhfs daylt tvs09 sc_70 ohg02	626	279	430	191	352	682 5/ 1/17	93855	1877	682 5/ 1/17	93855	70656	164511	13-Oct-89	offlds10				
base rhfs daylt tvs11 sc_70 ohg02	625	279	426	191	352	681 5/ 1/17	93658	1873	681 5/ 1/17	93658	70402	164060	13-Oct-89	offlds10				
base rhfs daylt tvs13 sc_70 ohg02	628	283	424	191	352	684 5/ 1/17	93873	1877	684 5/ 1/17	93873	70433	164306	13-Oct-89	offlds10				
base rhfs daylt tvs03 sc_70 ohg04	610	264	489	191	352	688 5/ 7/10	95321	1906	688 5/ 7/10	95321	71174	166496	13-Oct-89	offlds10				
base rhfs daylt tvs05 sc_70 ohg04	605	263	451	191	352	680 5/ 7/10	93068	1861	680 5/ 7/10	93068	70218	163287	13-Oct-89	offlds10				
base rhfs daylt tvs07 sc_70 ohg04	603	263	438	191	352	673 5/ 7/10	92329	1847	673 5/ 7/10	92329	69724	162053	13-Oct-89	offlds10				
base rhfs daylt tvs09 sc_70 ohg04	603	263	431	191	352	669 5/ 1/17	91975	1839	669 5/ 1/17	91975	69385	161361	13-Oct-89	offlds10				
base rhfs daylt tvs11 sc_70 ohg04	601	261	427	191	352	667 5/ 1/17	91611	1832	667 5/ 1/17	91611	69038	160649	13-Oct-89	offlds10				
base rhfs daylt tvs13 sc_70 ohg04	602	262	425	191	352	668 5/ 1/17	91569	1831	668 5/ 1/17	91569	68923	160492	13-Oct-89	offlds10				
base rhfs daylt tvs05 sc_70 ohg06	597	254	500	191	352	682 5/ 7/10	94711	1894	682 5/ 7/10	94711	70500	165212	13-Oct-89	offlds10				
base rhfs daylt tvs07 sc_70 ohg06	592	254	457	191	352	676 5/ 7/10	92239	1845	676 5/ 7/10	92239	69554	161794	13-Oct-89	offlds10				
base rhfs daylt tvs09 sc_70 ohg06	587	251	441	191	352	668 5/ 7/10	91125	1822	668 5/ 7/10	91125	68930	160056	13-Oct-89	offlds10				
base rhfs daylt tvs11 sc_70 ohg06	587	251	434	191	352	663 5/ 7/10	90727	1814	663 5/ 7/10	90727	68590	159317	13-Oct-89	offlds10				
base rhfs daylt tvs13 sc_70 ohg06	586	250	429	191	352	659 5/ 1/17	90450	1809	659 5/ 1/17	90450	68283	158734	13-Oct-89	offlds10				
base rhfs daylt tvs03 sc_70 ohg08	587	252	427	191	352	659 5/ 1/17	90406	1808	659 5/ 1/17	90406	68203	158610	13-Oct-89	offlds10				
base rhfs daylt tvs05 sc_70 ohg08	586	247	505	191	352	677 5/ 7/10	94055	1881	677 5/ 7/10	94055	69890	163945	13-Oct-89	offlds10				
base rhfs daylt tvs07 sc_70 ohg08	578	243	459	191	352	670 5/ 7/10	91198	1824	670 5/ 7/10	91198	68783	159982	13-Oct-89	offlds10				
base rhfs daylt tvs09 sc_70 ohg08	577	244	443	191	352	665 5/ 7/10	90383	1808	665 5/ 7/10	90383	68415	158799	13-Oct-89	offlds10				
base rhfs daylt tvs11 sc_70 ohg08	576	243	435	191	352	658 5/ 7/10	89862	1797	658 5/ 7/10	89862	68025	157887	13-Oct-89	offlds10				
base rhfs daylt tvs13 sc_70 ohg08	575	243	430	191	352	653 5/ 7/10	89607	1792	653 5/ 7/10	89607	67716	157323	13-Oct-89	offlds10				
base rhfs daylt tvs03 sc_70 ohg08	577	246	427	191	352	654 5/ 1/17	89677	1793	654 5/ 1/17	89677	67714	157391	13-Oct-89	offlds10				
base rhfs eneff hrelc	256	87	311	191	352	408 5/ 6/16	59836	1197	408 5/ 6/16	59836	43881	103718	26-Mar-90	offbls1				
base rhfs nrch1 thmst tspar hrelc	636	254	629	191	352	577 5/ 6/17	103103	2062	577 5/ 6/17	103103	63359	166462	20-Mar-90	offbls1				
base rhfs engh hrelc	109	254	629	191	352	476 1/31/17	88444	2902	476 1/31/17	88444	52376	140821	20-Mar-90	offbls1				
base rhfs stand hrelc	374	198	438	191	352	530 5/ 6/15	77678	1554	530 5/ 6/15	77678	56709	134388	21-Mar-90	offbls1				

THAI OFFICE BLDG		PROTOTYPE	Bangkok	Total Energy (kWh/m ² /yr)	Peak Demand (W/m ²)	Total Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base	rhfs			314	110	27.32			
base	rhfs	wvr05		295	101	25.45	6.3%	8.1%	6.8%
base	rhfs	wvr10		297	102	25.64	5.6%	7.2%	6.1%
base	rhfs	wvr20		301	104	26.02	4.4%	5.5%	4.8%
base	rhfs	wvr30		305	105	26.41	3.1%	3.8%	3.3%
base	rhfs	wvr40		309	107	26.84	1.6%	2.0%	1.7%
base	rhfs			314	110	27.32	0.0%	0.0%	0.0%
base	rhfs	wvr60		319	112	27.78	-1.6%	-1.8%	-1.7%
base	rhfs	wvr70		324	114	28.25	-3.2%	-3.8%	-3.4%
base	rhfs	wvr80		329	116	28.72	-4.7%	-5.8%	-5.1%
base	rhfs	wvr90		334	118	29.17	-6.3%	-7.6%	-6.8%
base	rhfs	wvr95		336	119	29.39	-7.0%	-8.5%	-7.6%
base	rhfs	sc_10		299	103	25.86	5.0%	5.9%	5.3%
base	rhfs	sc_20		305	106	26.42	3.1%	3.7%	3.3%
base	rhfs	sc_30		311	108	27.04	0.9%	1.3%	1.0%
base	rhfs	sc_40		318	111	27.66	-1.2%	-1.3%	-1.3%
base	rhfs	sc_50		324	114	28.24	-3.2%	-3.7%	-3.4%
base	rhfs	sc_60		332	116	28.95	-5.7%	-6.2%	-6.0%
base	rhfs	sc_70		340	120	29.66	-8.2%	-9.2%	-8.6%
base	rhfs	sc_80		348	123	30.41	-10.8%	-12.0%	-11.3%
base	rhfs	sc_90		353	125	30.89	-12.4%	-13.9%	-13.1%
base	rhfs	sc100		362	128	31.69	-15.2%	-17.1%	-16.0%
base	rhfs	ohg01		312	109	27.10	0.7%	1.0%	0.8%
base	rhfs	ohg02		310	108	26.93	1.3%	1.7%	1.4%
base	rhfs	ohg03		308	107	26.74	2.0%	2.5%	2.1%
base	rhfs	ohg04		308	107	26.67	2.2%	2.8%	2.4%
base	rhfs	ohg05		307	106	26.58	2.5%	3.3%	2.7%
base	rhfs	ohg06		305	105	26.45	2.9%	3.8%	3.2%
base	rhfs	ohg07		304	105	26.38	3.2%	4.1%	3.4%
base	rhfs	ohg08		304	105	26.34	3.3%	4.2%	3.6%
base	rhfs	ohg09		303	105	26.26	3.6%	4.5%	3.9%
base	rhfs	ohg10		302	104	26.19	3.8%	4.8%	4.1%
base	rhfs	fin01		312	109	27.07	0.8%	1.0%	0.9%
base	rhfs	fin02		312	109	27.08	0.8%	1.0%	0.9%
base	rhfs	fin03		311	108	26.98	1.1%	1.4%	1.2%

THAI OFFICE BLDG		PROTOTYPE	BangK	Total Energy (kWh/m ² /yr)	Peak Demand (W/m ²)	Total Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base	rhfs	fin04		310	108	26.95	1.2%	1.2%	1.3%
base	rhfs	fin05		310	108	26.93	1.3%	1.6%	1.4%
base	rhfs	fin06		310	108	26.91	1.4%	1.7%	1.5%
base	rhfs	fin07		310	108	26.90	1.4%	1.7%	1.5%
base	rhfs	fin08		310	108	26.93	1.3%	1.7%	1.4%
base	rhfs	fin09		310	108	26.92	1.3%	1.7%	1.4%
base	rhfs	fin10		310	108	26.91	1.4%	1.7%	1.5%
base	rhfs	ohg01	fin01	311	108	26.98	1.1%	1.6%	1.2%
base	rhfs	ohg02	fin02	308	107	26.70	2.1%	2.5%	2.2%
base	rhfs	ohg03	fin03	306	106	26.54	2.6%	3.3%	2.8%
base	rhfs	ohg04	fin04	305	105	26.42	3.0%	3.8%	3.3%
base	rhfs	ohg05	fin05	304	105	26.34	3.3%	4.1%	3.6%
base	rhfs	ohg06	fin06	303	105	26.26	3.6%	4.5%	3.9%
base	rhfs	ohg07	fin07	302	104	26.16	3.9%	5.0%	4.2%
base	rhfs	ohg08	fin08	301	104	26.09	4.2%	5.2%	4.5%
base	rhfs	ohg09	fin09	300	104	26.01	4.4%	5.5%	4.8%
base	rhfs	ohg10	fin10	299	103	25.91	4.8%	5.9%	5.2%
base	rhfs	cls20		313	109	27.21	0.3%	0.6%	0.4%
base	rhfs	cls60		315	110	27.37	-0.2%	-0.1%	-0.2%
base	rhfs	sunc1		315	110	27.38	-0.2%	-0.1%	-0.2%
base	rhfs	sunc3		315	110	27.37	-0.2%	-0.1%	-0.2%
base	rhfs	sunc7		314	109	27.25	0.2%	0.3%	0.2%
base	rhfs	sunc9		313	109	27.21	0.3%	0.4%	0.4%
base	rhfs	shm50		313	109	27.21	0.3%	0.4%	0.4%
base	rhfs	shm25		312	109	27.12	0.6%	0.8%	0.7%
base	rhfs	wabs1		310	108	26.87	1.5%	1.8%	1.6%
base	rhfs	wabs2		311	108	26.98	1.1%	1.4%	1.2%
base	rhfs	wabs3		312	109	27.09	0.7%	1.0%	0.8%
base	rhfs	wabs4		313	109	27.20	0.3%	0.6%	0.4%
base	rhfs	wabs6		314	110	27.32	0.0%	0.0%	0.0%
base	rhfs	wabs7		316	110	27.43	-0.4%	-0.4%	-0.4%
base	rhfs	wabs8		317	111	27.57	-0.9%	-1.0%	-0.9%
base	rhfs	wabs9		319	111	27.71	-1.4%	-1.6%	-1.5%
base	rhfs	wabs9		320	112	27.87	-1.9%	-2.1%	-2.0%
base	rhfs	uw125		314	109	27.26	0.1%	0.3%	0.2%

THAI OFFICE BLDG PROTOTYPE Bangkok

		Total Energy (kWh/m ² /yr)	Peak Demand (W/m ²)	Total Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base	rhfs	313	109	27.20	0.3%	0.7%	0.4%
base	rhfs	313	109	27.17	0.4%	0.8%	0.5%
base	rhfs	313	109	27.14	0.5%	1.0%	0.6%
base	rhfs	313	108	27.12	0.5%	1.3%	0.7%
base	rhfs	312	108	27.10	0.6%	1.3%	0.8%
base	rhfs	318	111	27.61	0.0%	0.0%	0.0%
base	rhfs	314	109	27.27	1.1%	1.3%	1.2%
base	rhfs	312	108	27.06	1.8%	2.2%	2.0%
base	rhfs	311	108	26.94	2.2%	2.7%	2.4%
base	rhfs	310	107	26.90	2.2%	2.9%	2.6%
base	rhfs	315	110	27.34	0.0%	0.0%	0.0%
base	rhfs	314	110	27.32	0.0%	0.1%	0.1%
base	rhfs	314	109	27.30	0.1%	0.3%	0.1%
base	rhfs	314	109	27.29	0.1%	0.3%	0.2%
base	rhfs	314	109	27.29	0.1%	0.3%	0.2%
base	rhfs	314	109	27.28	0.1%	0.3%	0.1%
base	rhfs	314	109	27.30	0.0%	0.1%	0.0%
base	rhfs	314	110	27.33	0.0%	0.0%	0.0%
base	rhfs	315	110	27.35	-0.1%	-0.1%	-0.1%
base	rhfs	315	110	27.35	-0.1%	-0.1%	-0.1%
base	rhfs	314	109	27.30	0.0%	0.1%	0.1%
base	rhfs	314	109	27.29	0.1%	0.1%	0.1%
base	rhfs	314	109	27.27	0.1%	0.3%	0.2%
base	rhfs	228	84	20.23	27.5%	22.9%	25.9%
base	rhfs	253	92	22.25	19.7%	16.4%	18.6%
base	rhfs	277	99	24.27	11.8%	9.9%	11.2%
base	rhfs	302	106	26.28	4.0%	3.4%	3.8%
base	rhfs	352	120	30.38	-12.0%	-9.8%	-11.2%
base	rhfs	264	92	22.85	16.1%	16.1%	16.4%
base	rhfs	284	99	24.63	9.6%	9.8%	9.8%
base	rhfs	325	113	28.22	-3.3%	-3.3%	-3.3%

THAI OFFICE BLDG PROTOTYPE Bangkok			Total Energy (kWh/m ² /yr)		Peak Demand (W/m ²)		Total Cost (\$/m ²)		Total Energy Savings (%)		Peak Demand Savings (%)		Total Cost Savings (%)	
base	rhfs	eqp30	366	128	31.85	-15.3%	-16.3%	-16.6%						
base	rhfs	inf02	314	110	27.31	0.0%	0.0%	0.0%						
base	rhfs	inf05	314	110	27.31	0.0%	0.0%	0.0%						
base	rhfs		314	110	27.32	0.0%	0.0%	0.0%						
base	rhfs	inf20	322	112	27.97	-2.4%	-2.4%	-2.4%						
base	rhfs	inf30	332	116	28.84	-5.6%	-5.5%	-5.6%						
base	rhfs	uncno	318	110	27.62	-1.1%	-0.6%	-1.1%						
base	rhfs	unca	315	109	27.40	-0.2%	0.1%	-0.3%						
base	rhfs	uncwe	311	107	27.01	0.9%	2.1%	1.1%						
base	rhfs	spt18	493	169	42.97	-56.9%	-54.2%	-57.3%						
base	rhfs	spt19	419	144	36.44	-33.3%	-31.4%	-33.4%						
base	rhfs	spt20	379	132	32.97	-20.7%	-20.4%	-20.7%						
base	rhfs	spt21	353	123	30.72	-12.5%	-12.5%	-12.5%						
base	rhfs	spt22	335	117	29.10	-6.5%	-6.5%	-6.5%						
base	rhfs	spt23	327	114	28.45	-4.2%	-4.1%	-4.1%						
base	rhfs	spt24	314	109	27.30	0.0%	0.1%	0.0%						
base	rhfs	spt25	303	106	26.35	3.5%	3.7%	3.5%						
base	rhfs	spt26	294	102	25.53	6.4%	6.8%	6.6%						
base	rhfs	spt27	286	99	24.83	8.9%	9.6%	9.1%						
base	rhfs	spt28	283	98	24.50	10.1%	10.8%	10.3%						
base	rhfs	spt29	276	95	23.87	12.3%	13.3%	12.6%						
base	rhfs	spt30	269	93	23.31	14.3%	15.6%	14.7%						
base	rhfs	daylt tvs05 lmpf0	274	103	24.21	12.7%	6.5%	11.4%						
base	rhfs	daylt tvs05 lmpf1	278	103	24.45	11.5%	6.1%	10.5%						
base	rhfs	daylt tvs05 lmpf2	282	103	24.68	10.3%	5.8%	9.7%						
base	rhfs	daylt tvs05	286	104	24.94	9.1%	5.5%	8.7%						
base	rhfs	daylt tvs05 lmpf4	290	104	25.21	7.9%	5.1%	7.7%						
base	rhfs	daylt tvs05 lmpf5	294	105	25.53	6.5%	4.7%	6.5%						
base	rhfs	daylt tvs05 lctst1	304	108	26.55	3.2%	1.6%	2.8%						
base	rhfs	daylt tvs05 lctst2	292	105	25.58	7.3%	4.0%	6.3%						
base	rhfs	daylt tvs05 lctst3	288	105	25.27	8.5%	4.2%	7.5%						
base	rhfs	daylt tvs05 lctst4	286	105	25.09	9.0%	4.2%	8.1%						
base	rhfs	daylt tvs05 lctst5	285	105	24.99	9.4%	4.4%	8.5%						
base	rhfs	daylt tvs05 lctst1 lcpr5	309	109	26.92	1.6%	0.8%	1.5%						

THAI OFFICE BLDG			PROTOTYPE		Bangk					
			Total Energy (kWh/m ² /yr.)	Peak Demand (W/m ²)	Total Cost (\$/m ²)	Total Energy Savings		Peak Demand Savings		Total Cost Savings (%)
						(%)	(%)	(%)	(%)	
base	rhfs	daylt tvs03	294	105	25.53	6.4%	4.7%	6.5%		
base	rhfs	daylt tvs05	286	104	24.94	9.1%	5.5%	8.7%		
base	rhfs	daylt tvs07	281	103	24.62	10.7%	6.1%	9.9%		
base	rhfs	daylt tvs09	278	102	24.41	11.6%	6.9%	10.6%		
base	rhfs	daylt tvs11	277	101	24.30	12.0%	7.5%	11.1%		
base	rhfs	daylt tvs13	276	101	24.22	12.3%	8.1%	11.3%		
base	rhfs	daylt tvs03 sc_70	308	111	26.89	2.2%	-1.0%	1.6%		
base	rhfs	daylt tvs05 sc_70	302	109	26.44	4.0%	0.4%	3.2%		
base	rhfs	daylt tvs07 sc_70	300	109	26.32	4.4%	0.7%	3.6%		
base	rhfs	daylt tvs09 sc_70	299	109	26.19	4.8%	1.0%	4.1%		
base	rhfs	daylt tvs11 sc_70	299	109	26.18	4.8%	0.8%	4.1%		
base	rhfs	daylt tvs13 sc_70	298	108	26.03	5.3%	1.3%	4.7%		
base	rhfs	daylt tvs03 ohg02	293	104	25.42	6.8%	5.4%	6.9%		
base	rhfs	daylt tvs05 ohg02	285	103	24.83	9.4%	6.1%	9.1%		
base	rhfs	daylt tvs07 ohg02	279	102	24.45	11.2%	6.8%	10.5%		
base	rhfs	daylt tvs09 ohg02	276	102	24.23	12.2%	7.4%	11.3%		
base	rhfs	daylt tvs11 ohg02	274	101	24.12	12.7%	7.9%	11.7%		
base	rhfs	daylt tvs13 ohg02	273	100	24.03	13.0%	8.5%	12.0%		
base	rhfs	daylt tvs03 ohg04	291	103	25.25	7.3%	6.1%	7.6%		
base	rhfs	daylt tvs05 ohg04	283	102	24.68	9.8%	6.7%	9.6%		
base	rhfs	daylt tvs07 ohg04	277	102	24.29	11.8%	7.4%	11.1%		
base	rhfs	daylt tvs09 ohg04	274	101	24.07	12.8%	7.9%	11.9%		
base	rhfs	daylt tvs11 ohg04	272	100	23.94	13.3%	8.4%	12.4%		
base	rhfs	daylt tvs13 ohg04	271	100	23.84	13.7%	8.9%	12.7%		
base	rhfs	daylt tvs03 ohg06	291	103	25.18	7.5%	6.5%	7.8%		
base	rhfs	daylt tvs05 ohg06	283	102	24.63	9.9%	7.2%	9.8%		
base	rhfs	daylt tvs07 ohg06	277	101	24.22	11.9%	7.8%	11.3%		
base	rhfs	daylt tvs09 ohg06	273	101	23.98	13.0%	8.1%	12.2%		
base	rhfs	daylt tvs11 ohg06	271	100	23.81	13.8%	8.6%	12.8%		
base	rhfs	daylt tvs13 ohg06	270	100	23.71	14.2%	9.1%	13.2%		
base	rhfs	daylt tvs03 ohg08	290	102	25.13	7.7%	6.8%	8.0%		
base	rhfs	daylt tvs05 ohg08	283	102	24.60	10.0%	7.4%	10.0%		

THAI OFFICE BLDG PROTOTYPE			Bangk		Total Energy (kWh/m ² /yr)	Peak Demand (W/m ²)	Total Cost (\$/m ²)	Total		Peak		Total	
base	rhfs	daylt tvs07 ohg08						Energy Savings (%)	Demand Savings (%)	Cost Savings (%)	Total Savings (%)	Energy Savings (%)	Total Savings (%)
base	rhfs	daylt tvs09 ohg08			277	101	24.18	12.0%	7.9%	11.5%			
base	rhfs	daylt tvs11 ohg08			272	100	23.86	13.4%	8.5%	12.6%			
base	rhfs	daylt tvs13 ohg08			269	99	23.61	14.6%	9.3%	13.6%			
base	rhfs	daylt tvs03 sc_70 ohg02			302	109	26.43	3.8%	0.4%	3.2%			
base	rhfs	daylt tvs05 sc_70 ohg02			295	107	25.89	6.1%	2.1%	5.2%			
base	rhfs	daylt tvs07 sc_70 ohg02			293	106	25.71	6.7%	3.1%	5.9%			
base	rhfs	daylt tvs09 sc_70 ohg02			292	106	25.55	7.3%	3.4%	6.5%			
base	rhfs	daylt tvs11 sc_70 ohg02			291	106	25.48	7.5%	3.5%	6.7%			
base	rhfs	daylt tvs13 sc_70 ohg02			292	106	25.52	7.3%	3.1%	6.6%			
base	rhfs	daylt tvs03 sc_70 ohg04			296	107	25.86	5.8%	2.5%	5.3%			
base	rhfs	daylt tvs05 sc_70 ohg04			289	106	25.36	8.1%	3.7%	7.2%			
base	rhfs	daylt tvs07 sc_70 ohg04			287	105	25.17	8.7%	4.7%	7.9%			
base	rhfs	daylt tvs09 sc_70 ohg04			286	104	25.06	9.1%	5.2%	8.3%			
base	rhfs	daylt tvs11 sc_70 ohg04			285	104	24.95	9.5%	5.5%	8.7%			
base	rhfs	daylt tvs13 sc_70 ohg04			284	104	24.92	9.5%	5.4%	8.8%			
base	rhfs	daylt tvs03 sc_70 ohg06			294	106	25.66	6.4%	3.4%	6.1%			
base	rhfs	daylt tvs05 sc_70 ohg06			287	105	25.13	8.8%	4.2%	8.0%			
base	rhfs	daylt tvs07 sc_70 ohg06			283	104	24.86	10.0%	5.4%	9.0%			
base	rhfs	daylt tvs09 sc_70 ohg06			282	103	24.74	10.4%	6.1%	9.4%			
base	rhfs	daylt tvs11 sc_70 ohg06			281	102	24.65	10.6%	6.7%	9.7%			
base	rhfs	daylt tvs13 sc_70 ohg06			281	102	24.63	10.7%	6.7%	9.8%			
base	rhfs	daylt tvs03 sc_70 ohg08			292	105	25.46	7.1%	4.1%	6.8%			
base	rhfs	daylt tvs05 sc_70 ohg08			283	104	24.85	9.9%	5.1%	9.0%			
base	rhfs	daylt tvs07 sc_70 ohg08			281	103	24.66	10.7%	5.8%	9.7%			
base	rhfs	daylt tvs09 sc_70 ohg08			279	102	24.52	11.2%	6.8%	10.2%			
base	rhfs	daylt tvs11 sc_70 ohg08			278	101	24.43	11.5%	7.5%	10.6%			
base	rhfs	daylt tvs13 sc_70 ohg08			278	102	24.44	11.4%	7.4%	10.5%			
base	rhfs	eneff hrelc			186	63	16.11	40.9%	42.2%	41.6%			
base	rhfs	nrc1 thmst tspar hrelc			320	90	25.85	-1.9%	18.3%	5.4%			
base	rhfs	engch hrelc			451	74	21.87	-43.4%	32.6%	19.9%			
base	rhfs	stand hrelc			241	82	20.87	23.2%	24.9%	23.6%			

THAI OFFICE BLDG PROTOTYPE Bangkok 85

		Cooling Load (MWh)	Latent Cooling (MWh)	Peak Cooling (kW)	Hours	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base rhfs varsp		2075	434	897	3084	58199	0.915	1.146
base rhfs tf2sp		2075	434	897	3084	58199	0.915	1.146
base rhfs cop35		2075	434	897	3084	58199	0.915	1.176
base rhfs		2075	434	897	3084	58199	0.915	1.146
base rhfs cop45		2075	434	897	3084	58199	0.915	1.118
base rhfs cop50		2075	434	897	3084	58199	0.915	1.098
base rhfs cop55		2075	434	897	3084	58204	0.915	1.081
base rhfs aircd		2075	434	897	3084	58199	0.915	0.915
base rhfs recch		2075	434	897	3084	58199	0.915	1.146
VAVS:								
base vavs		1837	438	896	3084	58199	0.914	1.146
base vavs fcd1s		1911	452	900	3084	58199	0.918	1.15
base vavs		1837	438	896	3084	58199	0.914	1.146
base vavs fcsdpd		1806	431	897	3084	58199	0.915	1.147
base vavs cccwrm		1836	437	896	3084	58199	0.914	1.146
base vavs cccres		1837	438	896	3084	58199	0.914	1.146
base vavs		1837	438	896	3084	58199	0.914	1.146
base vavs mst45		2029	663	948	3084	32234	0.967	1.211
base vavs mst50		1971	601	933	3084	36993	0.951	1.192
base vavs mst55		1903	526	911	3084	44219	0.93	1.165
base vavs oactm		1848	450	1168	3084	58199	1.191	1.492
base vavs oacen		1836	438	896	3084	58199	0.914	1.146
base vavs oa_05		1500	194	724	3084	58199	0.739	0.926
base vavs oa_10		1617	278	784	3084	58199	0.8	1.002
base vavs oa_15		1734	363	844	3084	58199	0.861	1.079
base vavs oa_25		1980	541	969	3084	58199	0.989	1.239

THAI OFFICE BLDG PROTOTYPE Bangkok 85

	Cooling Load (MWh)	Latent Cooling (MWh)	Peak Cooling (kW)	Hours	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base vavs siz11	1867	441	900	3084	63949	0.918	1.15
base vavs siz13	1926	446	912	3084	75594	0.931	1.166
base vavs siz15	1988	451	921	3084	87244	0.939	1.177
base vavs sizco	1834	435	899	3084	55221	0.917	1.149
base vavs cop35	1837	438	896	3084	58199	0.914	1.176
base vavs cop45	1837	438	896	3084	58199	0.914	1.117
base vavs cop50	1837	438	896	3084	58199	0.914	1.097
base vavs aircd	1837	438	896	3084	58199	0.914	0.914
base vavs tub78	1837	438	896	3084	58199	0.914	1.146
base vavs tub80	1837	438	896	3084	58199	0.914	1.146
base vavs tub82	1837	438	896	3084	58199	0.914	1.146
base vavs tub86	1837	438	896	3084	58199	0.914	1.146
base vavs recch	1837	438	896	3084	58199	0.914	1.146
base vavs varsp	1837	438	896	3084	58199	0.914	1.146
base vavs prcwk prc1h	1898	446	889	3388	58199	0.907	1.137
base vavs prcwk prc2h	1952	450	883	3692	58199	0.901	1.129
base vavs prcwk prc3h	2008	455	878	3996	58199	0.895	1.122
base vavs prcmn prc1h	1846	439	890	3131	58199	0.908	1.137
base vavs prcmn prc2h	1854	440	884	3178	58199	0.901	1.13
base vavs prcmn prc3h	1863	440	878	3225	58199	0.896	1.123
base vavs cckrm mst08	2005	643	944	3083	33375	0.963	1.206
base vavs cckrm mst10	1966	599	933	3083	36998	0.951	1.192
base vavs cckrm mst12	1920	548	918	3083	41851	0.936	1.173
base vavs cckrm mst14	1870	488	903	3083	49053	0.921	1.154
base vavs cckrm mst18	1789	344	893	3084	82301	0.911	1.141

OTHER SYSTEM TYPES:

base szrh	1622	271	913	3084	58199	0.931	1.167
base cbvav	1963	435	900	3084	58199	0.918	1.151

THAI OFFICE BLDG PROTOTYPE Bangkok 85

	Cooling Load (MWh)	Latent Cooling (MWh)	Peak Cooling (kW)	Hours Cooling	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base tpfc	1702	275	875	3083	58199	0.892	1.118
base szci	1837	438	897	3084	58204	0.914	1.146
base tpiu	1696	403	839	3084	16717	0.856	1.072
THERMAL STORAGE:							
base rhfs nrch1 thmst tspar	2075	434	897	3084	58204	0.469	0.587
base rhfs nrch1 thmst tsful	2075	434	897	3084	58204	0.908	1.138
base rhfs nrch1 thmst tsdem	2075	434	897	3084	58204	0.791	0.991
base rhfs nrch1 thmst tspar ts_in	2075	434	897	3084	58204	0.469	0.587
base rhfs nrch1 thmst tsful ts_in	2075	434	897	3084	58204	0.908	1.138
base rhfs nrch1 thmst tsdem ts_in	2075	434	897	3084	58204	0.791	0.991
GAS COOLING:							
base rhfs engch	2075	434	897	3084	58204	0.915	1.573
base rhfs abgch	2075	434	897	3084	58204	0.915	1.836

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						Fans &		Lights (MWh)	Elev. (MWh)	Equip. (MWh)	Energy (MWh)	Peak Elec. (kW)	Peak Time (M/D/H)	Energy Cost (\$)	Demand Cost (\$)	Total Cost (\$)	Run Date	Run File	
						Cooling (MWh)	Pumps (MWh)												
base	rhfs					598	254	629	191	352	2024	706 5/ 6/15	101226	74655	175882	175882	21-Aug-89	offrhfs1	
base	rhfs	ccwrm				574	254	629	191	352	2000	706 5/ 6/15	100028	74817	174846	174846	21-Aug-89	offrhfs1	
base	rhfs	ccres				598	254	629	191	352	2024	706 5/ 6/15	101226	74655	175882	175882	21-Aug-89	offrhfs1	
base	rhfs					598	254	629	191	352	2024	706 5/ 6/15	101226	74655	175882	175882	21-Aug-89	offrhfs1	
base	rhfs	oactm				620	265	629	191	352	2056	713 5/ 6/16	102815	75184	178000	178000	21-Aug-89	offrhfs1	
base	rhfs	oacen				598	254	629	191	352	2024	706 5/ 6/15	101226	74655	175881	175881	21-Aug-89	offrhfs1	
base	rhfs					598	254	629	191	352	2024	706 5/ 6/15	101226	74655	175882	175882	21-Aug-89	offrhfs1	
base	rhfs	oa_05				494	248	629	191	352	1914	653 5/ 6/15	95721	69841	165563	165563	21-Aug-89	offrhfs1	
base	rhfs	oa_10				530	250	629	191	352	1953	671 5/ 6/15	97630	71483	169114	169114	21-Aug-89	offrhfs1	
base	rhfs	oa_15				566	252	629	191	352	1991	690 5/ 6/15	99539	73137	172677	172677	21-Aug-89	offrhfs1	
base	rhfs					598	254	629	191	352	2024	706 5/ 6/15	101226	74655	175882	175882	21-Aug-89	offrhfs1	
base	rhfs	oa_25				643	257	629	191	352	2071	728 5/ 6/15	103566	76766	180332	180332	21-Aug-89	offrhfs1	
base	rhfs	prcwk prc1h				626	279	629	191	352	2077	704 5/ 6/15	103838	74453	178292	178292	21-Aug-89	offrhfs2	
base	rhfs	prcwk prc2h				651	304	629	191	352	2127	702 5/ 6/15	106345	74269	180614	180614	21-Aug-89	offrhfs2	
base	rhfs	prcwk prc3h				677	329	629	191	352	2177	701 5/ 6/15	108877	74118	182996	182996	21-Aug-89	offrhfs2	
base	rhfs	prcmn prc1h				602	258	629	191	352	2032	704 5/ 6/15	101614	74608	176222	176222	21-Aug-89	offrhfs2	
base	rhfs	prcmn prc2h				606	262	629	191	352	2040	702 5/ 6/15	101994	74557	176551	176551	21-Aug-89	offrhfs2	
base	rhfs	prcmn prc3h				610	265	629	191	352	2047	701 5/ 6/15	102378	74504	176883	176883	21-Aug-89	offrhfs2	
base	rhfs	fspr1				562	141	629	191	352	1875	656 5/ 6/15	93758	69243	163002	163002	18-Aug-89	offrhfs3	
base	rhfs					598	254	629	191	352	2024	706 5/ 6/15	101226	74655	175882	175882	21-Aug-89	offrhfs1	
base	rhfs	fspr3				634	367	629	191	352	2174	755 5/ 6/15	108692	80062	188755	188755	18-Aug-89	offrhfs3	
base	rhfs	fspr4				670	480	629	191	352	2323	804 5/ 6/15	116153	85466	201619	201619	18-Aug-89	offrhfs3	
base	rhfs	fspr5				707	594	629	191	352	2472	853 5/ 6/15	123613	90865	214478	214478	18-Aug-89	offrhfs3	
base	rhfs	fspr6				743	707	629	191	352	2622	902 5/ 6/15	131081	96268	227350	227350	18-Aug-89	offrhfs3	
base	rhfs	fspr7				779	820	629	191	352	2771	951 5/ 6/15	138534	101660	240195	240195	18-Aug-89	offrhfs3	
base	rhfs	fspr8				814	933	629	191	352	2919	1000 5/ 6/15	145980	107048	253029	253029	18-Aug-89	offrhfs3	
base	rhfs	fspr9				850	1046	629	191	352	3068	1049 5/ 6/15	153418	112432	265850	265850	18-Aug-89	offrhfs3	
base	rhfs	feff3				622	330	629	191	352	2124	738 5/ 6/15	106202	78260	184463	184463	18-Aug-89	offrhfs3	
base	rhfs					598	254	629	191	352	2024	706 5/ 6/15	101226	74655	175882	175882	21-Aug-89	offrhfs1	
base	rhfs	feff5				584	209	629	191	352	1965	686 5/ 6/15	98238	72490	170729	170729	18-Aug-89	offrhfs3	
base	rhfs	feff6				574	179	629	191	352	1925	673 5/ 6/15	96247	71048	167295	167295	18-Aug-89	offrhfs3	
base	rhfs	feff7				567	157	629	191	352	1896	663 5/ 6/15	94825	70017	164842	164842	18-Aug-89	offrhfs3	
base	rhfs	nvcnd nvd3 nvr10 nvt29				795	333	629	191	352	2301	939 3/29/19	115053	90350	205403	205403	27-Aug-89	offrhfs5	

THAI OFFICE BLDG PROTOTYPE Bangkok

		Fans &		Cooling		Pumps		Lights		Elev.		Equip.		Total		Peak		Energy		Demand		Total		Run Date		Run File	
		(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(kW)	(M/D/H)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)				
base	rhfs	vars	594	247	629	191	352	2013	706	5/	6/16	100658	74479	175137	27-Aug-89	offrhfs4											
base	rhfs	tf2sp	598	254	629	191	352	2024	706	5/	6/15	101226	74655	175881	27-Aug-89	offrhfs4											
base	rhfs	cop35	666	254	629	191	352	2093	737	5/	6/15	104634	77717	182352	21-Aug-89	offrhfs1											
base	rhfs		598	254	629	191	352	2024	706	5/	6/15	101226	74655	175882	21-Aug-89	offrhfs1											
base	rhfs	cop45	534	254	629	191	352	1960	676	5/	6/15	98027	71780	169807	21-Aug-89	offrhfs1											
base	rhfs	cop50	489	254	629	191	352	1915	655	5/	6/17	95757	69740	165497	21-Aug-89	offrhfs1											
base	rhfs	cop55	452	254	629	191	352	1878	638	5/	6/17	93902	68073	161976	Oct-89	offrhfs4											
base	rhfs	aircd	518	254	629	191	352	1944	678	3/29/17	97204	72155	169359	21-Aug-89	offrhfs1												
base	rhfs	recch	659	254	629	191	352	2085	714	5/	6/17	104260	75846	180106	21-Aug-89	offrhfs1											
VAVS:																											
base	vavs		535	164	629	191	352	1871	703	5/	6/17	93542	72270	165812	21-Aug-89	offvavs1											
base	vavs	fcdis	555	225	629	191	352	1952	706	5/	6/17	97583	73927	171511	21-Aug-89	offvavs1											
base	vavs		535	164	629	191	352	1871	703	5/	6/17	93542	72270	165812	21-Aug-89	offvavs1											
base	vavs	fcspd	527	139	629	191	352	1838	704	5/	6/17	91914	72096	164010	21-Aug-89	offvavs1											
base	vavs	ccwrm	535	164	629	191	352	1871	703	5/	6/17	93535	72270	165805	21-Aug-89	offvavs1											
base	vavs	ccres	535	164	629	191	352	1871	703	5/	6/17	93542	72270	165812	21-Aug-89	offvavs1											
base	vavs		535	164	629	191	352	1871	703	5/	6/17	93542	72270	165812	21-Aug-89	offvavs1											
base	vavs	mst45	588	101	629	191	352	1861	683	5/	6/17	93040	70788	163829	21-Aug-89	offvavs1											
base	vavs	mst50	572	113	629	191	352	1857	686	5/	6/17	92847	70937	163784	21-Aug-89	offvavs1											
base	vavs	mst55	553	131	629	191	352	1857	690	5/	6/17	92830	71284	164114	21-Aug-89	offvavs1											
base	vavs	oactm	555	173	629	191	352	1900	741	8/	1/17	94998	73542	168540	21-Aug-89	offvavs1											
base	vavs	oacen	535	164	629	191	352	1871	703	5/	6/17	93538	72270	165808	21-Aug-89	offvavs1											
base	vavs	oa_05	437	158	629	191	352	1766	650	5/	6/17	88307	67579	155886	21-Aug-89	offvavs1											
base	vavs	oa_10	471	160	629	191	352	1802	668	5/	6/17	90127	69194	159322	21-Aug-89	offvavs1											
base	vavs	oa_15	505	162	629	191	352	1839	687	5/	6/17	91940	70823	162763	21-Aug-89	offvavs1											
base	vavs	oa_25	577	166	629	191	352	1915	725	5/	6/17	95764	74281	170046	21-Aug-89	offvavs1											

THAI OFFICE BLDG PROTOTYPE Bangkok

	Cooling (MWh)	Fans & Pumps (MWh)	Lights (MWh)	Elev. (MWh)	Equip. (MWh)	Total Energy (MWh)	Peak Elec. (kW)	Peak Time (M/D/H)	Energy Cost (\$)	Demand Cost (\$)	Total Cost (\$)	Run Date	Run File
base vavs siz11	543	169	629	191	352	1884	701 5/ 6/17	94189	72392	166582	21-Aug-89 offvavs1		
base vavs siz13	559	182	629	191	352	1913	703 5/ 6/17	95632	72677	168310	21-Aug-89 offvavs1		
base vavs siz15	576	198	629	191	352	1946	705 5/ 6/17	97279	73150	170430	21-Aug-89 offvavs1		
base vavs sizco	534	165	629	191	352	1871	708 5/ 6/17	93564	72615	166179	21-Aug-89 offvavs1		
base vavs cop35	595	164	629	191	352	1931	734 5/ 6/17	96544	75219	171763	21-Aug-89 offvavs2		
base vavs cop45	479	164	629	191	352	1814	674 5/ 6/17	90724	69501	160225	21-Aug-89 offvavs2		
base vavs cop50	439	164	629	191	352	1774	653 5/ 6/17	88724	67537	156261	21-Aug-89 offvavs2		
base vavs aircd	463	164	629	191	352	1799	675 5/ 6/17	89941	69802	159744	21-Aug-89 offvavs2		
base vavs twb78	535	164	629	191	352	1871	704 5/ 6/17	93538	72175	165713	21-Aug-89 offvavs2		
base vavs twb80	535	164	629	191	352	1871	704 5/ 6/17	93534	72211	165746	21-Aug-89 offvavs2		
base vavs twb82	535	164	629	191	352	1871	703 5/ 6/17	93537	72245	165782	21-Aug-89 offvavs2		
base vavs twb86	535	164	629	191	352	1871	703 5/ 6/17	93549	72291	165840	21-Aug-89 offvavs2		
base vavs recch	600	164	629	191	352	1936	711 5/ 6/17	96785	73712	170498	21-Aug-89 offvavs2		
base vavs varsp	535	164	629	191	352	1871	703 5/ 6/17	93542	72270	165812	21-Aug-89 offvavs2		
base vavs prcwk prc1h	554	175	629	191	352	1901	700 5/ 6/17	95076	72011	167087	21-Aug-89 offvavs2		
base vavs prcwk prc2h	573	187	629	191	352	1931	697 5/ 6/17	96559	71783	168343	21-Aug-89 offvavs2		
base vavs prcwk prc3h	591	198	629	191	352	1962	695 5/ 6/17	98087	71575	169663	21-Aug-89 offvavs2		
base vavs prcmn prc1h	538	165	629	191	352	1875	701 4/12/17	93748	72201	165950	21-Aug-89 offvavs2		
base vavs prcmn prc2h	540	167	629	191	352	1879	699 4/12/17	93953	72142	166096	21-Aug-89 offvavs2		
base vavs prcmn prc3h	543	168	629	191	352	1883	697 4/12/17	94169	72082	166251	21-Aug-89 offvavs2		
base vavs ccwrm mst08	582	104	629	191	352	1857	683 5/ 6/17	92878	70816	163694	10-Oct-89 offvavs3		
base vavs ccwrm mst10	571	113	629	191	352	1856	686 5/ 6/17	92802	70939	163741	10-Oct-89 offvavs3		
base vavs ccwrm mst12	558	125	629	191	352	1856	689 5/ 6/17	92787	71194	163981	10-Oct-89 offvavs3		
base vavs ccwrm mst14	544	143	629	191	352	1859	694 5/ 6/17	92951	71524	164476	10-Oct-89 offvavs3		
base vavs ccwrm mst18	522	221	629	191	352	1915	733 4/12/17	95755	74851	170606	10-Oct-89 offvavs3		

OTHER SYSTEM TYPES:

base szrh	480	255	629	191	352	1906	710 5/ 6/17	93542	72270	165812	19-Aug-89 testsys		
base cbvav	568	252	629	191	352	1992	706 5/ 6/15	101226	74655	175882	19-Aug-89 testsys		

THAI OFFICE BLDG PROTOTYPE Bangkok															
	Cooling		Fans & Pumps		Lights	Elev.	Equip.	Total		Peak Time	Energy Cost	Demand Cost	Total Cost	Run Date	Run File
	(MWh)	(MWh)	(MWh)	(MWh)				Energy	(MWh)						
base tpfc	498	303	629	191	352	1973	715	5/ 6/17	93543	72271	165814	19-Aug-89 testsys			
base szci	535	164	629	191	352	1871	703	5/ 6/17	98667	74949	173617	19-Sep-89 testsys			
base tpiu	494	93	629	191	352	1759	636	5/ 6/17	87971	66487	154459	19-Aug-89 testsys			
THERMAL STORAGE:															
base rhfs nrchl thmst tspar	636	254	629	191	352	2062	577	5/ 6/17	103103	63359	166462	25-May-90 offtes2			
base rhfs nrchl thmst tsful	626	254	629	191	352	2052	478	4/20/13	102599	52483	155082	25-May-90 offtes2			
base rhfs nrchl thmst tsdem	628	254	629	191	352	2055	444	4/20/13	102729	48764	151494	25-May-90 offtes2			
base rhfs nrchl thmst tspar ts_in	632	254	629	191	352	2058	577	5/ 6/17	102907	63359	166266	25-May-90 offtes2			
base rhfs nrchl thmst tsful ts_in	622	254	629	191	352	2048	478	4/20/13	102421	52483	154904	25-May-90 offtes2			
base rhfs nrchl thmst tsdem ts_in	625	254	629	191	352	2051	444	4/20/13	102570	48764	151335	25-May-90 offtes2			
GAS COOLING:															
base rhfs engch	109	254	629	191	352	2902	476	1/31/17	88444	52376	140821	20-Mar-90 offrhfs6			
base rhfs abgch	133	254	629	191	352	3655	484	1/31/17	95841	53210	149052	20-Mar-90 offrhfs6			

THAI OFFICE BLDG			PROTOTYPE		Bangkok		Total Energy (kWh/m ² /yr)	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)		Total Energy Savings (%)		Peak Demand Savings (%)		Total Cost Savings (%)	
base	rhfs					314	110	27.32								
base	rhfs	ccwrm				311	110	27.15			1.2%		0.0%		0.6%	
base	rhfs	ccres				314	110	27.32			0.0%		0.0%		0.0%	
base	rhfs					314	110	27.32								
base	rhfs	oactm				319	111	27.64			-1.6%		-1.0%		-1.2%	
base	rhfs	oacen				314	110	27.31			0.0%		0.0%		0.0%	
base	rhfs					314	110	27.32								
base	rhfs	oa_05				297	101	25.71			5.4%		7.5%		5.9%	
base	rhfs	oa_10				303	104	26.26			3.5%		5.0%		3.8%	
base	rhfs	oa_15				309	107	26.82			1.6%		2.3%		1.8%	
base	rhfs					314	110	27.32			0.0%		0.0%		0.0%	
base	rhfs	oa_25				322	113	28.01			-2.3%		-3.1%		-2.5%	
base	rhfs	prcwk prc1h				323	109	27.69			-2.6%		0.3%		-1.4%	
base	rhfs	prcwk prc2h				330	109	28.05			-5.1%		0.6%		-2.7%	
base	rhfs	prcwk prc3h				338	109	28.42			-7.6%		0.7%		-4.0%	
base	rhfs	prcmm prc1h				316	109	27.37			-0.4%		0.3%		-0.2%	
base	rhfs	prcmm prc2h				317	109	27.42			-0.8%		0.6%		-0.4%	
base	rhfs	prcmm prc3h				318	109	27.47			-1.1%		0.7%		-0.6%	
base	rhfs	fspr1				291	102	25.31			7.4%		7.1%		7.3%	
base	rhfs					314	110	27.32			0.0%		0.0%		0.0%	
base	rhfs	fspr3				338	117	29.31			-7.4%		-6.9%		-7.3%	
base	rhfs	fspr4				361	125	31.31			-14.8%		-13.9%		-14.6%	
base	rhfs	fspr5				384	132	33.31			-22.1%		-20.8%		-21.9%	
base	rhfs	fspr6				407	140	35.31			-29.5%		-27.8%		-29.3%	
base	rhfs	fspr7				430	148	37.30			-36.9%		-34.7%		-36.6%	
base	rhfs	fspr8				453	155	39.30			-44.2%		-41.6%		-43.9%	
base	rhfs	fspr9				476	163	41.29			-51.6%		-48.6%		-51.2%	
base	rhfs	feff3				330	115	28.65			-4.9%		-4.5%		-4.9%	
base	rhfs					314	110	27.32			0.0%		0.0%		0.0%	
base	rhfs	feff5				305	107	26.51			2.9%		2.8%		2.9%	
base	rhfs	feff6				299	105	25.98			4.9%		4.7%		4.9%	
base	rhfs	feff7				294	103	25.60			6.3%		6.1%		6.3%	
base	rhfs	nvcstd nvd3 nvr10 nvt29				357	146	31.90			-13.7%		-33.0%		-16.8%	

THAI OFFICE BLDG PROTOTYPE Bangkok				Total Energy		Peak Demand	Total Energy Cost		Energy Savings	Peak Demand Savings	Total Cost Savings	
				(kWh/m ² /yr)	(W/m ²)		(\$/m ²)	(%)	(%)	(%)	(%)	(%)
base	rhfs	nvcstd nvd11	nvr10 nvt29	394	171		35.11	-25.4%	-55.9%	-28.5%		
base	rhfs	nvcstd nvd12	nvr10 nvt29	381	170		33.94	-21.2%	-55.2%	-24.3%		
base	rhfs	nvcstd nvd14	nvr10 nvt29	346	138		30.90	-10.1%	-25.5%	-13.1%		
base	rhfs	nvcstd nvd13	nvr05 nvt29	335	111		28.51	-6.5%	-1.4%	-4.4%		
base	rhfs	nvcstd nvd13	nvr10 nvt28	359	146		31.99	-14.1%	-33.0%	-17.1%		
base	rhfs	nvcstd nvd13	nvr10 nvt30	355	146		31.79	-12.9%	-33.0%	-16.4%		
base	rhfs	nvcstd nvd13	nvr10 nvt31	350	146		31.45	-11.3%	-33.0%	-15.2%		
base	rhfs	nvcstd nvd12	nvr10 nvt28	385	170		34.15	-22.5%	-55.2%	-25.0%		
base	rhfs	nvcstd nvd12	nvr10 nvt30	375	170		33.51	-19.3%	-55.2%	-22.7%		
base	rhfs	nvcstd nvd12	nvr10 nvt31	358	146		32.16	-13.8%	-33.3%	-17.8%		
base	rhfs	nvcstd nvd11	nvr10	420	171		36.41	-33.5%	-55.9%	-33.3%		
base	rhfs	nvcstd nvd12	nvr10	389	170		34.34	-23.8%	-55.2%	-25.7%		
base	rhfs	nvcstd nvd13	nvr10	360	146		32.06	-14.5%	-33.0%	-17.4%		
base	rhfs	nvcstd nvd14	nvr10	347	138		30.95	-10.4%	-25.5%	-13.3%		
base	rhfs	nvcstd nvd13	nvr05	336	111		28.58	-6.9%	-1.4%	-4.6%		
base	rhfs	nvcstd nvd13	nvr02 nvt29	322	109		27.69	-2.5%	0.3%	-1.1%		
base	rhfs	nvcstd nvd13	nvr01 nvt29	321	109		27.61	-2.0%	0.3%	-1.1%		
base	rhfs	nvcstd nvd13	nvr01 nvt28	321	109		27.64	-2.1%	0.3%	-1.2%		
base	rhfs	nvcstd nvd13	nvr01 nvt27	321	109		27.65	-2.2%	0.3%	-1.2%		
base	rhfs	nvcstd nvd13	nvr01 nvt26	321	109		27.66	-2.2%	0.3%	-1.2%		
base	rhfs	mst08		307	106		26.63	2.3%	3.3%	2.5%		
base	rhfs	mst10		308	106		26.69	2.1%	3.0%	2.3%		
base	rhfs	mst12		309	107		26.79	1.7%	2.4%	1.9%		
base	rhfs	mst14		311	108		27.00	1.1%	1.4%	1.2%		
base	rhfs			314	110		27.32	0.0%	0.0%	0.0%		
base	rhfs	mst18		326	114		28.36	-3.7%	-4.0%	-3.8%		
base	rhfs	siz11		321	112		27.90	-2.1%	-2.1%	-2.1%		
base	rhfs	siz13		334	116		29.00	-6.2%	-6.2%	-6.2%		
base	rhfs	siz15		346	121		30.05	-10.0%	-9.9%	-10.0%		
base	rhfs	sizco		314	110		27.32	0.0%	0.0%	0.0%		
base	rhfs	tub25		314	110		27.28	0.0%	-0.1%	0.1%		
base	rhfs	tub26		314	110		27.29	0.0%	-0.1%	0.1%		
base	rhfs	tub27		314	110		27.30	0.0%	0.0%	0.1%		
base	rhfs	tub28		314	110		27.31	0.0%	0.0%	0.0%		
base	rhfs	tub30		314	109		27.32	0.0%	0.1%	0.0%		

THAI OFFICE	BLDG	PROTOTYPE	Bangkok	Total Energy (kwh/m2/yr)	Peak Demand (w/m2)	Total Energy Cost (\$/m2)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base	rhfs	varsp		313	110	27.20	0.5%	0.0%	0.4%
base	rhfs	tf2sp		314	110	27.31	0.0%	0.0%	0.0%
base	rhfs	cop35		325	114	28.32	-3.4%	-4.4%	-3.7%
base	rhfs			314	110	27.32	0.0%	0.0%	0.0%
base	rhfs	cop45		304	105	26.37	3.2%	4.2%	3.5%
base	rhfs	cop50		297	102	25.70	5.4%	7.2%	5.9%
base	rhfs	cop55		292	99	25.16	7.2%	9.6%	7.9%
base	rhfs	aircd		302	105	26.30	4.0%	4.0%	3.7%
base	rhfs	recch		324	111	27.97	-3.0%	-1.1%	-2.4%
VAVS:									
base	vavs			291	109	25.75	7.6%	0.4%	5.7%
base	vavs	fcd1s		303	110	26.64	3.6%	0.0%	2.5%
base	vavs			291	109	25.75	7.6%	0.4%	5.7%
base	vavs	fcspd		285	109	25.47	9.2%	0.3%	6.7%
base	vavs	ccwrm		291	109	25.75	7.6%	0.4%	5.7%
base	vavs	ccres		291	109	25.75	7.6%	0.4%	5.7%
base	vavs			291	109	25.75	7.6%	0.4%	5.7%
base	vavs	mst45		289	106	25.44	8.1%	3.3%	6.9%
base	vavs	mst50		288	107	25.44	8.3%	2.8%	6.9%
base	vavs	mst55		288	107	25.49	8.3%	2.3%	6.7%
base	vavs	oactm		295	115	26.17	6.1%	-5.0%	4.2%
base	vavs	oacn		291	109	25.75	7.6%	0.4%	5.7%
base	vavs	oa_05		274	101	24.21	12.7%	7.9%	11.4%
base	vavs	oa_10		280	104	24.74	11.0%	5.4%	9.4%
base	vavs	oa_15		286	107	25.28	9.1%	2.7%	7.5%
base	vavs	oa_25		297	113	26.41	5.4%	-2.7%	3.3%

THAI OFFICE BLDG PROTOTYPE Bangkok

		Total Energy (kWh/m ² /yr)	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base vavs siz11		293	109	25.87	6.9%	0.7%	5.3%
base vavs siz13		297	109	26.14	5.5%	0.4%	4.3%
base vavs siz15		302	109	26.47	3.9%	0.1%	3.1%
base vavs sizco		291	110	25.81	7.6%	-0.3%	5.5%
base vavs cop35		300	114	26.68	4.6%	-4.0%	2.3%
base vavs cop45		282	105	24.88	10.4%	4.5%	8.9%
base vavs cop50		276	101	24.27	12.4%	7.5%	11.2%
base vavs aircd		279	105	24.81	11.1%	4.4%	9.2%
base vavs twb78		291	109	25.74	7.6%	0.3%	5.8%
base vavs twb80		291	109	25.74	7.6%	0.3%	5.8%
base vavs twb82		291	109	25.75	7.6%	0.4%	5.7%
base vavs twb86		291	109	25.76	7.6%	0.4%	5.7%
base vavs recch		301	110	26.48	4.3%	-0.7%	3.1%
base vavs varsp		291	109	25.75	7.6%	0.4%	5.7%
base vavs prcwk prc1h		295	109	25.95	6.1%	0.8%	5.0%
base vavs prcwk prc2h		300	108	26.14	4.6%	1.3%	4.3%
base vavs prcwk prc3h		305	108	26.35	3.1%	1.6%	3.5%
base vavs prcmn prc1h		291	109	25.77	7.4%	0.7%	5.6%
base vavs prcmn prc2h		292	109	25.80	7.2%	1.0%	5.6%
base vavs prcmn prc3h		292	108	25.82	7.0%	1.3%	5.5%
base vavs ccwrm mst08		288	106	25.42	8.3%	3.3%	6.9%
base vavs ccwrm mst10		288	107	25.43	8.3%	2.8%	6.9%
base vavs ccwrm mst12		288	107	25.47	8.3%	2.4%	6.8%
base vavs ccwrm mst14		289	108	25.54	8.2%	1.7%	6.5%
base vavs ccwrm mst18		297	114	26.50	5.4%	-3.8%	3.0%

OTHER SYSTEM TYPES:

base szrh	296	110	25.75	5.8%	-0.6%	5.7%
base cbvav	309	110	27.32	1.6%	0.0%	0.0%

THAI OFFICE BLDG PROTOTYPE Bangkok

	Total Energy (kWh/m2/yr)	Peak Demand (W/m2)	Total Energy Cost (\$/m2)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base tpfc	306	111	25.75	2.5%	-1.3%	5.7%
base szci	291	109	26.96	7.6%	0.4%	1.3%
base tpiu	273	99	23.99	13.1%	9.9%	12.2%
THERMAL STORAGE:						
base rhfs nrch1 thmst tspar	320	90	25.85	-1.9%	18.3%	5.4%
base rhfs nrch1 thmst tsful	319	74	24.08	-1.4%	32.3%	11.8%
base rhfs nrch1 thmst tsdem	319	69	23.53	-1.5%	37.1%	13.9%
base rhfs nrch1 thmst tspar ts_in	320	90	25.82	-1.7%	18.3%	5.5%
base rhfs nrch1 thmst tsful ts_in	318	74	24.06	-1.2%	32.3%	11.9%
base rhfs nrch1 thmst tsdem ts_in	319	69	23.50	-1.3%	37.1%	14.0%
GAS COOLING:						
base rhfs engch	451	74	21.87	-43.4%	32.6%	19.9%
base rhfs abgch	568	75	23.15	-80.6%	31.4%	15.3%

THAI HOTEL PROTOTYPE Bang k 85

		Cooling Load (MW)	Latent Cooling (MW/h)	Peak Cooling (kW)	Hours Cooling	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base	rhfs1 tpfc2	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpfc2 spt20	13833	3490	2742	6380	589168	2.731	3.421
base	rhfs1 tpfc2 spt21	12252	3490	2568	5893	345496	2.521	3.159
base	rhfs1 tpfc2 spt22	11482	3600	2482	5302	231272	2.484	3.113
base	rhfs1 tpfc2 spt23	10909	3518	2396	5218	196312	2.394	2.999
base	rhfs1 tpfc2	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpfc2 spt25	9471	3347	2201	5222	126911	2.186	2.74
base	rhfs1 tpfc2 spt26	8921	3273	2102	5431	108394	2.083	2.61
base	rhfs1 tpfc2 spt27	8396	3209	2010	5604	92782	1.98	2.481
base	rhfs1 tpfc2 spt28	8051	3154	1943	5907	86405	1.89	2.369
base	rhfs1 tpfc2 spt29	7643	3107	1856	6195	77113	1.792	2.246
base	rhfs1 tpfc2 spt30	7281	3065	1764	6435	70071	1.692	2.12
base	rhfs1 tpfc2 spt31	7006	3036	1676	6709	64453	1.595	1.999
base	rhfs1 tpfc2 spt32	6721	3018	1579	6932	57883	1.487	1.863
base	rhfs1 tpfc2 spt33	6463	2989	1458	7076	53039	1.348	1.689
base	rhfs1 tpfc2 wwr05	9706	3350	2127	5151	137698	2.104	2.637
base	rhfs1 tpfc2 wwr10	9738	3348	2129	5173	139142	2.107	2.64
base	rhfs1 tpfc2 wwr20	9994	3445	2238	5158	144179	2.223	2.785
base	rhfs1 tpfc2 wwr30	10069	3443	2268	5161	148297	2.256	2.827
base	rhfs1 tpfc2	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpfc2 wwr5C	10230	3426	2333	5162	161838	2.328	2.917
base	rhfs1 tpfc2 wwr60	10307	3420	2355	5224	167791	2.352	2.947
base	rhfs1 tpfc2 wwr70	10374	3405	2371	5194	175234	2.369	2.969
base	rhfs1 tpfc2 wwr80	10473	3403	2406	5232	182502	2.404	3.013
base	rhfs1 tpfc2 wwr90	10585	3400	2445	5203	191907	2.441	3.059
base	rhfs1 tpfc2 wwr95	10637	3399	2466	5161	196421	2.457	3.079
base	rhfs1 tpfc2 sc_10	9785	3429	2220	5150	141146	2.204	2.762
base	rhfs1 tpfc2 sc_20	9913	3432	2247	5129	145537	2.234	2.799
base	rhfs1 tpfc2 sc_30	10036	3436	2276	5159	149740	2.265	2.839
base	rhfs1 tpfc2	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpfc2 sc_50	10253	3435	2323	5159	158485	2.316	2.902
base	rhfs1 tpfc2 sc_60	10363	3432	2351	5194	164814	2.346	2.939
base	rhfs1 tpfc2 sc_70	10488	3433	2380	5220	170894	2.378	2.98
base	rhfs1 tpfc2 sc_80	10596	3429	2403	5215	176946	2.403	3.011

THAI HOTEL PROTOTYPE Bang k 85

	Load (MW)	Latent Cooling (MW)	Peak Cooling (kW)	Hours Cooling	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base rhfs1 tpf2 sc 90	10698	3419	2419	5219	183337	2.419	3.031
base rhfs1 tpf2 sc100	10849	3429	2471	5274	190728	2.472	3.097
base rhfs1 tpf2	10148	3435	2298	5182	154485	2.289	2.869
base rhfs1 tpf2 ohg02	10110	3436	2286	5192	152556	2.277	2.853
base rhfs1 tpf2 ohg03	10068	3437	2276	5172	150594	2.265	2.839
base rhfs1 tpf2 ohg04	10032	3434	2270	5170	149915	2.26	2.831
base rhfs1 tpf2 ohg05	10000	3432	2266	5167	149207	2.255	2.825
base rhfs1 tpf2 ohg06	9972	3430	2262	5155	148721	2.251	2.82
base rhfs1 tpf2 ohg07	9950	3431	2256	5155	147561	2.245	2.812
base rhfs1 tpf2 ohg08	9932	3431	2250	5152	146636	2.238	2.805
base rhfs1 tpf2 ohg09	9918	3430	2248	5151	146377	2.236	2.802
base rhfs1 tpf2 ohg10	9906	3429	2245	5146	145990	2.233	2.797
base rhfs1 tpf2 fin01	10116	3436	2286	5144	152782	2.277	2.853
base rhfs1 tpf2 fin02	10085	3435	2279	5165	151631	2.27	2.844
base rhfs1 tpf2 fin03	10076	3435	2276	5175	151193	2.267	2.84
base rhfs1 tpf2 fin04	10072	3435	2277	5164	151325	2.267	2.841
base rhfs1 tpf2 fin05	10065	3434	2277	5189	151320	2.267	2.841
base rhfs1 tpf2 fin06	10057	3433	2276	5163	151278	2.266	2.84
base rhfs1 tpf2 fin07	10053	3433	2275	5167	151235	2.266	2.839
base rhfs1 tpf2 fin08	10049	3432	2275	5170	151169	2.266	2.839
base rhfs1 tpf2 fin09	10046	3432	2274	5174	151136	2.265	2.838
base rhfs1 tpf2 fin10	10041	3434	2271	5165	150528	2.262	2.834
base rhfs1 tpf2	10150	3435	2299	5175	154622	2.29	2.87
base rhfs1 tpf2 wml25	10101	3436	2283	5154	152018	2.273	2.848
base rhfs1 tpf2 wml20	10009	3438	2258	5136	147702	2.243	2.811
base rhfs1 tpf2 wml15	9900	3429	2217	5146	143722	2.199	2.756
base rhfs1 tpf2 wml10	9815	3426	2200	5151	141099	2.18	2.732
base rhfs1 tpf2 wml05	9732	3423	2185	5157	138609	2.162	2.709
base rhfs1 tpf2 wml02	9685	3422	2175	5155	137043	2.151	2.695
base rhfs1 tpf2 wml100	9993	3424	2276	5160	152301	2.265	2.838
base rhfs1 tpf2 wml200	9991	3429	2270	5159	150127	2.257	2.828
base rhfs1 tpf2 wml300	9984	3438	2251	5167	146542	2.235	2.801
base rhfs1 tpf2 wml400	9969	3440	2240	5150	144830	2.223	2.785
base rhfs1 tpf2 wml500	9934	3433	2215	5151	143396	2.197	2.753

THAI HOTEL PROTOTYPE Bang k 85

	Cooling Load (MW)	Latent Cooling (MW)	Peak Cooling (kW)	Hours Cooling	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base rhfs1 tpf2 wabs1	9923	3429	2255	5152	147518	2.241	2.809
base rhfs1 tpf2 wabs2	9967	3429	2265	5158	149268	2.253	2.823
base rhfs1 tpf2 wabs3	10014	3432	2271	5173	150042	2.259	2.831
base rhfs1 tpf2 wabs4	10059	3434	2280	5165	151315	2.269	2.843
base rhfs1 tpf2 wabs5	10103	3434	2291	5156	153221	2.281	2.859
base rhfs1 tpf2	10148	3435	2298	5182	154485	2.289	2.869
base rhfs1 tpf2 wabs7	10196	3437	2307	5174	155980	2.299	2.881
base rhfs1 tpf2 wabs8	10245	3435	2317	5168	158489	2.311	2.895
base rhfs1 tpf2 wabs9	10296	3437	2324	5222	160022	2.318	2.905
base rhfs1 tpf2 rabs1	10050	3431	2286	5186	152452	2.274	2.849
base rhfs1 tpf2 rabs2	10066	3431	2288	5184	152787	2.276	2.852
base rhfs1 tpf2 rabs3	10082	3432	2290	5167	153112	2.279	2.856
base rhfs1 tpf2 rabs4	10098	3433	2292	5191	153447	2.282	2.859
base rhfs1 tpf2 rabs5	10113	3434	2294	5172	153721	2.284	2.862
base rhfs1 tpf2 rabs6	10131	3434	2296	5173	154155	2.287	2.865
base rhfs1 tpf2 rabs8	10165	3436	2300	5186	154924	2.292	2.872
base rhfs1 tpf2 rabs9	10182	3437	2303	5178	155310	2.295	2.876
base rhfs1 tpf2 inf02	10035	3407	2216	5157	142953	2.206	2.764
base rhfs1 tpf2 inf05	10077	3420	2238	5165	145585	2.228	2.792
base rhfs1 tpf2	10148	3435	2298	5182	154485	2.289	2.869
base rhfs1 tpf2 inf20	10307	3457	2430	5192	181978	2.36	2.957
base rhfs1 tpf2 inf30	10661	3521	2590	5469	220565	2.506	3.141
base rhfs1 tpf2 ltsv1	9918	3425	2266	5171	150495	2.255	2.825
base rhfs1 tpf2 ltsv2	9704	3415	2234	5167	146122	2.218	2.779
base rhfs1 tpf2 ltsv3	9473	3403	2203	5158	142179	2.181	2.733
base rhfs1 tpf2 ltsv4	9244	3391	2172	5133	137750	2.145	2.688
base rhfs1 tpf2 ltsv5	9043	3378	2141	5150	134161	2.11	2.644
base rhfs1 tpf2 nc01	10256	3426	2362	5171	162928	2.359	2.956
base vavs1 tpf2 eneff lts	5519	2382	1198	5559	79490	1.152	1.362
base rhfs1 tpf2 tspar hre	10148	3435	2298	5182	154485	1.611	2.019
base rhfs1 tpf2 engch hre	10148	3435	2298	5182	154485	2.289	3.937
base rhfs1 tpf2 stand lts	5487	1198	1377	5169	120987	1.373	1.678

THAI HOTEL PROTOTYPE Bang																							
Cooling		Fans & Pumps		Lights		Elev.		Equip.		Total Energy		Peak		Energy Cost		Demand Cost		Total Cost		Run Date		Run File	
(MWh)		(MWh)		(MWh)		(MWh)		(MWh)		(MWh)		(kW)		(MWh/H)		(\$)		(\$)					
base	rh1s1 tpf2	3157	1247	1896	745	421	7465	1393	4/10/18	373253	142647	515900	15-Sep-89	hot1ds1									
base	rh1s1 tpf2	spt20	4125	3716	1896	745	421	10902	1773	4/10/18	545116	185835	730951	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt21	3732	2364	1896	745	421	9128	1586	4/10/18	456390	164708	621099	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt22	3522	1732	1896	745	421	8315	1504	4/10/18	415744	154886	570630	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt23	3361	1521	1896	745	421	7944	1454	4/10/18	397215	149585	546800	15-Sep-89	hot1ds1								
base	rh1s1 tpf2		3157	1247	1896	745	421	7465	1393	4/10/18	373253	142647	515900	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	sp_25	2970	1058	1896	745	421	7090	1342	4/10/18	354479	137002	491481	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt26	2810	936	1896	745	421	6807	1298	4/10/18	340340	132585	472926	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt27	2655	834	1896	745	421	6550	1258	5/ 6/17	327507	128379	455887	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt28	2541	787	1896	745	421	6390	1239	5/ 6/17	319481	125368	444849	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt29	2412	722	1896	745	421	6195	1208	5/ 6/17	309740	121689	431430	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt30	2290	667	1896	745	421	6019	1177	5/ 6/17	300961	118026	418987	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt31	2189	627	1896	745	421	5877	1147	5/ 6/17	293866	114684	408551	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt32	2081	577	1896	745	421	5720	1111	5/ 6/17	285978	111163	397142	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	spt33	1970	531	1896	745	421	5563	1066	5/ 6/17	278131	107708	385839	15-Sep-89	hot1ds1								
base	rh1s1 tpf2	wwr05	2984	1162	1896	745	421	7208	1330	4/10/18	350379	136952	497332	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	wwr10	2992	1169	1896	745	421	7223	1331	4/10/18	361153	137311	498465	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	wwr20	3095	1198	1896	745	421	7355	1368	4/10/18	367730	140280	508010	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	wwr30	3126	1219	1896	745	421	7406	1380	4/10/18	370322	141450	511773	15-Sep-89	hot1ds2								
base	rh1s1 tpf2		3157	1247	1896	745	421	7465	1393	4/10/18	373253	142647	515900	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	wwr50	3191	1277	1896	745	421	7530	1408	4/10/18	376495	144076	520572	10-Oct-89	hot1ds2								
base	rh1s1 tpf2	wwr60	3218	1303	1896	745	421	7582	1418	4/10/18	379118	145311	524430	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	wwr70	3240	1334	1896	745	421	7635	1426	4/10/18	381769	146213	527983	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	wwr80	3276	1370	1896	745	421	7708	1440	4/10/18	385385	147674	533060	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	wwr90	3316	1414	1896	745	421	7792	1456	4/10/18	389592	149308	538901	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	wwr95	3334	1434	1896	745	421	7830	1463	4/10/18	391501	150060	541562	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	sc_10	3042	1179	1896	745	421	7283	1361	4/10/18	364160	138674	502834	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	sc_20	3082	1202	1896	745	421	7346	1372	4/10/18	367306	140106	507412	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	sc_30	3122	1224	1996	745	421	7408	1384	4/10/18	370421	141473	511895	15-Sep-89	hot1ds2								
base	rh1s1 tpf2		3157	1247	1896	745	421	7465	1393	4/10/18	373253	142647	515900	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	sc_50	3191	1266	1896	745	421	7518	1403	4/10/18	375911	143879	519790	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	sc_60	3227	1291	1896	745	421	7580	1414	4/10/18	378994	145222	524216	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	sc_70	3268	1321	1896	745	421	7651	1427	4/10/18	382541	146641	529183	15-Sep-89	hot1ds2								
base	rh1s1 tpf2	sc_80	3302	1345	1896	745	421	7709	1437	4/10/18	385434	147963	533398	15-Sep-89	hot1ds2								

THAI HOTEL PROTOTYPE Bang

	Cooling (MMWh)	Fans & Pumps (MMWh)	Lights (MMWh)	Elev. (MMWh)	Equip. (MMWh)	Total Energy (MMWh)	Peak Elec. (kW)	Peak Time (M/D/H)	Energy Cost (\$)	Demand Cost (\$)	Total Cost (\$)	Run Date	Run File
base rhfs1 tpf2 wabs1	3088	1211	1896	745	421	7361	1375	4/10/18	368039	140431	508471	16-Sep-89	hotlds3
base rhfs1 tpf2 wabs2	3103	1219	1896	745	421	7383	1379	4/10/18	369134	140905	510040	16-Sep-89	hotlds3
base rhfs1 tpf2 wabs3	3115	1225	1896	745	421	7402	1382	4/10/18	370098	141309	511407	16-Sep-89	hotlds3
base rhfs1 tpf2 wabs4	3129	1232	1896	745	421	7423	1385	4/10/18	371135	141754	512899	16-Sep-89	hotlds3
base rhfs1 tpf2 wabs5	3144	1240	1896	745	421	7445	1390	4/10/18	372259	142228	514487	16-Sep-89	hotlds3
base rhfs1 tpf2	3157	1247	1896	745	421	7465	1393	4/10/18	373253	142647	515900	16-Sep-89	hotlds3
base rhfs1 tpf2 wabs7	3171	1255	1896	745	421	7488	1397	4/10/18	374397	143120	517518	16-Sep-89	hotlds3
base rhfs1 tpf2 wabs8	3186	1266	1896	745	421	7514	1401	4/10/18	375679	143668	519348	16-Sep-89	hotlds3
base rhfs1 tpf2 wabs9	3201	1275	1896	745	421	7537	1404	4/10/18	376843	144150	520994	16-Sep-89	hotlds3
base rhfs1 tpf2 rabs1	3130	1227	1896	745	421	7418	1386	4/10/18	370883	141916	512799	16-Sep-89	hotlds3
base rhfs1 tpf2 rabs2	3134	1230	1896	745	421	7425	1387	4/10/18	371267	142035	513302	16-Sep-89	hotlds3
base rhfs1 tpf2 rabs3	3139	1233	1896	745	421	7433	1388	4/10/18	371648	142153	513801	16-Sep-89	hotlds3
base rhfs1 tpf2 rabs4	3143	1236	1896	745	421	7441	1389	4/10/18	372025	142270	514295	16-Sep-89	hotlds3
base rhfs1 tpf2 rabs5	3147	1239	1896	745	421	7448	1390	4/10/18	372396	142384	514781	16-Sep-89	hotlds3
base rhfs1 tpf2 rabs6	3152	1243	1896	745	421	7457	1392	4/10/18	372831	142519	515350	16-Sep-89	hotlds3
base rhfs1 tpf2 rabs8	3162	1251	1896	745	421	7474	1394	4/10/18	373691	142783	516474	16-Sep-89	hotlds3
base rhfs1 tpf2 rabs9	3166	1254	1896	745	421	7482	1395	4/10/18	374121	142913	517035	16-Sep-89	hotlds3
base rhfs1 tpf2 inf02	3097	1224	1896	745	421	7392	1366	4/10/18	369099	141047	510146	16-Sep-89	hotlds3
base rhfs1 tpf2 inf05	3115	1229	1896	745	421	7406	1373	4/10/18	370317	141525	511842	16-Sep-89	hotlds3
base rhfs1 tpf2	3157	1247	1896	745	421	7465	1393	4/10/18	373253	142647	515900	16-Sep-89	hotlds3
base rhfs1 tpf2 inf20	3222	1304	1896	745	421	7588	1419	4/10/18	379384	144833	524217	16-Sep-89	hotlds3
base rhfs1 tpf2 inf30	3360	1447	1896	745	421	7869	1450	4/10/18	393428	148202	541631	16-Sep-89	hotlds3
base rhfs1 tpf2 ltsv1	3094	1200	1705	745	421	7165	1338	4/10/18	358237	136671	494908	16-Sep-89	hotlds3
base rhfs1 tpf2 ltsv2	3033	1155	1530	745	421	6884	1285	4/10/18	344210	130916	475126	16-Sep-89	hotlds3
base rhfs1 tpf2 ltsv3	2970	1108	1339	745	421	6583	1230	4/10/18	329148	124951	454100	16-Sep-89	hotlds3
base rhfs1 tpf2 ltsv4	2907	1062	1148	745	421	6282	1175	4/10/18	314102	118984	433086	16-Sep-89	hotlds3
base rhfs1 tpf2 ltsv5	2850	1020	984	745	421	6020	1125	4/10/18	301002	113715	414717	16-Sep-89	hotlds3
base rhfs1 tpf2 nsori	3211	1278	1896	745	421	7550	1417	4/10/18	377510	144214	521724	10-Oct-89	hotlds2
base wabs1 tpf2 eneff lts	1265	250	984	745	421	3665	703 5/	6/17	183244	72108	255353	26-Mar-90	hotbls1
base rhfs1 tpf2 tspar hre	3021	1247	1896	745	421	7329	1224 5/	7/17	366465	132354	498819	20-Mar-90	hotbls1
base rhfs1 tpf2 engch hre	759	1247	1896	745	421	11431	845	1/31/17	307681	92884	400566	20-Mar-90	hotbls1
base rhfs1 tpf2 stand lts	1602	904	1148	745	421	4821	892	4/10/18	241030	93492	334522	22-Mar-90	hotbls1

FINAL HOTEL PROTOTYPE	Bang	Total Energy (kWh/m2/yr)	Peak Demand (W/m2)	Total Energy Cost (\$/m2)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base rhfs1 tpf2		362	68	25.02			
base rhfs1 tpf2 spt20		529	86	35.45	-46.0%	-27.3%	-41.7%
base rhfs1 tpf2 spt21		443	77	30.12	-22.3%	-13.9%	-20.4%
base rhfs1 tpf2 spt22		403	73	27.68	-11.4%	-8.0%	-10.6%
base rhfs1 tpf2 spt23		385	71	26.52	-6.4%	-4.4%	-6.0%
base rhfs1 tpf2		362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpf2 spt25		344	65	23.84	5.0%	3.7%	4.7%
base rhfs1 tpf2 spt26		330	63	22.94	8.8%	6.8%	8.3%
base rhfs1 tpf2 spt27		318	61	22.11	12.3%	9.7%	11.6%
base rhfs1 tpf2 spt28		310	60	21.58	14.4%	11.1%	13.8%
base rhfs1 tpf2 spt29		300	59	20.92	17.0%	13.3%	16.4%
base rhfs1 tpf2 spt30		292	57	20.32	19.4%	15.5%	18.8%
base rhfs1 tpf2 spt31		285	56	19.82	21.3%	17.7%	20.8%
base rhfs1 tpf2 spt32		277	54	19.26	23.4%	20.2%	23.0%
base rhfs1 tpf2 spt33		270	52	18.71	25.5%	23.5%	25.2%
base rhfs1 tpf2 wwr05		350	65	24.12	3.4%	4.5%	3.6%
base rhfs1 tpf2 wwr10		350	65	24.18	3.2%	4.5%	3.4%
base rhfs1 tpf2 wwr20		357	66	24.64	1.5%	1.8%	1.5%
base rhfs1 tpf2 wwr30		359	67	24.82	0.8%	0.9%	0.8%
base rhfs1 tpf2		362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpf2 wwr50		365	68	25.25	-0.9%	-1.1%	-0.9%
base rhfs1 tpf2 wwr60		368	69	25.44	-1.6%	-1.8%	-1.7%
base rhfs1 tpf2 wwr70		370	69	25.61	-2.3%	-2.4%	-2.3%
base rhfs1 tpf2 wwr80		374	70	25.85	-3.3%	-3.4%	-3.3%
base rhfs1 tpf2 wwr90		378	71	26.14	-4.4%	-4.5%	-4.5%
base rhfs1 tpf2 wwr95		380	71	26.27	-4.9%	-5.0%	-5.0%
base rhfs1 tpf2 sc_10		353	66	24.39	2.4%	2.3%	2.5%
base rhfs1 tpf2 sc_20		356	67	24.61	1.6%	1.5%	1.6%
base rhfs1 tpf2 sc_30		359	67	24.83	0.8%	0.6%	0.8%
base rhfs1 tpf2		362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpf2 sc_50		365	68	25.21	-0.7%	-0.7%	-0.8%
base rhfs1 tpf2 sc_60		368	69	25.43	-1.5%	-1.5%	-1.6%
base rhfs1 tpf2 sc_70		371	69	25.67	-2.5%	-2.4%	-2.6%
base rhfs1 tpf2 sc_80		374	70	25.87	-3.3%	-3.2%	-3.4%

THAI HOTEL PROTOTYPE		Bang	Total Energy (kWh/m ² /yr)	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base	rhfs1	tpfc2 sc_90	377	70	26.05	-4.0%	-3.7%	-4.1%
base	rhfs1	tpfc2 sc100	381	71	26.37	-5.3%	-5.1%	-5.4%
base	rhfs1	tpfc2	362	68	25.02	0.0%	0.0%	0.0%
base	rhfs1	tpfc2 ohg02	361	67	24.95	0.3%	0.3%	0.3%
base	rhfs1	tpfc2 ohg03	360	67	24.87	0.6%	0.6%	0.6%
base	rhfs1	tpfc2 ohg04	359	67	24.82	0.8%	0.8%	0.8%
base	rhfs1	tpfc2 ohg05	359	67	24.77	1.0%	0.9%	1.0%
base	rhfs1	tpfc2 ohg06	358	67	24.73	1.1%	1.1%	1.2%
base	rhfs1	tpfc2 ohg07	357	67	24.69	1.3%	1.2%	1.3%
base	rhfs1	tpfc2 ohg08	357	67	24.65	1.4%	1.4%	1.5%
base	rhfs1	tpfc2 ohg09	357	67	24.63	1.5%	1.4%	1.6%
base	rhfs1	tpfc2 ohg10	356	67	24.61	1.6%	1.5%	1.7%
base	rhfs1	tpfc2 fin01	361	67	24.96	0.3%	0.3%	0.3%
base	rhfs1	tpfc2 fin02	360	67	24.90	0.5%	0.5%	0.5%
base	rhfs1	tpfc2 fin03	360	67	24.88	0.5%	0.6%	0.6%
base	rhfs1	tpfc2 fin04	360	67	24.88	0.5%	0.6%	0.6%
base	rhfs1	tpfc2 fin05	360	67	24.87	0.6%	0.6%	0.6%
base	rhfs1	tpfc2 fin06	360	67	24.86	0.6%	0.6%	0.6%
base	rhfs1	tpfc2 fin07	360	67	24.86	0.6%	0.7%	0.7%
base	rhfs1	tpfc2 fin08	360	67	24.85	0.7%	0.6%	0.7%
base	rhfs1	tpfc2 fin09	360	67	24.85	0.7%	0.6%	0.7%
base	rhfs1	tpfc2 fin10	359	67	24.83	0.8%	0.7%	0.8%
base	rhfs1	tpfc2	362	68	25.03	0.0%	0.0%	0.0%
base	rhfs1	tpfc2 um125	361	67	24.92	0.4%	0.4%	0.4%
base	rhfs1	tpfc2 um120	358	67	24.73	1.2%	1.3%	1.2%
base	rhfs1	tpfc2 um115	355	66	24.50	2.1%	2.4%	2.1%
base	rhfs1	tpfc2 um110	352	66	24.35	2.7%	2.9%	2.7%
base	rhfs1	tpfc2 um105	350	65	24.22	3.3%	3.4%	3.2%
base	rhfs1	tpfc2 um102	349	65	24.13	3.6%	3.7%	3.5%
base	rhfs1	tpfc2 um100	359	67	24.83	0.0%	0.0%	0.0%
base	rhfs1	tpfc2 um200	358	67	24.77	0.2%	0.2%	0.2%
base	rhfs1	tpfc2 um300	357	67	24.68	0.5%	0.8%	0.6%
base	rhfs1	tpfc2 um400	356	66	24.61	0.8%	1.2%	0.9%
base	rhfs1	tpfc2 um500	355	66	24.51	1.1%	1.7%	1.3%

THAI HOTEL PROTOTYPE Bang

	Total Energy (kWh/m ² /yr)	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base rhfs1 tpfc2 wabs1	357	67	24.66	1.4%	1.3%	1.4%
base rhfs1 tpfc2 wabs2	358	67	24.74	1.1%	1.0%	1.1%
base rhfs1 tpfc2 wabs3	359	67	24.80	0.8%	0.8%	0.9%
base rhfs1 tpfc2 wabs4	360	67	24.88	0.6%	0.6%	0.6%
base rhfs1 tpfc2 wabs5	361	67	24.95	0.3%	0.2%	0.3%
base rhfs1 tpfc2	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpfc2 wabs7	363	68	25.10	-0.3%	-0.3%	-0.3%
base rhfs1 tpfc2 wabs8	364	68	25.19	-0.7%	-0.6%	-0.7%
base rhfs1 tpfc2 wabs9	366	68	25.27	-1.0%	-0.8%	-1.0%
base rhfs1 tpfc2 rabs1	360	67	24.87	0.6%	0.5%	0.6%
base rhfs1 tpfc2 rabs2	360	67	24.90	0.5%	0.4%	0.5%
base rhfs1 tpfc2 rabs3	361	67	24.92	0.4%	0.4%	0.4%
base rhfs1 tpfc2 rabs4	361	67	24.94	0.3%	0.3%	0.3%
base rhfs1 tpfc2 rabs5	361	67	24.97	0.2%	0.2%	0.2%
base rhfs1 tpfc2 rabs6	362	68	25.00	0.1%	0.1%	0.1%
base rhfs1 tpfc2 rabs8	362	68	25.05	-0.1%	-0.1%	-0.1%
base rhfs1 tpfc2 rabs9	363	68	25.08	-0.2%	-0.1%	-0.2%
base rhfs1 tpfc2 inf02	358	66	24.74	1.1%	1.9%	1.1%
base rhfs1 tpfc2 inf05	359	67	24.83	0.8%	1.4%	0.8%
base rhfs1 tpfc2	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpfc2 inf20	368	69	25.43	-1.6%	-1.9%	-1.6%
base rhfs1 tpfc2 inf30	382	70	26.27	-5.4%	-4.1%	-5.0%
base rhfs1 tpfc2 ltsv1	348	65	24.00	4.0%	3.9%	4.1%
base rhfs1 tpfc2 ltsv2	334	62	23.04	7.8%	7.8%	7.9%
base rhfs1 tpfc2 ltsv3	319	60	22.02	11.8%	11.7%	12.0%
base rhfs1 tpfc2 ltsv4	305	57	21.01	15.8%	15.6%	16.1%
base rhfs1 tpfc2 ltsv5	292	55	20.11	19.4%	19.2%	19.6%
base rhfs1 tpfc2 nsori	366	69	25.30	-1.1%	-1.7%	-1.1%
base vavs1 tpfc2 eneff lts	178	34	12.38	50.9%	49.5%	50.5%
base rhfs1 tpfc2 tspar hre	355	59	24.19	1.8%	12.1%	3.3%
base rhfs1 tpfc2 engch hre	554	41	19.43	-53.1%	39.3%	22.4%
base rhfs1 tpfc2 stand lts	234	43	16.22	35.4%	36.0%	35.2%

THAI HOTEL PROTOTYPE Bangkok 85

		Cooling Load (MW)	Latent Cooling (MW)	Peak Cooling (MW)	Hours Cooling	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base	rhfs1 tpf2	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf2 cwr	9140	2858	2326	5188	154485	2.303	2.886
base	rhfs1 tpf2 ccr	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf2 oactm	10143	3438	2433	5178	154485	2.289	2.869
base	rhfs1 tpf2 oacn	10141	3435	2298	5183	154485	2.289	2.869
base	rhfs1 tpf2 oa_05	6773	1205	1596	5174	154485	1.628	2.04
base	rhfs1 tpf2 oa_10	7634	1770	1763	5169	154485	1.797	2.252
base	rhfs1 tpf2 oa_15	8480	2329	1938	5179	154485	1.963	2.459
base	rhfs1 tpf2 oa_20	9316	2884	2116	5181	154485	2.127	2.665
base	rhfs1 tpf2	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf2 oa_30	10974	3983	2480	5184	154485	2.451	3.071
base	rhfs1 tpf2 siz11	10379	3442	2338	5182	169668	2.331	2.921
base	rhfs1 tpf2 siz13	10796	3456	2393	5234	200435	2.379	2.981
base	rhfs1 tpf2 siz15	11169	3472	2432	5181	231706	2.423	3.036
base	rhfs1 tpf2 sizco	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf2 mst08	13673	6511	2871	5237	65354	2.776	3.478
base	rhfs1 tpf2 mst10	13302	6175	2780	5225	72382	2.716	3.403
base	rhfs1 tpf2 mst12	12848	5764	2658	5219	82122	2.643	3.312
base	rhfs1 tpf2 mst14	11962	5078	2542	5198	95616	2.527	3.166
base	rhfs1 tpf2 mst16	11009	4294	2417	5172	116304	2.405	3.014
base	rhfs1 tpf2	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf2 fspr1	9477	3215	2220	5185	154485	2.206	2.764
base	rhfs1 tpf2	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf2 fspr3	10818	3654	2376	5178	154485	2.372	2.972
base	rhfs1 tpf2 fspr4	11488	3870	2455	5177	154485	2.454	3.075
base	rhfs1 tpf2 fspr5	12156	4083	2535	5187	154485	2.535	3.177
base	rhfs1 tpf2 fspr6	12821	4293	2614	5185	154485	2.616	3.278
base	rhfs1 tpf2 fspr7	13484	4499	2692	5185	154485	2.692	3.378
base	rhfs1 tpf2 fspr8	14143	4701	2770	5175	154485	2.775	3.477
base	rhfs1 tpf2 fspr9	14799	4899	2847	5176	154485	2.853	3.575
base	rhfs1 tpf2 feff3	10595	3581	2350	5179	154485	2.345	2.938
base	rhfs1 tpf2	10148	3435	2298	5182	154485	2.289	2.869

THAI HOTEL PROTOTYPE Bangkok 85

		Cooling Load (MUh)	Latent Cooling (MUh)	Peak Cooling (kW)	Hours Cooling	Fan Capacity (Lit/sec)	Chiller Capacity (MU)	Tower Capacity (MU)
base	rhfs1 tpf22 tef5	9879	3347	2267	5184	154485	2.256	2.827
base	rhfs1 tpf22 tef6	9701	3288	2246	5172	154485	2.234	2.799
base	rhfs1 tpf22 tef7	9573	3246	2231	5175	154485	2.218	2.779
base	rhfs1 tpf22 twb25	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf22 twb26	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf22 twb27	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf22 twb28	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf22 twb30	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf22 tf2sp	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf22 varsp	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf22 recch aircr cop35	10148	3435	2298	5182	154485	2.289	2.289
base	rhfs1 tpf22 recch cop35	10148	3435	2298	5182	154485	2.289	2.944
base	rhfs1 tpf22 cop45	10148	3435	2298	5182	154485	2.289	2.798
base	rhfs1 tpf22 cop50	10148	3435	2298	5182	154485	2.289	2.747
base	rhfs1 tpf22 cop55	10148	3435	2298	5182	154485	2.289	2.706
base	rhfs1 tpf22 aircc	10148	3435	2298	5182	154485	2.289	2.289
base	rhfs1 tpf22 nrch2	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf22 nrch3	10148	3435	2298	5182	154485	2.289	2.869
base	rhfs1 tpf22 nrch4	10148	3435	2298	5182	154485	2.289	2.869
VAI/S:								
base	vavs1 tpf22	9372	3497	2246	5176	157390	2.263	2.836
base	vavs1 tpf22 ccwrm	9270	3425	2250	5172	157390	2.265	2.838
base	vavs1 tpf22 ccres	9372	3497	2246	5176	157390	2.263	2.836
base	vavs1 tpf22	9372	3497	2246	5176	157390	2.263	2.836

THAI HOTEL PROTOTYPE Bangkok 85

	Cooling Load (MW)	Latent Cooling (MW)	Peak Cooling (kW)	Hours	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base vavs1 tpf2 oactm	9385	3519	2246	5175	157390	2.263	2.836
base vavs1 tpf2 oacen	9365	3498	2246	5177	157390	2.263	2.836
base vavs1 tpf2	9372	3497	2246	5176	157390	2.263	2.836
base vavs1 tpf2 oa_05	6184	1220	1612	5168	157390	1.619	2.028
base vavs1 tpf2 oa_10	6989	1794	1767	5178	157390	1.781	2.231
base vavs1 tpf2 oa_15	7789	2366	1928	5181	157390	1.943	2.434
base vavs1 tpf2 oa_20	8582	2933	2088	5170	157390	2.103	2.635
base vavs1 tpf2 oa_30	10158	4058	2417	5190	157390	2.422	3.035
base vavs1 tpf2 siz11	9507	3515	2259	5168	172842	2.266	2.839
base vavs1 tpf2 siz13	9770	3549	2281	5236	204189	2.268	2.842
base vavs1 tpf2 siz15	10028	3578	2289	5185	236088	2.281	2.858
base vavs1 tpf2 sizco	9372	3497	2246	5176	157390	2.263	2.836
base vavs1 tpf2 mst08	13196	6732	2703	5180	87909	2.702	3.385
base vavs1 tpf2 mst10	12454	6249	2621	5182	90697	2.62	3.283
base vavs1 tpf2 mst12	11680	5696	2533	5191	94682	2.544	3.187
base vavs1 tpf2 mst14	10958	5078	2460	5196	102786	2.465	3.088
base vavs1 tpf2 mst16	10177	4343	2357	5169	120289	2.37	2.969
base vavs1 tpf2 fcd1s	9831	3685	2289	5175	157390	2.291	2.871
base vavs1 tpf2	9372	3497	2246	5176	157390	2.263	2.836
base vavs1 tpf2 fcspd	9147	3401	2244	5175	157390	2.261	2.833
base vavs1 tpf2 fspr1	8894	3290	2183	5180	157390	2.191	2.745
base vavs1 tpf2 fspr3	9848	3700	2317	5172	157390	2.335	2.926
base vavs1 tpf2 fspr4	10320	3899	2388	5179	157390	2.407	3.016
base vavs1 tpf2 fspr5	10788	4094	2458	5176	157390	2.478	3.105
base vavs1 tpf2 fspr6	11253	4285	2528	5181	157390	2.549	3.194
base vavs1 tpf2 fspr7	11714	4471	2597	5177	157390	2.619	3.282
base vavs1 tpf2 fspr8	12171	4653	2666	5176	157390	2.689	3.369
base vavs1 tpf2 fspr9	12625	4831	2734	5180	157390	2.758	3.456
base vavs1 tpf2 feff3	9690	3633	2294	5171	157390	2.311	2.896
base vavs1 tpf2 feff5	9181	3415	2221	5176	157390	2.234	2.8
base vavs1 tpf2 feff6	9054	3359	2204	5191	157390	2.215	2.775
base vavs1 tpf2 feff7	8962	3320	2192	5176	157390	2.201	2.758

THAI HOTEL PROTOTYPE Bangkok 85

	Cooling Load (MW)	Latent Cooling (MW)	Peak Cooling (kW)	Hours Cooling	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base vavs1 tpfc2 ccwrm mst08	12292	6180	2721	5187	87909	2.718	3.406
base vavs1 tpfc2 ccwrm mst10	11911	5904	2631	5182	90697	2.631	3.296
base vavs1 tpfc2 ccwrm mst12	11435	5533	2541	5191	94682	2.549	3.194
base vavs1 tpfc2 ccwrm mst14	10806	4973	2465	5193	102786	2.468	3.092
base vavs1 tpfc2 ccwrm mst16	10056	4257	2360	5170	120289	2.372	2.972

THERMAL STORAGE:

base rhfs1 tpfc2 tspar	10148	3435	2298	5182	154485	1.611	2.019
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GAS COOLING:

base rhfs1 tpfc2 engch	10148	3435	2298	5182	154485	2.289	3.937
base rhfs1 tpfc2 abgch	10148	3435	2298	5182	154485	2.289	4.595

THAI HOTEL PROTOTYPE Bangkok 85

	Cooling Pumps		Fans & Lights		Elev.	quip.	Total Energy	Peak Elec.	Peak Time	Energy Cost	Demand Cost	Total Cost	Run Date	Run File
	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(kW)	(M/D/H)	(\$)	(\$)	(\$)		
base rhfs1 tpf2	3157	1247	1896	745	745	421	7465	1393	4/10/18	373253	142647	515900	21-Sep-89	hotrhfs1
base rhfs1 tpf2 ccurm	2981	1248	1896	745	745	421	7290	1397	4/10/18	364516	143096	507612	21-Sep-89	hotrhfs1
base rhfs1 tpf2 ccrs	3157	1247	1896	745	745	421	7465	1393	4/10/18	373253	142647	515900	21-Sep-89	hotrhfs1
base rhfs1 tpf2 oactm	3156	1247	1896	745	745	421	7464	1393	4/10/18	373205	142982	516187	21-Sep-89	hotrhfs1
base rhfs1 tpf2 oacen	3155	1247	1896	745	745	421	7464	1393	4/10/18	373186	142647	515834	21-Sep-89	hotrhfs1
base rhfs1 tpf2 oa_05	2162	1184	1896	745	745	421	6407	1197	4/10/18	320334	125485	445819	21-Sep-89	hotrhfs1
base rhfs1 tpf2 oa_10	2414	1200	1896	745	745	421	6675	1247	4/10/18	333753	129693	463447	21-Sep-89	hotrhfs1
base rhfs1 tpf2 oa_15	2663	1216	1896	745	745	421	6940	1296	4/10/18	347001	133963	480965	21-Sep-89	hotrhfs1
base rhfs1 tpf2 oa_20	2910	1231	1896	745	745	421	7203	1345	4/10/18	360144	138316	498461	21-Sep-89	hotrhfs1
base rhfs1 tpf2	3157	1247	1896	745	745	421	7465	1393	4/10/18	373253	142647	515900	21-Sep-89	hotrhfs1
base rhfs1 tpf2 oa_30	3402	1262	1896	745	745	421	7726	1441	4/10/18	386299	146950	533249	21-Sep-89	hotrhfs1
base rhfs1 tpf2 siz11	3222	1353	1896	745	745	421	7637	1417	4/10/18	381858	145239	527097	21-Sep-89	hotrhfs1
base rhfs1 tpf2 siz13	3329	1563	1896	745	745	421	7954	1466 5/ 6/17	397714	149854	547568	21-Sep-89	hotrhfs1	
base rhfs1 tpf2 siz15	3425	1773	1896	745	745	421	8260	1505 5/ 6/17	413020	153951	566971	21-Sep-89	hotrhfs1	
base rhfs1 tpf2 sizco	3157	1247	1896	745	745	421	7465	1393	4/10/18	373253	142647	515900	21-Sep-89	hotrhfs1
base rhfs1 tpf2 mst08	4097	728	1896	745	745	421	7887	1474	4/10/18	394344	150670	545014	21-Sep-89	hotrhfs1
base rhfs1 tpf2 mst10	3995	767	1896	745	745	421	7823	1461	4/10/18	391168	149306	540475	21-Sep-89	hotrhfs1
base rhfs1 tpf2 mst12	3873	820	1896	745	745	421	7754	1446	4/10/18	387699	148013	535712	21-Sep-89	hotrhfs1
base rhfs1 tpf2 mst14	3637	893	1896	745	745	421	7592	1421	4/10/18	379600	145539	525140	21-Sep-89	hotrhfs1
base rhfs1 tpf2 mst16	3386	1009	1896	745	745	421	7456	1399	4/10/18	372801	143232	516034	21-Sep-89	hotrhfs1
base rhfs1 tpf2	3157	1247	1896	745	745	421	7465	1393	4/10/18	373253	142647	515900	21-Sep-89	hotrhfs1
base rhfs1 tpf2 fspr1	2983	769	1896	745	745	421	6814	1314	4/10/18	340709	134082	474792	21-Sep-89	hotrhfs2
base rhfs1 tpf2	3157	1247	1896	745	745	421	7465	1393	4/10/18	373253	142647	515900	21-Sep-89	hotrhfs1
base rhfs1 tpf2 fspr3	3331	1724	1896	745	745	421	8117	1471	4/10/18	405834	151197	557032	21-Sep-89	hotrhfs2
base rhfs1 tpf2 fspr4	3506	2202	1896	745	745	421	8769	1549	4/10/18	438441	159731	598172	21-Sep-89	hotrhfs2
base rhfs1 tpf2 fspr5	3681	2679	1896	745	745	421	9421	1627	4/10/18	471061	168247	639309	21-Sep-89	hotrhfs2
base rhfs1 tpf2 fspr6	3856	3156	1896	745	745	421	10073	1705	4/10/18	503685	176746	680432	21-Sep-89	hotrhfs2
base rhfs1 tpf2 fspr7	4031	3633	1896	745	745	421	10726	1782	4/10/18	536304	185226	721531	21-Sep-89	hotrhfs2
base rhfs1 tpf2 fspr8	4206	4110	1896	745	745	421	11378	1859	4/10/18	568911	193688	762600	21-Sep-89	hotrhfs2
base rhfs1 tpf2 fspr9	4381	4587	1896	745	745	421	12030	1936	4/10/18	601499	202131	803630	21-Sep-89	hotrhfs2
base rhfs1 tpf2 feff3	3273	1565	1896	745	745	421	7899	1445	4/10/18	394973	148351	543325	21-Sep-89	hotrhfs2
base rhfs1 tpf2	3157	1247	1896	745	745	421	7465	1393	4/10/18	373253	142647	515900	21-Sep-89	hotrhfs1

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	Cooling Pumps			Fans & Lights			Elev. quip.			Total Energy		Peak Elec.		Peak Time		Energy Cost		Demand Cost		Total Cost		Run Date		Run File	
	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(kW)	(kW)	(M/D/H)	(M/D/H)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)				
base rhfs1 tpf22 feff5	3087	1056	1896	1896	745	745	421	7205	1362	4/10/18	360230	139225	499453	21-Sep-89	hotrhfs2										
base rhfs1 tpf22 feff6	3041	928	1896	1896	745	745	421	7031	1341	4/10/18	351554	136941	488496	21-Sep-89	hotrhfs2										
base rhfs1 tpf22 feff7	3008	837	1896	1896	745	745	421	6907	1326	4/10/18	345357	135308	480665	21-Sep-89	hotrhfs2										
base rhfs1 tpf22 twb25	3169	1247	1896	1896	745	745	421	7478	1393	4/10/18	373886	142536	516423	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 twb26	3164	1247	1896	1896	745	745	421	7473	1394	4/10/18	373636	142562	516199	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 twb27	3161	1247	1896	1896	745	745	421	7469	1394	4/10/18	373457	142589	516047	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 twb28	3158	1247	1896	1896	745	745	421	7467	1393	4/10/18	373332	142620	515952	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 twb30	3155	1247	1896	1896	745	745	421	7464	1393	4/10/18	373186	142678	515865	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 tf2sp	3156	1247	1896	1896	745	745	421	7464	1393	4/10/18	373200	142647	515848	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 varsp	3121	1150	1896	1896	745	745	421	7332	1393	4/10/18	366599	142005	508605	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 recch aircr cop35	4015	1247	1896	1896	745	745	421	8324	1513	4/11/17	416191	157499	573690	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 recch cop35	4049	1247	1896	1896	745	745	421	8358	1474	4/10/18	417876	154069	571945	22-Sep-89	hotrhfs3										
base rhfs1 tpf22	3157	1247	1896	1896	745	745	421	7465	1393	4/10/18	373253	142647	515900	21-Sep-89	hotrhfs1										
base rhfs1 tpf22 cop45	2837	1247	1896	1896	745	745	421	7145	1320	4/10/18	357257	136103	493361	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 cop50	2610	1247	1896	1896	745	745	421	6918	1268	4/10/18	345905	131489	477394	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 cop55	2424	1247	1896	1896	745	745	421	6732	1226	4/10/18	336616	127720	464336	9-Oct-89	hotrhfs3										
base rhfs1 tpf22 aircr	2578	1247	1896	1896	745	745	421	6886	1349	5/ 6/17	344316	138550	482866	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 nrch2	2991	1247	1896	1896	745	745	421	7300	1393	4/10/18	364977	142611	507589	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 nrch3	3157	1247	1896	1896	745	745	421	7465	1393	4/10/18	373253	142647	515900	22-Sep-89	hotrhfs3										
base rhfs1 tpf22 nrch4	2988	1247	1896	1896	745	745	421	7297	1393	4/10/18	364825	142633	507458	22-Sep-89	hotrhfs3										

VAVS:

base vavs1 tpf22	2992	848	1896	1896	745	745	421	6901	1369	5/ 6/17	345071	139413	484484	22-Sep-89	hotvavs1
base vavs1 tpf22 ccwrm	2975	852	1896	1896	745	745	421	6888	1369	5/ 6/17	344421	139592	484013	22-Sep-89	hotvavs1
base vavs1 tpf22 ccres	2992	848	1896	1896	745	745	421	6901	1369	5/ 6/17	345071	139413	484484	22-Sep-89	hotvavs1
base vavs1 tpf22	2992	848	1896	1896	745	745	421	6901	1369	5/ 6/17	345071	139413	484484	22-Sep-89	hotvavs1

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	Fans &			Total Energy (MWh)	Peak Elec. (kW)	Peak Time (M/D/H)	Energy Cost (\$)	Demand Cost (\$)	Total Cost (\$)	Run Date	Run File
	Cooling (MWh)	Pumps (MWh)	Lights (MWh)								
base vavs1 tpf2 oactm	2993	848	1896	745	421	6902	1369 5/ 6/17	345122	139413	484535	22-Sep-89 hotvavs1
base vavs1 tpf2 oacen	2990	848	1896	745	421	6899	1369 5/ 6/17	344972	139413	484385	22-Sep-89 hotvavs1
base vavs1 tpf2	2992	848	1896	745	421	6901	1369 5/ 6/17	345071	139413	484484	22-Sep-89 hotvavs1
base vavs1 tpf2 oa_05	2049	789	1896	745	421	5899	1181 5/ 6/17	294963	123390	418353	22-Sep-89 hotvavs1
base vavs1 tpf2 oa_10	2285	802	1896	745	421	6148	1227 5/ 6/17	307385	127213	434598	22-Sep-89 hotvavs1
base vavs1 tpf2 oa_15	2521	817	1896	745	421	6399	1274 5/ 6/17	319963	131237	451200	22-Sep-89 hotvavs1
base vavs1 tpf2 oa_20	2757	832	1896	745	421	6650	1322 5/ 6/17	332524	135309	467833	22-Sep-89 hotvavs1
base vavs1 tpf2 oa_30	3226	864	1896	745	421	7152	1416 5/ 6/17	357578	143643	501222	22-Sep-89 hotvavs1
base vavs1 tpf2 siz11	3019	884	1896	745	421	6964	1377 5/ 6/17	348209	139717	487927	22-Sep-89 hotvavs1
base vavs1 tpf2 siz13	3072	967	1896	745	421	7100	1396 5/ 6/17	354992	140618	495611	22-Sep-89 hotvavs1
base vavs1 tpf2 siz15	3128	1061	1896	745	421	7251	1402 5/ 6/17	362530	141486	504016	22-Sep-89 hotvavs1
base vavs1 tpf2 sizco	2992	848	1896	745	421	6901	1369 5/ 6/17	345071	139413	484484	22-Sep-89 hotvavs1
base vavs1 tpf2 mst08	3967	572	1896	745	421	7600	1455 5/ 6/17	380023	147605	527629	22-Sep-89 hotvavs1
base vavs1 tpf2 mst10	3776	580	1896	745	421	7418	1441 5/ 6/17	370893	145446	516339	22-Sep-89 hotvavs1
base vavs1 tpf2 mst12	3583	596	1896	745	421	7240	1425 5/ 6/17	362003	143400	505404	22-Sep-89 hotvavs1
base vavs1 tpf2 mst14	3402	634	1896	745	421	7098	1405 5/ 6/17	354877	141901	496778	22-Sep-89 hotvavs1
base vavs1 tpf2 mst16	3202	707	1896	745	421	6970	1384 5/ 6/17	348502	140347	488849	22-Sep-89 hotvavs1
base vavs1 tpf2 fcdis	3095	1129	1896	745	421	7286	1393 4/10/18	364298	142764	507063	22-Sep-89 hotvavs1
base vavs1 tpf2	2992	848	1896	745	421	6901	1369 5/ 6/17	345071	139413	484484	22-Sep-89 hotvavs1
base vavs1 tpf2 fcspr	2949	715	1896	745	421	6725	1368 5/ 6/17	336247	139041	475289	22-Sep-89 hotvavs1
base vavs1 tpf2 fspr1	2863	569	1896	745	421	6494	1301 4/10/18	324712	132496	457208	22-Sep-89 hotvavs2
base vavs1 tpf2 fspr3	3120	1127	1896	745	421	7309	1440 5/ 6/17	365441	146469	511910	22-Sep-89 hotvavs2
base vavs1 tpf2 fspr4	3247	1408	1896	745	421	7716	1511 5/ 6/17	385817	153571	539388	22-Sep-89 hotvavs2
base vavs1 tpf2 fspr5	3374	1688	1896	745	421	8124	1583 5/ 6/17	406197	160694	566891	22-Sep-89 hotvavs2
base vavs1 tpf2 fspr6	3500	1970	1896	745	421	8532	1654 5/ 6/17	426574	167844	594419	22-Sep-89 hotvavs2
base vavs1 tpf2 fspr7	3625	2252	1896	745	421	8939	1726 5/ 6/17	446948	175012	621960	22-Sep-89 hotvavs2
base vavs1 tpf2 fspr8	3750	2535	1896	745	421	9346	1798 5/ 6/17	467311	182192	649503	22-Sep-89 hotvavs2
base vavs1 tpf2 fspr9	3874	2818	1896	745	421	9753	1870 5/ 6/17	487666	189406	677072	22-Sep-89 hotvavs2
base vavs1 tpf2 feff3	3077	1034	1896	745	421	7173	1416 5/ 6/17	358652	144116	502768	22-Sep-89 hotvavs2
base vavs1 tpf2 feff5	2941	736	1896	745	421	6739	1341 4/10/18	336927	136643	473571	22-Sep-89 hotvavs2
base vavs1 tpf2 feff6	2906	662	1896	745	421	6630	1323 4/10/18	331497	134800	466297	22-Sep-89 hotvavs2
base vavs1 tpf2 feff7	2882	609	1896	745	421	6552	1310 4/10/18	327619	133484	461104	22-Sep-89 hotvavs2

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	Fans, &		Total		Peak		Energy		Demand		Total		Run Date - Run File
	Cooling (MWh)	Fumps (MWh)	Lights (MWh)	Elev. (MWh)	quip. (MWh)	Peak Elec. (kW)	Peak Time (M/D/H)	Energy (MWh)	Cost (\$)	Cost (\$)	Cost (\$)		
base vavs1 tpf2 ccwrm mst08	3804	578	1896	745	421	1466	5/ 6/17	7444	372180	148504	520684	10-Oct-89 hotvavs1	
base vavs1 tpf2 ccwrm mst10	3681	584	1896	745	421	1444	5/ 6/17	7327	366332	146056	512389	10-Oct-89 hotvavs1	
base vavs1 tpf2 ccwrm mst12	3542	599	1896	745	421	1427	5/ 6/17	7202	360095	143766	503861	10-Oct-89 hotvavs1	
base vavs1 tpf2 ccwrm mst14	3377	637	1896	745	421	1406	5/ 6/17	7075	353767	142133	495900	10-Oct-89 hotvavs1	
base vavs1 tpf2 ccwrm mst16	3182	710	1896	745	421	1386	5/ 6/17	6953	347665	140549	488215	10-Oct-89 hotvavs1	

THERMAL STORAGE:

base rhfs1 tpf2 tspar	3021	1247	1896	745	421	7329	1224 5/ 7/17	366465	132354	498819	14-Mar-90 hottes1
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GAS COOLING:

base rhfs1 tpf2 engch	759	1247	1896	745	421	11431	845 1/31/17	307681	92884	409566	20-Mar-90 hotrhfs4
base rhfs1 tpf2 abgch	922	1247	1896	745	421	15693	863 1/31/17	350812	94867	445680	20-Mar-90 hotrhfs4

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	Total Energy kwh/m2/yr	Peak Demand (W/m2)	Total Energy Cost (\$/m2)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base rhfs1 tpf2	362	68	25.02			
base rhfs1 tpf2 cwrn	354	68	24.62	2.3%	-0.3%	1.6%
base rhfs1 tpf2 ccrs	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpf2 oactm	362	68	25.04	0.0%	0.0%	-0.1%
base rhfs1 tpf2 oacen	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpf2 oa_05	311	58	21.62	14.2%	14.1%	13.6%
base rhfs1 tpf2 oa_10	324	60	22.48	10.6%	10.5%	10.2%
base rhfs1 tpf2 oa_15	337	63	23.33	7.0%	7.0%	6.8%
base rhfs1 tpf2 oa_20	349	65	24.18	3.5%	3.4%	3.4%
base rhfs1 tpf2	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpf2 oa_30	375	70	25.86	-3.5%	-3.4%	-3.4%
base rhfs1 tpf2 siz11	370	69	25.56	-2.3%	-1.7%	-2.2%
base rhfs1 tpf2 siz13	386	71	26.56	-6.6%	-5.2%	-6.1%
base rhfs1 tpf2 siz15	401	73	27.50	-10.6%	-8.0%	-9.9%
base rhfs1 tpf2 sizco	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpf2 mst08	383	71	26.43	-5.7%	-5.8%	-5.6%
base rhfs1 tpf2 mst10	379	71	26.21	-4.8%	-4.9%	-4.8%
base rhfs1 tpf2 mst12	376	70	25.98	-3.9%	-3.8%	-3.8%
base rhfs1 tpf2 mst14	368	69	25.47	-1.7%	-2.0%	-1.8%
base rh's1 tpf2 mst16	362	68	25.03	0.1%	-0.4%	0.0%
base rhfs1 tpf2	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpf2 fspr1	330	64	23.03	8.7%	5.7%	8.0%
base rhfs1 tpf2	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpf2 fspr3	394	71	27.02	-8.7%	-5.6%	-8.0%
base rhfs1 tpf2 fspr4	425	75	29.01	-17.5%	-11.2%	-15.9%
base rhfs1 tpf2 fspr5	457	79	31.01	-26.2%	-16.8%	-23.9%
base rhfs1 tpf2 fspr6	489	83	33.00	-34.9%	-22.4%	-31.9%
base rhfs1 tpf2 fspr7	520	86	35.00	-43.7%	-27.9%	-39.9%
base rhfs1 tpf2 fspr8	552	90	36.99	-52.4%	-33.5%	-47.8%
base rhfs1 tpf2 fspr9	583	94	38.98	-61.2%	-39.0%	-55.8%
base rhfs1 tpf2 feff3	383	70	26.35	-5.8%	-3.7%	-5.3%
base rhfs1 tpf2	362	68	25.02	0.0%	0.0%	0.0%

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	Total Energy kWh/m ² /yr	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base rhfs1 tpic2 feff5	349	66	24.22	3.5%	2.2%	3.2%
base rhfs1 tpic2 feff6	341	65	23.69	5.8%	3.7%	5.3%
base rhfs1 tpic2 feff7	335	64	23.31	7.5%	4.8%	6.8%
base rhfs1 tpic2 twb25	363	68	25.05	-0.2%	0.0%	-0.1%
base rhfs1 tpic2 twb26	362	68	25.04	-0.1%	-0.1%	-0.1%
base rhfs1 tpic2 twb27	362	68	25.03	-0.1%	-0.1%	0.0%
base rhfs1 tpic2 twb28	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpic2 twb30	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpic2 tf2sp	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpic2 varsp	356	68	24.67	1.8%	0.0%	1.4%
base rhfs1 tpic2 recch aircr cop35	404	73	27.82	-11.5%	-8.6%	-11.2%
base rhfs1 tpic2 recch cop35	405	71	27.74	-12.0%	-5.8%	-10.9%
base rhfs1 tpic2	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpic2 cop45	347	64	23.93	4.3%	5.2%	4.4%
base rhfs1 tpic2 cop50	336	61	23.15	7.3%	9.0%	7.5%
base rhfs1 tpic2 cop55	327	59	22.52	9.8%	12.0%	10.0%
base rhfs1 tpic2 aircc	334	65	23.42	7.8%	3.2%	6.4%
base rhfs1 tpic2 nrch2	354	68	24.62	2.2%	0.0%	1.6%
base rhfs1 tpic2 nrch3	362	68	25.02	0.0%	0.0%	0.0%
base rhfs1 tpic2 nrch4	354	68	24.61	2.3%	0.0%	1.6%
VAVS:						
base vavs1 tpic2	335	66	23.50	7.6%	1.7%	6.1%
base vavs1 tpic2 ccwrm	334	66	23.48	7.7%	1.7%	6.2%
base vavs1 tpic2 ccres	335	66	23.50	7.6%	1.7%	6.1%
base vavs1 tpic2	335	66	23.50	7.6%	1.7%	6.1%

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	Total Energy kWh/m ² /yr	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base vavs1 tpfcd2 oactm	335	66	23.50	7.5%	1.7%	6.1%
base vavs1 tpfcd2 oacem	335	66	23.49	7.6%	1.7%	6.1%
base vavs1 tpfcd2	335	66	23.50	7.6%	1.7%	6.1%
base vavs1 tpfcd2 oa_05	286	57	20.29	21.0%	15.2%	18.9%
base vavs1 tpfcd2 oa_10	298	60	21.08	17.6%	11.9%	15.8%
base vavs1 tpfcd2 oa_15	310	62	21.88	14.3%	8.5%	12.5%
base vavs1 tpfcd2 oa_20	323	64	22.69	10.9%	5.1%	9.3%
base vavs1 tpfcd2 oa_30	347	69	24.31	4.2%	-1.7%	2.8%
base vavs1 tpfcd2 siz11	338	67	23.67	6.7%	1.1%	5.4%
base vavs1 tpfcd2 siz13	344	68	24.04	4.9%	-0.2%	3.9%
base vavs1 tpfcd2 siz15	352	68	24.45	2.9%	-0.6%	2.3%
base vavs1 tpfcd2 sizco	335	66	23.50	7.6%	1.7%	6.1%
base vavs1 tpfcd2 mst08	369	71	25.59	-1.8%	-4.5%	-2.3%
base vavs1 tpfcd2 mst10	360	70	25.04	0.6%	-3.4%	-0.1%
base vavs1 tpfcd2 mst12	351	69	24.51	3.0%	-2.3%	2.0%
base vavs1 tpfcd2 mst14	344	68	24.09	4.9%	-0.9%	3.7%
base vavs1 tpfcd2 mst16	338	67	23.71	6.6%	0.6%	5.2%
base vavs1 tpfcd2 fcd15	353	68	24.59	2.4%	0.0%	1.7%
base vavs1 tpfcd2	335	66	23.50	7.6%	1.7%	6.1%
base vavs1 tpfcd2 fcsdpd	326	66	23.05	9.9%	1.8%	7.9%
base vavs1 tpfcd2 fspr1	315	63	22.18	13.0%	6.6%	11.4%
base vavs1 tpfcd2 fspr3	354	70	24.83	2.1%	-3.4%	0.8%
base vavs1 tpfcd2 fspr4	374	73	26.16	-3.4%	-8.5%	-4.6%
base vavs1 tpfcd2 fspr5	394	77	27.49	-8.8%	-13.6%	-9.9%
base vavs1 tpfcd2 fspr6	414	80	28.83	-14.3%	-18.7%	-15.2%
base vavs1 tpfcd2 fspr7	434	84	30.17	-19.7%	-23.9%	-20.6%
base vavs1 tpfcd2 fspr8	453	87	31.50	-25.2%	-29.1%	-25.9%
base vavs1 tpfcd2 fspr9	473	91	32.84	-30.6%	-34.2%	-31.2%
base vavs1 tpfcd2 feff3	348	69	24.38	3.9%	-1.7%	2.5%
base vavs1 tpfcd2 feff5	327	65	22.97	9.7%	3.7%	8.2%
base vavs1 tpfcd2 feff6	322	64	22.62	11.2%	5.0%	9.6%
base vavs1 tpfcd2 feff7	318	64	22.36	12.2%	6.0%	10.6%

THAI HOTEL PROTOTYPE Bangkok 85

	Total Energy kWh/m ² /yr	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base vavs1 tpf2 ccwrm mst08	361	71	25.25	0.3%	-5.2%	-0.9%
base vavs1 tpf2 ccwrm mst10	355	70	24.85	1.8%	-3.7%	0.7%
base vavs1 tpf2 ccwrm mst12	349	69	24.44	3.5%	-2.4%	2.3%
base vavs1 tpf2 ccwrm mst14	343	68	24.05	5.2%	-0.9%	3.9%
base vavs1 tpf2 ccwrm mst16	337	67	23.68	6.9%	0.5%	5.4%

THERMAL STORAGE:

base rhfs1 tpf2 tspar	355	59	24.19	1.8%	12.1%	3.3%
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GAS COOLING:

base rhfs1 tpf2 engch	554	41	19.43	-53.1%	39.3%	22.4%
base rhfs1 tpf2 abgch	761	42	21.62	-110.2%	38.0%	13.6%

THAI RETAIL BLDG	PROTOTYP	Bangkok 85	Chiller	Tower
			Capacity (MW)	Capacity (MW)
base	rhfs1 ptac2	2359	373	798
		2359	373	798
base	rhfs1 ptac2 spt18	2756	387	871
base	rhfs1 ptac2 spt19	2728	385	864
base	rhfs1 ptac2 spt20	2688	384	857
base	rhfs1 ptac2 spt21	2647	382	834
base	rhfs1 ptac2 spt22	2581	379	804
base	rhfs1 ptac2 spt23	2518	377	802
base	rhfs1 ptac2	2359	373	798
base	rhfs1 ptac2 spt25	2359	373	798
base	rhfs1 ptac2 spt26	2272	372	781
base	rhfs1 ptac2 spt27	2183	370	763
base	rhfs1 ptac2 spt28	2096	368	743
base	rhfs1 ptac2 spt29	2005	365	724
base	rhfs1 ptac2 spt30	1916	362	705
base	rhfs1 ptac2 spt31	1831	359	686
base	rhfs1 ptac2 spt32	1755	354	668
base	rhfs1 ptac2 spt33	1685	352	650
base	rhfs1 ptac2 wwr05	2184	374	732
base	rhfs1 ptac2 wwr10	2214	374	743
base	rhfs1 ptac2 wwr20	2274	373	761
base	rhfs1 ptac2 wwr30	2331	373	785
base	rhfs1 ptac2 wwr40	2388	373	811
base	rhfs1 ptac2 wwr50	2444	373	836
base	rhfs1 ptac2 wwr60	2500	373	863
base	rhfs1 ptac2 wwr70	2556	374	888
base	rhfs1 ptac2 wwr80	2611	372	913
base	rhfs1 ptac2 wwr90	2667	372	938
base	rhfs1 ptac2 wwr95	2694	372	951
base	rhfs1 ptac2 sc_10	2154	374	738
base	rhfs1 ptac2 sc_20	2195	375	750
base	rhfs1 ptac2 sc_30	2234	375	762
base	rhfs1 ptac2 sc_40	2272	375	773
base	rhfs1 ptac2 sc_50	2311	373	780
base	rhfs1 ptac2 sc_60	2348	373	794
base	rhfs1 ptac2 sc_70	2386	373	807

THAI RETAIL BLDG	PROTOTYP	Bangkok 85					Chiller Capacity (MW)	Tower Capacity (MW)
		Cooling Load (MWh)	Latent Cooling (MWh)	Peak Cooling (kW)	Hours	Fan Capacity (Lit/sec)		
base	rhfs1 ptac2 sc_80	2424	373	824	4380	69274	0.366	0.366
	rhfs1 ptac2 sc_90	2462	373	835	4380	71750	0.366	0.366
	rhfs1 ptac2 sc100	2499	373	849	4380	73184	0.366	0.366
base	rhfs1 ptac2	2359	373	798	4380	65175	0.366	0.366
	rhfs1 ptac2 wab10	2319	373	783	4380	63038	0.366	0.366
	rhfs1 ptac2 wab20	2339	373	791	4380	64104	0.366	0.366
	rhfs1 ptac2 wab30	2359	373	798	4380	65175	0.366	0.366
	rhfs1 ptac2 wab40	2380	373	805	4380	66269	0.366	0.366
	rhfs1 ptac2 wab50	2400	373	812	4380	67396	0.366	0.366
	rhfs1 ptac2 wab60	2420	373	819	4380	68670	0.366	0.366
	rhfs1 ptac2 wab70	2440	373	825	4380	69939	0.366	0.366
	rhfs1 ptac2 wab80	2460	373	831	4380	71259	0.366	0.366
	rhfs1 ptac2 wab90	2479	371	836	4380	72580	0.365	0.365
base	rhfs1 ptac2 rab10	2312	372	787	4380	64038	0.359	0.359
	rhfs1 ptac2 rab20	2320	372	789	4380	64241	0.36	0.36
	rhfs1 ptac2 rab30	2329	372	791	4380	64434	0.362	0.362
	rhfs1 ptac2 rab40	2337	373	793	4380	64618	0.363	0.363
	rhfs1 ptac2 rab50	2346	373	795	4380	64812	0.364	0.364
	rhfs1 ptac2 rab60	2355	373	797	4380	65048	0.365	0.365
	rhfs1 ptac2 rab70	2364	373	799	4380	65293	0.367	0.367
	rhfs1 ptac2 rab80	2373	373	801	4380	65529	0.368	0.368
	rhfs1 ptac2 rab90	2383	374	803	4380	65774	0.37	0.37
	base	rhfs1 ptac2 inf02	2317	341	793	4380	64076	0.358
rhfs1 ptac2 inf05		2333	354	794	4380	64420	0.361	0.361
rhfs1 ptac2		2359	373	798	4380	65175	0.366	0.366
rhfs1 ptac2 inf20		2494	412	828	4380	71208	0.409	0.409
rhfs1 ptac2 inf30		2627	442	990	4380	78320	0.521	0.521
base	rhfs1 ptac2 ltsv1	2232	372	766	4380	61939	0.357	0.357
	rhfs1 ptac2 ltsv2	2108	371	734	4380	58793	0.349	0.349
	rhfs1 ptac2 ltsv3	1989	370	704	4380	55930	0.343	0.343
	rhfs1 ptac2 ltsv4	1872	370	673	4380	53143	0.338	0.338
	rhfs1 ptac2 ltsv5	1769	369	646	4380	50747	0.333	0.333
base	rhfs1 ptac2 ohg01	2337	373	789	4380	63524	0.366	0.366

THAI RETAIL BLDG		PROTOTYP	Bangkok 85		Cooling Latent		Peak	Hours	Fan	Chiller	Tower
			Load	Cooling	Peak	Cooling	Hours	Capacity	Capacity	Capacity	
			(MWh)	(MWh)	(kW)	(kW)		(Lit/sec)	(MW)	(MW)	
base	rhfs1 ptac2 ohg02	2317	373	782	4380	62637	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 ohg03	2295	373	783	4380	62015	0.365	0.365	0.365	0.365	
base	rhfs1 ptac2 ohg04	2282	373	777	4380	61241	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 ohg05	2268	375	775	4380	60345	0.367	0.367	0.367	0.367	
base	rhfs1 ptac2 ohg06	2254	373	769	4380	59755	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 ohg07	2241	373	769	4380	59378	0.365	0.365	0.365	0.365	
base	rhfs1 ptac2 ohg08	2236	375	767	4380	58982	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 ohg09	2228	373	762	4380	58982	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 ohg10	2223	375	763	4380	58741	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 fin01	2345	373	793	4380	64203	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 fin02	2336	373	789	4380	63944	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 fin03	2333	373	788	4380	63906	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 fin04	2332	373	788	4380	63864	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 fin05	2330	373	787	4380	63812	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 fin06	2327	373	786	4380	63736	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 fin07	2326	373	786	4380	63736	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 fin08	2326	373	786	4380	63703	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 fin09	2325	373	786	4380	63694	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 fin10	2325	373	786	4380	63680	0.366	0.366	0.366	0.366	
base	rhfs1 ptac2 nsori	2391	374	833	4380	67590	0.366	0.366	0.366	0.366	
base	vavs1 vavs2 eneff lt	1386	265	497	4380	33465	0.507	0.507	0.599	0.599	
base	rhfs1 rhfs2 tspar hr	2792	375	854	4380	65175	0.82	0.82	4.688	4.688	
base	rhfs1 rhfs2 engch hr	2792	375	854	4380	65175	0.852	0.852	0.852	0.852	
base	rhfs1 ptac2 stand lt	1389	144	483	4380	43422	0.212	0.212	0.212	0.212	

THAI RETAIL BLDG PROTOTYP

	Cooling (MWh)	Fans & Pumps (MWh)	Lights (MWh)	Elev. (MWh)	Equip. (MWh)	Total Elec. (MWh)	Peak Time (M/D/H)	Energy Cost (\$)	Demand Cost (\$)	Total Cost (\$)	Run Date	Run File
base rhfs1 ptac2	958	110	1516	68	117	2770	843 4/12/14	138481	88571	227052	19-Sep-89	retlids1
base rhfs1 ptac2 spt18	1120	162	1516	68	117	2984	878 4/12/14	149178	92811	241990	19-Sep-89	retlids1
base rhfs1 ptac2 spt19	1107	153	1516	68	117	2961	871 4/12/14	148038	92146	240184	19-Sep-89	retlids1
base rhfs1 ptac2 spt20	1089	143	1516	68	117	2934	864 4/12/14	146680	91475	238156	19-Sep-89	retlids1
base rhfs1 ptac2 spt21	1071	133	1516	68	117	2905	857 4/12/14	145258	90862	236121	19-Sep-89	retlids1
base rhfs1 ptac2 spt22	1044	123	1516	68	117	2868	851 4/12/14	143395	90120	233516	19-Sep-89	retlids1
base rhfs1 ptac2 spt23	1019	118	1516	68	117	2838	850 4/12/14	141895	89793	231688	19-Sep-89	retlids1
base rhfs1 ptac2	958	110	1516	68	117	2770	843 4/12/14	138481	88571	227052	20-Sep-89	retlids3
base rhfs1 ptac2 spt25	958	110	1516	68	117	2770	843 4/12/14	138481	88571	227052	19-Sep-89	retlids1
base rhfs1 ptac2 spt26	925	107	1516	68	117	2733	834 4/12/14	136657	87579	224236	19-Sep-89	retlids1
base rhfs1 ptac2 spt27	890	103	1516	68	117	2694	823 4/12/14	134703	86482	221185	19-Sep-89	retlids1
base rhfs1 ptac2 spt28	857	100	1516	68	117	2658	813 4/12/14	132918	85498	218416	19-Sep-89	retlids1
base rhfs1 ptac2 spt29	823	98	1516	68	117	2622	803 4/12/14	131098	84537	215635	19-Sep-89	retlids1
base rhfs1 ptac2 spt30	789	96	1516	68	117	2586	793 4/12/14	129284	83597	212881	19-Sep-89	retlids1
base rhfs1 ptac2 spt31	754	93	1516	68	117	2548	782 4/12/14	127407	82596	210003	19-Sep-89	retlids1
base rhfs1 ptac2 spt32	722	91	1516	68	117	2514	772 4/12/14	125678	81635	207313	19-Sep-89	retlids1
base rhfs1 ptac2 spt33	691	89	1516	68	117	2481	763 4/12/14	124032	80717	204750	19-Sep-89	retlids1
base rhfs1 ptac2 wwr05	875	107	1516	68	117	2684	812 4/12/14	134171	85312	219484	19-Sep-89	retlids2
base rhfs1 ptac2 wwr10	889	108	1516	68	117	2698	817 4/12/14	134883	85849	220732	19-Sep-89	retlids2
base rhfs1 ptac2 wwr20	916	109	1516	68	117	2726	826 4/12/14	136290	86873	223164	19-Sep-89	retlids2
base rhfs1 ptac2 wwr30	944	110	1516	68	117	2755	838 4/12/14	137755	88015	225771	19-Sep-89	retlids2
base rhfs1 ptac2 wwr40	972	111	1516	68	117	2784	848 4/12/14	139215	89148	228364	8-Oct-89	retlids5
base rhfs1 ptac2 wwr50	1001	112	1516	68	117	2814	859 4/12/14	140696	90333	231030	8-Oct-89	retlids2
base rhfs1 ptac2 wwr60	1029	113	1516	68	117	2844	871 4/12/14	142175	91570	233746	19-Sep-89	retlids2
base rhfs1 ptac2 wwr70	1059	114	1516	68	117	2874	883 4/12/14	143687	92834	236522	19-Sep-89	retlids2
base rhfs1 ptac2 wwr80	1086	116	1516	68	117	2902	893 4/12/14	145118	94017	239136	19-Sep-89	retlids2
base rhfs1 ptac2 wwr90	1115	117	1516	68	117	2932	905 4/12/14	146622	95284	241907	19-Sep-89	retlids2
base rhfs1 ptac2 wwr95	1129	117	1516	68	117	2948	911 4/12/14	147379	95925	243305	19-Sep-89	retlids2
base rhfs1 ptac2 sc_10	869	106	1516	68	117	2676	819 4/12/14	133806	85471	219277	19-Sep-89	retlids2
base rhfs1 ptac2 sc_20	887	107	1516	68	117	2695	824 4/12/14	134725	86077	220803	19-Sep-89	retlids2
base rhfs1 ptac2 sc_30	905	107	1516	68	117	2713	829 4/12/14	135655	86691	222346	19-Sep-89	retlids2
base rhfs1 ptac2 sc_40	922	108	1516	68	117	2731	834 4/12/14	136555	87282	223838	8-Oct-89	retlids5
base rhfs1 ptac2 sc_50	936	110	1516	68	117	2746	836 4/12/14	137315	87763	225078	19-Sep-89	retlids2
base rhfs1 ptac2 sc_60	953	110	1516	68	117	2764	842 4/12/14	138210	88391	226601	19-Sep-89	retlids2
base rhfs1 ptac2 sc_70	971	111	1516	68	117	2783	847 4/12/14	139137	89027	228164	19-Sep-89	retlids2

THAI RETAIL BLDG PROTOTYP

	Total Energy kWh/m ² /yr	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base rhfs1 ptac2	344	105	28.16			
base rhfs1 ptac2 spt18	370	109	30.02	-7.7%	-4.2%	-6.6%
base rhfs1 ptac2 spt19	367	108	29.79	-6.9%	-3.3%	-5.8%
base rhfs1 ptac2 spt20	364	107	29.54	-5.9%	-2.5%	-4.9%
base rhfs1 ptac2 spt21	360	106	29.29	-4.9%	-1.7%	-4.0%
base rhfs1 ptac2 spt22	356	106	28.97	-3.5%	-0.9%	-2.8%
base rhfs1 ptac2 spt23	352	105	28.74	-2.5%	-0.8%	-2.0%
base rhfs1 ptac2	344	105	28.16	0.0%	0.0%	0.0%
base rhfs1 ptac2 spt25	344	105	28.16	0.0%	0.0%	0.0%
base rhfs1 ptac2 spt26	339	103	27.81	1.3%	1.1%	1.2%
base rhfs1 ptac2 spt27	334	102	27.44	2.7%	2.4%	2.6%
base rhfs1 ptac2 spt28	330	101	27.09	4.0%	3.6%	3.8%
base rhfs1 ptac2 spt29	325	100	26.75	5.3%	4.7%	5.0%
base rhfs1 ptac2 spt30	321	98	26.41	6.6%	5.9%	6.2%
base rhfs1 ptac2 spt31	316	97	26.05	8.0%	7.2%	7.5%
base rhfs1 ptac2 spt32	312	96	25.71	9.2%	8.4%	8.7%
base rhfs1 ptac2 spt33	308	95	25.40	10.4%	9.5%	9.8%
base rhfs1 ptac2 wwr05	333	101	27.22	3.1%	3.7%	3.3%
base rhfs1 ptac2 wwr10	335	101	27.38	2.6%	3.1%	2.8%
base rhfs1 ptac2 wwr20	338	102	27.68	1.6%	2.0%	1.7%
base rhfs1 ptac2 wwr30	342	104	28.00	0.5%	0.6%	0.6%
base rhfs1 ptac2 wwr40	345	105	28.33	-0.5%	-0.6%	-0.6%
base rhfs1 ptac2 wwr50	349	107	28.66	-1.6%	-1.9%	-1.8%
base rhfs1 ptac2 wwr60	353	108	28.99	-2.7%	-3.3%	-2.9%
base rhfs1 ptac2 wwr70	356	110	29.34	-3.8%	-4.7%	-4.2%
base rhfs1 ptac2 wwr80	360	111	29.66	-4.8%	-5.9%	-5.3%
base rhfs1 ptac2 wwr90	364	112	30.01	-5.8%	-7.4%	-6.5%
base rhfs1 ptac2 wwr95	366	113	30.18	-6.4%	-8.1%	-7.2%
base rhfs1 ptac2 sc_10	332	102	27.20	3.4%	2.8%	3.4%
base rhfs1 ptac2 sc_20	334	102	27.39	2.7%	2.3%	2.8%
base rhfs1 ptac2 sc_30	337	103	27.58	2.1%	1.7%	2.1%
base rhfs1 ptac2 sc_40	339	103	27.76	1.4%	1.1%	1.4%
base rhfs1 ptac2 sc_50	341	104	27.92	0.9%	0.8%	0.9%
base rhfs1 ptac2 sc_60	343	104	28.11	0.2%	0.1%	0.2%
base rhfs1 ptac2 sc_70	345	105	28.30	-0.5%	-0.5%	-0.5%

THAI RETAIL BLDG PROTOTYP									
		Total Energy kWh/m2/yr	Peak Demand (W/m2)	Total Energy Cost (\$/m2)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)		
base	rhfs1 ptac2 sc 80	348	106	28.50	-1.2%	-1.1%	-1.2%		
base	rhfs1 ptac2 sc 90	350	106	28.70	-1.8%	-1.8%	-1.9%		
base	rhfs1 ptac2 sc100	352	107	28.87	-2.5%	-2.4%	-2.5%		
base	rhfs1 ptac2	344	105	28.16					
base	rhfs1 ptac2 wab10	341	104	27.97	0.7%	0.6%	0.7%		
base	rhfs1 ptac2 wab20	342	104	28.06	0.4%	0.4%	0.4%		
base	rhfs1 ptac2 wab30	344	105	28.16	0.0%	0.0%	0.0%		
base	rhfs1 ptac2 wab40	345	105	28.26	-0.3%	-0.2%	-0.4%		
base	rhfs1 ptac2 wab50	346	105	28.36	-0.7%	-0.6%	-0.7%		
base	rhfs1 ptac2 wab60	347	105	28.47	-1.0%	-0.8%	-1.1%		
base	rhfs1 ptac2 wab70	349	106	28.57	-1.4%	-1.2%	-1.4%		
base	rhfs1 ptac2 wab80	350	106	28.68	-1.8%	-1.5%	-1.8%		
base	rhfs1 ptac2 wab90	351	106	28.76	-2.1%	-1.7%	-2.1%		
base	rhfs1 ptac2 rab10	341	104	27.96	0.8%	0.7%	0.7%		
base	rhfs1 ptac2 rab20	341	104	27.99	0.6%	0.6%	0.6%		
base	rhfs1 ptac2 rab30	342	104	28.03	0.5%	0.5%	0.5%		
base	rhfs1 ptac2 rab40	342	104	28.07	0.4%	0.4%	0.3%		
base	rhfs1 ptac2 rab50	343	104	28.10	0.3%	0.2%	0.2%		
base	rhfs1 ptac2 rab60	343	104	28.14	0.1%	0.1%	0.1%		
base	rhfs1 ptac2 rab70	344	105	28.18	-0.1%	0.0%	-0.1%		
base	rhfs1 ptac2 rab80	344	105	28.22	-0.2%	-0.1%	-0.2%		
base	rhfs1 ptac2 rab90	345	105	28.27	-0.4%	-0.4%	-0.4%		
base	rhfs1 ptac2 inf02	341	104	28.00	0.8%	0.4%	0.6%		
base	rhfs1 ptac2 inf05	342	104	28.05	0.5%	0.2%	0.4%		
base	rhfs1 ptac2	344	105	28.16	0.0%	0.0%	0.0%		
base	rhfs1 ptac2 inf20	354	107	28.91	-3.0%	-2.3%	-2.6%		
base	rhfs1 ptac2 inf30	367	110	29.93	-6.9%	-5.2%	-6.3%		
base	rhfs1 ptac2 ltsv1	318	98	26.13	7.5%	6.5%	7.2%		
base	rhfs1 ptac2 ltsv2	292	91	24.12	15.1%	12.9%	14.4%		
base	rhfs1 ptac2 ltsv3	267	84	22.14	22.4%	19.2%	21.4%		
base	rhfs1 ptac2 ltsv4	241	78	20.17	29.7%	25.5%	28.4%		
base	rhfs1 ptac2 ltsv5	219	72	18.42	36.2%	31.1%	34.6%		
base	rhfs1 ptac2 ohg01	342	104	28.04	0.4%	0.4%	0.5%		

THAI RETAIL BLDG PROTOTYP		Total Energy kWh/m ² /yr	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base	rhfs1 ptac2 ohg02	341	104	27.93	0.8%	0.7%	0.8%
base	rhfs1 ptac2 ohg03	340	104	27.88	1.0%	0.6%	1.0%
base	rhfs1 ptac2 ohg04	339	104	27.79	1.3%	0.8%	1.3%
base	rhfs1 ptac2 ohg05	339	104	27.74	1.5%	0.9%	1.5%
base	rhfs1 ptac2 ohg06	338	103	27.66	1.8%	1.3%	1.8%
base	rhfs1 ptac2 ohg07	337	103	27.62	1.9%	1.3%	1.9%
base	rhfs1 ptac2 ohg08	337	103	27.59	2.0%	1.3%	2.0%
base	rhfs1 ptac2 ohg09	336	103	27.55	2.2%	1.7%	2.2%
base	rhfs1 ptac2 ohg10	336	103	27.54	2.2%	1.4%	2.2%
base	rhfs1 ptac2 fin01	343	104	28.09	0.3%	0.2%	0.3%
base	rhfs1 ptac2 fin02	342	104	28.05	0.4%	0.4%	0.4%
base	rhfs1 ptac2 fin03	342	104	28.04	0.5%	0.4%	0.4%
base	rhfs1 ptac2 fin04	342	104	28.03	0.5%	0.4%	0.5%
base	rhfs1 ptac2 fin05	342	104	28.02	0.5%	0.4%	0.5%
base	rhfs1 ptac2 fin06	342	104	28.01	0.5%	0.5%	0.5%
base	rhfs1 ptac2 fin07	342	104	28.01	0.5%	0.5%	0.6%
base	rhfs1 ptac2 fin08	342	104	28.00	0.6%	0.5%	0.6%
base	rhfs1 ptac2 fin09	342	104	28.00	0.6%	0.5%	0.6%
base	rhfs1 ptac2 fin10	342	104	28.00	0.6%	0.5%	0.6%
base	rhfs1 ptac2 nsori	346	106	28.35	-0.7%	-1.4%	-0.7%
base	vavs1 vavs2 eneff lt	151	47	12.61	56.0%	54.7%	55.2%
base	rhfs1 rhfs2 tspar hr	378	90	28.50	-10.0%	14.1%	-1.2%
base	rhfs1 rhfs2 engch hr	498	73	23.13	-45.1%	30.5%	17.9%
base	rhfs1 ptac2 stand lt	198	63	16.49	42.4%	39.9%	41.4%

THAI RETAIL BLDG PROTOTYPE Bangkok 85

	base	rhfs1	ptac2	Load (MWh)	Latent Cooling (MWh)	Peak Cooling (kW)	Hours	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
				2359	373	798	4380	65175	0.366	0.366
base	rhfs1	ptac2	ccwrm	2240	299	786	4380	65175	0.349	0.349
base	rhfs1	ptac2	ccres	2359	373	798	4380	65175	0.366	0.366
base	rhfs1	ptac2		2359	373	798	4380	65175	0.366	0.366
base	rhfs1	ptac2	oactm	2360	374	798	4380	65175	0.366	0.366
base	rhfs1	ptac2	oacen	2359	373	798	4380	65175	0.366	0.366
base	rhfs1	ptac2		2359	373	798	4380	65175	0.366	0.366
base	rhfs1	ptac2	oa_05	2022	144	679	4380	65175	0.245	0.245
base	rhfs1	ptac2	oa_10	2107	201	681	4380	65175	0.247	0.247
base	rhfs1	ptac2	oa_15	2192	259	713	4380	65175	0.28	0.28
base	rhfs1	ptac2	oa_20	2276	316	755	4380	65175	0.322	0.322
base	rhfs1	ptac2		2359	373	798	4380	65175	0.366	0.366
base	rhfs1	ptac2	oa_30	2442	429	840	4380	65175	0.409	0.409
base	rhfs1	ptac2		2359	373	798	4380	65175	0.366	0.366
base	rhfs1	ptac2	siz11	2383	375	809	4380	71674	0.376	0.376
base	rhfs1	ptac2	siz13	2423	378	821	4380	84692	0.394	0.394
base	rhfs1	ptac2	siz15	2459	380	829	4380	97734	0.41	0.41
base	rhfs1	ptac2	sizco	2359	373	798	4380	65175	0.366	0.366
base	rhfs1	ptac2	mst08	2492	588	829	4380	31191	0.412	0.412
base	rhfs1	ptac2	mst10	2464	548	823	4380	35866	0.404	0.404
base	rhfs1	ptac2	mst12	2430	499	815	4380	42172	0.393	0.393
base	rhfs1	ptac2	mst14	2394	440	803	4380	51209	0.38	0.38
base	rhfs1	ptac2		2359	373	798	4380	65175	0.366	0.366
base	rhfs1	ptac2	mst18	2273	287	771	4380	89588	0.353	0.353
base	rhfs1	ptac2	prclh	2403	389	792	4742	65175	0.364	0.364
base	rhfs1	ptac2	prc2h	2437	400	788	5092	65175	0.362	0.362
base	rhfs1	ptac2	prc3h	2464	406	784	5431	65175	0.36	0.36
base	rhfs1	ptac2	fspr1	2304	354	784	4380	65175	0.352	0.352
base	rhfs1	ptac2		2359	373	798	4380	65175	0.366	0.366
base	rhfs1	ptac2	fspr3	2414	392	811	4380	65175	0.38	0.38
base	rhfs1	ptac2	fspr4	2469	411	825	4380	65175	0.394	0.394
base	rhfs1	ptac2	fspr5	2522	429	838	4380	65175	0.407	0.407

THAI RETAIL BLDG PROTOTYPE Bangkok 85

	Cooling Load (MW)	Latent Cooling (MW)	Peak Cooling (kW)	Hours	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base rhfs1 ptac2 varsp	2359	373	798	4380	65175	0.366	0.366
base rhfs1 ptac2	2359	373	798	4380	65175	0.366	0.366
base rhfs1 ptac2 cench tower cop40	2359	373	798	4380	65175	0.366	0.458
base rhfs1 ptac2 cench tower cop45	2359	373	798	4380	65175	0.366	0.457
base rhfs1 ptac2 cench tower cop50	2359	373	798	4380	65175	0.366	0.439
base rhfs1 ptac2 cench tower cop55	2359	373	798	4380	65175	0.366	0.433
base rhfs1 ptac2 nrch1	2359	373	798	4380	65175	0.366	0.366
base rhfs1 ptac2 nrch3	2359	373	798	4380	65175	0.366	0.366
base rhfs1 ptac2 nrch4	2359	373	798	4380	65175	0.366	0.366

RHFS Only:

base rhfs1 rhfs2	2792	375	854	4380	65175	0.852	0.852
base rhfs1 rhfs2 cccrm	2434	272	818	4380	65175	0.824	0.824
base rhfs1 rhfs2 ccres	2792	375	854	4380	65175	0.852	0.852
base rhfs1 rhfs2	2792	375	854	4380	65175	0.852	0.852
base rhfs1 rhfs2 oactm	2792	375	854	4380	65175	0.852	0.852
base rhfs1 rhfs2 oacen	2792	375	854	4380	65175	0.852	0.852
base rhfs1 rhfs2	2792	375	854	4380	65175	0.852	0.852
base rhfs1 rhfs2 oa_05	2439	146	732	4380	65175	0.739	0.739
base rhfs1 rhfs2 oa_10	2528	204	734	4380	65175	0.739	0.739
base rhfs1 rhfs2 oa_15	2617	261	770	4380	65175	0.771	0.771
base rhfs1 rhfs2 oa_20	2705	318	811	4380	65175	0.812	0.812
base rhfs1 rhfs2 oa_30	2879	432	898	4380	65175	0.891	0.891
base rhfs1 rhfs2	2792	375	854	4380	65175	0.852	0.852
base rhfs1 rhfs2 siz11	2877	377	875	4380	71674	0.876	0.876
base rhfs1 rhfs2 siz13	3029	381	932	4380	84692	0.92	0.92
base rhfs1 rhfs2 siz15	2792	375	854	4380	65175	0.852	0.852
base rhfs1 rhfs2 sizco	2792	375	854	4380	65175	0.852	0.852

THAI RETAIL BLDG PROTOTYPE Bangkok 85

	Cooling Load (MW)	Latent Cooling (MW)	Peak Cooling (kW)	Hours Cooling	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base rhfs1 rhfs2 mst08	2937	593	945	4380	31191	0.868	0.868
base rhfs1 rhfs2 mst10	2898	553	927	4380	35866	0.864	0.864
base rhfs1 rhfs2 mst12	2852	502	905	4380	42172	0.859	0.859
base rhfs1 rhfs2 mst14	2816	443	879	4380	51209	0.853	0.853
base rhfs1 rhfs2	2792	375	854	4380	65175	0.852	0.852
base rhfs1 rhfs2 mst18	2773	295	837	4380	89588	0.84	0.84
VAVS:							
base vavs1 ptac2	2331	381	792	4380	68340	0.358	0.358
base vavs1 ptac2 ccwrm	2324	378	792	4380	68340	0.358	0.358
base vavs1 ptac2 ccres	2331	381	792	4380	68340	0.358	0.358
base vavs1 ptac2 oactm	2331	381	792	4380	68340	0.358	0.358
base vavs1 ptac2 oacen	2331	381	792	4380	68340	0.358	0.358
base vavs1 ptac2 oa_05	2000	145	667	4380	68340	0.23	0.23
base vavs1 ptac2 oa_10	2083	204	674	4380	68340	0.238	0.238
base vavs1 ptac2 oa_15	2166	264	713	4380	68340	0.278	0.278
base vavs1 ptac2 oa_20	2249	323	752	4380	68340	0.317	0.317
base vavs1 ptac2 oa_30	2412	439	834	4380	68340	0.401	0.401
base vavs1 ptac2 siz11	2342	385	799	4380	75160	0.362	0.362
base vavs1 ptac2 siz13	2363	392	806	4380	88820	0.368	0.368
base vavs1 ptac2 siz15	2389	397	811	4380	102470	0.376	0.376
base vavs1 ptac2 sizco	2331	381	792	4380	68340	0.358	0.358
base vavs1 ptac2 mst08	2603	619	861	4380	40219	0.458	0.458
base vavs1 ptac2 mst10	2532	572	841	4380	44091	0.429	0.429
base vavs1 ptac2 mst12	2459	518	821	4380	49303	0.402	0.402
base vavs1 ptac2 mst14	2395	454	805	4380	56779	0.382	0.382
base vavs1 ptac2 mst18	2207	291	760	4380	89772	0.339	0.339
base vavs1 ptac2 fcd1s	2372	396	802	4380	68340	0.368	0.368
base vavs1 ptac2	2331	381	792	4380	68340	0.358	0.358

THAI RETAIL BLDG PROTOTYPE Bangkok 85

		Cooling Load (MW)	Latent Cooling (MW)	Peak Cooling (kW)	Hours	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base	vavs1 ptac2 fcsdpd	2312	374	789	4380	68340	0.355	0.355
base	vavs1 ptac2 fspr1	2289	364	781	4380	68340	0.347	0.347
base	vavs1 ptac2 fspr3	2372	397	803	4380	68340	0.369	0.369
base	vavs1 ptac2 fspr4	2413	414	814	4380	68340	0.381	0.381
base	vavs1 ptac2 fspr5	2454	429	826	4380	68340	0.392	0.392
base	vavs1 ptac2 fspr6	2495	445	837	4380	68340	0.404	0.404
base	vavs1 ptac2 fspr7	2534	460	848	4380	68340	0.415	0.415
base	vavs1 ptac2 fspr8	2574	474	859	4380	68340	0.427	0.427
base	vavs1 ptac2 fspr9	2613	488	870	4380	68340	0.438	0.438
base	vavs1 ptac2 feff3	2358	392	799	4380	68340	0.365	0.365
base	vavs1 ptac2 feff5	2314	374	788	4380	68340	0.354	0.354
base	vavs1 ptac2 feff6	2303	370	785	4380	68340	0.351	0.351
base	vavs1 ptac2 feff7	2295	366	783	4380	68340	0.349	0.349
base	vavs1 ptac2 nrch1	2331	381	792	4380	68340	0.358	0.358
base	vavs1 ptac2 nrch3	2331	381	792	4380	68340	0.358	0.358
base	vavs1 ptac2 nrch4	2331	381	792	4380	68340	0.358	0.358
base	vavs1 ptac2 varsp	2331	381	792	4380	68340	0.358	0.358
base	vavs1 ptac2 tower twb25	2331	381	792	4380	68340	0.358	0.462
base	vavs1 ptac2 tower twb26	2331	381	792	4380	68340	0.358	0.462
base	vavs1 ptac2 tower twb27	2331	381	792	4380	68340	0.358	0.462
base	vavs1 ptac2 tower twb28	2331	381	792	4380	68340	0.358	0.462
base	vavs1 ptac2 tower twb28	2331	381	792	4380	68340	0.358	0.462
base	vavs1 ptac2 tower twb30	2331	381	792	4380	68340	0.358	0.462
base	vavs1 ptac2 tower tf2sp	2331	381	792	4380	68340	0.358	0.462
base	vavs1 ptac2 cench tower twb29	2331	381	792	4380	68340	0.358	0.447
base	vavs1 ptac2 cench tower twb29	2331	381	792	4380	68340	0.358	0.437
base	vavs1 ptac2 cench tower twb29	2331	381	792	4380	68340	0.358	0.43
base	vavs1 ptac2 cench tower twb29	2331	381	792	4380	68340	0.358	0.423

VAVS ONLY:

THAI RETAIL BLDG PROTOTYPE Bangkok 85

	Cooling Load (MMh)	Latent Cooling (MMh)	Peak Cooling (kW)	Hours	Fan Capacity (Lit/sec)	Chiller Capacity (MW)	Tower Capacity (MW)
base vavs1 vavs2	2461	384	805	4380	68340	0.811	0.811
base vavs1 vavs2 fcd1s	2587	402	830	4380	68340	0.837	0.87
base vavs1 vavs2 fcspd	2395	375	800	4380	68340	0.805	0.805
base vavs1 vavs2 ccwrm	2415	373	806	4380	68340	0.812	0.812
base vavs1 vavs2 ccres	2461	384	805	4380	68340	0.811	0.811
base vavs1 vavs2 mst08	2727	623	869	4380	40219	0.866	0.866
base vavs1 vavs2 mst10	2655	575	851	4380	44091	0.85	0.85
base vavs1 vavs2 mst12	2582	520	830	4380	49303	0.837	0.837
base vavs1 vavs2 mst14	2517	457	818	4380	56779	0.825	0.825
base vavs1 vavs2 mst18	2423	302	799	4380	89772	0.804	0.804
base vavs1 vavs2 ccwrm mst08	2466	488	849	4380	40219	0.856	0.856
base vavs1 vavs2 ccwrm mst10	2466	480	842	4380	44091	0.852	0.852
base vavs1 vavs2 ccwrm mst12	2465	467	832	4380	49303	0.839	0.839
base vavs1 vavs2 ccwrm mst14	2450	434	819	4380	56779	0.826	0.826
base vavs1 vavs2 ccwrm mst18	2386	293	800	4380	89772	0.805	0.805
base vavs1 vavs2 oactm	2461	385	805	4380	68340	0.811	0.811
base vavs1 vavs2 oacen	2461	384	805	4380	68340	0.811	0.811
base vavs1 vavs2 oa_05	2127	147	683	4380	68340	0.651	0.651
base vavs1 vavs2 oa_10	2211	207	688	4380	68340	0.692	0.692
base vavs1 vavs2 oa_15	2295	266	728	4380	68340	0.732	0.732
base vavs1 vavs2 oa_20	2378	325	767	4380	68340	0.772	0.772
base vavs1 vavs2 oa_30	2543	442	847	4380	68340	0.851	0.851
base vavs1 vavs2 siz11	2497	369	810	4380	75160	0.816	0.816
base vavs1 vavs2 siz13	2585	396	818	4380	88820	0.824	0.824
base vavs1 vavs2 siz15	2694	400	840	4380	102470	0.833	0.833
base vavs1 vavs2 sizco	2461	384	805	4380	68340	0.811	0.811

THERMAL STORAGE:

base rhfs1 rhfs2 tspar	2792	375	854	4380	65175	0.82	4.688
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THAI RETAIL BLDG PROTOTYPE		Bangk 85						
		Cooling Load		Latent	Peak	Hours	Fan	Tower
		(MWh)		(MWh)	Cooling (kW)	Cooling Capacity	Capacity (Lit/sec)	Capacity (MW)
GAS COOLING:								
base	rhfs1 rhfs2 engch	2792	375	375	854	4380	65175	0.852
base	rhfs1 rhfs2 abgch	2792	375	375	854	4380	65175	1.709

THAI RETAIL BLDG PROTOTYPE Bangkok

	Cooling		Fans & Pumps		Lights (MWh)	Elev. (MWh)	Equip. (MWh)	Total Energy (MWh)	Peak Elec. (kW)	Peak Time (M/D/H)	Energy Cost (\$)	Demand Cost (\$)	Total Cost (\$)	Run Date	Run File
	(MWh)	(MWh)	(MWh)	(MWh)											
base rhfs1 ptac2	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs1		
base rhfs1 ptac2 ccwrm	926	110	1516	68	117	2738	840	4/12/14	136883	88168	225052	20-Sep-89	retrhfs1		
base rhfs1 ptac2 ccres	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs1		
base rhfs1 ptac2	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs1		
base rhfs1 ptac2 oactm	958	110	1516	68	117	2770	843	4/12/14	138489	88571	227060	20-Sep-89	retrhfs1		
base rhfs1 ptac2 oacen	958	110	1516	68	117	2770	843	4/12/14	138480	88571	227051	20-Sep-89	retrhfs1		
base rhfs1 ptac2	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs1		
base rhfs1 ptac2 oa_05	843	105	1516	68	117	2649	793	4/12/14	132438	83814	216253	20-Sep-89	retrhfs1		
base rhfs1 ptac2 oa_10	863	105	1516	68	117	2669	801	4/12/14	133440	84608	218049	20-Sep-89	retrhfs1		
base rhfs1 ptac2 oa_15	894	106	1516	68	117	2702	814	4/12/14	135087	85824	220911	20-Sep-89	retrhfs1		
base rhfs1 ptac2 oa_20	927	108	1516	68	117	2736	828	4/12/14	136813	87189	224003	20-Sep-89	retrhfs1		
base rhfs1 ptac2	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs1		
base rhfs1 ptac2 oa_30	992	113	1516	68	117	2805	857	4/12/14	140260	89943	230204	20-Sep-89	retrhfs1		
base rhfs1 ptac2	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs1		
base rhfs1 ptac2 siz11	978	118	1516	68	117	2797	853	4/12/14	139824	89355	229180	20-Sep-89	retrhfs1		
base rhfs1 ptac2 siz13	1015	133	1516	68	117	2849	866	4/12/14	142450	90714	233165	20-Sep-89	retrhfs1		
base rhfs1 ptac2 siz15	1051	148	1516	68	117	2900	879	4/12/14	145007	92020	237027	9-Oct-89	retrhfs1		
base rhfs1 ptac2 sizco	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs1		
base rhfs1 ptac2 mst08	1013	64	1516	68	117	2777	851	4/12/14	138862	89068	227931	20-Sep-89	retrhfs1		
base rhfs1 ptac2 mst10	1004	70	1516	68	117	2774	850	4/12/14	138719	88950	227670	20-Sep-89	retrhfs1		
base rhfs1 ptac2 mst12	992	78	1516	68	117	2771	848	4/12/14	138551	88801	227353	20-Sep-89	retrhfs1		
base rhfs1 ptac2 mst14	977	91	1516	68	117	2769	844	4/12/14	138464	88602	227066	20-Sep-89	retrhfs1		
base rhfs1 ptac2	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs1		
base rhfs1 ptac2 mst18	913	155	1516	68	117	2769	811	4/12/14	138464	86478	224943	20-Sep-89	retrhfs1		
base rhfs1 ptac2 prc1h	984	118	1516	68	117	2803	839	4/12/14	140148	88178	228326	Sep-89	retrhfs2		
base rhfs1 ptac2 prc2h	1004	125	1516	68	117	2830	836	4/12/14	141515	87877	229392	Sep-89	retrhfs2		
base rhfs1 ptac2 prc3h	1021	132	1516	68	117	2854	833	4/12/14	142708	87636	230344	Sep-89	retrhfs2		
base rhfs1 ptac2 fspr1	939	74	1516	68	117	2715	829	4/12/14	135723	87123	222847	Sep-89	retrhfs2		
base rhfs1 ptac2	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs1		
base rhfs1 ptac2 fspr3	977	147	1516	68	117	2825	856	4/12/14	141244	90011	231255	Sep-89	retrhfs2		
base rhfs1 ptac2 fspr4	995	183	1516	68	117	2880	870	4/12/14	143990	91444	235435	Sep-89	retrhfs2		
base rhfs1 ptac2 fspr5	1013	220	1516	68	117	2934	883	4/12/14	146717	92869	239587	Sep-89	retrhfs2		

THAI RETAIL BLDG PROTOTYPE

	Cooling			Fans &		Lights	Elev.	Equip.	Total Energy	Peak Elec.	Peak Time	Energy Cost	Demand		Total Cost	Run Date	Run File
	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)								(MWh)	(MWh)			
base	rhfs1	ptac2	fspr6	1031	256	1516	68	117	2989	897	4/12/14	149446	94288	243734	Sep-89	retrhfs2	
base	rhfs1	ptac2	fspr7	1050	293	1516	68	117	3043	910	4/12/14	152173	95704	247878	Sep-89	retrhfs2	
base	rhfs1	ptac2	fspr8	1067	329	1516	68	117	3098	923	4/12/14	154891	97116	252008	Sep-89	retrhfs2	
base	rhfs1	ptac2	fspr9	1085	366	1516	68	117	3152	936	4/12/14	157607	99522	256129	Sep-89	retrhfs2	
base	rhfs1	ptac2	feff3	971	135	1516	68	117	2806	852	4/12/14	140317	89532	229849	Sep-89	retrhfs2	
base	rhfs1	ptac2		958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs1	
base	rhfs1	ptac2	feff5	951	96	1516	68	117	2748	837	4/12/14	137378	87993	225372	Sep-89	retrhfs2	
base	rhfs1	ptac2	feff6	946	86	1516	68	117	2733	834	4/12/14	136642	87606	224249	Sep-89	retrhfs2	
base	rhfs1	ptac2	feff7	942	79	1516	68	117	2722	831	4/12/14	136115	87330	223446	Sep-89	retrhfs2	
base	rhfs1	ptac2	nvcsd	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	958	110	1516	68	117	2770	841	4/12/14	138489	88555	227045	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	976	113	1516	68	117	2790	851	4/12/14	139511	89376	226887	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	989	116	1516	68	117	2807	858	4/12/14	140323	90103	230427	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	1023	130	1516	68	117	2854	868	4/12/14	142696	91026	233722	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	1002	120	1516	68	117	2823	858	4/12/14	141170	90088	231258	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	980	115	1516	68	117	2796	851	4/12/14	139804	89375	229180	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	960	111	1516	68	117	2772	843	4/12/14	138596	88571	227167	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	nvcsd	961	111	1516	68	117	2773	843	4/12/14	138658	88570	227229	20-Sep-89	retrhfs3	
base	rhfs1	ptac2	cop42	896	110	1516	68	117	2708	822	4/12/14	135371	86529	221901	20-Sep-89	retrhfs4	
base	rhfs1	ptac2	tower	958	110	1516	68	117	2769	832	5/ 6/14	138468	88084	226552	20-Sep-89	retrhfs4	
base	rhfs1	ptac2	tower	958	110	1516	68	117	2769	832	5/ 6/14	138471	88102	226573	20-Sep-89	retrhfs4	
base	rhfs1	ptac2	tower	958	110	1516	68	117	2770	832	5/ 6/14	138478	88120	226598	20-Sep-89	retrhfs4	
base	rhfs1	ptac2	tower	958	110	1516	68	117	2770	833	5/ 6/14	138486	88137	226624	20-Sep-89	retrhfs4	
base	rhfs1	ptac2	tower	958	110	1516	68	117	2769	831	5/ 6/14	138468	88065	226534	20-Sep-89	retrhfs4	
base	rhfs1	ptac2	tower	959	110	1516	68	117	2770	833	5/ 6/14	138501	88166	226668	20-Sep-89	retrhfs4	
base	rhfs1	ptac2	tower	957	110	1516	68	117	2768	831	5/ 6/14	138411	88065	226476	20-Sep-89	retrhfs4	

THAI RETAIL BLDG PROTOTYPE Bangkok

	Fans &	Cooling	Pumps	Lights	Elev.	Equip.	Total	Peak	Energy	Demand	Total	Run Date	Run File
	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(kW)	Cost	Cost	(\$)		
base rhfs1 ptac2 varsp	955	105	1516	68	117	2761	842	4/12/14	138049	88466	226516	20-Sep-89	retrrhfs4
base rhfs1 ptac2	958	110	1516	68	117	2770	843	4/12/14	138481	88571	227052	20-Sep-89	retrrhfs1
base rhfs1 ptac2 cench tower cop40	880	110	1516	68	117	2691	814	5/ 6/14	134555	85851	220407	9-Oct-89	retrrhfs4
base rhfs1 ptac2 cench tower cop45	851	110	1516	68	117	2663	804	5/ 6/14	133137	84927	218064	20-Sep-89	retrrhfs4
base rhfs1 ptac2 cench tower cop50	829	110	1516	68	117	2640	796	5/ 6/14	132011	84195	216207	20-Sep-89	retrrhfs4
base rhfs1 ptac2 cench tower cop55	811	110	1516	68	117	2622	789	5/ 6/14	131100	83602	214703	9-Oct-89	retrrhfs4
base rhfs1 ptac2 nrch1	973	110	1516	68	117	2784	843	4/12/14	139208	88571	227780	20-Sep-89	retrrhfs4
base rhfs1 ptac2 nrch3	954	110	1516	68	117	2766	843	4/12/14	138282	88571	226853	20-Sep-89	retrrhfs4
base rhfs1 ptac2 nrch4	943	110	1516	68	117	2755	843	4/12/14	137748	88569	226318	20-Sep-89	retrrhfs4
RHFS Only:													
base rhfs1 rhfs2	995	396	1516	68	117	3092	882	4/12/14	154619	93890	248509	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 ccwrm	888	395	1516	68	117	2983	873	4/12/14	149167	92598	241765	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 ccras	995	396	1516	68	117	3092	882	4/12/14	154619	93890	248509	29-Sep-89	retrrhfs5
base rhfs1 rhfs2	995	396	1516	68	117	3092	882	4/12/14	154619	93890	248509	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 oactm	995	396	1516	68	117	3092	882	4/12/14	154619	93890	248509	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 oacen	995	396	1516	68	117	3092	882	4/12/14	154619	93890	248509	29-Sep-89	retrrhfs5
base rhfs1 rhfs2	995	396	1516	68	117	3092	882	4/12/14	154619	93890	248509	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 oa_05	872	391	1516	68	117	2963	838	4/12/14	148162	89260	237423	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 oa_10	891	391	1516	68	117	2982	841	4/12/14	149115	89934	239050	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 oa_15	924	392	1516	68	117	3017	853	4/12/14	150857	91162	242020	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 oa_20	960	394	1516	68	117	3055	868	4/12/14	152764	92530	245294	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 oa_30	1030	398	1516	68	117	3129	897	4/12/14	156434	95248	251682	29-Sep-89	retrrhfs5
base rhfs1 rhfs2	995	396	1516	68	117	3092	882	4/12/14	154619	93890	248509	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 siz11	1025	433	1516	68	117	3158	899	4/12/14	157922	95691	253614	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 siz13	1078	506	1516	68	117	3285	931	4/12/14	164232	99130	263362	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 siz15	995	396	1516	68	117	3092	882	4/12/14	154619	93890	248509	29-Sep-89	retrrhfs5
base rhfs1 rhfs2 siz20	995	396	1516	68	117	3092	882	4/12/14	154619	93890	248509	29-Sep-89	retrrhfs5

THAI RETAIL BLDG PROTOTYPE Bangkok

	Fans &			Total Energy (MWh)	Peak Elec. (kW)	Peak Time (M/D/H)	Energy Cost (\$)	Demand Cost (\$)	Total Cost (\$)	Run Date	Run File
	Cooling (MWh)	Pumps (MWh)	Lights (MWh)								
base rhfs1 rhfs2 mst08	1036	212	1516	68	117	2948	846 4/12/14	147408	90021	237429	29-Sep-89 retrhfs5
base rhfs1 rhfs2 mst10	1025	237	1516	68	117	2963	850 4/12/14	148154	90446	238600	29-Sep-89 retrhfs5
base rhfs1 rhfs2 mst12	1012	271	1516	68	117	2985	856 4/12/14	149223	91062	240286	29-Sep-89 retrhfs5
base rhfs1 rhfs2 mst14	1002	320	1516	68	117	3023	866 4/12/14	151136	92055	243191	29-Sep-89 retrhfs5
base rhfs1 rhfs2	995	396	1516	68	117	3092	882 4/12/14	154619	93890	248509	29-Sep-89 retrhfs5
base rhfs1 rhfs2 mst18	987	529	1516	68	117	3217	909 4/12/14	160850	96906	257756	29-Sep-89 retrhfs5
VAVS:											
base vavs1 ptac2	951	89	1516	68	117	2740	839 4/12/14	137019	88114	225134	10-Oct-89 retvavs1
base vavs1 ptac2 ccwrm	949	89	1516	68	117	2740	839 4/12/14	136974	88134	225109	10-Oct-89 retvavs1
base vavs1 ptac2 ccres	951	89	1516	68	117	2740	839 4/12/14	137019	88114	225134	10-Oct-89 retvavs1
base vavs1 ptac2 oactm	951	89	1516	68	117	2741	839 4/12/14	137023	88114	225138	10-Oct-89 retvavs1
base vavs1 ptac2 oacen	951	89	1516	68	117	2740	839 4/12/14	137018	88114	225132	10-Oct-89 retvavs1
base vavs1 ptac2 oa_05	833	82	1516	68	117	2617	788 4/12/14	130844	83288	214133	10-Oct-89 retvavs1
base vavs1 ptac2 oa_10	855	83	1516	68	117	2639	797 4/12/14	131952	84137	216090	10-Oct-89 retvavs1
base vavs1 ptac2 oa_15	887	85	1516	68	117	2673	812 4/12/14	133664	85466	219131	10-Oct-89 retvavs1
base vavs1 ptac2 oa_20	919	87	1516	68	117	2707	825 4/12/14	135325	86782	222107	10-Oct-89 retvavs1
base vavs1 ptac2 oa_30	984	91	1516	68	117	2776	854 4/12/14	138778	89484	228262	10-Oct-89 retvavs1
base vavs1 ptac2 siz11	966	91	1516	68	117	2758	846 4/12/14	137884	88624	226509	10-Oct-89 retvavs1
base vavs1 ptac2 siz13	995	96	1516	68	117	2792	855 4/12/14	139607	89459	229066	10-Oct-89 retvavs1
base vavs1 ptac2 siz15	1025	104	1516	68	117	2830	863 4/12/14	141500	90307	231807	10-Oct-89 retvavs1
base vavs1 ptac2 sizco	951	89	1516	68	117	2740	839 4/12/14	137019	88114	225134	10-Oct-89 retvavs1
base vavs1 ptac2 mst08	1050	71	1516	68	117	2822	864 4/12/14	141081	90358	231439	10-Oct-89 retvavs1
base vavs1 ptac2 mst10	1027	72	1516	68	117	2799	857 4/12/14	139969	89684	229653	10-Oct-89 retvavs1
base vavs1 ptac2 mst12	1002	74	1516	68	117	2777	852 4/12/14	138851	89108	227960	10-Oct-89 retvavs1
base vavs1 ptac2 mst14	979	80	1516	68	117	2760	844 4/12/14	137991	88611	226603	10-Oct-89 retvavs1
base vavs1 ptac2 mst18	892	120	1516	68	117	2713	806 4/12/14	135629	85594	221223	10-Oct-89 retvavs1
base vavs1 ptac2 fcdis	964	115	1516	68	117	2781	848 4/12/14	139023	89117	228141	10-Oct-89 retvavs1
base vavs1 ptac2	951	89	1516	68	117	2740	839 4/12/14	137019	88114	225134	10-Oct-89 retvavs1

THAI RETAIL BLDG PROTOTYPE Bangkok

	Cooling			Fans & Pumps			Elev. (MWh)	Equip. (MWh)	Total Energy (MWh)	Peak Elec. (kW)	Peak Time (M/D/H)	Energy Cost (\$)	Demand Cost (\$)	Total Cost (\$)	Run Date	Run File
	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)										
base vavs1 ptac2 fcsdpd	945	77	1516	68	117	2723	837	4/12/14	136140	87810	223950	10-Oct-89	retvavs1			
base vavs1 ptac2 fspr1	936	63	1516	68	117	2701	828	4/12/14	135030	86993	222024	10-Oct-89	retvavs2			
base vavs1 ptac2 fspr3	965	114	1516	68	117	2780	850	4/12/14	138987	89227	228215	10-Oct-89	retvavs2			
base vavs1 ptac2 fspr4	979	139	1516	68	117	2820	861	4/12/14	140973	90354	231327	10-Oct-89	retvavs2			
base vavs1 ptac2 fspr5	993	165	1516	68	117	2859	873	4/12/14	142954	91475	234430	10-Oct-89	retvavs2			
base vavs1 ptac2 fspr6	1007	190	1516	68	117	2899	883	4/12/14	144922	92590	237512	10-Oct-89	retvavs2			
base vavs1 ptac2 fspr7	1021	216	1516	68	117	2938	894	4/12/14	146892	93697	240589	10-Oct-89	retvavs2			
base vavs1 ptac2 fspr8	1035	241	1516	68	117	2977	905	4/12/14	148846	94799	243646	10-Oct-89	retvavs2			
base vavs1 ptac2 fspr9	1048	266	1516	68	117	3016	916	4/12/14	150793	95895	246688	10-Oct-89	retvavs2			
base vavs1 ptac2 feff3	960	106	1516	68	117	2767	847	4/12/14	138336	88857	227194	10-Oct-89	retvavs2			
base vavs1 ptac2 feff5	945	79	1516	68	117	2725	835	4/12/14	136223	87666	223890	10-Oct-89	retvavs2			
base vavs1 ptac2 feff6	941	72	1516	68	117	2714	832	4/12/14	135693	87368	223061	10-Oct-89	retvavs2			
base vavs1 ptac2 feff7	938	67	1516	68	117	2706	830	4/12/14	135315	87154	222469	10-Oct-89	retvavs2			
base vavs1 ptac2 nrch1	965	89	1516	68	117	2755	839	4/12/14	137755	88114	225870	11-Oct-89	retvavs3			
base vavs1 ptac2 nrch3	945	89	1516	68	117	2735	839	4/12/14	136730	88114	224844	11-Oct-89	retvavs3			
base vavs1 ptac2 nrch4	935	89	1516	68	117	2725	839	4/12/14	136258	88108	224367	11-Oct-89	retvavs3			
base vavs1 ptac2 varsp	948	83	1516	68	117	2732	839	4/12/14	136581	88017	224599	11-Oct-89	retvavs3			
base vavs1 ptac2 tower tub25	950	89	1516	68	117	2740	829	5/ 6/14	136984	87657	224641	11-Oct-89	retvavs3			
base vavs1 ptac2 tower tub26	950	89	1516	68	117	2740	829	5/ 6/14	136983	87673	224662	11-Oct-89	retvavs3			
base vavs1 ptac2 tower tub27	950	89	1516	68	117	2740	829	5/ 6/14	136993	87690	224683	11-Oct-89	retvavs3			
base vavs1 ptac2 tower tub28	950	89	1516	68	117	2740	829	5/ 6/14	136999	87705	224705	11-Oct-89	retvavs3			
base vavs1 ptac2 tower tub28	950	89	1516	68	117	2740	829	5/ 6/14	136999	87705	224705	11-Oct-89	retvavs3			
base vavs1 ptac2 tower tub30	951	89	1516	68	117	2740	829	5/ 6/14	137014	87732	224746	11-Oct-89	retvavs3			
base vavs1 ptac2 tower tf2sp	948	89	1516	68	117	2738	829	5/ 6/14	136884	87640	224524	11-Oct-89	retvavs3			
base vavs1 ptac2 cench tower tub29	874	89	1516	68	117	2664	810	5/ 6/14	133175	85523	218698	11-Oct-89	retvavs3			
base vavs1 ptac2 cench tower tub29	847	89	1516	68	117	2636	800	5/ 6/14	131819	84585	216405	11-Oct-89	retvavs3			
base vavs1 ptac2 cench tower tub29	825	89	1516	68	117	2615	791	5/ 6/14	130755	83854	214610	11-Oct-89	retvavs3			
base vavs1 ptac2 cench tower tub29	808	89	1516	68	117	2598	785	5/ 6/14	129885	83258	213143	11-Oct-89	retvavs3			

VAVS ONLY:

Bangk

THERMAL STORAGE:

14-Mar-90 rettes1

THAI RETAIL BLDG PROTOTYPE				Bangk		Fans &		Total		Peak		Energy		Demand		Total		Run Date		Pun File	
		Cooling		Pumps		Lights		Elev.		Equip.		Elec.		Time		Cost		Cost		(\$)	
		(MWh)		(MWh)		(MWh)		(MWh)		(MWh)		(kWh)		(M/D/H)		(\$)		(\$)			
GAS COOLING:																					
base	rhfs1	rhfs2	engch	20	396	1516	68	117	4018	586	1/31/14	122065	64444	186509	20-Mar-90	retrhfs6					
base	rhfs1	rhfs2	abgch	191	396	1516	68	117	5078	625	1/31/14	138202	68734	206937	20-Mar-90	retrhfs6					

THAI RETAIL BLDG		PROTOTYPE	Bangkok	Total Energy kWh/m2/yr	Peak Demand (W/m2)	Total Energy Cost (\$/m2)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base	rhfs1	ptac2		344	105	28.16			
base	rhfs1	ptac2	ccrm	340	104	27.92	1.2%	0.4%	0.9%
base	rhfs1	ptac2	ccres	344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1	ptac2		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1	ptac2	oactm	344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1	ptac2	oacen	344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1	ptac2	oa_05	329	98	26.82	4.4%	5.9%	4.8%
base	rhfs1	ptac2	oa_10	331	99	27.05	3.6%	5.0%	4.0%
base	rhfs1	ptac2	oa_15	335	101	27.40	2.5%	3.4%	2.7%
base	rhfs1	ptac2	oa_20	339	103	27.79	1.2%	1.8%	1.3%
base	rhfs1	ptac2		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1	ptac2	oa_30	348	106	28.55	-1.3%	-1.7%	-1.4%
base	rhfs1	ptac2		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1	ptac2	siz11	347	106	28.43	-1.0%	-1.2%	-0.9%
base	rhfs1	ptac2	siz13	353	107	28.92	-2.9%	-2.7%	-2.7%
base	rhfs1	ptac2	siz15	360	109	29.40	-4.7%	-4.3%	-4.4%
base	rhfs1	ptac2	sizco	344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1	ptac2	mst08	344	106	28.27	-0.3%	-0.9%	-0.4%
base	rhfs1	ptac2	mst10	344	105	28.24	-0.1%	-0.8%	-0.3%
base	rhfs1	ptac2	mst12	344	105	28.20	0.0%	-0.6%	-0.1%
base	rhfs1	ptac2	mst14	343	105	28.16	0.0%	-0.1%	0.0%
base	rhfs1	ptac2		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1	ptac2	mst18	343	101	27.90	0.0%	3.8%	0.9%
base	rhfs1	ptac2	prc1h	348	104	28.32	-1.2%	0.5%	-0.6%
base	rhfs1	ptac2	prc2h	351	104	28.45	-2.2%	0.8%	-1.0%
base	rhfs1	ptac2	prc3h	354	103	28.57	-3.0%	1.2%	-1.4%
base	rhfs1	ptac2	fspr1	337	103	27.64	2.0%	1.7%	1.9%
base	rhfs1	ptac2		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1	ptac2	fspr3	350	106	28.68	-2.0%	-1.5%	-1.9%
base	rhfs1	ptac2	fspr4	357	108	29.20	-4.0%	-3.2%	-3.7%
base	rhfs1	ptac2	fspr5	364	110	29.72	-5.9%	-4.7%	-5.5%

THAI RETAIL BLDG	PROTOTYPE	Bangkok	Total Energy kWh/m ² /yr	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base	rhfs1 ptac2 fspr6		371	111	30.23	-7.9%	-6.4%	-7.3%
base	rhfs1 ptac2 fspr7		377	113	30.75	-9.9%	-7.9%	-9.2%
base	rhfs1 ptac2 fspr8		384	114	31.26	-11.8%	-9.5%	-11.0%
base	rhfs1 ptac2 fspr9		391	116	31.77	-13.8%	-11.0%	-12.8%
base	rhfs1 ptac2 feff3		348	106	28.51	-1.3%	-1.1%	-1.2%
base	rhfs1 ptac2		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1 ptac2 feff5		341	104	27.95	0.8%	0.7%	0.7%
base	rhfs1 ptac2 feff6		339	103	27.82	1.3%	1.1%	1.2%
base	rhfs1 ptac2 feff7		338	103	27.72	1.7%	1.4%	1.6%
base	rhfs1 ptac2 nvcsd nvdt3 nvr10		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1 ptac2 nvcsd nvdt1 nvr10		344	104	28.16	0.0%	0.2%	0.0%
base	rhfs1 ptac2 nvcsd nvdt2 nvr10		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1 ptac2 nvcsd nvdt4 nvr10		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1 ptac2 nvcsd nvdt3 nvr05		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1 ptac2 nvcsd nvdt3 nvr10		346	106	28.39	-0.7%	-0.9%	-0.8%
base	rhfs1 ptac2 nvcsd nvdt3 nvr10		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1 ptac2 nvcsd nvdt3 nvr10		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1 ptac2 nvcsd nvdt3 nvr10		348	106	28.58	-1.3%	-1.8%	-1.5%
base	rhfs1 ptac2 nvcsd nvdt2 nvr10		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1 ptac2 nvcsd nvdt2 nvr10		344	105	28.16	0.0%	0.0%	0.0%
base	rhfs1 ptac2 nvcsd nvdt1 nvr10		354	108	28.99	-3.0%	-3.0%	-2.9%
base	rhfs1 ptac2 nvcsd nvdt2 nvr10		350	106	28.68	-1.9%	-1.8%	-1.9%
base	rhfs1 ptac2 nvcsd nvdt3 nvr10		347	106	28.43	-0.9%	-0.9%	-0.9%
base	rhfs1 ptac2 nvcsd nvdt4 nvr10		344	105	28.18	-0.1%	0.0%	-0.1%
base	rhfs1 ptac2 nvcsd nvdt3 nvr05		344	105	28.19	-0.1%	0.0%	-0.1%
base	rhfs1 ptac2 cop42		336	102	27.52	2.2%	2.5%	2.3%
base	rhfs1 ptac2 tower twb25		343	103	28.10	0.0%	1.3%	0.2%
base	rhfs1 ptac2 tower twb26		343	103	28.10	0.0%	1.3%	0.2%
base	rhfs1 ptac2 tower twb27		344	103	28.11	0.0%	1.3%	0.2%
base	rhfs1 ptac2 tower twb28		344	103	28.11	0.0%	1.2%	0.2%
base	rhfs1 ptac2 tower twb29		343	103	28.10	0.0%	1.4%	0.2%
base	rhfs1 ptac2 tower twb30		344	103	28.12	0.0%	1.2%	0.2%
base	rhfs1 ptac2 tower twb29 tf2sp		343	103	28.09	0.1%	1.4%	0.3%

THAI RETAIL BLDG	PROTOTYPE	BangK	Total Energy kWh/m ² /yr	Peak Demand (W/m ²)	Total Energy Cost (\$/m ²)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base rhfs1 ptac2 varsp			342	104	28.10	0.3%	0.1%	0.2%
base rhfs1 ptac2			344	105	28.16	0.0%	0.0%	0.0%
base rhfs1 ptac2 cench tower cop40			334	101	27.34	2.9%	3.4%	2.9%
base rhfs1 ptac2 cench tower cop45			330	100	27.05	3.9%	4.6%	4.0%
base rhfs1 ptac2 cench tower cop50			327	99	26.82	4.7%	5.6%	4.8%
base rhfs1 ptac2 cench tower cop55			325	98	26.63	5.3%	6.4%	5.4%
base rhfs1 ptac2 nrch1			345	105	28.25	-0.5%	0.0%	-0.3%
base rhfs1 ptac2 nrch3			343	105	28.14	0.1%	0.0%	0.1%
base rhfs1 ptac2 nrch4			342	105	28.07	0.5%	0.0%	0.3%
RHFS Only:								
base rhfs1 rhfs2			384	109	30.82			
base rhfs1 rhfs2 ccurm			370	108	29.99	-7.7%	-3.6%	-6.5%
base rhfs1 rhfs2 ccren			384	109	30.82	-11.6%	-4.6%	-9.5%
base rhfs1 rhfs2			384	109	30.82	-11.6%	-4.6%	-9.5%
base rhfs1 rhfs2 oactm			384	109	30.82	-11.6%	-4.6%	-9.5%
base rhfs1 rhfs2 oacen			384	109	30.82	-11.6%	-4.6%	-9.5%
base rhfs1 rhfs2			384	109	30.82	-11.6%	-4.6%	-9.5%
base rhfs1 rhfs2 oa_05			368	104	29.45	-7.0%	0.6%	-4.6%
base rhfs1 rhfs2 oa_10			370	104	29.65	-7.7%	0.2%	-5.3%
base rhfs1 rhfs2 oa_15			374	106	30.02	-8.9%	-1.2%	-6.6%
base rhfs1 rhfs2 oa_20			379	108	30.43	-10.3%	-3.0%	-8.0%
base rhfs1 rhfs2 oa_30			388	111	31.22	-13.0%	-6.4%	-10.8%
base rhfs1 rhfs2			384	109	30.82	-11.6%	-4.6%	-9.5%
base rhfs1 rhfs2 siz11			392	112	31.46	-14.0%	-6.6%	-11.7%
base rhfs1 rhfs2 siz13			407	115	32.67	-18.6%	-10.4%	-16.0%
base rhfs1 rhfs2 siz15			384	109	30.82	-11.6%	-4.6%	-9.5%
base rhfs1 rhfs2 sizco			384	109	30.82	-11.6%	-4.6%	-9.5%

THAI RETAIL BLDG PROTOTYPE Bangkok

	Total Energy kWh/m2/yr	Peak Demand (W/m2)	Total Energy Cost (\$/m2)	Total Energy Savings (%)	Peak Demand Savings (%)	Total Cost Savings (%)
base rhfs1 rhfs2 mst08	366	105	29.45	-6.4%	-0.4%	-4.6%
base rhfs1 rhfs2 mst10	368	105	29.60	-7.0%	-0.8%	-5.1%
base rhfs1 rhfs2 mst12	370	106	29.80	-7.8%	-1.5%	-5.8%
base rhfs1 rhfs2 mst14	375	107	30.17	-9.1%	-2.7%	-7.1%
base rhfs1 rhfs2	384	109	30.82	-11.6%	-4.6%	-9.5%
base rhfs1 rhfs2 mst18	399	113	31.97	-16.1%	-7.8%	-13.5%
VAVS:						
base vavs1 ptac2	340	104	27.93	1.1%	0.5%	0.8%
base vavs1 ptac2 ccwrm	340	104	27.92	1.1%	0.5%	0.9%
base vavs1 ptac2 ccres	340	104	27.93	1.1%	0.5%	0.8%
base vavs1 ptac2 oactm	340	104	27.93	1.0%	0.5%	0.8%
base vavs1 ptac2 oacen	340	104	27.93	1.1%	0.5%	0.8%
base vavs1 ptac2 oa_05	325	98	26.56	5.5%	6.5%	5.7%
base vavs1 ptac2 oa_10	327	99	26.80	4.7%	5.5%	4.8%
base vavs1 ptac2 oa_15	332	101	27.18	3.5%	3.7%	3.5%
base vavs1 ptac2 oa_20	336	102	27.55	2.3%	2.1%	2.2%
base vavs1 ptac2 oa_30	344	106	28.31	-0.2%	-1.3%	-0.5%
base vavs1 ptac2 siz11	342	105	28.10	0.4%	-0.4%	0.2%
base vavs1 ptac2 siz13	346	106	28.41	-0.8%	-1.4%	-0.9%
base vavs1 ptac2 siz15	351	107	28.75	-2.2%	-2.4%	-2.1%
base vavs1 ptac2 sizco	340	104	27.93	1.1%	0.5%	0.8%
base vavs1 ptac2 mst08	350	107	28.71	-1.9%	-2.5%	-1.9%
base vavs1 ptac2 mst10	347	106	28.49	-1.0%	-1.7%	-1.1%
base vavs1 ptac2 mst12	344	106	28.28	-0.3%	-1.1%	-0.4%
base vavs1 ptac2 mst14	342	105	28.11	0.4%	-0.1%	0.2%
base vavs1 ptac2 mst18	337	100	27.44	2.1%	4.4%	2.6%
base vavs1 ptac2 fcds	345	105	28.30	-0.4%	-0.6%	-0.5%
base vavs1 ptac2	340	104	27.93	1.1%	0.5%	0.8%

THAI RETAIL BLDG PROTOTYPE		Bangk		Total		Peak		Total		Total		Peak		Total	
		Energy		Demand		Cost		Savings		Savings		Savings		Savings	
		kWh/m ² /yr		(W/m ²)		(\$/m ²)		(%)		(%)		(%)		(%)	
base	vavs1 ptac2 fcspd	338	104	27.78	1.7%	0.7%	1.4%								
base	vavs1 ptac2 fspr1	335	103	27.54	2.5%	1.8%	2.2%								
base	vavs1 ptac2 fspr3	345	105	28.31	-0.4%	-0.8%	-0.5%								
base	vavs1 ptac2 fspr4	350	107	28.69	-1.8%	-2.1%	-1.9%								
base	vavs1 ptac2 fspr5	355	108	29.08	-3.2%	-3.6%	-3.2%								
base	vavs1 ptac2 fspr6	360	110	29.46	-4.7%	-4.7%	-4.6%								
base	vavs1 ptac2 fspr7	364	111	29.84	-6.1%	-6.0%	-6.0%								
base	vavs1 ptac2 fspr8	369	112	30.22	-7.5%	-7.4%	-7.3%								
base	vavs1 ptac2 fspr9	374	114	30.60	-8.9%	-8.7%	-8.6%								
base	vavs1 ptac2 feff3	343	105	28.18	0.1%	-0.5%	-0.1%								
base	vavs1 ptac2 feff5	338	104	27.77	1.6%	0.9%	1.4%								
base	vavs1 ptac2 feff6	337	103	27.67	2.0%	1.3%	1.8%								
base	vavs1 ptac2 feff7	336	103	27.59	2.3%	1.5%	2.0%								
base	vavs1 ptac2 nrch1	342	104	28.02	0.5%	0.5%	0.5%								
base	vavs1 ptac2 nrch3	339	104	27.89	1.3%	0.5%	1.0%								
base	vavs1 ptac2 nrch4	338	104	27.83	1.6%	0.5%	1.2%								
base	vavs1 ptac2 varsp	339	104	27.86	1.4%	0.5%	1.1%								
base	vavs1 ptac2 twb25	340	103	27.86	1.1%	1.7%	1.1%								
base	vavs1 ptac2 tower twb26	340	103	27.87	1.1%	1.7%	1.1%								
base	vavs1 ptac2 tower twb27	340	103	27.87	1.1%	1.7%	1.0%								
base	vavs1 ptac2 tower twb28	340	103	27.87	1.1%	1.7%	1.0%								
base	vavs1 ptac2 tower twb29	340	103	27.87	1.1%	1.7%	1.0%								
base	vavs1 ptac2 tower twb30	340	103	27.88	1.1%	1.7%	1.0%								
base	vavs1 ptac2 tower tf2sp	340	103	27.85	1.2%	1.7%	1.1%								
base	vavs1 ptac2 cench tower twb29	330	100	27.13	3.8%	3.9%	3.7%								
base	vavs1 ptac2 cench tower twb29	327	99	26.84	4.8%	5.1%	4.7%								
base	vavs1 ptac2 cench tower twb29	324	98	26.62	5.6%	6.2%	5.5%								
base	vavs1 ptac2 cench tower twb29	322	97	26.44	6.2%	6.9%	6.1%								

VAVS ONLY:

THAI RETAIL BLDG PROTOTYPE		Bangk		Total		Peak		Total		Peak		Total	
		kWh/m2/yr		Energy		Demand		Energy		Demand		Energy	
				Cost		(\$/m2)		Savings		(\$)		Savings	
</													

THAI RETAIL BLDG PROTOTYPE		Bangk		Total		Peak		Total		Peak		Total	
		Energy		Demand		Energy Cost		Energy Savings		Demand Savings		Cost Savings	
		kWh/m ² /yr		(W/m ²)		(\$/m ²)		(%)		(%)		(%)	
								</					

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Assumptions/Conversions:

kW to tons: 0.28441667
 lit/sec to cfm: 2.12014134
 Exchange rate (B/\$): 25
 Discount rate (real) 7%

INPUT PANEL

Model for Calculating Cost-Effectiveness Measures for Thai Commercial Building Conservation.

Measure(s)	Code(s)	Annual Energy (MWh)	Annual Peak (kW)	Annual Operating Cost (\$)	Chiller Capacity (kW)	Fan Capacity (lit/sec)	Incremental Quantity of Measure	Units	Measure Unit Cost (B/unit)	Source	Lifetime (years)
OFFICES											
Base Case	6439	2024	706	175882	915	58199					
Overhangs, 10% win. ht. Glazing	ohg01	2009	699	174488	899	56652	307 m2	m2	2000	[1]	30
Lighting	ltp10	1626	590	143248	844	52251	6439 m2	m2	150	[3,4]	15
VAV, VSD fan control	fcpd	1838	704	164010	915	58199	82 kW	kW	10000	[2]	20
VSD pumps	varsp	2013	706	175137	915	58199	10 kW	kW	10000	[2]	20
Airfoil fans	feff7	1896	663	164842	878	58199	123828 cfm	cfm	7	[2]	20
EE Chiller, COP 5.5	cop55	1876	638	161976	915	58204	260 tons	tons	2000	[2]	20
Energy-Efficient pkg.	eneff	1115	400	97298	491	24564	see above				20

HOTELS											
Base Case	20618	7465	1393	516031	2290	154622					
Lighting	ltsv5	6020	1125	414717	2110	134161	20618 m2	m2	200		15
Overhangs, 40% window ht.	ohg04	7406	1382	511677	2260	149915	1062 m2	m2	2000	[1]	30
Opaque wall insulation	uiw102	7197	1341	497613	2151	137043	4016 m2	m2	776	[2]	30
Darker tinted glass	sc_30										
VAV, VSD fan control	fcpd	6725	1368	475289	2261	157390	147 kW	kW	10000	[2]	20
Airfoil fans	feff7	6552	1310	461104	2201	157390	333689 cfm	cfm	7	[2]	20
VSD pumps	varsp	7332	1393	508605	2289	154485	25 kW	kW	10000	[2]	20
EE Chiller, COP 5.5	cop55	6732	1225	464336	2289	154485	651 tons	tons	2000	[2]	20
High Efficiency Package	eneff	3656	699	254506	1142	79490	see above				20

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Assumptions/Conversions:

kW to tons:	0.28441667
lit/sec to cfm:	2.12014134
Exchange rate (B/\$):	25
Discount rate (real)	7%

INPUT PANEL

Model for Calculating Cost-effectiveness Measures for Thai Commercial Building Conservation.

Measure(s)	Code(s)	Annual Energy (MWh)	Annual Peak (kW)	Annual Operating Cost (\$)	Chiller Capacity (kW)	Fan Capacity (lit/sec)	Incremental Quantity of Measure	Units	Measure Unit Cost (B/unit)	Source	Lifetime (years)
RETAIL											
Base Case		8062	274	227051	626	65175					
Overhangs, 10% window ht.	ohg01	2758	840	226026		63524	94	m2	2000	[1]	30
Lighting	ltsv6	1509	539	136192		48346	8062	m2	200		15
Tinted Glazing	sc_30	2713	829	222346		58991	10410	ft2	115	[5]	30
VAV, VSD fan control	fcspd	2756	832	241874	805	68340	90	kW	10000	[2]	20
Airfoil fans	feff7	2722	831	223446		65175	138180	cfm	7	[2]	20
EE Chiller, COP 5.5	cop55	2622	789	214793	626	65175	178	tons	2000	[2]	20
High Efficiency Package	eneff	1223	382	101883	510	33776	see above				20

Sources:

- [1] Personal communication with Vajrindr Nimboonchai, Vice President of Casa Company Ltd., on 12 July 1988, Bangkok, Thailand.
- [2] Personal communication with Boonpong Kijwatanachai, Engineer of MTR Technical Consultant Co., Ltd., on Dec. 1989, Bangkok, Thailand.
- [3] Personal communication with Chaiyut Chevasutho, Asst. Manager of MTR Technical Consultant Co., Ltd., on July 1988, Bangkok, Thailand.
- [4] Piette, M.A.; Krause, F.; and Verderber, R. "Technology Assessment: Energy-Efficient Commercial Lighting." LBL Report # LBL-27032.
- [5] Personal communication with Rongyuth Seehanath, Senior Architect of Yon Hong Seng Co. Ltd., on 28 July 1988, Bangkok Thailand.

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OUTPUT PANEL

Model for Calculating Cost-

Measure(s)	Annual Energy Savings (kWh/m2)	Annual Peak Savings (t/m2)	Annual Operating Cost Savings (\$/m2)	Incr. Cost (\$/m2)	CRF	CCE (\$/kWh)	CCP (\$/kWh)	SPT (years)	IRR (%)
OFFICES									
Base Case									
Overhangs, 10% win. ht.	2.3	1.1	0.2	3.8	0.081	0.132	3,509	17.6	4%
Glazing									
Lighting	61.8	18.0	5.1	6.0	0.110	0.011	333	1.2	84%
VAV, VSD fan control	28.9	0.3	1.8	5.1	0.094	0.017	16,400	2.8	36%
VSD pumps	1.7	0.0	0.1	0.6	0.094	0.034 n/a		5.4	18%
Airfoil fans	19.9	6.7	1.7	5.4	0.094	0.026	806	3.1	32%
EE Chiller, COP 5.5	23.0	10.6	2.2	3.2	0.094	0.013	306	1.5	67%
Energy-Efficient pkg.	141.2	47.5	12.2	24.1	0.094	0.016	508	2.0	51%
HOTELS									
Base Case									
Lighting	70.1	13.0	4.9	8.0	0.110	0.013	615	1.6	61%
Overhangs, 40% window ht.	2.9	0.5	0.2	4.1	0.081	0.116	7,724	19.5	3%
Opaque wall insulation	13.0	2.5	0.9	6.0	0.081	0.037	2,398	6.8	15%
Darker tinted glass									
VAV, VSD fan control	35.9	1.2	2.0	2.9	0.094	0.008	2,352	1.4	69%
Airfoil fans	44.3	4.0	2.7	4.5	0.094	0.010	1,126	1.7	53%
VSD pumps	6.5	0.0	0.4	0.5	0.094	0.007 n/a		1.3	74%
EE Chiller, COP 5.5	35.6	8.1	2.5	2.5	0.094	0.007	312	1.0	99%
High Efficiency Package	184.7	33.7	12.7	28.6	0.094	0.015	849	2.3	44%

file: thaecon.xls
 created: 1 feb 90
 updated: 20 may 90
 j.busch

OUTPUT PANEL

Model for Calculating Cost-

Measure(s)	Annual Energy Savings (kWh/m2)	Annual Peak Savings (W/m2)	Annual Operating Cost Savings (\$/m2)	Incr. Cost (\$/m2)	CRF	CCE (\$/kWh)	CCP (\$/kWh)	SPT (years)	IRR (%)
RETAIL									
Base Case									
Overhangs, 10% window ht.	1.5	0.4	0.1	0.9	0.081	0.051	2,507	7.3	13%
Lighting	144.0	37.7	11.3	8.0	0.110	0.006	212	0.7	141%
Tinted Glazing	7.1	1.7	0.6	5.9	0.081	0.068	3,420	10.2	9%
VAV, VSD fan control	1.7	1.4	-1.8	4.5	0.094	0.243	3,273	-2.4 n/a	
Airfoil fans	6.0	1.5	0.4	4.8	0.094	0.076	3,224	10.7	7%
EE Chiller, COP 5.5	18.4	6.7	1.5	1.8	0.094	0.009	264	1.2	86%
High Efficiency Package	191.9	57.2	15.5	25.9	0.094	0.013	453	1.7	60%

Sources:

- [1] Personal communication
- [2] Personal communication
- [3] Personal communication
- [4] Piette, M.A.; Krause, F. March 1989.
- [5] Personal communication

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Model for Calculating Cost-

Measure(s)	Economics w/ HVAC downsizing credit					
	HVAC Savings (\$/m ²)	Incr. Cost (\$/m ²)	CRF	CCE (\$/kWh)	COP (\$/kW)	IRR (%)
OFFICES						
Base Case						
Overhangs, 10% win. ht.	0.5	3.3	0.081	0.115	3,051	5%
Glazing						
Lighting	2.1	3.9	0.110	0.007	214	132%
VAV, VSD fan control	0.0	5.1	0.094	0.017	16,400	36%
VSD pumps	0.0	0.6	0.094	0.034	#DIV/0!	18%
Airfoil fans	0.9	4.5	0.094	0.021	669	38%
EE Chiller, COP 5.5	0.0	3.2	0.094	0.013	306	67%
Energy-Efficient pkg.	12.7	11.4	0.094	0.008	241	107%

HOTELS						
Base Case						
Lighting	1.8	6.2	0.110	0.010	476	79%
Overhangs, 40% window ht.	0.3	3.8	0.081	0.107	7,108	4%
Opaque wall insulation	1.4	4.6	0.081	0.029	1,829	19%
Darkener tinted glass						
VAV, VSD fan control	0.2	2.7	0.094	0.007	2,214	74%
Airfoil fans	0.6	3.9	0.094	0.008	969	68%
VSD pumps	0.0	0.5	0.094	0.007 n/a		76%
EE Chiller, COP 5.5	0.0	2.5	0.094	0.007	311	100%
High Efficiency Package	10.4	18.2	0.094	0.009	539	70%

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Model for Calculating Cost-

Measure(s)	Economics w/ HVAC downsizing credit					
	HVAC Savings (\$/m2)	Incr. Cost (\$/m2)	CRF	CCE (\$/kWh)	CCP (\$/kWh)	IRR SPT (years) (%)

RETAIL

Base Case

Overhangs, 10% window ht.
 Lighting
 Tinted Glazing
 VAV, VSD fan control
 Airfoil fans
 EE Chiller, COP 5.5

High Efficiency Package 3.9 22.0 0.094 0.011 384 1.4 71%

Sources:

- [1] Personal communication
- [2] Personal communication
- [3] Personal communication
- [4] Piette, H.A.; Krause, F
- [5] Personal communication

```

c loadegat.for
c program to process an egat load file
c calculates energy, peak, and load-factor for each week,
c the average weekly and total energy and load-factor for the month,
c and the total yearly energy and peak load, date, and hour
c and the minimum load, date, and hour
c egat format begins with october through september
c created: 25 nov 87
c updated: 7 jan 90
c j. busch
c
c define variables
  INTEGER HRLOAD,DYLOAD,WKLOAD,MTHLOAD,YRLOAD
  INTEGER YPKLOAD,MPKLOAD,WPKLOAD
  INTEGER YMNLOAD,WMNLOAD
  INTEGER YPKHOUR,YMNHOUR
  INTEGER DYCOUNT,MONDAY
  INTEGER NRDAY, NRMONTHS
  REAL WLOADF,MLOADF,YLOADF
  REAL WKAVG
  CHARACTER*25 EGATFILE,OUTFILE
  CHARACTER*15 DATE,YPKDATE,YMNDATE
  DIMENSION NRDAY(12),HRLOAD(24)
c nr days in each month starting with october through september
  DATA NRDAY /31,30,31,31,28,31,30,31,30,31,31,30/
c  DATA NRDAY /28,28,28,28,28,28,28,28,28,28,28,28/
  DATA NRMONTHS /12/
c screen inputs
  PRINT*,'Enter the EGAT-format loads data file name'
  READ(5,10) EGATFILE
10  FORMAT(A25)
  OPEN(UNIT=10,FILE=EGATFILE,STATUS='OLD')
c
  PRINT*,'Enter the output file name'
  READ(5,10) OUTFILE
  OPEN(FILE=OUTFILE,STATUS='NEW',UNIT=20)
c
  PRINT*,'Enter the date of first Monday of October'
  READ(5,9) MONDAY
9  FORMAT(I4)
c skip to the first monday in the file
  DO 201 L=1,(MONDAY-1)
c skip the 3 records that comprise each day's data
  READ(10,8)
8  FORMAT(//)
201 CONTINUE
c reset the first month's nr. of days to the days remaining
  NRDAY(1)=NRDAY(1) - (MONDAY-1)
c initialize data
  WMNLOAD = 1000000
  YMNLOAD = 1000000
c start main loop
  DO 100 I=1,NRMONTHS
    DO 200 J=1,NRDAYS(I)

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c read a day's hourly loads consisting of two records
  READ(10,11,END=202) (HRLOAD(K),K=1,24)
11  FORMAT(16(1X,I4),/,3(1X,I4),5X,5(1X,I4))
c read the date which is the record immediately following load records
  READ(10,21) DATE
21  FORMAT(A15)
c sum up the hourly loads to get a daily load
  DO 300 N=1,24
    DYLOAD = DYLOAD + HRLOAD(N)
c find the peak load and hour of the year
    IF(YPKLOAD.LT.HRLOAD(N)) THEN
      YPKLOAD = HRLOAD(N)
      YPKDATE = DATE
      YPKHOUR = N
    END IF
c find the minimum load and hour of the year
    IF(YMNLOAD.GT.HRLOAD(N)) THEN
      YMNLOAD = HRLOAD(N)
      YMNDATE = DATE
      YMNHOUR = N
    END IF
c find the peak load of the month
    IF(MPKLOAD.LT.HRLOAD(N)) THEN
      MPKLOAD = HRLOAD(N)
    END IF
c find the peak load of the week
    IF(WPKLOAD.LT.HRLOAD(N)) THEN
      WPKLOAD = HRLOAD(N)
    END IF
c find the minimum load of the week
    IF(WMNLOAD.GT.HRLOAD(N)) THEN
      WMNLOAD = HRLOAD(N)
    END IF
c end of loop over hours in day
300  CONTINUE
c convert the loads from mwh to gwh
  DYLOAD = DYLOAD/1000
c print out the daily load
  WRITE(20,12) DATE,DYLOAD
12  FORMAT(A15,3X,I10)
c sum up the daily loads for the week
  WKLOAD = WKLOAD + DYLOAD
c increment counter for days in the week
  DYCOUNT = DYCOUNT + 1
c print out the weekly load info
  IF(DYCOUNT.EQ.7) THEN
c calculate the weekly load factor
    WLOADF = (FLOAT(WKLOAD)*1000*100)/(FLOAT(WPKLOAD)*24*7)
    WRITE(20,13)
13  FORMAT('Weekly Data:',2x,'Energy (GWh)',2x,
  $      'Peak (MW)',3x,'Min. (MW)',3x,'Load Fac. (%)')
    WRITE(20,23) WKLOAD,WPKLOAD,WMNLOAD,WLOADF
23  FORMAT(16x,3I10,F12.1)
c reset weekly load and counter

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        WKLOAD = 0
        WPKLOAD = 0
        WMNLOAD = 1000000
        DYCOUNT = 0
    END IF
c sum up the daily loads for the month
    MTHLOAD = MTHLOAD + DYLOAD
c reset daily load
    DYLOAD = 0
c end of loop over days in the month
200 CONTINUE
202 CONTINUE
c calculate the average weekly load for the month
    WKAvg = FLOAT(MTHLOAD)/(FLOAT(NRDAY(I))/7)
c calculate the monthly load factor
    MLOADF = (FLOAT(MTHLOAD)*1000*100)/
$      (FLOAT(MPKLOAD)*24*NRDAY(I))
c print out the total monthly load and average weekly load
    WRITE(20,14)
14  FORMAT('Monthly Data:',2x,'Avg. Energy (GWh)',2x,
$      'Total Energy (GWh)',3x,'Load Fac. (%)')
    WRITE(20,24) WKAvg,MTHLOAD,MLOADF
24  FORMAT(17X,F10.0,4X,I10,10X,F10.1)
c sum up the monthly loads for the year
    YRLOAD = YRLOAD + MTHLOAD
c reset monthly load summation and peak load
    MTHLOAD = 0
    MPKLOAD = 0
c end of loop over months in year
100 CONTINUE
c calculate the yearly load factor
    YLOADF = (FLOAT(YRLOAD)*1000*100)/(FLOAT(YPKLOAD)*8760)
c print out the total load and peak for the year
    WRITE(20,15)
15  FORMAT('Yearly Data:',2x,'Total Energy (GWh)',2x,'Load Fac.(%)')
    WRITE(20,25) YRLOAD,YLOADF
25  FORMAT(20X,I5,13X,F5.1)
    WRITE(20,26)
26  FORMAT(14x,'Peak Load (MW), Date, & Hour',3x,
$      'Min. Load (MW), Date, & Hour')
    WRITE(20,27) YPKLOAD,YPKDATE,YPKHOUR,YMNLOAD,YMNDATE,YMNHOUR
27  FORMAT(15X,I6,4X,A15,I2,4X,I6,4X,A15,I2)
c
    STOP
    END

```

OCT.5,1986	63
OCT.6,1986	73
OCT.7,1986	75
OCT.8,1986	77
OCT.9,1986	78
OCT.10,1986	76
OCT.11,1986	73

Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	515	4203	2054	72.9

OCT.12,1986	64
OCT.13,1986	73
OCT.14,1986	75
OCT.15,1986	75
OCT.16,1986	77
OCT.17,1986	75
OCT.18,1986	71

Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	510	4044	2089	75.1

OCT.19,1986	64
OCT.20,1986	76
OCT.21,1986	79
OCT.22,1986	79
OCT.23,1986	66
OCT.24,1986	74
OCT.25,1986	72

Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	510	4220	2057	71.9

OCT.26,1986	65
OCT.27,1986	76
OCT.28,1986	77
OCT.29,1986	75
OCT.30,1986	73
OCT.31,1986	73

Monthly Data:	Avg. Energy (GWh)	Total Energy (GWh)	Load Fac. (%)
	512.	1974	72.2

NOV 1, 1986	71
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Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	510	4097	2167	74.1

NOV 2, 1986	62
NOV 3, 1986	73
NOV 4, 1986	75
NOV 5, 1986	75
NOV 6, 1986	76
NOV 7, 1986	77
NOV 8, 1986	75

Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	513	4152	2003	73.5

NOV 9, 1986	64
NOV 10, 1986	74
NOV 11, 1986	76
NOV 12, 1986	77
NOV 13, 1986	77
NOV 14, 1986	76
NOV 15, 1986	71

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 515 4184 2099 73.3

NOV 16, 1986 62
 NOV 17, 1986 73
 NOV 18, 1986 75
 NOV 19, 1986 74
 NOV 20, 1986 73
 NOV 21, 1986 74
 NOV 22, 1986 71

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 502 4101 2007 72.9

NOV 23, 1986 61
 NOV 24, 1986 69
 NOV 25, 1986 71
 NOV 26, 1986 71
 NOV 27, 1986 72
 NOV 28, 1986 73
 NOV 29, 1986 69

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 486 4067 1886 71.1

NOV 30, 1986 57

Monthly Data: Avg. Energy (GWh) Total Energy (GWh) Load Fac. (%)
 500. 2144 71.2

DEC 1, 1986 66
 DEC 2, 1986 68
 DEC 3, 1986 69
 DEC 4, 1986 65
 DEC 5, 1986 51
 DEC 6, 1986 59

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 435 4003 1533 64.7

DEC 7, 1986 59
 DEC 8, 1986 69
 DEC 9, 1986 71
 DEC 10, 1986 67
 DEC 11, 1986 69
 DEC 12, 1986 70
 DEC 13, 1986 67

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 472 4044 1889 69.5

DEC 14, 1986 60
 DEC 15, 1986 68
 DEC 16, 1986 70
 DEC 17, 1986 71
 DEC 18, 1986 73
 DEC 19, 1986 73
 DEC 20, 1986 71

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 486 4110 1865 70.4

DEC 21, 1986 62
 DEC 22, 1986 70
 DEC 23, 1986 71
 DEC 24, 1986 71
 DEC 25, 1986 71

DEC 26, 1986	73			
DEC 27, 1986	71			
Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	489	4102	1985	71.0
DEC 28, 1986	64			
DEC 29, 1986	70			
DEC 30, 1986	68			
DEC 31, 1986	54			
Monthly Data:	Avg. Energy (GWh)	Total Energy (GWh)	Load Fac. (%)	
	470.	2081	68.1	
JAN 1, 1987	50			
JAN 2, 1987	65			
JAN 3, 1987	68			
Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	439	3957	1680	66.0
JAN 4, 1987	63			
JAN 5, 1987	74			
JAN 6, 1987	75			
JAN 7, 1987	74			
JAN 8, 1987	73			
JAN 9, 1987	73			
JAN 10, 1987	70			
Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	502	4174	2067	71.6
JAN 11, 1987	63			
JAN 12, 1987	71			
JAN 13, 1987	71			
JAN 14, 1987	70			
JAN 15, 1987	71			
JAN 16, 1987	71			
JAN 17, 1987	68			
Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	485	4066	2001	71.0
JAN 18, 1987	61			
JAN 19, 1987	71			
JAN 20, 1987	73			
JAN 21, 1987	75			
JAN 22, 1987	77			
JAN 23, 1987	78			
JAN 24, 1987	74			
Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	509	4253	1940	71.2
JAN 25, 1987	64			
JAN 26, 1987	71			
JAN 27, 1987	69			
JAN 28, 1987	62			
JAN 29, 1987	55			
JAN 30, 1987	60			
JAN 31, 1987	59			
Weekly Data:	Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)
	440	4033	1740	64.9
Monthly Data:	Avg. Energy (GWh)	Total Energy (GWh)	Load Fac. (%)	
	478.	2119	67.0	
FEB 1, 1987	58			

FEB 2, 1987 69
 FEB 3, 1987 71
 FEB 4, 1987 70
 FEB 5, 1987 70
 FEB 6, 1987 72
 FEB 7, 1987 71

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 481 4019 1899 71.2

FEB 8, 1987 64
 FEB 9, 1987 74
 FEB 10, 1987 76
 FEB 11, 1987 78
 FEB 12, 1987 72
 FEB 13, 1987 78
 FEB 14, 1987 76

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 518 4235 2068 72.8

FEB 15, 1987 67
 FEB 16, 1987 78
 FEB 17, 1987 80
 FEB 18, 1987 80
 FEB 19, 1987 81
 FEB 20, 1987 81
 FEB 21, 1987 78

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 545 4355 2184 74.5

FEB 22, 1987 69
 FEB 23, 1987 79
 FEB 24, 1987 80
 FEB 25, 1987 81
 FEB 26, 1987 81
 FEB 27, 1987 81
 FEB 28, 1987 78

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 549 4378 2283 74.6

Monthly Data: Avg. Energy (GWh) Total Energy (GWh) Load Fac. (%)
 523. 2093 71.1

MAR 1, 1987 63
 MAR 2, 1987 74
 MAR 3, 1987 75
 MAR 4, 1987 77
 MAR 5, 1987 77
 MAR 6, 1987 78
 MAR 7, 1987 78

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 522 4287 2017 72.5

MAR 8, 1987 70
 MAR 9, 1987 81
 MAR 10, 1987 83
 MAR 11, 1987 83
 MAR 12, 1987 83
 MAR 13, 1987 84
 MAR 14, 1987 81

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)

	565	4446	2330	75.6
MAR 15, 1987	72			
MAR 16, 1987	82			
MAR 17, 1987	82			
MAR 18, 1987	83			
MAR 19, 1987	83			
MAR 20, 1987	85			
MAR 21, 1987	82			
Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)				
	569	4485	2391	75.5
MAR 22, 1987	72			
MAR 23, 1987	83			
MAR 24, 1987	85			
MAR 25, 1987	86			
MAR 26, 1987	87			
MAR 27, 1987	83			
MAR 28, 1987	80			
Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)				
	576	4565	2411	75.1
MAR 29, 1987	71			
MAR 30, 1987	82			
MAR 31, 1987	85			
Monthly Data: Avg. Energy (GWh) Total Energy (GWh) Load Fac. (%)				
	558.	2470	72.7	
APR 1, 1987	85			
APR 2, 1987	86			
APR 3, 1987	87			
APR 4, 1987	84			
Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)				
	580	4514	2372	76.5
APR 5, 1987	74			
APR 6, 1987	76			
APR 7, 1987	85			
APR 8, 1987	84			
APR 9, 1987	87			
APR 10, 1987	87			
APR 11, 1987	82			
Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)				
	575	4527	2501	75.6
APR 12, 1987	71			
APR 13, 1987	65			
APR 14, 1987	77			
APR 15, 1987	80			
APR 16, 1986	79			
APR 17, 1986	81			
APR 18, 1987	80			
Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)				
	533	4249	2285	74.7
APR 19, 1987	74			
APR 20, 1987	85			
APR 21, 1987	88			
APR 22, 1987	86			
APR 23, 1987	87			
APR 24, 1987	88			

APR 25, 1987	85			
Weekly Data: Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)	
593	4554	2529	77.5	
APR 26, 1987	79			
APR 27, 1987	81			
APR 28, 1987	82			
APR 29, 1987	83			
APR 30, 1987	83			
Monthly Data: Avg. Energy (GWh)	Total Energy (GWh)	Load Fac. (%)		
572.	2451	74.8		
MAY 1, 1987	65			
MAY 2, 1987	74			
Weekly Data: Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)	
547	4381	2171	74.3	
MAY 3, 1987	75			
MAY 4, 1987	83			
MAY 5, 1987	77			
MAY 6, 1987	80			
MAY 7, 1987	81			
MAY 8, 1978	83			
MAY 9, 1978	79			
Weekly Data: Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)	
558	4332	2470	76.7	
MAY 10, 1978	71			
MAY 11, 1978	74			
MAY 12, 1978	84			
MAY 13, 1978	87			
MAY 14, 1978	83			
MAY 15, 1978	83			
MAY 16, 1978	81			
Weekly Data: Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)	
563	4486	2248	74.7	
MAY 17, 1978	74			
MAY 18, 1978	86			
MAY 19, 1978	88			
MAY 20, 1978	88			
MAY 21, 1978	88			
MAY 22, 1978	90			
MAY 23, 1978	86			
Weekly Data: Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)	
600	4683	2632	76.3	
MAY 24, 1978	78			
MAY 25, 1978	87			
MAY 26, 1978	88			
MAY 27, 1978	85			
MAY 28, 1978	86			
MAY 29, 1978	82			
MAY 30, 1978	79			
Weekly Data: Energy (GWh)	Peak (MW)	Min. (MW)	Load Fac. (%)	
585	4587	2525	75.9	
MAY 31, 1978	70			
Monthly Data: Avg. Energy (GWh)	Total Energy (GWh)	Load Fac. (%)		
568.	2515	72.2		
JUN 1, 1987	82			

JUN 2, 1987 84
 JUN 3, 1987 84
 JUN 4, 1987 84
 JUN 5, 1987 84
 JUN 6, 1987 81

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 569 4513 2479 75.0

JUN 7, 1987 71
 JUN 8, 1987 79
 JUN 9, 1987 84
 JUN 10, 1987 84
 JUN 11, 1987 85
 JUN 12, 1987 86
 JUN 13, 1987 80

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 569 4498 2318 75.3

JUN 14, 1987 71
 JUN 15, 1987 80
 JUN 16, 1987 82
 JUN 17, 1987 82
 JUN 18, 1987 83
 JUN 19, 1987 82
 JUN 20, 1987 78

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 558 4457 2412 74.5

JUN 21, 1987 70
 JUN 22, 1987 81
 JUN 23, 1987 84
 JUN 24, 1987 84
 JUN 25, 1987 85
 JUN 26, 1987 86
 JUN 27, 1987 83

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 573 4587 2417 74.4

JUN 28, 1987 73
 JUN 29, 1987 84
 JUN 30, 1987 85

Monthly Data: Avg. Energy (GWh) Total Energy (GWh) Load Fac. (%)
 570. 2441 73.9

JUL 1, 1987 83
 JUL 2, 1987 84
 JUL 3, 1987 84
 JUL 4, 1987 79

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 572 4580 2499 74.3

JUL 5, 1987 69
 JUL 6, 1987 79
 JUL 7, 1987 82
 JUL 8, 1987 80
 JUL 9, 1987 81
 JUL 10, 1987 79
 JUL 11, 1987 67

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 537 4657 2324 68.6

JUL 12, 1987 68
 JUL 13, 1987 80
 JUL 14, 1987 84
 JUL 15, 1987 84
 JUL 16, 1987 85
 JUL 17, 1987 86
 JUL 18, 1987 82

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 569 4540 2261 74.6

JUL 19, 1987 74
 JUL 20, 1987 85
 JUL 21, 1987 86
 JUL 22, 1987 88
 JUL 23, 1987 88
 JUL 24, 1987 87
 JUL 25, 1987 83

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 591 4702 2532 74.8

JUL 26, 1987 75
 JUL 27, 1987 87
 JUL 28, 1987 88
 JUL 29, 1987 88
 JUL 30, 1987 88
 JUL 31, 1987 84

Monthly Data: Avg. Energy (GWh) Total Energy (GWh) Load Fac. (%)
 573. 2537 72.5

AUG. 1, 1987 82

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 592 4676 2608 75.4

AUG 2, 1987 71
 AUG 3, 1987 82
 AUG 4, 1987 85
 AUG 5, 1987 86
 AUG 6, 1987 87
 AUG 7, 1987 89
 AUG 8, 1987 85

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 585 4664 2328 74.7

AUG 9, 1987 76
 AUG 10, 1987 86
 AUG 11, 1987 85
 AUG 12, 1987 68
 AUG 13, 1987 83
 AUG 14, 1987 90
 AUG 15, 1987 87

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)
 575 4730 2183 72.4

AUG 16, 1987 74
 AUG 17, 1987 83
 AUG 18, 1987 84
 AUG 19, 1987 85
 AUG 20, 1987 87
 AUG 21, 1987 86
 AUG 22, 1987 81

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)

	580	4685	2468	73.7
AUG 23, 1987	69			
AUG 24, 1987	80			
AUG 25, 1987	81			
AUG 26, 1987	83			
AUG 27, 1987	84			
AUG 28, 1987	84			
AUG 29, 1987	81			

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)

	562	4531	2291	73.8
AUG 30, 1987	72			
AUG 31, 1987	82			

Monthly Data: Avg. Energy (GWh) Total Energy (GWh) Load Fac. (%)

	573.	2538	72.1
SEP 1, 1987	84		
SEP 2, 1987	83		
SEP 3, 1987	84		
SEP 4, 1987	85		
SEP 5, 1987	80		

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)

	570	4637	2423	73.2
SEP 6, 1987	67			
SEP 7, 1987	74			
SEP 8, 1987	81			
SEP 9, 1987	84			
SEP 10, 1987	83			
SEP 11, 1987	83			
SEP 12, 1987	80			

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)

	552	4505	2111	72.9
SEP 13, 1987	73			
SEP 14, 1987	85			
SEP 15, 1987	86			
SEP 16, 1987	84			
SEP 17, 1987	83			
SEP 18, 1987	81			
SEP 19, 1987	79			

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)

	571	4734	2427	71.8
SEP 20, 1987	67			
SEP 21, 1987	78			
SEP 22, 1987	82			
SEP 23, 1987	83			
SEP 24, 1987	83			
SEP 25, 1987	84			
SEP 26, 1987	80			

Weekly Data: Energy (GWh) Peak (MW) Min. (MW) Load Fac. (%)

	557	4557	2158	72.8
SEP 27, 1987	73			
SEP 28, 1987	81			
SEP 29, 1987	85			
SEP 30, 1987	87			

Monthly Data: Avg. Energy (GWh) Total Energy (GWh) Load Fac. (%)

565.	2422	71.1
Yearly Data: Total Energy (GWh) Load Fac.(%)		
27785	67.0	
Peak Load (MW), Date, & Hour Min. Load (MW), Date, & Hour		
4734	SEP 14, 1987 20	1533 DEC 6, 1986 3

```

c  program for calculating heat rates for elfin
c  based on a quadratic formula and coefficients
c  used in wigplan by egat
c  created: 7 dec 87
c  j. busch
c
c  define variables
  INTEGER NRBLKS
  REAL MW,A,B,C,HA,HR,MBTUH,DMBTUH
  DIMENSION MW(6),HA(6),HR(5)
c
c  screen inputs
c
  PRINT*,'Enter the number of capacity blocks'
  READ(5,100) NRBLKS
100 FORM A. (I4)
c
  PRINT*,'Enter the capacity level at each block in MW'
  DO 1000 I=1,NRBLKS
    READ(5,*) MW(I)
1000 CONTINUE
c
  PRINT*,'Enter the 3 coefficients A, B, C'
  READ(5,*) A,B,C
c
c  calculate the average heat rates at each block
c
  DO 1001 J=1,NRBLKS
    MBTUH = A + (B*MW(J)) + (C*(MW(J)**2))
    HA(J) = MBTUH*1000/MW(J)
1001 CONTINUE
c
c  calculate the incremental heat rates for all but first block
c
  DO 1002 L=2,NRBLKS
    DMBTUH = B*(MW(L)-MW(L-1)) + C*(MW(L)**2 - MW(L-1)**2)
    HR(L) = DMBTUH*1000/(MW(L) - MW(L-1))
1002 CONTINUE
c
c  print out results
c
  WRITE(6,200)
200 FORMAT(/2X,'MW',5X,'Avg. HR',4X,'Incr. HR')
  DO 1003 N=1,NRBLKS
    IF(N.EQ.1) THEN
      WRITE(6,201) MW(1),HA(1)
201  FORMAT(F6.0,2X,F8.0)
      GOTO 1003
    ENDIF
    WRITE(6,202) MW(N),HA(N),HR(N)
202  FORMAT(F6.0,2X,F8.0,3X,F8.0)
1003 CONTINUE
c
  STOP

```

```

c *****
c eifin input data file
c electricity generating authority of thailand
c
c integrated analysis of air-conditioning study
c
c sources: lfwp 89 load forecast working group, oct 89
c pdp 90-01 eqat power devo plan, dec 89
c wipin vol-1 overall data summary for pdp 88-02
c
c scenarios: 1 eqat pdp 90-01
c 2 average hyro year
c 3 wet hydro year
c 11 high efficiency, penetration 100%
c 12 high efficiency, penetration 50%
c 13 high efficiency, penetration 10%
c 21 building energy standard, penetration 100%
c 22 building energy standard, penetration 50%
c 23 building energy standard, penetration 67%
c 24 building energy standard, penetration 33%
c 31 load-shifting, penetration 100%
c 32 load-shifting, penetration 40%
c 33 load-shifting, penetration 20%
c 41 non-electric cooling, penetration 100%
c 42 non-electric cooling, penetration 20%
c 50-59 add 100-200 mw gas turbines in a year
c 60-69 add 300-400 mw gas turbines in a year
c 70-79 add >=500 mw gas turbines in a year
c 80-89 add gta in year combinations
c 90-99 cancel given unit(s)
c
c notes: (1) criteria for thermal block detail is as follows:
c <200 MW, 2 bks; 200-500, 3; >500, 4
c (2) units commissioned in the first 6 months of a year
c are counted in that year's mix, otherwise in next
c
c created: 6 dec 87
c updated: 24 apr 90
c j busch
c *****
c ---generation parameters
c
c baseyr: 0 base year
c 0 1989
c lastyr: 0 last year
c 0 2006
c extens: 1 cost of energy not served ($ .049/kwh): wipin vol-1
c 2 .049
c fyear: 1 fraction of year in 12 typical weeks
c 7 0833 0833 0833 0833 0833 0833
c 0833 0833 0833 0833 0833 0833
c eegen: 0 electric generation plant categories
c 1 'nbks' 'boks' 'surt' 'krm1' 'krm2'
c 'bpth' 'bpcc' 'rycc' 'nmpq' 'krm2'
c 'nmoa' 'nmp' 'krbi' 'sbyo' 'lmpq' 'slmp'
c 'sopl' 'lqcl'
c 'jgt' 'nwqt' 'dsel'
c 'laos' 'cons' 'hydr'
c commit: 1 based on eqat power sys control dept operating forecast
c oct 89 - sep 90
c 2 1.16
c rorder: 1 voltage support per eqat mar 88 memo
c 1 'sbks' 'bpth' 'nmoa'
c
c ---generation summary categories
c
c gensum 1 oil
c 7 'nbks' 'surt' 'krm1'
c gensum 2 steam & cc gas
c 7 'sbks' 'bpth' 'krm2'
c 'bpcc' 'rycc' 'nmpq'
c gensum 3 gas turbines
c 7 'jgt' 'nwqt'
c gensum 4 diesel
c 7 'dsel'
c gensum 5 lignite
c 7 'nmoa' 'nmp' 'krbi'
c 'sbyo' 'lmpq' 'slmp'
c gensum 6 coal
c 7 'sopl' 'lqcl'
c gensum 7 purchases
c 7 'laos'
c gensum 8 conservation
c 7 'cons'
c gensum 9 hydro-elec
c 7 'hydr'
c subtotals in generation summary table
c jsumat 1 oil & gas
c 7 2 3 4
c jsumat 2 lignite & coal
c 7 5 6
c jsumat 3 non-eqat power
c 7
c jsumat 4 cons & lm
c 7 8
c jsumat 5 hydro
c 7 9
c
c ---titles
c
c dbkax 0 north bangkok
c sbkax 0 south bangkok
c mbkax 0 mae non 1-1
c lmpax 0 mae non 1-1 & lampang
c
c lmpax 0 lampang units 5-7
c krbiak 0 krabi
c surtax 0 surat thani
c krm1ax 0 khamom ppb unit 1
c krm2ax 0 khamom ppb unit 2
c bpthax 0 bang pakong thermal
c bpccax 0 bang pakong 1-2 cc
c ryccax 0 rayong 4 bp 1-4 cc
c nmpqax 0 nam phong 1-2 cc
c soplax 0 ao phai units 1-4
c sbyoax 0 saba yoi units 1-3
c slmpax 0 sin pun units 1-2
c lqclax 0 large coal units 1-5
c lqgtax 0 lan grabu qt 1-7
c nwqtax 0 new qt units 1-5
c dselax 0 diesel plants
c laosax 0 laos purchases
c nalyax 0 malaysia purchases
c consax 0 conservation
c hydrax 0 hydro-electric
c ps 1ax 0 srinagarind 4-5 ps
c ps 2ax 0 bhumbol 8 ps
c ps 3ax 0 lam takhong 1-4 ps
c
c ---systemwide parameters
c
c effncy: 1 set to 1.0 to match sales=load
c 2 1.0
c anpeak: 1 annual peak (mw): 1989-2001: lfwp oct 89:
c 2002-2006 eqat pdp 90-01 dec 89
c 4
c 7760 8610 9489 10330 11054
c 11785 12508 13246 14007 14768
c 15565 16380 17212 18063 18932
c 19819
c sales: 1 annual sales (gwh): 1989-2001: lfwp oct 89:
c 2002-2006 eqat pdp 90-01 dec 89
c 4
c 46311 51500 56976 62211 66865
c 71641 76274 81159 86310 91718
c 97377 103222 109289 115509 121873
c 128380
c
c ---fuel cost data (1989 real prices)
c
c based on meeting 3 oct 89 of nedsb, nepo, ppt, and eqat
c holife: 1 nepo fuel oil price projection (85% of crude oil price)
c 4
c 2.44e-6 2.58e-6 2.74e-6 2.90e-6 3.07e-6
c 3.24e-6 3.39e-6 3.53e-6 3.67e-6 3.81e-6
c 3.97e-6
c ngasfc: 1 ppt natural gas price projection
c 4
c 2.17e-6 2.09e-6 2.16e-6 2.21e-6 2.24e-6
c 2.28e-6 2.27e-6 2.27e-6 2.26e-6 2.22e-6
c lligfc: 1 mine eng/g dept. mae non lignite price projection ($12.17/ton)
c 4
c 1.19e-6 1.19e-6 1.19e-6 1.19e-6 1.19e-6
c 1.20e-6 1.21e-6 1.22e-6 1.23e-6 1.24e-6
c 1.25e-6 1.26e-6 1.27e-6 1.28e-6 1.30e-6
c 1.31e-6
c lligfc: 1 mine eng/g dept. saba yoi lignite price projection ($15.42/ton)
c 4
c 1.61e-6 1.62e-6 1.63e-6 1.64e-6 1.65e-6
c 1.66e-6 1.67e-6 1.68e-6 1.69e-6 1.70e-6
c 1.71e-6
c lligfc: 1 mine eng/g dept. sin pun lignite price projection ($15.25/ton)
c 4
c 1.38e-6 1.38e-6 1.39e-6 1.39e-6 1.40e-6
c 1.41e-6 1.41e-6 1.42e-6 1.42e-6 1.42e-6
c 1.43e-6
c coalfc: 1 nepo imported coal price projection (cif p.u. $4/ton trans)
c 4
c 1.83e-6 1.83e-6 1.83e-6 1.83e-6 1.83e-6
c 1.83e-6 1.87e-6 1.90e-6 1.93e-6 1.97e-6
c 2.00e-6
c nusefc: 1 thermal eng/g dept. estimate
c 2 0.413e-6
c laosfc: 1 purchase price of electricity from laos
c 2 0.005
c
c ---operations and maintenance cost data
c
c omthom: 1 variable o&m for thermal plants per wipin vol-1
c based on actual 1986 records
c 2 20326
c omccom: 1 variable o&m for combined cycle per wipin vol-1
c based on actual 1986 records
c 2 20367
c omqcom: 1 variable o&m for gas turbines per wipin vol-1
c based on actual 1986 records
c 2 20441
c omdeom: 1 variable o&m for diesel units per wipin vol-1
c based on actual 1986 records
c 2 20013
c hydoom: 1 variable o&m for hydro units per wipin vol-1
c based on actual 1986 records
c 2 20408
c
c ---unit generating characteristics
c
c
c
c ---oil/gas units
c

```

```

c ---north bangkok units 1-2
ndbkcm 1 pdp 90-01: assumed 2 bks
17 y1989 95 238
y2004 0 0
ndbknu 1
17 y1989 3
y2004 0
ndbkhr 1 based on wigpin vol-1 quadratic fit
17 y1989 14131 7174
ndbkfr 1 assumed all outages at last block: wtd avg for by
c capacities per wigpin vol-1
17 y1989 0 .88
y1994 0 .95
ndbkrr 1 scheduled maintenance pattern 4-6-4 4 4-6 wks
c per wigpin vol-1 wtd by unit capacities
4 .077 .101 .091 .077 .101
.091 .077 .101 .091 .077
.101 .091 .077
ndbkrm 1
9 'omth'
ndbkrc 1
9 'hoil'
c
c ---south bangkok units 1-5
sbkcm 1 pdp 90-01: min cap per wigpin vol-1: assumed 4 bks at equal
c capacity increments
17 y1989 520 910 1300
y2004 0 0 0
sbknu 1
17 y1989 5
y2004 0
sbkhr 1 based on wigpin vol-1 quadratic fit wtd avg by capacities
17 y1989 13045 6109 7068
sbkfr 1 assumed all outages at last block: wtd avg for by
c capacities per wigpin vol-1
17 y1989 0 0 .94
sbkrr 1 scheduled maintenance pattern per wigpin vol-1 wtd by
c unit capacities
4 .092 .092 .086 .092 .086
.086 .092 .092 .086 .092
.092 .086 .092 .092 .086
sbkrm 1
9 'omth'
sbkrfc 1
9 'ngas'
c
c ---surat thani
surthcm 1 min cap per wigpin vol-1: assumed 2 bks:
retirement per pdp 90-01
17 y1989 10 10
y1998 0 0
surthr 1 based on wigpin vol-1 quadratic fit
17 y1989 25690 11471
surthr 1 assumed all outages at last block: wigpin vol-1
17 y1989 0 .961
surthr 1 scheduled maintenance pattern 4-4-6 wks per wigpin vol-1
4 .077 .077 .115 .077 .115
.115 .077
surthrm 1
9 'omth'
surthrc 1
9 'hoil'
c
c ---khanom power plant barge unit 1 (oil)
knhcm 1 pdp 90-01: min cap per wigpin vol-1: assumed 2 bks
17 y1989 30 75
y2004 0 0
knhr 1 based on wigpin vol-1 quadratic fit
17 y1989 13366 6765
knhr 1 assumed all outages at last block: wigpin vol-1
17 y1989 0 .986
knhr 1 scheduled maintenance pattern 4-4-6 wks per wigpin vol-1
4 .077 .077 .115 .077 .115
.115 .077 .077 .115 .077
.077 .115 .077 .115
knhrm 1
9 'omth'
knhrfc 1
9 'hoil'
c
c ---khanom power plant barge unit 2 (gas)
knh2cm 1 min cap per wigpin vol-1: assumed 2 bks
17 y1989 30 75
knh2hr 1 based on wigpin vol-1 quadratic fit
17 y1989 13366 6765
knh2fr 1 assumed all outages at last block: wigpin vol-1
17 y1989 0 .937
knh2rr 1 scheduled maintenance pattern 4-4-4 wks per wigpin vol-1
4 .077 .115 .077 .077 .115
.077 .077 .115 .077 .115
.115
knh2rm 1
9 'omth'
knh2rc 1
9 'ngas'
c
c ---bang pakong thermal units 1-4
bpthcm 1 pdp 90-01: min cap per wigpin vol-1: assumed 4 bks at equal

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c capacity increments
17 y1989 440 660 880 1100
y1992 680 1020 1360 1700
y1993 920 1360 1840 2300
bpthnu 1
17 y1989 2
y1992 3
y1993 4
bpthhr 1 based on wigpin vol-1 quadratic fit
17 y1989 12205 5556 6150 6744
y1992 12223 5567 6163 6760
y1993 12232 5573 6170 6767
bpthfr 1 assumed all outages at last block: wtd avg for by
c capacities per wigpin vol-1
17 y1989 0 .93
bpthrr 1 scheduled maintenance pattern 4-8-4 wks for unit 1,
c 4-4-8 for units 2-4 per wigpin vol-1 avg. rates over units
4 .077 .103 .096 .096 .115
.096 .096 .115 .096 .115
.115
bpthrm 1
9 'omth'
bpthrc 1
9 'ngas'
c
c ---bang pakong 1-2 combined cycle
bpccm 1 pdp 90-01: min cap per wigpin vol-1: assumed 3 bks at equal
c capacity increments
17 y1989 280 520 760
y2003 140 260 380
y2004 0 0 0
bpccnu 1
17 y1989 2
y2003 1
y2004 0
bpcchr 1 based on wigpin vol-1 quadratic fit wtd avg by capacities
17 y1989 13612 6304 7408
bpccfr 1 assumed all outages at last block
17 y1989 0 0 .95
bpccrr 1 scheduled maintenance 4 wks for units 1-2 per wigpin vol-1
2 .077
bpccrm 1
9 'omcc'
bpccrc 1
9 'ngas'
c
c ---rayong 1-4, bang pakong 3-4, 4 khanom 1 combined cycle
ryccm 1 pdp 90-01: min cap per wigpin vol-1:
assumed 3 bks at equal capacity increments except last
17 y1989 0 0 0
y1990 240 428 614
y1991 480 856 1230
y1992 600 1070 1538
y1994 720 1284 1846
y1995 840 1494 2146
ryccm90 cancel khanom #1 cc
17 y1989 0 0 0
y1990 240 428 614
y1991 480 856 1230
y1992 600 1070 1538
y1994 720 1284 1846
ryccnu 1
17 y1989 0
y1990 2
y1991 4
y1992 5
y1994 6
y1995 7
ryccnu90
17 y1989 0
y1990 2
y1991 4
y1992 5
y1994 6
rycchr 1 based on wigpin vol-1 quadratic fit
17 y1989 10970 5160 6006
ryccfr 1 assumed all outages at last block: per wigpin vol-1
17 y1989 0 0 .96
ryccrr 1 scheduled maintenance pattern 4-4-6 wks per wigpin vol-1
4 .077 .077 .108 .083 .077
.104 .088 .077 .104 .088
.077 .104 .088 .077 .104
.088
ryccrm 1
9 'omcc'
ryccrc 1
9 'ngas'
c
c ---nam phong units 1-2 combined cycle
nnpqcm 1 pdp 90-01: min cap per wigpin vol-1: assumed 3 bks at equal
c capacity increments
17 y1989 0 0 0
y1991 140 248 355
y1995 280 496 710
nnpqcm90 cancel nam phong unit 2 cc
17 y1989 0 0 0
y1991 140 248 355
nnpqnu 1
17 y1989 0
y1991 1
y1995 2

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```

nmpqnu90
17 y1989 0
   y1991 1
nmpqhr 1 based on wigpin vol-1 88-02 (heat rate curve of "new cd #1-3")
17 y1989 10092 5403 6371
nmpqfr 1 assumed all outages at last block; wtd avg for by
c capacities per wigpin vol-1.
17 y1989 0 0 .95
nmpqmr 1 scheduled maintenance 4-4-4 was per wigpin vol-1 88-02
4
.077 .077 .115 .077 .077
.096 .096 .077 .096 .096
.077 .096 .096 .077 .096
.096

nmpqom 1
9 'omca'
nmpqfc 1
9 'nqaa'
c
c ---lignite/coal units
c
c ---gas mch units 1-7 (small)
nmpocm 1 pdp 90-01; min cap per wigpin vol-1; assumed 3 bks at equal
c capacity increments
17 y1989 130 425
   y2004 270 675
   y2006 240 600
nmpomu 1
17 y1989 7
   y2004 5
   y2006 4
nmpohr 1 based on wigpin vol-1 quadratic fit; wtd by capacity
17 y1989 14282 7050
   y2004 13668 7028
   y2006 13797 6992
nmpofr 1 per wigpin vol-1; assumed all outages at last block
17 y1989 0 .944
nmpomr 1 scheduled maintenance pattern wtd by capacity per wigpin vol-1
4
.084 .094 .091 .084 .094
.091 .084 .094 .091 .084
.094 .091 .084 .094 .091
.084
nmpoom 1
9 'omch'
nmpofc 1
9 'liqm'
c
c ---gas mch units 8-11 & lampang units 1-4
nmpocm 1 pdp 90-01; min cap per wigpin vol-1; assumed 3 bks at equal
c capacity increments
17 y1989 120 210 300
   y1991 240 420 600
   y1992 480 840 1200
   y1993 400 1050 1500
   y1996 840 1470 2100
   y1997 960 1680 2400
nmpocn90 cancel lampang unit 1
17 y1989 120 210 300
   y1991 240 420 600
   y1992 480 840 1200
   y1996 720 1260 1800
   y1997 840 1470 2100
nmpocn91 cancel lampang unit 4
17 y1989 120 210 300
   y1991 240 420 600
   y1992 480 840 1200
   y1993 600 1050 1500
   y1996 840 1470 2100
nmpocn92 cancel lampang unit 1 & 2
17 y1989 120 210 300
   y1991 240 420 600
   y1992 480 840 1200
   y1996 600 1050 1500
   y1997 720 1260 1800
nmpocn93 cancel lampang unit 1 - 3
17 y1989 120 210 300
   y1991 240 420 600
   y1992 480 840 1200
   y1993 600 1050 1500
nmpocn94 cancel lampang unit 2 - 4
17 y1989 120 210 300
   y1991 240 420 600
   y1992 480 840 1200
   y1993 600 1050 1500
nmpocn95 cancel lampang unit 1 - 4
17 y1989 120 210 300
   y1991 240 420 600
   y1992 480 840 1200
   y1993 600 1050 1500
nmpocn96 cancel lampang unit 3 & 4
17 y1989 120 210 300
   y1991 240 420 600
   y1992 480 840 1200
   y1993 600 1050 1500
   y1996 720 1260 1800
nmpohu 1
17 y1989 1
   y1991 2
   y1992 4
   y1993 5
   y1996 7

nmpnu90
17 y1989 1
   y1991 2
   y1992 4
   y1996 6
   y1997 7
nmpnu91
17 y1989 1
   y1991 2
   y1992 4
   y1993 5
   y1996 7
nmpnu92
17 y1989 1
   y1991 2
   y1992 4
   y1996 5
   y1997 6
nmpnu93
17 y1989 1
   y1991 2
   y1992 4
   y1997 5
nmpnu94
17 y1989 1
   y1991 2
   y1992 4
   y1993 5
nmpnu95
17 y1989 1
   y1991 2
   y1992 4
nmpnu96
17 y1989 1
   y1991 2
   y1992 4
   y1993 5
   y1996 6
nmpnr 1 based on wigpin vol-1 quadratic fit
17 y1989 13391 6279 7269
nmpfr 1 per wigpin vol-1; assumed all outages at last block;
17 y1989 0 0 917
nmpwr 1 scheduled maintenance pattern 4-4-4 was for gas mch 8,
c 6-4-4 for 9, and 4-4-4 for 10-11 & lampang 1-4
per wigpin vol-1 88-02
4
.096 .077 .087 .096 .085
.082 .091 .091 .087 .091
.091 .087 .091 .091 .087
.091
nmpom 1
9 'omch'
nmpfc 1
9 'liqm'
c
c ---erabi units 1 & 3
nmpocm 1 pdp 90-01; min cap per wigpin vol-1; assumed 2 bks
17 y1989 14 34
   y1996 0 0
nmpohu 1
17 y1989 2
nmpohr 1 based on wigpin vol-1 quadratic fit
17 y1989 18439 8384
nmpofr 1 assumed all outages at last block; wtd avg for by
c capacities per wigpin vol-1
17 y1989 0 .95
nmpomr 1 scheduled maintenance pattern 6-4-4 was units 1 & 3
4
.077 .115 .077 .077 .077
nmpocm 1
9 'omch'
nmpofc 1 assumed min pun lignite resource
9 'liqm'
c
c ---saba vol units 1-3
nmpocm 1 pdp 90-01; min cap per wigpin vol-1; assumed 2 bks
17 y1989 0 0 0
   y1990 120 210 300
   y1999 240 420 600
   y2002 360 630 900
nmpocm90 cancel unit 1
17 y1989 0 0 0
   y1999 120 210 300
   y2002 240 420 600
nmpocm91 defer unit 1 two years
17 y1989 0 0 0
   y1999 120 210 300
   y2000 240 420 600
   y2002 360 630 900
nmpocm92 defer unit 1 three years
17 y1989 0 0 0
   y1999 120 210 300
   y2001 240 420 600
   y2002 360 630 900
nmpocm93 defer unit 1 four years
17 y1989 0 0 0
   y1999 120 210 300
   y2002 360 630 900
nmpocm94 cancel units 1 & 2
17 y1989 0 0 0
   y2002 120 210 300
nmpocm95 cancel units 1 - 3

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```

17 y1989 0 0 0
sbyonu 1
17 y1989 0
y1999 1
y1999 2
y2002 3
sbyonu90
17 y1989 0
y1999 1
y2002 2
sbyonu91
17 y1989 0
y1999 1
y2000 2
y2002 3
sbyonu92
17 y1989 0
y1999 1
y2001 2
y2002 3
sbyonu93
17 y1989 0
y1999 1
y2002 3
sbyonu94
17 y1989 0
y2002 1
sbyonu95
17 y1989 0
sbyonu 1 based on wigpin vol-1 quadratic fit
17 y1989 12935 6062 7016
sbyofr 1 assumed all outages at last block; wigpin vol-1
17 y1989 0 0 .95
sbyomr 1 scheduled maintenance pattern 4-4-6 wks per wigpin vol-1
4
0 0 0 0 0
0 0 .077 .077 .096
.096 .077 .090 .103 .077
.090
sbyoom 1
9 'omth'
sbyofc 1
9 'ligy'
c
---lampg units 5-7
c
lampqm 1 pdp 90-01: min cap per wigpin vol-1; assumed 3 bikes
17 y1989 0 0 0
y1999 120 285 450
y2001 160 855 1350
lampqm90 cancel unit 5
17 y1989 0 0 0
y2001 240 570 900
lampqm91 cancel unit 5 - 6
17 y1989 0 0 0
y2001 120 285 450
lampqm92 cancel unit 5 - 7
17 y1989 0 0 0
lampqnu 1
17 y1989 0
y1999 1
y2001 3
lampqnu90
17 y1989 0
y2001 2
lampqnu91
17 y1989 0
y2001 1
lampqnu92
17 y1989 0
lampqhr 1 assumed curve same as max moh 8-11
17 y1989 13191 6692 8507
lampqfr 1 per wigpin vol-1; assumed all outages at last block;
17 y1989 0 0 .917
lampqmr 1 scheduled maintenance pattern 4-4-6 wks per wigpin vol-1
4
0 0 0 0 0
0 0 0 .077 .077
.090 .077 .103 .090 .077
.103
lampqum 1
9 'omth'
lampqfc 1
9 'ligm'
c
---sin pun units 1-2
c
sinpcw 1 pdp 90-01 (modeled as arab unit 4 of pdp 88-02)
17 y1989 0 0
y2006 60 150
sinpnu 1
17 y1989 0
y2006 2
sinpnr 1 based on wigpin vol-1 quadratic fit
17 y1985 14464 7320
sinpfr 1
17 y1989 0 .95
sinpnr 1
2 .077
sinpum 1
9 'omth'
sinpfc 1
9 'ligp'
c
---so phai units 1-4 (coal)

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aopcm 1 pdp 90-01: min cap per wigpin vol-1; assumed 4 bikes
17 y1989 0 0 0
y1998 240 393 546 700
y1999 480 786 1092 1400
y2002 720 1179 1638 2100
y2003 960 1572 2184 2800
aopcm90 cancel unit 1
17 y1989 0 0 0
y1999 240 393 546 700
y2002 480 786 1092 1400
y2003 720 1179 1638 2100
aopcm91 cancel unit 1 & 2
17 y1989 0 0 0
y2002 240 393 546 700
y2003 480 786 1092 1400
aopinu 1
17 y1985 0
y1998 1
y1999 2
y2002 3
y2003 4
aopinu90
17 y1989 0
y1999 1
y2002 2
y2003 3
aopinu91
17 y1989 0
y2002 1
y2003 2
aopihr 1 based on wigpin vol-1 quadratic fit
17 y1989 12967 6029 6855 7694
aopifr 1 assumed all outages at last block; per wigpin vol-1
17 y1989 0 0 0 .95
aopimr 1 scheduled maintenance pattern 4-4-8 wks per wigpin vol-1
4
0 0 0 0 0
0 0 .077 .077 .115
.115 .077 .096 .115 .096
.096
aopiom 1
9 'omth'
aopifc 1
9 'coal'
c
c
lqclom 1 new thermal units 1-5 (assumed coal)
17 y1989 0 0 0 0
y2003 140 573 766 1000
y2004 720 1146 1572 2000
y2005 1080 1719 2358 3000
y2006 1800 2865 3930 5000
lqclnu 1
17 y1989 0
y2003 1
y2004 2
y2005 3
y2006 5
lqclhr 1 based on wigpin vol-1 quadratic fit
17 y1989 12674 6245 7695 9045
lqclfr 1 assumed all outages at last block; per wigpin vol-1
17 y1989 0 0 0 .95
lqclmr 1 4-4-8 per wigpin vol-1
4
0 0 0 0 0
0 0 0 0 0
0 0 .077 .077 .103
.092
lqclom 1
9 'omth'
lqclfc 1
9 'coal'
c
c
---gas turbines
c
lqqtcp 1 lan grabu qt units 1-7 per pdp 90-01
17 y1989 126
y2000 0
lqqtnu 1
17 y1989 7
y2000 0
lqqttr 1 wtd avg hr by capacities per wigpin vol-1
17 y1989 15695
lqqtfr 1 wtd avg for by capacities per wigpin vol-1
17 y1989 042
lqqtmr 1 scheduled maintenance 4 wks per wigpin vol-1
2 .077
lqqtom 1
9 'omgt'
lqqtfc 1
9 'ngas'
c
c
nwqtcp 1 new gas turbine units 1-5 per pdp 90-01
17 y1989 0
y1996 370
nwqtcp90 add 100 mw qt in 1999 for loip maintenance
17 y1989 0
y1996 370
y1999 470
nwqtcp91 add 100 mw qt in 1995 for loip maintenance

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17 y1989 0
y1993 100
y1996 470
nwgtcp52 add 100 mw qt in 1997 for loip maintenance
17 y1989 0
y1996 370
y1997 470
nwgtcp53 add 135 mw qt in 1998 for loip maintenance
17 y1989 0
y1996 370
y1998 503
nwgtcp54 add 200 mw qt in 2000 for loip maintenance
17 y1989 0
y1996 370
y2000 570
nwgtcp55 add 200 mw qt in 1995 for loip maintenance
17 y1989 0
y1993 200
y1996 570
nwgtcp56 add 200 mw qt in 1996 for loip maintenance
17 y1989 0
y1996 570
nwgtcp57 add 200 mw qt in 1997 for loip maintenance
17 y1989 0
y1996 370
y1997 570
nwgtcp58 add 35 mw qt in 2000 for loip maintenance
17 y1989 0
y1996 370
y2000 405
nwgtcp60 add 300 mw qt in 2000 for loip maintenance
17 y1989 0
y1996 370
y2000 670
nwgtcp61 add 300 mw qt in 1995 for loip maintenance
17 y1989 0
y1993 300
y1996 670
nwgtcp62 add 400 mw qt in 1995 for loip maintenance
17 y1989 0
y1993 400
y1996 770
nwgtcp70 add 600 mw qt in 1995 for loip maintenance
17 y1989 0
y1993 600
y1996 970
nwgtcp71 add 700 mw qt in 1995 for loip maintenance
17 y1989 0
y1993 700
y1996 1070
nwgtcp72 add 700 mw qt in 1996 for loip maintenance
17 y1989 0
y1996 1070
nwgtcp73 add 500 mw qt in 1995 for loip maintenance
17 y1989 0
y1993 500
y1996 870
nwgtcp74 add 500 mw qt in 1996 for loip maintenance
17 y1989 0
y1996 870
nwgtcp75 add 800 mw qt in 1998 for loip maintenance
17 y1989 0
y1996 1170
nwgtcp76 add 300 mw qt in 1996 for loip maintenance
17 y1989 0
y1996 1270
nwgtcp77 add 1000 mw qt in 1996 for loip maintenance
17 y1989 0
y1996 1370
nwgtcp78 add 1000 mw qt in 1998 for loip maintenance
17 y1989 0
y1996 370
y1998 1370
nwgtcp80 add 100 mw qt in 1995, 100 mw in 2000 for loip maintenance
17 y1989 0
y1993 300
y1996 670
y2000 770
nwgtcp81 add 300 mw qt in 1995, 100 mw in 2000, 100 mw in 2001
for loip maintenance
17 y1989 0
y1993 300
y1996 670
y2000 770
y2001 870
nwgtcp82 add 100 mw qt in 1996, 100 mw in 2000 for loip maintenance
17 y1989 0
y1996 670
y2000 770
nwgtcp83 add 200 mw qt in 1995, 100 mw in 1996, 100 mw in 1997
17 y1989 0
y1993 200
y1996 670
y1997 770
nwgtcp84 add 100 mw qt in 1995, 100 mw in 1996, 100 mw in 2004
17 y1989 0
y1993 100
y1996 770
y2004 870
nwgtcp85 add 100 mw qt in 1997, 35 mw in 2001
17 y1989 0
y1996 370
y1997 470

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y2001 503
nwgtcp86 add 300 mw qt in 1996, 300 in 2001
17 y1989 0
y1996 670
y2001 970
nwgtcp87 add 200 mw qt each in 1996, 1998, 2000, 2002
17 y1989 0
y1996 370
y1998 770
y2000 970
y2002 1170
nwgtcp88 add 500 mw qt in 1998, 500 mw in 2001
17 y1989 0
y1996 370
y1998 870
y2001 1370
nwgtcnu 1
17 y1989 0
y1996 5
nwgtcnu50
17 y1989 0
y1996 5
y1999 6
nwgtcnu51
17 y1989 0
y1996 6
nwgtcnu52
17 y1989 0
y1996 5
y1997 6
nwgtcnu53
17 y1989 0
y1996 5
y1998 7
nwgtcnu54
17 y1989 0
y1996 5
y2000 7
nwgtcnu55
17 y1989 0
y1993 2
y1996 7
nwgtcnu56
17 y1989 0
y1996 7
nwgtcnu57
17 y1989 0
y1996 5
y1997 7
nwgtcnu58
17 y1989 0
y1996 5
y2000 6
nwgtcnu60
17 y1989 0
y1996 5
y2000 8
nwgtcnu61
17 y1989 0
y1993 3
y1996 8
nwgtcnu62
17 y1989 0
y1993 4
y1996 9
nwgtcnu70
17 y1989 0
y1993 6
y1996 11
nwgtcnu71
17 y1989 0
y1993 7
y1996 12
nwgtcnu72
17 y1989 0
y1996 12
nwgtcnu73
17 y1989 0
y1993 5
y1996 10
nwgtcnu74
17 y1989 0
y1996 10
nwgtcnu75
17 y1989 0
y1996 5
y1998 13
nwgtcnu76
17 y1989 0
y1996 14
nwgtcnu77
17 y1989 0
y1996 15
nwgtcnu78
17 y1989 0
y1996 5
y1998 15
nwgtcnu80
17 y1989 0
y1993 3
y1996 8
y2000 9
nwgtcnu81
y2000 9

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17 y1989 0
y1995 5
y1996 6
y2000 9
y2003 10
nwqtnu#2 17 y1989 0
y1996 6
y2000 9
nwqtnu#3 17 y1989 0
y1995 2
y1996 6
y1997 9
nwqtnu#4 17 y1989 0
y1995 1
y1996 9
y2004 10
nwqtnu#5 17 y1989 0
y1996 5
y1997 6
y2001 7
nwqtnu#6 17 y1989 0
y1996 8
y2001 11
nwqtnu#7 17 y1989 0
y1996 7
y1998 9
y2000 11
y2002 13
nwqtnu#8 17 y1989 0
y1996 5
y1998 10
y2001 15
nwqtncr 1 per wlgpin vol-1.
4 14015
nwqtncf 1 wtd avg for by capacities per wlgpin vol-1
4 .345
nwqtncr 1 scheduled maintenance 4 wks per wlgpin vol-1.
2 .077
nwqtcsm 1
9 'omgt'
nwqtcfco 1
9 'ngas'
c
c ---diesel units
c
c
c
develop 1 nakorn ratchasima unit 1, udon thani unit 1,
nat yal units 1-3, surat thani units 3-5 per pdp 90-01
17 y1989 112
y1994 84
jseinu 1 17 y1989 8
y1994 6
jseincr 1 per wlgpin vol-1
2 17064
jseicfr 1 wtd avg for by capacities per wlgpin vol-1
2 04
jseincr 1
2 .077
jselow 1
9 'omsd'
jseilfc 1 assumed use of natural gas since no diesel fuel cost data
9 'ngas'
c
c
c ---purchased energy
c
c
c ---laos purchases
causcp 1 annual (as highest monthly reading) cap avg'd over '81-'87
17 y1989 98
causte 1 avg annual energy tax over '81-'87
17 y1989 684
caucft 1
2 0
caocmr 1
2 0
c
c ---hydro units
c
c
c ---total hydro less erinagarind 4-5, phumibol 8
hydnrc 1 dry hydro year -- per pdp 90-01, wlgpin vol-1.
internal eqat hydo data 90% exceedence levels:
see exceed.xls for accumulations
90% exceedence levels: see exceed xls for accumulations
24 y1989 1962 1943 1918 1779 1705 1680
1678 1748 1650 2004 2028 2004
c addition of pak mun 1-4
y1994 2028 1985 1970 1822 1759 1767
1754 1799 1930 2072 2111 2081
c addition of sirikit 4, lower sirikit, saeng krung
y1995 2210 2163 2135 2002 1944 1954

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1939 1961 2122 2273 2283 2272
a addition of mae taeng
y1997 2236 2189 2141 2028 1970 1980
1965 1987 2140 2129 2309 2290
a addition of sai buri
y1980 2245 2198 2170 2037 1979 1989
1973 1995 2157 2307 2317 2312
a addition of mae lama luang 1-3, nam ngao 1-2, mae kok 1-2
y2000 2457 2407 2468 2468 2411 2459
2405 2427 2588 2739 2749 2744
a addition of nam khok 1-2
y2003 2788 2741 2712 2571 2511 2506
2503 2530 2699 2850 2860 2855
hydrho 2 average hydro year -- per pdp 90-01, wlgpin vol-1,
c internal eqat hydro data 50% exceedence levels:
c see exceed.xls for accumulations
24 y1989 2179 2175 2058 2116 2083 2061
2066 2063 2154 2193 2201 2196
y1994 2225 2187 2150 2159 2137 2148
2122 2134 2198 2241 2284 2273
y1995 2416 2376 2328 2347 2330 2344
2319 2310 2398 2473 2463 2472
y1997 2442 2402 2354 2373 2356 2370
2243 2236 2424 2499 2491 2494
y1998 2454 2421 2366 2387 2365 2379
2334 2345 2355 2509 2516 2535
y2000 2486 2457 2798 2813 2790 2794
2783 2775 2865 2941 2948 2967
y2003 2997 2954 2909 2924 2901 2909
2894 2886 2981 3059 3066 3078
hydrho 3 wet hydro year -- per pdp 90-01, wlgpin vol-1,
c internal eqat hydro data 10% exceedence levels:
c see exceed.xls for accumulations
24 y1989 2214 2214 2176 2121 2095 2082
2085 2119 2194 2237 2240 2240
y1994 2260 2222 2164 2217 2219 2219
2141 2170 2238 2305 2323 2317
y1995 2451 2445 2406 2352 2345 236A
2360 2340 2440 2517 2504 2516
y1997 2477 2471 2432 2378 2371 2394
2386 2374 2466 2543 2530 2542
y1998 2507 2492 2447 2390 2384 2406
2400 2389 2483 2533 2559 2591
y2000 2939 2897 2821 2809 2825 2825
2829 2819 2915 3005 2991 3023
y2003 3050 3035 2990 2932 2920 2936
2940 2937 3033 3123 3109 3134
hydrhm 1 zero run-of-river capacity per mar 88 eqat memo
24 y1989 0 0 0 0 0 0
0 0 0 0 0 0
c hydrhm 2 implied capacity remaining beyond 20% capacity factor:
c see eqatdryr.xls (needs to be updated to 88-02)
24 y1986 0 62 0 38 174 364
360 118 68 148 0 0
c y1994 5 89 27 0 42 176 361
360 118 82 173 7 24
hydrhm 1 dry hydro year -- per pdp 90-01, wlgpin vol-1,
c internal eqat hydro data 90% exceedence levels:
c see exceed.xls for accumulations
24 y1989 280 284 376 511 353 250
369 267 251 278 324 302
y1994 286 289 359 516 359 261
393 297 278 321 359 318
y1995 304 305 398 535 378 278
410 317 295 337 375 333
y1997 308 308 401 538 382 285
419 325 309 356 384 339
y1998 315 314 408 544 388 291
425 331 315 362 390 349
y2000 381 377 469 601 438 339
480 400 396 487 461 451
y2003 389 393 481 618 457 358
500 421 417 468 481 434
hydrhm 2 average hydro year -- per pdp 90-01, wlgpin vol-1,
c internal eqat hydro data 50% exceedence levels:
c see exceed.xls for accumulations
24 y1989 447 491 669 714 491 446
456 324 293 277 342 322
y1994 455 496 674 719 497 458
479 355 320 321 371 359
y1995 471 514 692 718 517 474
496 375 337 336 392 354
y1997 475 417 694 741 521 481
505 382 351 355 401 359
y1998 484 530 703 747 527 487
512 389 357 363 419 387
y2000 547 591 761 801 576 516
592 511 515 482 492 451
y2003 565 607 774 819 595 555
614 536 598 536 610 449
hydrhm 3 wet hydro year -- per pdp 90-01, wlgpin vol-1,
c internal eqat hydro data 10% exceedence levels:
c see exceed.xls for accumulations
24 y1989 451 497 678 650 509 489
821 818 848 454 594 557
y1994 459 502 683 655 514 500
845 869 875 497 625 574
y1995 474 520 700 674 533 514
862 894 910 539 674 593
y1997 478 523 703 677 537 523
871 801 924 558 683 598
y1998 500 537 714 686 547 532
882 912 936 580 704 635

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y2000 564 598 722 740 597 581
      869 1053 1074 713 779 699
y2003 582 615 790 758 616 601
      993 1141 1159 752 797 717

hydrom 1
  9 'hydo'

a
a ---pumped storage (erinagarin unit 4-5)
pscap 1 pdp 90-01; per wipgin vol-1
  17 y1989 140
     y1991 360
psuff 1 per wipgin vol-1
  2 .475
pres 1 expected ps generation per wipgin vol-1
  24 y1989 22 20 22 22 22 22
     22 22 22 22 22 22
     y1991 27 20 22 22 31 32
     30 30 36 40 40 40

a
a ---pumped storage (bhumail unit 8)
pscap2 1 pdp 90-01; per wipgin vol-1
  17 y1989 0
     y1995 175
psuff2 1 per wipgin vol-1
  2 .700
pres2 1 per wipgin vol-1
  24 y1989 0 0 0 0 0 0
     0 0 0 0 0 0
     y1995 22 20 22 21 22 21
     22 22 21 22 21 22

a
a ---pumped storage (iam takhong unit 1-4)
pscap3 1 pdp 90-01; per wipgin vol-1
  17 y1989 0
     y1997 600
psuff3 1 per wipgin vol-1
  2 .743
pres3 1 per wipgin vol-1 (retained as new chern 1-4 of pdp 88-02)
  24 y1989 0 0 0 0 0 0
     0 0 0 0 0 0
     y1997 17 69 77 74 77 74
     17 17 74 74 74 74

a
a ---conservation (commercial buildings)

consim 1 no conservation
  19 y1989 mon 0 0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0
  19 y1989 mon 0 0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0

consim1 high efficiency, 100% penetration (see consim2 1a)
  19 y1989 mon 121 121 114 108 108 126 195 229
     301 411 429 442 472 452 457 452
     436 433 379 293 236 187 153 147
  y1992 mon 134 134 126 119 119 139 219 257
     339 460 480 493 527 505 511 505
     487 481 420 325 262 208 170 163
  y1993 mon 146 146 138 130 130 152 243 283
     372 505 526 543 578 553 560 553
     534 526 459 356 286 227 185 177
  y1994 mon 159 159 150 142 142 165 263 308
     406 532 576 594 632 635 612 605
     584 575 502 388 312 247 202 193
  y1995 mon 171 171 162 153 153 178 285 334
     441 600 626 646 688 658 666 658
     635 625 546 421 338 267 218 209
  y1996 mon 185 185 175 165 165 192 308 362
     477 652 680 701 747 715 723 715
     689 678 592 455 364 288 235 225
  y1997 mon 198 198 185 175 175 204 329 386
     510 700 731 753 803 768 777 768
     740 728 636 486 403 306 249 239
  y1998 mon 208 208 197 186 186 216 352 413
     545 753 786 810 864 826 836 826
     795 782 683 519 416 325 264 253
  y1999 mon 221 221 209 197 197 230 374 441
     583 809 844 871 928 888 899 888
     854 840 733 555 445 345 281 269
  y2000 mon 233 233 220 208 208 243 401 469
     621 867 906 934 996 951 964 953
     915 900 786 590 473 365 296 284
  y2001 mon 246 246 233 220 220 256 419 492
     650 918 960 989 1057 1011 1023 1011
     971 960 838 625 501 381 313 300

consim2 high efficiency, 50% penetration (see consim2 1a)
  19 y1989 mon 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0
  y1991 mon 5 5 5 5 5 6 10
     14 19 19 20 21 21 21 21
     20 20 17 13 11 9 7 7
  y1992 mon 12 12 11 11 11 13 20 23
     31 42 44 45 48 46 46 46
     44 44 38 30 24 15 15 15
  y1993 mon 20 20 19 18 18 21 33 39
     51 69 72 74 79 75 76 75
     73 72 63 49 39 31 25 24
  y1994 mon 29 29 27 26 26 30 48 56
     74 100 103 108 115 110 111 110

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	106	104	71	71	57	45	37	35	
y1985 man	39	39	37	35	35	41	45	36	
	100	136	142	147	156	150	151	150	
	144	142	124	96	77	61	49	47	
y1986 man	50	50	46	45	45	52	44	39	
	130	178	185	191	204	195	197	195	
	188	185	161	124	100	78	64	61	
y1987 man	62	62	59	58	56	65	105	123	
	162	223	232	240	255	244	247	244	
	232	232	202	155	122	97	79	76	
y1988 man	74	74	71	67	67	79	128	150	
	190	274	286	295	314	300	304	300	
	289	284	248	189	151	118	96	92	
y1989 man	90	90	85	81	81	94	154	180	
	238	331	345	356	380	363	368	363	
	349	344	300	227	182	141	115	110	
y2000 man	104	104	100	94	94	110	182	213	
	282	394	412	424	453	433	416	433	
	414	409	357	286	215	166	130	129	
y2001 man	123	123	116	110	110	128	210	246	
	325	459	480	495	528	506	512	506	
	485	480	419	312	251	192	156	150	
consam13 high efficiency, 10% penetration (see consam2 k1a)									
19 y1989 man	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	
y1991 man	1	1	1	1	1	2	2		
	3	4	4	4	4	4	4		
	4	4	3	2	2	1	1		
y1992 man	2	2	2	2	2	3	5		
	6	6	5	9	10	9	9		
	9	9	8	6	5	4	3		
y1993 man	4	4	4	4	4	7	8		
	10	14	14	15	16	15	15		
	15	14	13	10	8	5	5		
y1994 man	6	6	5	5	6	10	11		
	15	20	21	22	23	22	22		
	21	21	19	14	11	9	7		
y1995 man	8	8	7	7	7	8	13		
	20	27	28	29	31	30	30		
	29	28	25	19	15	12	10		
y1996 man	10	10	10	9	9	10	17		
	26	36	37	38	41	39	39		
	38	37	32	25	20	16	13		
y1997 son	12	12	12	11	11	13	21		
	40	46	46	48	51	49	49		
	47	46	40	31	25	19	16		
y1998 man	15	15	14	13	13	16	26		
	40	55	57	59	63	60	61		
	58	57	50	38	30	24	19		
y1999 man	18	18	17	16	16	19	31		
	48	66	69	71	76	73	74		
	70	69	60	45	38	28	23		
y2000 man	21	21	20	19	19	22	36		
	34	42	42	43	46	47	48		
	83	82	71	54	43	33	27		
y2001 man	25	25	23	22	22	26	42		
	65	82	86	99	106	101	102	101	
	97	96	84	62	50	38	31	30	
consam21 building energy standard, 100% penetration (see consam2 k1a)									
19 y1989 man	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	
y1991 man	82	82	76	69	69	88	115	141	
	190	273	299	304	331	309	319	304	
	293	308	270	195	156	126	102	102	
y1992 man	91	91	84	77	77	98	129	158	
	214	305	334	339	369	344	350	344	
	327	341	299	217	173	140	113	113	
y1993 man	99	99	91	83	83	106	142	173	
	235	334	366	372	404	377	384	377	
	358	373	328	237	189	155	123	123	
y1994 man	108	108	100	91	91	114	155	189	
	256	365	400	407	442	413	422	413	
	392	408	358	259	204	167	134	134	
y1995 man	116	116	107	98	98	125	166	205	
	278	390	435	443	481	449	457	449	
	426	444	389	280	223	180	145	145	
y1996 man	126	126	116	106	106	135	181	222	
	301	432	473	481	522	488	496	488	
	462	482	423	303	241	194	156	156	
y1997 son	133	133	123	112	112	143	194	237	
	321	464	508	517	561	524	533	524	
	497	517	454	323	257	207	166	166	
y1998 man	141	141	130	119	119	154	207	251	
	343	498	546	556	604	564	574	564	
	534	556	488	345	274	220	176	176	
y1999 man	150	150	139	127	127	162	221	272	
	367	536	587	597	649	606	617	606	
	574	598	524	369	293	231	187	187	
y2000 man	158	158	146	134	134	174	235	287	
	390	574	630	641	697	650	662	650	
	615	641	562	392	311	247	198	198	
y2001 man	168	168	155	141	141	180	247	301	
	409	609	669	681	740	691	703	691	
	634	665	600	415	329	260	209	209	
consam22 building energy standard, 54% penetration (see consam2 k1a)									
19 y1989 man	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	
y1991 man	4	4	4	3	3	4	7		
	9	13	13	15	16	15	15		
	14	15	13	10	8	6	5		

[illegible]

consim31 load-shifting		30	21	18	12	10	8	6	4			
19 y1989 mon	(tee),	100%	penetration (see consim22.kis)									
	0	0	0	0	0	0	0	0	0			
	0	0	0	0	0	0	0	0	0			
	0	0	0	0	0	0	0	0	0			
y1991 mon	-176	-182	-169	-109	-77	-83	12	15				
	42	93	112	117	95	96	99	78				
	88	-31	-21	-121	-148	-170	-176	-163				
y1992 mon	-198	105	-190	-121	-85	-91	15	28				
	49	104	124	132	107	108	112	87				
	96	-39	-24	-138	-168	-191	-198	-144				
y1993 mon	-218	+226	-208	-132	-94	-100	17	22				
	55	116	139	146	118	118	123	66				
	108	-43	-30	-152	-185	-210	-218	-202				
y1994 mon	-239	-247	-228	-145	-102	-111	19	24				
	60	127	132	159	129	129	134	103				
	118	-46	-32	-167	-203	-230	-239	-221				
y1995 mon	-260	-269	-248	-158	-112	-120	20	26				
	61	136	166	173	141	141	146	115				
	128	-32	-35	-181	-221	-251	-260	-241				
y1996 mon	-283	-293	-270	-172	-122	-131	22	27				
	70	151	180	189	153	153	159	125				
	139	-56	-38	-197	-240	-273	-283	-262				
y1997 mon	-305	-316	-291	-184	-132	-142	23	29				
	74	162	194	203	165	165	171	134				
	150	-60	-41	-212	-259	-295	-305	-283				
y1998 mon	-329	-340	-314	-200	-143	-154	24	30				
	79	165	200	219	178	178	185	145				
	151	-65	-44	-229	-279	-319	-329	-308				
y1999 mon	-355	-367	-338	-216	-155	-167	24	30				
	83	188	225	235	192	192	199	156				
	173	-69	-47	-245	-300	-343	-355	-330				
y2000 mon	-382	-395	-364	-232	-167	-181	25	31				
	88	202	242	253	207	206	214	168				
	186	-74	-50	-264	-323	-370	-382	-356				
y2001 mon	-404	-417	-385	-250	-180	-195	22	28				
	94	211	254	266	218	218	227	179				
	197	-73	-49	-275	-340	-392	-404	-376				
consim32 load-shifting		(tee),	40% penetration (see consim22.kis)									
19 y1989 mon	0	0	0	0	0	0	0	0				
	0	0	0	0	0	0	0	0				
	0	0	0	0	0	0	0	0				
	0	0	0	0	0	0	0	0				
y1991 mon	-6	-7	-6	-4	-3	-1	0	1				
	2	3	4	4	3	3	4	3				
	3	-1	-1	-4	-5	-6	-6	-6				
y1992 mon	-14	4	-15	-14	-9	-6	-1	1				
	4	8	9	10	8	8	6	4				
	7	-3	-2	-10	-12	-14	-14	-13				
y1993 mon	-24	-25	-23	-14	-10	-11	2	2				
	6	13	15	16	13	13						

```

y1999 mon -58 -60 -55 -35 -25 -27 4 5
14 31 37 38 31 31 33 28
20 -11 -8 -40 -49 -56 -58 -54
y2000 mon -70 -72 -68 -62 -30 -33 5 6
16 37 44 46 38 37 39 31
34 -14 -9 -48 -59 -67 -70 -65
y2001 mon -61 -63 -17 -50 -36 -39 4 5
18 42 51 53 44 44 45 36
39 -13 -10 -15 -68 -78 -81 -75

```

conslm41 non-electric cooling (engine chillers), 100% penetration

(see conlsec2.als)

```

c
19 y1999 mon 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
y1991 mon 44 44 77 71 71 83 140 154
170 191 226 234 246 243 253 248
249 197 170 158 124 101 97 97
y1992 mon 93 93 86 78 78 92 158 173
192 215 253 263 275 271 284 277
279 218 188 175 137 111 107 107
y1993 mon 101 101 93 86 86 100 174 190
211 238 278 289 302 298 311 304
304 238 205 191 150 122 117 111
y1994 mon 110 110 102 93 93 109 190 208
231 258 304 315 330 325 340 333
334 260 224 208 164 132 127 127
y1995 mon 119 119 110 100 100 117 204 225
250 280 330 343 359 354 370 362
363 283 244 225 177 143 137 137
y1996 mon 128 128 118 108 108 126 223 244
271 304 358 372 390 384 401 393
394 308 264 244 192 154 148 148
y1997 mon 135 135 125 115 115 134 239 260
290 326 385 400 419 412 431 422
422 328 283 261 204 163 154 156
y1998 mon 144 144 133 122 122 142 255 278
310 350 413 429 430 443 463 453
453 351 303 278 218 173 164 166
y1999 mon 152 152 141 129 129 150 273 297
331 375 444 461 483 476 497 487
486 375 325 298 253 183 174 176
y2000 mon 161 161 148 136 136 158 291 316
353 401 475 494 518 510 533 521
520 403 347 317 248 193 185 185
y2001 mon 169 169 156 143 143 167 304 331
369 422 502 522 548 540 564 552
551 430 371 337 264 204 196 196

```

conslm42 non-electric cooling (engine chillers), 20% penetration

(see conlsec2.als)

```

c
19 y1999 mon 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
y1991 mon 2 2 1 1 1 2 3 3
3 3 4 4 4 4 5 5
5 4 3 3 2 2 2 2
y1992 mon 3 3 3 3 3 3 6 6
10 8 9 10 10 10 10 10
10 8 9 6 5 4 4 4
y1993 mon 6 6 5 5 5 5 9 10
12 13 15 16 16 16 17 17
17 13 11 10 8 7 6 6
y1994 mon 8 8 7 7 7 8 14 15
17 19 22 23 24 24 25 24
24 19 16 15 12 10 9 9
y1995 mon 11 11 10 9 9 11 19 20
23 25 30 31 33 32 34 33
33 26 22 20 16 13 12 12
y1996 mon 14 14 13 12 12 14 24 27
30 33 39 41 43 42 44 43
43 33 29 27 21 17 16 14
y1997 mon 17 17 14 15 15 17 30 33
37 41 49 51 53 52 55 54
54 42 36 33 24 21 20 20
y1998 mon 21 21 19 18 18 21 37 40
45 51 60 62 65 64 67 66
66 51 44 40 32 25 24 24
y1999 mon 25 25 23 21 21 25 45 49
54 61 73 75 79 78 81 80
80 62 51 49 38 30 28 28
y2000 mon 29 29 27 25 25 29 53 58
64 71 86 90 94 93 97 95
95 73 61 58 45 35 34 34
y2001 mon 34 34 31 29 29 33 61 66
74 84 100 104 110 108 113 112
110 86 74 61 53 41 39 39

```

conslm43 no load to eqat

2 2

```

2322 2240 2204 2185 2330 2779 2695 2763
3088 3183 3228 3049 3102 3283 3320 3438
3608 3628 3988 3839 3475 3158 2718 2369
2322 2148 2106 2115 2212 2741 2855 2894
3004 3123 3179 3024 3011 3218 3276 3419
3445 3437 3986 3818 3443 3047 2475 2337
2220 2145 2120 2100 2340 2740 2854 2712
3001 3117 3185 3016 3046 3299 3335 3458
3417 3479 3995 3809 3499 3120 2667 2405
2262 2170 2123 2108 2244 2620 2794 2765
3048 3173 3257 3076 3078 3354 3361 3489
3448 3418 3983 3825 3500 3198 2641 2544
2251 2169 2117 2112 2226 2512 2686 2609
2954 3073 3124 2972 2957 3042 3082 3239
3227 3144 3061 3276 3466 3122 2734 2405

```

we0289 1 eqat week 8-14 Feb 87

```

2384 2304 2242 2202 2272 2457 2572 2358
2494 2587 2626 2598 2567 2621 2651 2757
2879 2951 3076 3378 3399 3069 2615 2350
2175 2126 2088 2577 2259 2703 2682 2791
3232 3377 3468 3862 3329 3567 3552 3632
3647 3514 4120 4065 3756 3445 3021 2612
2356 2337 2307 2302 2421 2852 3014 2886
3267 3419 3508 3290 3357 3581 3557 3632
3668 3577 4186 4127 3853 3491 3050 2624
2467 2793 2388 2353 2462 2967 3045 2954
3388 3513 3617 3446 3323 3638 3677 3759
3719 3566 4222 4117 3875 3520 3136 2714
2569 2449 2424 2423 2491 2779 2735 2942
2665 3072 3136 3024 3027 3150 3167 3203
3191 3238 3929 3890 3846 3323 2898 2580
2381 2343 2250 2234 2364 2810 2978 2940
3335 3500 3580 3384 3410 3721 3716 3753
3771 3620 4235 4170 3843 3542 3191 2918
2554 2677 2610 2404 2464 2786 2880 2876
3245 3353 3447 3329 3260 3431 3429 3510
3505 3436 4161 4025 3808 3501 3121 2760

```

we0289 1 eqat week 8-14 Mar 87

```

2441 2621 2525 2485 2558 2812 2682 2547
2721 2809 2904 2844 2835 2471 2338 2275
3078 3119 3030 3840 3710 3440 3039 2747
2539 2424 2355 2330 2448 2914 2684 3020
3493 3674 3761 3633 3610 3872 3875 3928
3828 3696 4353 4347 4162 3775 3397 2981
2745 2448 2558 2555 2678 3154 3017 3159
3635 3775 3895 3599 3639 3949 3954 3991
3926 3777 4411 4396 4180 3758 3352 2924
2718 2622 2589 2539 2699 3201 3042 3135
3609 3893 3894 3627 3705 3911 3946 3987
3895 3871 4443 4408 4201 3846 3140 2975
2819 2692 2626 2583 2707 3201 3002 3180
3604 3737 3809 3568 3600 3896 3867 3981
3933 3746 4446 4401 4188 3792 3166 2950
2768 2669 2590 2548 2658 3156 2980 3404
3624 3815 3845 3711 3717 3954 3936 3969
3931 3746 4420 4381 4206 3878 3556 3249
2837 2711 2564 2492 2686 3028 2960 3083
3442 3558 3640 3540 3510 3672 3612 3701
3575 3568 4226 4217 4057 3784 3449 3115

```

we0289 1 eqat week 5-11 Apr 87

```

2961 2860 2735 2735 2797 3030 2755 2678
2862 2968 2999 2954 2938 2912 3012 3099
3165 3130 3008 3962 3885 3626 3325 2931
2755 2641 2537 2501 2588 2894 2758 2777
3062 3224 3288 3231 3207 3286 3103 3380
3467 3406 4084 4198 4085 3803 3347 3024
2815 2702 2635 2610 2714 3169 2954 3210
3770 4002 4067 3748 3762 4094 4248 4170
4040 3837 4356 4435 4175 3924 3502 3113
2943 2852 2741 2713 2804 3242 2956 3245
3673 3695 3835 3633 3682 3934 3931 4011
3901 3800 4315 4422 4172 3879 3470 3124
2973 2838 2787 2777 2844 3299 3018 3145
3745 3888 3954 3743 3769 4033 4030 4091
4000 3822 4447 4527 4345 3981 3614 3210
3054 2960 2843 2825 2942 3346 3073 3135
3715 3898 3968 3784 3779 4028 3974 4225
3940 3790 4338 4478 4388 4035 3722 3379
3017 2892 2820 2767 2825 3231 2334 3093
3318 3626 3688 3495 3390 3606 3593 3616
3584 3493 4153 4292 4115 3917 3520 3132

```

we0289 1 eqat week 10-14 May 87

```

2695 2631 2361 2480 2593 2728 2566 2574
2801 2927 2790 2788 2791 2985 2991 3261
3155 3281 3689 3828 3866 3377 3201 2623
2650 2519 2458 2450 2627 2899 2630 2730
2245 3151 3102 2442 3182 3184 3134 3213
3269 3199 3849 4012 3868 3558 3343 2853
2468 2614 2540 2503 2629 3247 3243 3261
3697 3667 3962 3981 3920 3971 3924 4180
3926 3703 4310 4453 4252 3910 3425 3275
3115 3029 2937 2898 3277 3576 2962 3285
3753 3911 3991 3820 3836 4239 4026 4071
3678 3733 4298 4484 4250 3944 3501 3146
2248 2861 2811 2772 2903 3108 3138 3127
3722 3751 3841 3604 3602 3843 3698 3937
3891 3668 4119 4141 3910 3625 3232 2842
2708 2622 2583 2560 2704 3291 2825 3146
3637 3762 3876 3611 3710 3916 3859 3969

```

3680 3671 4159 4328 4179 3682 3631 3684
2769 2684 2653 2601 2729 3072 2781 3045
3489 3586 3757 3527 3534 3659 3695 3729
3640 3533 4031 4270 4163 3688 3694 3142

vx0689 1 eqat week 21-27 Jun 87

2683 2656 2592 2687 2638 2970 2569 2513
2749 2624 2675 2638 2600 2628 2683 2945
3037 3001 3459 3905 3787 3425 3088 2753
2542 2474 2424 2417 2556 3163 2742 3079
3575 3691 3797 3576 3578 3810 3813 3699
3683 3668 3945 4388 4197 3772 3324 2964
2808 2727 2685 2669 2784 3316 2889 3161
3539 3751 3623 3637 3710 3904 3881 3942
3954 3760 3965 4512 4345 3930 3451 3058
2884 2605 2713 2680 2840 3340 2875 3174
3689 3081 3879 3667 3702 3930 3946 3990
3952 3791 4020 4587 4475 4093 3549 3150
2891 2857 2761 2768 2886 3384 2903 3250
3702 3604 3896 3682 3730 3995 3969 4014
3948 3786 4094 4548 4357 3968 3424 3052
2911 2812 2721 2708 2858 3349 2912 3279
3711 3655 3902 3691 3716 3949 3954 4037
3928 3762 4021 4549 4417 4112 3689 3203
3019 2890 2811 2753 2880 3179 2853 3172
3587 3725 3835 3878 3616 3779 3799 3820
3712 3617 3905 4380 4199 3642 3512 3189

vx0789 1 eqat week 28 Jun - 4 Jul 86

2969 2842 2739 2687 2782 2995 2664 2657
2865 2976 3020 2962 2957 2999 3023 3026
3096 3096 3562 4012 3918 3596 3163 2844
2686 2570 2499 2506 2654 3185 2817 3154
3666 3636 3948 3616 3691 3948 3984 4045
3978 3781 4123 4580 4395 3990 3546 3184
2956 2864 2763 2728 2859 3391 2936 3325
3696 3856 2918 3678 3688 3825 3945 4014
3882 3778 4058 4465 4250 3793 3357 3123
2844 2756 2720 2671 2824 3257 2909 3146
3588 3708 3767 3593 3623 3882 3849 3914
3906 3676 4027 4458 4237 3917 3430 3058
2880 2791 2709 2637 2836 3336 2928 3184
3526 3737 3812 3572 3631 3835 3872 3925
3923 3716 4031 4505 4342 3936 3507 3080
2899 2799 2715 2875 2825 3556 3092 3172
3667 3783 3880 3640 3670 3848 3935 3972
3904 3731 3938 4408 4215 3906 3550 3229
2857 2774 2705 2627 2741 3130 2810 3009
3532 3550 3503 3451 3428 3583 3546 3599
3532 3432 3994 4162 4000 3697 3257 2914

vx0889 1 eqat week 9-15 Aug 87

3014 2899 2837 2813 2909 3168 2799 2789
2882 3112 3168 3147 3099 3126 3161 3009
3294 3264 3824 4144 3993 3740 3277 2938
2780 2683 2620 2607 2791 3213 2964 3139
3763 3952 4007 3836 3821 4043 4018 4092
4002 3769 4293 4599 4364 4112 3479 3155
2932 2813 2753 2715 2875 3386 3029 3305
3736 3911 3969 3784 3774 4013 4023 4070
4003 3814 4292 4475 4205 3778 3376 2946
2770 2729 2584 2584 2680 2941 2564 2518
2565 2726 2830 2791 2736 2791 2845 2897
2927 2971 3571 3768 3563 3262 2776 2494
2548 2270 2183 2201 2477 2804 2153 3108
3642 3638 3936 3751 3750 4015 4023 4101
4041 3870 4319 4451 4589 4135 3586 3207
3044 2945 2856 2763 2961 3813 3070 3298
3890 3931 4041 3880 3884 4142 4135 4202
4123 3910 4453 4730 4603 4310 3969 3604
3193 3064 2769 2903 2994 3364 3045 3276
3728 3873 3947 3798 3793 3918 3884 3977
3865 3751 4277 4484 4313 3989 3574 3207

vx0989 1 eqat week 13-19 Sep 87 (peak 14 Sep 87)

2752 2675 2614 2580 2692 2987 2614 2579
2811 2925 3009 2997 2944 2994 3030 3133
3181 3195 3999 4095 3891 3605 3108 2803
2954 2486 2437 2427 2560 3128 2856 3104
3583 3793 3882 3600 3693 3909 3930 4051
4060 3889 4732 4714 4392 4008 3511 3112
2869 2776 2662 2670 2883 3371 3021 3210
3634 3712 3880 3644 3640 3896 3942 4043
3977 3869 4628 4676 4378 3967 3504 3150
2946 2825 2736 2752 2913 3437 3019 3219
3678 3821 3909 3880 3550 3836 3818 3976
3967 3893 4555 4532 4117 3807 3191 2647
2700 2580 2531 2525 2946 3242 2938 3117
3588 3744 3852 3616 3679 3904 3973 4068
4016 3963 4518 4473 4049 3675 3228 2945
2738 2584 2527 2525 2709 3164 2872 3040
3667 3598 3701 3689 3501 3710 3737 3817
3807 3748 4411 4343 3974 3627 3408 2951
2644 2542 2501 2494 2638 3013 2929 3134
3439 3504 3573 3408 3422 3600 3519 3672
3625 3607 4262 4220 3859 3510 3234 2863

vx1289 1 eqat week 19-25 Oct 86

2164 2267 2212 2198 2328 2611 2387 2290
2488 2574 2642 2677 2621 2637 2687 2822
2830 3315 3574 3482 3225 2922 2848 2372
2230 2152 2132 2122 2297 2718 2581 2849
3290 3450 3384 3350 3408 3631 3897 3631

3803 4119 4046 3941 3728 3418 3163 2721
2566 2434 2415 2383 2516 2930 2793 3010
3455 3549 3629 3347 3483 3705 3670 3820
3766 3836 4210 4098 3882 3504 3194 2831
2682 2581 2532 2485 2643 3058 2832 3076
3455 3611 3641 3447 3391 3649 3625 3749
3708 3904 4104 3947 3676 3377 3109 2723
2564 2495 2434 2404 2524 2793 2544 2454
2619 2729 2765 2676 2609 3883 2145 2890
2970 3333 3549 3361 3204 3905 2669 2339
2209 2116 2080 2057 2207 2680 2580 2872
3314 3399 3488 3309 3361 3437 3562 3440
3612 3841 4036 3850 3597 3545 3026 2735
2502 2407 2357 2321 2478 2841 2669 2802
3165 3210 3381 3193 3138 3277 3222 3319
3331 3567 3861 3681 3495 3241 2879 2521

vx1189 1 eqat week 16-22 Nov 86

2394 2312 2217 2194 2208 2429 2161 2234
2346 2442 2447 2475 2457 2505 2548 2443
2633 3257 3568 3411 3159 2835 2550 2285
2105 2062 2016 2007 2257 2686 2569 2738
3196 3378 3441 3267 3272 3511 3542 3633
3625 3949 4095 3980 3601 3283 2906 2500
2358 2336 2257 2240 2441 2939 2747 2880
3310 3409 3452 3204 3286 3540 3546 3599
3610 3896 4101 3914 3624 3276 2897 2515
2273 2267 2240 2223 2440 2916 2666 2829
3194 3304 3276 3203 3221 3477 3482 3593
3570 3667 4065 3874 3542 3172 2809 2494
2324 2260 2191 2182 2369 2868 2714 2820
3187 3283 3358 3150 3109 3434 3418 3544
3527 3855 4079 3857 3524 3145 2838 2489
2318 2261 2209 2204 2433 2889 2705 2818
3188 3290 3342 3183 3161 3404 3456 3570
3567 3825 4061 3838 3545 3272 2968 2707
2344 2250 2185 2235 2312 2692 2637 2667
3038 3213 3250 3093 3031 3211 3149 3289
3270 3737 3941 3710 3446 3188 2825 2461

vx1289 1 eqat week 7-13 Dec 86

2036 1966 1929 1889 2025 2325 2282 2164
2342 2434 2508 2462 2439 2489 2509 2653
2779 3189 3482 3234 2969 2609 2772 2136
1960 1929 1915 1932 2137 2828 2576 2637
3005 3099 3227 3042 3015 3245 3304 3459
3477 3734 4024 2762 3454 3101 2677 2393
2196 2128 2075 2084 2254 2748 2679 2695
3042 3186 3268 3045 3087 3325 3344 3482
3419 3745 4044 3787 3476 3138 2771 2412
2282 2162 2116 2095 2204 2565 2576 2686
2938 2952 3012 2825 2837 3007 3017 3124
3225 3418 3708 3669 3387 2941 2826 2289
2158 2096 2017 1997 2192 2842 2617 2612
2990 3047 3169 3002 3006 3229 3259 3596
3434 3637 3991 3710 3572 2995 2610 2279
2157 2086 2049 2067 2213 2727 2715 2671
2978 3092 3167 2981 2941 3232 3247 3386
3388 3612 3972 3696 3422 3114 2731 2424
2185 2134 2084 2044 2176 2657 2584 2576
2881 3035 3093 2936 2936 3058 3078 3158
3142 3419 3842 3570 3332 3054 2625 2322

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Capacity (MW)																	
EGAT:																	
oil	1748	1748	1748	2348	2348	2198	2198	2198	2168	2168	2168	2168	2168	1930	1930	1940	600
steam & cc gas	1861	2161	4354	4354	4662	5167	5467	5466	5466	5466	5466	5466	5466	4706	4706	4706	4631
gas turbines	860	1514	238	444	452	410	580	580	580	496	370	370	370	370	370	370	370
oil & gas	4469	5423	6340	7146	7462	7775	8245	8244	8214	8130	8004	8004	8004	7006	7006	7016	5601
lignite	1459	1459	2059	2059	2059	2359	2925	3225	3525	4275	4275	5175	5475	5475	5325	5325	5400
coal	0	0	0	0	0	0	0	0	700	1400	1400	1400	2100	3800	4800	5800	7800
hydro	2249	2429	2429	2429	2690	2945	2945	3571	3627	3627	4055	4055	4055	4175	4175	4175	4175
	8177	9311	10828	11634	12211	13079	14115	15040	16066	17432	17734	18634	19634	20456	21306	22316	22976
ELFIN (avg hydro)																	
oil	343	343	343	343	343	343	343	343	313	313	313	313	313	313	75	75	0
steam & cc gas	3849	4820	5728	6328	6636	7291	7291	7291	7291	7291	7291	7291	7291	6911	6531	6531	5231
gas turbines	126	126	126	126	126	126	496	496	496	496	370	370	370	370	370	370	370
diesel	112	112	112	112	84	84	84	84	84	84	84	84	84	84	84	84	84
oil & gas	4430	5401	6309	6909	7189	7844	8214	8214	8184	8184	8058	8058	8058	7678	7060	7060	5685
lignite	1159	1459	2059	2059	2059	2359	2925	3225	3525	4275	4275	5175	5475	5475	5325	5325	5400
coal	0	0	0	0	0	0	0	0	700	1400	1400	1400	2100	3800	4800	5800	7800
hydro	2334	2514	2514	2514	2558	2933	2933	3559	3568	3568	4000	4000	4000	4116	4116	4116	4116
TOTAL	7923	9374	10882	11482	11806	13136	14072	14998	15977	17427	17733	18633	19633	21069	21301	22301	23001
Percent Difference																	
oil	-80%	-80%	-80%	-85%	-85%	-84%	-84%	-84%	-86%	-86%	-86%	-86%	-86%	-84%	-96%	-96%	-100%
steam & cc gas	107%	123%	32%	45%	42%	41%	33%	33%	33%	33%	33%	33%	33%	47%	39%	39%	13%
gas turbines	-85%	-92%	-47%	-72%	-72%	-69%	-14%	-14%	-14%	0%	0%	0%	0%	0%	0%	0%	0%
oil & gas	-1%	0%	0%	-3%	-4%	1%	0%	0%	0%	1%	1%	1%	1%	10%	1%	1%	1%
lignite	-21%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
coal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
hydro	4%	3%	3%	3%	-5%	0%	0%	0%	-2%	-2%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
TOTAL	-3%	1%	0%	-1%	-3%	0%	0%	0%	-1%	0%	0%	0%	0%	3%	0%	0%	0%

```

      program loadshape
c program for reading binary hourly output from thal doe-2 runs
c and extracting typical load shapes
c created: 29 jan 90
c updated: 5 mar 90
c j. busch
c
      real elecload(12,31,24),sum(7,24),dallyprof(12,7,24)
      real wkdayprof(12,24),wkendprof(12,24),weeklyprof(12,24)
      real anwkprof(24),anwdprof(24),anweprof(24),nrdys(7)
      real wdsum,wesum,wksum,wdnrdys,wenrdys,wknrdys
      real anwdsum,anwesum,anwksum
      real area(3),uconv
      integer bldg,ihr,idy,imo,month(12),dywk
      character binfile*20
      data month /31,28,31,30,31,30,31,31,30,31,30,31/
      data nrdys /7*0/
      data anwdsum /0/, anwesum /0/, anwklysum /0/
c initialize which day-of-the-week (1-7) simulation output begins
c 1985 begins on a tuesday
      data dywk /2/
c floor area for thai office, hotel, and retail building, respectively
      data area /6439,20618,8062/
c unit conversion from input btu/hr to watts
      data uconv /3.413/
c
      print*,'Enter code for bldg type: 1=off,2=hot,3=ret'
      read(5,*) bldg
c
      print*,'Enter binary DOE-2 output file to process'
      read(5,*) binfile
      open (unit=1,file=binfile,form="unformatted")
      open (unit=10,file='hrly.out')
c cycle through the months
      do 100 i=1,12
c cycle through the days of each month
      do 200 j=1,month(i)
c cycle through the hours of each day
      do 300 k=1,24
          read(1) imo,idy,ihr,elecload(i,j,k)
c          write(6,99) imo,idy,ihr,elecload(i,j,k)
c 99          format(3i3,f14.0)
c check record correspondence
          if(ihr.ne.k) print*,'hourly mismatch hour',ihr
          sum(dywk,k)=sum(dywk,k)+elecload(i,j,k)
300          continue
c mark the number of times each day-of-the-week is encountered
          nrdys(dywk)=nrdys(dywk)+1
c          print*,'nrdys(dywk)=',nrdys(dywk)
c increment day-of-the-week counter
          dywk=dywk+1
          if(dywk.eq.8) dywk=1
200          continue
c determine an hourly profile by day-of-the-week for the month

```

```

c note that this and all profiles are converted to w/m2
  do 400 j=1,7
    do 500 k=1,24
      dailyprof(i,j,k)=sum(j,k)/nrdys(j)/area(bldg)/uconv
500    continue
400  continue
c
  do 600 k=1,24
c determine an hourly profile by weekday
  do 700 j=1,5
    wdsum=wdsum+sum(j,k)
    wdnrdys=wdnrdys+nrdys(j)
700  continue
    wkdayprof(i,k)=wdsum/wdnrdys/area(bldg)/uconv
    wdsum=0
    wdnrdys=0
c determine an hourly profile by weekend
  do 800 j=6,7
    wesum=wesum+sum(j,k)
    wenrdys=wenrdys+nrdys(j)
800  continue
    wkendprof(i,k)=wesum/wenrdys/area(bldg)/uconv
    wesum=0
    wenrdys=0
c determine an hourly profile by a whole-week for the month
  do 900 j=1,7
    wksum=wksum+sum(j,k)
    wknrdys=wknrdys+nrdys(j)
900  continue
    weeklyprof(i,k)=wksum/wknrdys/area(bldg)/uconv
    wksum=0
    wknrdys=0
600  continue
c reinitialize arrays for the next month
  do 1000 j=1,7
    nrdys(j)=0
  do 1100 k=1,24
    sum(j,k)=0
1100  continue
1000  continue
c end of cycle through the months
100  continue
c generate an annual weekly profile
  do 1400 k=1,24
    do 1500 j=1,7
      do 1600 i=1,12
        anwksum=anwksum+dailyprof(i,j,k)
1600    continue
1500  continue
        anwkprof(k)=anwksum/7/12
        anwksum=0
1400  continue
c generate an annual weekday profile
  do 2000 k=1,24

```



```

do 2100 j=1,5
  do 2200 i=1,12
    anwdsum=anwdsum+dailyprof(i,j,k)
2200  continue
2100  continue
    anwdprof(k)=anwdsum/5/12
    anwdsum=0
2000 continue
c generate an annual weekend profile
  do 2300 k=1,24
    do 2400 j=6,7
      do 2500 i=1,12
        anwesum=anwesum+dailyprof(i,j,k)
2500  continue
2400  continue
        anweprof(k)=anwesum/2/12
        anwesum=0
2300 continue
c write out profiles
  do 1200 i=1,12
    write(10,69) i
69  format(4x,'month = ',i2)
    write(10,70)
70  format(4x,'mon',4x,'tue',4x,'wed',4x,'thu',4x,'fri',
$    4x,'sat',4x,'sun',3x,'wkdy',3x,'wked',3x,'week')
    do 1300 k=1,24
      write(10,10) (dailyprof(i,j,k),j=1,7),wkdayprof(i,k),
$    wkendprof(i,k),weeklyprof(i,k)
10  format(10f7.0)
1300 continue
    write(10,11)
11  format()
1200 continue
    write(10,71)
71  format(2x,'annual',2x,'annual',2x,'annual')
    write(10,72)
72  format(2x,'weekly',1x,'weekday',1x,'weekend')
    do 1700 k=1,24
      write(10,12) anwkprof(k),anwdprof(k),anweprof(k)
12  format(3f8.0)
1700 continue
c
  stop
end

```


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Model f r calculating conservation scenarios of the Thai commercial sector.

		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
11pr	2	17													
Midnight	1	15													

MODEL CALCULATION PANEL

Electricity Forecast for Large Business Customer Class for MEA and PEA (Gwh) [1]

Whole sale & Retail Trade	830	935	1062	1177	1300	1423	1559	1706	1861	2016	2187	2371	2570	2776
Banking & Insurance	687	794	906	1015	1178	1298	1416	1533	1660	1785	1921	2066	2221	2285
Hotel & Restaurants	584	738	864	991	1106	1209	1318	1434	1555	1650	1750	1853	1959	2069
Other Market Services	298	336	382	431	481	535	593	655	720	777	836	897	960	1026
Non-Market Services	39	69	74	78	83	88	93	97	101	105	109	112	116	119
Specific Business	516	562	632	701	765	832	903	962	1026	1085	1149	1224	1281	1351
Total	2954	3434	3920	4393	4913	5385	5882	6387	6923	7418	7952	8523	9107	9626

Electricity Consumption by Building Type (Gwh)

[5]

Office	1024	1199	1362	1524	1742	1921	2102	2285	2481	2667	2866	3075	3297	3430
Hotel	1100	1300	1496	1692	1871	2041	2221	2396	2581	2735	2899	3077	3240	3420
Retail	830	935	1062	1177	1300	1423	1559	1706	1861	2016	2187	2371	2570	2776
Total	2954	3434	3920	4393	4913	5385	5882	6387	6923	7418	7952	8523	9107	9626

Floor Area by Building Type (M. m2)

	Energy intensity														
	kuh/m2)														
Office	314	3.26	3.81	4.33	4.85	5.54	6.11	6.69	7.27	7.89	8.48	9.12	9.78	10.49	10.91
Hotel	362	3.04	3.59	4.13	4.67	5.17	5.64	6.13	6.62	7.13	7.55	8.01	8.50	8.95	9.44
Retail	343	2.42	2.72	3.09	3.43	3.78	4.14	4.54	4.97	5.42	5.87	6.37	6.90	7.48	8.08

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	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total	8.71	10.13	11.56	12.95	14.49	15.89	17.36	18.85	20.44	21.91	23.49	25.18	26.92	28.44

Conservation Penetration (M. m2)

Conservation Scenario Commences	1991													
Conservation Scenario Ends	2001													
Target total Penetration	50%													
Annual penetration New Bldgs.	50%													
Override Existing Bldg Profile A	no													
Cumulative Penetration Area	0.00	0.00	0.00	0.59	1.32	2.17	3.16	4.28	5.57	6.97	8.54	10.30	12.24	14.22
Yearly penetration Area	0.00	0.00	0.00	0.59	0.73	0.85	0.99	1.13	1.29	1.40	1.57	1.76	1.93	1.98
Remaining Unpenetrated Area	8.71	10.13	11.56	12.36	13.18	13.72	14.20	14.57	14.86	14.94	14.95	14.88	14.68	14.22
Yearly existing Bldg Penetrated Area				0.00	0.00	0.15	0.25	0.38	0.50	0.66	0.78	0.91	1.07	1.22
Yearly new Bldg Penetrated Area				0.59	0.73	0.70	0.73	0.75	0.79	0.73	0.79	0.85	0.87	0.76
Yearly existing Bldg % of Unpenetrated				0%	0%	1%	2%	3%	3%	4%	5%	6%	7%	9%

Incremental Conservation Investment (M\$)

Office	0.0	0.0	0.0	5.3	6.7	7.8	9.1	10.4	12.0	13.0	14.6	16.4	18.1	18.3
Hotel	0.0	0.0	0.0	6.2	7.5	8.7	10.1	11.5	13.0	14.0	15.5	17.2	18.6	19.1
Retail	0.0	0.0	0.0	4.0	5.0	5.8	6.7	7.7	8.9	9.7	11.1	12.5	14.0	14.7
Total	0.0	0.0	0.0	15.5	19.2	22.3	26.0	29.7	33.9	36.7	41.3	46.2	50.7	52.0

EGAT System Losses (%) 15%

Conservation Scenario (GWh)

Office	1024	1199	1362	1496	1677	1814	1946	2073	2205	2321	2441	2561	2685	2730

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	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Hotel	1100	1300	1496	1653	1785	1899	2016	2119	2223	2293	2363	2437	2491	2551
Retail	830	935	1062	1147	1234	1314	1400	1489	1577	1657	1741	1827	1915	1998
Total	2954	3434	3920	4296	4696	5028	5362	5681	6004	6270	6545	6826	7092	7279
Electricity Savings	0	0	0	112	250	411	598	812	1056	1321	1618	1952	2318	2700

Load Sh pes (MW)

Base Case	Annual Weekly LS (W/m2)	1	2	3	4	5	6	7	8	9	10	11	12
Office	1m	3	4	4	4	5	6	6	7	7	8	8	9
	2am	3	4	4	4	5	6	6	7	7	8	8	9
	3am	3	4	4	4	5	6	6	7	7	8	8	9
	4am	3	4	4	4	5	6	6	7	7	8	8	9
	5am	3	4	4	4	5	6	6	7	7	8	8	9
	6am	3	4	4	4	5	6	6	7	7	8	8	9
	7am	147	172	195	218	249	275	301	327	355	382	410	440
	8am	205	240	273	305	349	385	421	458	497	535	574	616
	9am	264	309	351	393	449	495	542	589	639	687	739	792
	10am	264	309	351	393	449	495	542	589	639	687	739	792
	11am	267	313	355	398	454	501	548	596	647	696	748	802
	Noon	270	317	360	402	460	507	555	603	655	704	757	812
	1pm	205	240	273	305	349	385	421	458	497	535	574	616
	2pm	231	271	308	344	393	434	475	516	560	602	647	695
	3pm	235	275	312	349	399	440	481	523	568	611	656	704
	4pm	231	271	308	344	393	434	475	516	560	602	647	695
	5pm	231	271	308	344	393	434	475	516	560	602	647	695
	6pm	65	76	87	97	111	122	134	145	158	170	182	196
	7pm	52	61	69	78	89	98	107	116	126	136	146	157
	8pm	39	46	52	58	67	73	80	87	95	102	109	117
	9pm	29	34	39	44	50	55	60	65	71	76	82	88

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Model f r calculating conservation scenarios of the Thai commercial sector.

		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Hotel	10pm	7													
	11pm	3													
	Midnight	2													
Hotel	1am	30	91	108	124	140	155	169	184	199	214	227	240	255	268
	2am	30	91	108	124	140	155	169	184	199	214	227	240	255	268
	3am	27	82	97	112	126	140	152	166	179	192	204	216	229	242
	4am	26	79	93	107	121	134	147	159	172	185	196	208	221	233
	5am	26	79	93	107	121	134	147	159	172	185	196	208	221	233
	6am	26	79	93	107	121	134	147	159	172	185	196	208	221	233
	7am	37	112	133	153	173	191	209	227	245	264	279	296	314	331
	8am	41	125	147	169	192	212	231	251	271	292	310	328	348	367
	9am	47	143	169	194	220	243	265	288	311	335	355	376	399	421
	10am	46	140	165	190	215	238	259	282	304	328	347	368	391	412
	11am	45	137	162	186	210	233	254	276	298	321	340	360	382	403
	Noon	47	143	169	194	220	243	265	288	311	335	355	376	399	421
	1pm	46	140	165	190	215	238	259	282	304	328	347	368	391	412
	2pm	46	140	165	190	215	238	259	282	304	328	347	368	391	412
	3pm	46	140	165	190	215	238	259	282	304	328	347	368	391	412
	4pm	46	140	165	190	215	238	259	282	304	328	347	368	391	412
	5pm	57	173	205	235	266	295	321	350	377	406	431	456	484	510
Retail	6pm	56	170	201	231	262	289	316	343	371	399	423	448	476	501
	7pm	55	167	197	227	257	284	310	337	364	392	415	440	467	492
	8pm	46	140	165	190	215	238	259	282	304	328	347	368	391	412
	9pm	44	134	158	182	206	227	248	270	291	314	332	352	374	394
	10pm	46	140	165	190	215	238	259	282	304	328	347	368	391	412
	11pm	39	118	140	161	182	202	220	239	258	278	295	312	331	349
	Midnight	36	109	129	149	168	186	203	221	238	257	272	288	306	322
	1am	2	5	5	6	7	8	8	9	10	11	12	13	14	15
	2am	2	5	5	6	7	8	8	9	10	11	12	13	14	15
	3am	2	5	5	6	7	8	8	9	10	11	12	13	14	15
	4am	2	5	5	6	7	8	8	9	10	11	12	13	14	15
	5am	2	5	5	6	7	8	8	9	10	11	12	13	14	15

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Model f r calculating conservation scenarios of the Thai commercial sector.

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
6am	2	5	6	7	8	8	9	10	11	12	13	14	15	16
7am	2	5	6	7	8	8	9	10	11	12	13	14	15	16
8am	2	5	6	7	8	8	9	10	11	12	13	14	15	16
9am	2	5	6	7	8	8	9	10	11	12	13	14	15	16
10am	72	174	196	223	247	273	327	358	390	423	458	497	539	582
11am	83	201	226	257	284	314	377	412	450	487	529	573	621	671
Noon	84	203	229	260	288	318	348	381	417	455	493	535	580	629
1pm	93	225	253	288	319	352	422	462	504	546	592	642	696	752
2pm	94	227	256	291	322	356	427	467	509	552	599	649	703	760
3pm	90	217	245	278	308	341	409	447	488	528	573	621	673	727
4pm	90	217	245	278	308	341	409	447	488	528	573	621	673	727
5pm	90	217	245	278	308	341	409	447	488	528	573	621	673	727
6pm	88	213	240	272	302	333	399	437	477	517	560	607	658	711
7pm	84	203	229	260	288	318	348	381	417	455	493	535	580	629
8pm	23	56	63	71	79	87	95	104	114	125	135	146	159	172
9pm	21	51	57	65	72	79	87	95	104	114	123	134	145	157
10pm	2	5	6	7	8	8	9	10	11	12	13	14	15	16
11pm	2	5	6	7	8	8	9	10	11	12	13	14	15	16
Midnight	2	5	6	7	8	8	9	10	11	12	13	14	15	16
Sum of	99	117	134	152	168	183	200	216	233	247	262	279	294	310
Offices	99	117	134	152	168	183	200	216	233	247	262	279	294	310
Hotels,	90	106	122	138	153	167	181	196	211	224	238	253	267	282
& Retail	87	103	118	133	147	161	175	189	204	217	230	245	258	273
4am	87	103	118	133	147	161	175	189	204	217	230	245	258	273
5am	87	103	118	133	147	161	175	189	204	217	230	245	258	273
6am	264	310	354	398	448	492	537	582	630	673	719	768	818	857
7am	335	393	449	504	569	624	682	739	800	856	915	979	1043	1091
8am	411	483	551	619	699	768	839	910	985	1054	1128	1206	1285	1344
9am	578	670	764	854	959	1053	1151	1251	1357	1457	1565	1680	1800	1900
10am	604	700	798	892	1001	1099	1201	1306	1418	1523	1636	1758	1884	1991
11am	616	714	814	910	1021	1120	1225	1332	1445	1552	1668	1791	1920	2029
Noon	570	659	751	839	939	1030	1126	1224	1329	1428	1535	1649	1768	1874
1pm	598	692	788	881	987	1083	1184	1287	1398	1502	1614	1734	1860	1969
2pm														

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	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
3pm	592	685	780	872	977	1072	1172	1275	1384	1487	1598	1717	1840	1948
4pm	589	681	776	868	972	1066	1165	1268	1376	1478	1589	1707	1830	1937
5pm	622	720	821	919	1029	1128	1233	1340	1454	1561	1677	1800	1928	2041
6pm	448	517	590	660	733	802	877	953	1034	1109	1191	1279	1369	1458
7pm	422	487	556	622	691	756	826	897	973	1044	1121	1204	1288	1373
8pm	234	274	313	352	391	428	467	506	547	584	624	667	710	751
9pm	214	249	286	321	357	390	425	461	498	532	568	607	645	684
10pm	167	197	227	256	284	310	338	365	394	419	445	473	500	527
11pm	133	157	180	204	226	246	268	290	312	332	352	375	395	417
Midnight	121	142	164	185	205	223	243	263	283	301	319	339	358	378
Diversity Factor	1.19	140	161	182	202	220	240	259	279	296	314	334	353	372
1.2	119	140	161	182	202	220	240	259	279	296	314	334	353	372
1.2	108	127	146	165	183	200	218	235	253	269	286	304	320	338
1.2	104	123	142	160	177	193	210	227	245	260	276	293	310	327
1.2	104	123	142	160	177	193	210	227	245	260	276	293	310	327
1.4	122	144	165	186	206	225	245	265	286	303	322	342	361	382
0.85	224	263	301	338	381	418	456	495	535	572	611	653	695	728
1	335	393	449	504	569	624	682	739	800	856	915	979	1043	1091
1	411	483	551	619	699	768	839	910	985	1054	1128	1206	1285	1344
0.9	520	603	687	769	863	947	1036	1126	1222	1312	1409	1512	1620	1710
0.9	544	630	718	803	901	989	1081	1175	1276	1371	1473	1582	1695	1792
0.9	555	643	732	819	919	1008	1102	1198	1301	1397	1501	1612	1728	1826
1	570	659	751	839	939	1030	1126	1224	1329	1428	1535	1648	1767	1874
0.95	568	657	749	837	938	1028	1124	1223	1328	1427	1533	1648	1767	1870
0.95	562	651	741	829	928	1019	1114	1211	1315	1412	1518	1631	1748	1850
0.95	559	647	737	824	923	1013	1107	1204	1307	1404	1509	1621	1738	1840
0.85	529	612	698	781	874	959	1048	1139	1236	1327	1425	1530	1639	1734
1.1	493	569	649	726	807	883	964	1048	1137	1220	1310	1407	1506	1604
1	422	487	556	622	691	756	826	897	973	1044	1121	1204	1288	1373
1.5	352	410	470	528	587	642	700	759	821	876	936	1001	1064	1127
1.35	289	337	386	434	482	527	574	622	673	718	767	819	871	923

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Model f r calculating conservation scenarios of the Thai commercial sector.

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
10pm	209	247	283	320	355	388	423	456	492	523	556	591	625	659
11pm	160	188	216	244	271	296	322	348	375	398	423	449	474	501
Midnight	145	171	196	222	246	268	292	315	340	361	383	407	430	454

Difference 0.68%

Conservation Annual
 Scenario (MW) Weekly LS
 (W/m²)

Office	1am	1	3	4	4	5	6	6	6	7	7	7	8	8	9	10	10	11
2am	1	3	4	4	5	6	6	6	6	7	7	7	8	8	9	10	10	11
3am	1	3	4	4	5	6	6	6	6	7	7	7	8	8	9	10	10	11
4am	1	3	4	4	5	6	6	6	6	7	7	7	8	8	9	10	10	11
5am	1	3	4	4	5	6	6	6	6	7	7	7	8	8	9	10	10	11
6am	1	3	4	4	5	6	6	6	6	7	7	7	8	8	9	10	10	11
7am	22	147	172	195	213	238	256	273	289	306	320	334	348	362	376	390	404	418
8am	41	205	240	273	301	338	367	395	422	450	475	501	528	556	583	611	638	666
9am	49	264	309	351	386	433	468	503	536	570	601	632	664	697	729	761	793	825
10am	49	264	309	351	386	433	468	503	536	570	601	632	664	697	729	761	793	825
11am	50	267	313	355	391	438	474	509	543	578	609	642	674	708	740	772	804	836
Noon	50	270	317	360	395	443	480	515	549	584	615	647	680	713	746	778	810	842
1pm	34	205	240	273	299	335	361	386	410	435	456	478	500	523	545	568	591	614
2pm	43	231	271	308	338	379	411	441	470	500	527	555	583	611	639	667	695	723
3pm	43	235	275	312	343	384	416	446	475	506	533	560	588	617	645	673	701	729
4pm	43	231	271	308	338	379	411	441	470	500	527	555	583	611	639	667	695	723
5pm	42	231	271	308	338	379	410	440	468	498	524	551	579	606	633	660	687	714
6pm	11	65	76	87	95	106	115	123	131	138	145	153	160	167	174	181	188	195
7pm	9	52	61	69	76	85	92	98	105	111	117	123	129	134	139	145	150	156
8pm	6	39	46	52	57	63	68	73	77	82	86	90	93	97	101	105	109	113
9pm	5	29	34	39	43	48	52	55	59	62	66	69	72	75	78	81	84	87
10pm	4	23	27	30	33	37	40	43	46	49	51	54	56	59	61	64	67	70
11pm	2	10	11	13	14	16	18	19	20	22	23	24	25	27	28	29	30	31
Midnight	1	7	8	9	9	11	11	12	13	14	14	15	16	16	17	18	19	20

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Model f r calculating conservation scenarios of the Thai commercial sector.

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Hotel														
1am	12	91	108	124	136	147	155	164	171	179	183	188	192	195
2am	12	91	108	124	136	147	155	164	171	179	183	188	192	195
3am	10	82	97	112	123	132	139	147	153	159	163	167	170	172
4am	10	79	93	107	118	127	134	142	148	154	158	162	165	168
5am	10	79	93	107	118	127	134	142	148	154	158	162	165	168
6am	10	79	93	107	118	127	134	142	148	154	158	162	165	168
7am	19	112	133	153	169	183	195	207	218	229	236	244	252	258
8am	22	125	147	169	188	203	216	230	243	255	264	273	282	290
9am	25	143	169	194	215	233	248	264	278	292	302	312	323	331
10am	25	140	165	190	210	228	243	259	273	287	297	307	318	326
11am	24	137	162	186	206	223	237	253	266	280	289	299	309	317
Noon	25	143	169	194	215	233	248	264	278	292	302	312	323	331
1pm	25	140	165	190	210	228	243	259	273	287	297	307	318	326
2pm	24	140	165	190	210	227	242	258	271	285	295	304	314	322
3pm	24	140	165	190	210	227	242	258	271	285	295	304	314	322
4pm	24	140	165	190	210	227	242	258	271	285	295	304	314	322
5pm	29	173	205	235	260	281	300	318	335	352	363	375	387	396
6pm	28	170	201	231	256	276	294	312	328	345	356	367	379	387
7pm	27	167	197	227	251	271	288	306	322	338	348	359	370	376
8pm	24	140	165	190	210	227	242	258	271	285	295	304	314	322
9pm	23	134	158	182	201	217	232	246	260	273	282	291	301	308
10pm	22	140	165	190	210	226	241	255	268	281	290	298	307	314
11pm	17	118	140	161	178	191	203	215	225	235	242	248	255	259
High	15	109	129	149	164	176	187	197	207	216	221	227	233	237
Retail														
1am	1	5	5	6	7	7	8	8	9	9	10	10	11	12
2am	1	5	5	6	7	7	8	8	9	9	10	10	11	12
3am	1	5	5	6	7	7	8	8	9	9	10	10	11	12
4am	1	5	5	6	7	7	8	8	9	9	10	10	11	12
5am	1	5	5	6	7	7	8	8	9	9	10	10	11	12
6am	1	5	5	6	7	7	8	8	9	9	10	10	11	12
7am	1	5	5	6	7	7	8	8	9	9	10	10	11	12
8am	1	5	5	6	7	7	8	8	9	9	10	10	11	12
9am	1	5	5	6	7	7	8	8	9	9	10	10	11	12

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	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
10am	174	196	223	240	258	275	292	310	328	344	361	378	396	412
11am	201	226	257	277	298	317	338	359	380	399	420	440	461	481
Noon	203	229	260	280	301	321	342	363	384	403	424	444	465	485
1pm	225	253	288	311	335	357	381	405	430	452	476	501	526	550
2pm	227	256	291	314	338	361	385	409	434	456	480	505	530	554
3pm	217	245	278	300	323	344	366	389	412	433	455	477	500	521
4pm	217	245	278	300	323	344	366	389	412	433	455	477	500	521
5pm	213	240	272	294	316	337	359	382	404	425	447	469	492	513
6pm	203	229	260	280	301	321	342	363	384	403	424	444	465	485
7pm	56	63	71	77	83	89	95	102	108	114	121	128	135	141
8pm	51	57	65	70	76	81	87	93	99	105	111	117	123	129
9pm	5	5	6	7	7	8	8	9	9	10	10	11	12	12
10pm	5	5	6	7	7	8	8	9	9	10	10	11	12	12
11pm	5	5	6	7	7	8	8	9	9	10	10	11	12	12
Midnight	5	5	6	7	7	8	8	9	9	10	10	11	12	12

Diversity
 Factor

Diversity 1am	119	140	161	177	191	203	215	225	235	242	249	256	261	266
Sum of 2am	119	140	161	177	191	203	215	225	235	242	249	256	261	266
Offices 3am	108	127	146	161	173	184	194	203	212	218	223	229	233	237
Hotels, 4am	104	123	142	156	168	178	188	197	206	212	217	223	228	232
& Retail 5am	104	123	142	156	168	178	188	197	206	212	217	223	228	232
6am	122	144	165	181	195	207	219	230	240	247	254	261	265	270
7am	224	263	301	331	364	390	415	438	462	481	500	519	537	546
8am	335	393	449	495	548	591	633	673	715	749	785	822	857	877
9am	411	483	551	607	673	724	775	823	872	913	955	998	1040	1061
10am	520	603	687	753	827	887	948	1007	1067	1118	1171	1225	1277	1311
11am	544	630	718	786	863	926	990	1052	1115	1168	1224	1281	1337	1374
Noon	555	643	732	801	880	944	1008	1071	1134	1189	1245	1302	1359	1396
1pm	570	659	751	820	897	961	1026	1088	1152	1206	1262	1319	1375	1414
2pm	568	657	749	819	898	963	1029	1093	1158	1214	1272	1332	1390	1431
3pm	562	651	741	811	888	952	1017	1079	1143	1197	1254	1311	1367	1405
4pm	559	647	737	806	883	947	1012	1074	1138	1192	1248	1305	1362	1400

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	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
0.85	529	612	698	764	836	896	956	1014	1073	1122	1174	1226	1277	1312
1.1	493	569	649	709	769	820	873	925	976	1019	1063	1108	1150	1187
1	422	487	556	607	658	701	746	790	833	868	905	943	978	1009
1.5	352	410	470	516	561	600	639	676	713	742	772	803	831	855
1.35	289	337	386	424	461	493	525	555	586	610	635	661	684	705
1.25	209	247	283	312	339	361	383	404	424	439	453	469	481	492
1.2	160	188	216	238	257	274	290	305	319	329	339	350	357	365
1.2	145	171	196	216	233	247	261	274	287	295	303	311	317	323
5pm	0	0	0	5	12	20	29	39	50	62	76	90	106	123
6pm	0	0	0	5	12	20	29	39	50	62	76	90	106	123
7pm	0	0	0	5	11	19	27	37	48	59	71	85	100	116
8pm	0	0	0	5	11	18	26	35	45	56	67	81	94	110
9pm	0	0	0	5	11	18	26	35	45	56	67	81	94	110
10pm	0	0	0	6	13	21	30	41	52	65	79	94	110	128
11pm	0	0	0	9	20	33	48	65	84	105	128	154	182	210
Midnight	0	0	0	10	23	39	56	76	99	123	150	180	213	246
Savings 1am	0	0	0	14	31	51	74	100	130	162	198	238	282	325
(incl. 2am	0	0	0	19	42	69	100	136	178	223	274	331	394	459
Losses)	0	0	0	19	44	72	105	142	185	232	286	345	412	480
3am	0	0	0	20	45	74	108	147	191	240	295	356	424	495
4am	0	0	0	21	48	79	115	156	204	255	314	380	453	528
5am	0	0	0	21	46	75	110	150	195	244	300	363	433	506
6am	0	0	0	21	46	76	111	151	197	247	304	368	438	512
7am	0	0	0	21	46	75	110	150	195	244	300	363	433	506
8am	0	0	0	20	44	73	106	144	188	235	289	349	416	485
9am	0	0	0	20	44	72	104	142	185	232	284	344	409	480
10am	0	0	0	17	38	63	91	124	161	202	248	300	357	419
11am	0	0	0	13	30	49	71	96	124	155	189	227	268	312
Noon	0	0	0	11	24	39	57	77	100	124	151	182	215	251
1pm	0	0	0	9	19	31	45	61	78	97	118	141	166	192
2pm	0	0	0	7	15	25	37	49	64	79	96	115	135	156
3pm	0	0	0	7	15	24	35	47	61	76	92	110	129	150
4pm	0	0	0	7	15	24	35	47	61	76	92	110	129	150
5pm	0	0	0	7	15	24	35	47	61	76	92	110	129	150
6pm	0	0	0	7	15	24	35	47	61	76	92	110	129	150
7pm	0	0	0	7	15	24	35	47	61	76	92	110	129	150
8pm	0	0	0	7	15	24	35	47	61	76	92	110	129	150
9pm	0	0	0	7	15	24	35	47	61	76	92	110	129	150
10pm	0	0	0	7	15	24	35	47	61	76	92	110	129	150
11pm	0	0	0	7	15	24	35	47	61	76	92	110	129	150
Midnight	0	0	0	7	15	24	35	47	61	76	92	110	129	150

file: prodcost.xls
 created: 14 feb 90
 updated: 25 apr 90
 j. busch

Proxy Plant Valuation of Conservation Scenarios Through Pr

Base case (avg. hydro) (M\$)	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Conservation Scenarios w/ & w/o deferrals:	1318	1420	1523	1611	1716	1792	1914	2016	2152	2298	2403	2554	2680
Energy Efficient, 100% Penetration	1255	1321	1413	1488	1592	1672	1773	1869	2006	2144	2295	2446	2569
Cancel Lampang #1 - #4	1306	1348	1463	1552	1648	1752	1830	1924	2061	2207	2314	2467	2595
Cancel Lampang #1 - #5	1306	1348	1463	1552	1648	1763	1840	1933	2069	2215	2325	2478	2609
Cancel Lampang #1 - #6	1306	1348	1463	1552	1648	1763	1840	1946	2081	2225	2339	2493	2627
Cancel Lampang #1 & #2, Ao Phai #1	1306	1348	1457	1536	1625	1738	1815	1922	2055	2199	2314	2468	2603
Cancel Lampang #1 - #7	1306	1348	1463	1552	1648	1763	1840	1971	2098	2237	2361	2514	2652
Cancel Lampang #1 - #7, add 1200 MW gt	1306	1348	1657.4	1552	1834.4	1746	2035.4	1970	2292.4	2239	2360	2514	2652
Cancel Lampang #1 - #7, add 1000 MW	1306	1348	1463	1552	1648	1763	1840	1971	2098	2237	2361	2514	2652
Cancel Lampang #1 - #4, Ao Phai #1 & #2	1306	1348	1463	1552	1643	1731	1830	1914	2041	2179	2304	2457	2598
Cancel Lampang #1 - #7, Saba Yoi #1-#2, add 1000 MW gt	1306	1348	1463	1552	2279	1762	1846	2013	2131	2249	2394	2547	2686
Cancel Lampang #1 - #7, Saba Yoi #1-#2, add 1000 MW gt	1306	1348	1463	1552	1973	1761	1847	2037	2131	2249	2394	2547	2686
Cancel Lampang #1 - #7, Saba Yoi #1-#3, add 1000 MW gt	1306	1348	1463	1552	2279	1762	1846	2013	2156	2264	2418	2571	2710
Cancel Lampang #1 - #7, Saba Yoi #1, add 800 MW gt	1306	1348	1434	1533	2295	1755	1841	1988	2111	2241	2375	2528	2666

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Discount rate (real):	7%
Gas Turbine Cost (\$/kW)	540
PWF for capital investment	1.2
Multiplier	0.648

Proxy Plant Valuation of Conservation Scenarios Through Production-Costing of the EGAT Power System Using ELFIN.

File	1991				1991				1991			
	Sum Total	NPV	% Change	Savings Base to 2030	Sum Total	NPV	% Change	Savings Base to 2006	Sum Total	NPV	% Change	Savings Base to 2006
Energy Efficient, 50% Penetration	93532	25415	-2%	524	27932	15057	-2%	303	938	1015	1183	1183
Cancel Khanom #1 cc	93550	25431	-2%	508	27975	15077	-2%	283	938	1015	1183	1183
Cancel Khanom #1 cc, Lampang #1	93811	25503	-2%	436	28061	15121	-2%	238	938	1015	1183	1183
Cancel Nam Phong #2 cc	93586	25440	-2%	499	27986	15082	-2%	278	938	1015	1183	1183
Cancel Lampang #1	93821	25509	-2%	430	28071	15127	-2%	233	938	1015	1183	1183
Cancel Lampang #1 & #2	94077	25577	-1%	362	28152	15167	-1%	192	938	1015	1183	1183
Cancel Lampang #5	93908	25510	-2%	429	28058	15112	-2%	247	938	1015	1183	1183
Cancel Ao Phai #1	93198	25358	-2%	581	27898	15047	-2%	313	938	1015	1183	1183
Cancel Saba Yoi #1	93555	25434	-2%	505	27980	15080	-2%	280	938	1015	1183	1183
Cancel Lampang #1 - #3, add 400 MW gt	94354	25647	-1%	292	28229	15206	-1%	154	938	1015	1183	1183
Cancel Lampang #1 - #4	94613	25832	0%	107	28488	15391	0%	-31	938	1015	1183	1183
Cancel Lampang #1 - #4, add 500 MW gt	94647	25716	-1%	223	28297	15239	-1%	121	938	1015	1183	1183
Cancel Lampang #1 - #4, add 500 MW gt	94960	25938	0%	1	28610	15461	1%	-101	938	1015	1183	1183
Cancel Lampang #2 - #5 add 500 MW gt	95132	25953	0%	-14	28632	15453	1%	-93	938	1015	1183	1183
Cancel Lampang #1, #2, #5	94489	25667	-1%	272	28239	15206	-1%	154	938	1015	1183	1183
Cancel Lampang #1, #2, #5, add 400 MW gt	94748	25852	0%	87	28498	15391	0%	-31	938	1015	1183	1183
Energy Efficient, 10% Penetration	95173	25845	0%	94	28448	15309	0%	50	941	1019	1192	1192
Cancel Nam Phong #2 cc	95193	25846	0%	93	28443	15306	0%	53	941	1019	1192	1192
Cancel Lampang #1	95421	25910	0%	29	28521	15347	0%	13	941	1019	1192	1192
Cancel Lampang #1, add 100 MW gt	95480	25950	0%	-11	28580	15387	0%	-27	941	1019	1192	1192
Cancel Lampang #1, add 200 MW gt	95540	25990	0%	-51	28640	15427	0%	-67	941	1019	1192	1192
Cancel Lampang #4	95412	25904	0%	35	28512	15341	0%	19	941	1019	1192	1192
Cancel Lampang #4, add 100 MW gt	95470	25941	0%	-2	28570	15377	0%	-17	941	1019	1192	1192
Cancel Lampang #4, add 200 MW gt	95530	25978	0%	-39	28630	15414	0%	-55	941	1019	1192	1192
Cancel Lampang #5	95572	25939	0%	0	28547	15356	0%	4	941	1019	1192	1192
Cancel Ao Phai #1	94794	25758	-1%	181	28344	15266	-1%	94	941	1019	1192	1192
Cancel Saba Yoi #1	95167	25844	0%	95	28442	15308	0%	52	941	1019	1192	1192
Cancel Saba Yoi #1, add 135 MW gt	95242	25888	0%	51	28517	15352	0%	8	941	1019	1192	1192
Cancel Saba Yoi #1, add 200 MW gt	95285	25913	0%	26	28560	15377	0%	-17	941	1019	1192	1192

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Proxy Plant Valuation of Conservation Scenarios Through Pr

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Energy Efficient, 50% Penetration													
Cancel Khanom #1 cc	1306	1404	1503	1572	1665	1750	1855	1963	2100	2206	2348	2500	2624
Cancel Khanom #1 cc, Lampang #1	1306	1399	1498	1580	1680	1780	1864	1959	2096	2241	2346	2497	2623
Cancel Nam Phong #2 cc	1306	1405	1504	1587	1685	1780	1868	1962	2099	2245	2351	2503	2630
Cancel Lampang #1	1306	1400	1498	1581	1680	1753	1865	1960	2096	2242	2347	2498	2624
Cancel Lampang #1 & #2	1306	1409	1508	1590	1689	1758	1872	1966	2103	2246	2353	2505	2630
Cancel Lampang #3	1306	1409	1513	1596	1694	1788	1876	1970	2106	2253	2358	2510	2637
Cancel Ao Phai #1	1306	1404	1503	1572	1665	1770	1875	1969	2106	2252	2357	2509	2634
Cancel Saba Yoi #1	1306	1404	1503	1572	1670	1776	1851	1944	2080	2227	2333	2484	2612
Cancel Lampang #1 - #3	1306	1404	1503	1572	1681	1751	1865	1959	2096	2241	2346	2497	2623
Cancel Lampang #1 - #3, add 400 MW gt	1306	1409	1521	1605	1700	1805	1881	1974	2110	2257	2364	2516	2645
Cancel Lampang #1 - #4	1306	1409	1521	1605	1700	1805	1881	1974	2110	2257	2364	2516	2645
Cancel Lampang #1 - #4, add 500 MW gt	1306	1409	1521	1619	1708	1810	1886	1979	2115	2261	2370	2523	2654
Cancel Lampang #2 - #5 add 500 MW gt	1306	1409	1521	1619	1708	1810	1886	1979	2115	2261	2370	2523	2654
Cancel Lampang #1, #2, #5	1306	1404	1503	1596	1694	1788	1876	1970	2106	2253	2358	2510	2637
Cancel Lampang #1, #2, #5, add 400 MW gt	1306	1409	1513	1596	1694	1788	1876	1970	2106	2253	2358	2510	2637
Energy Efficient, 10% Penetration													
Cancel Nam Phong #2 cc	1316	1417	1519	1605	1709	1785	1905	2005	2142	2288	2392	2544	2669
Cancel Lampang #1	1316	1413	1515	1603	1706	1806	1902	2002	2139	2285	2391	2543	2670
Cancel Lampang #1, add 100 MW gt	1316	1421	1524	1611	1714	1807	1909	2009	2145	2291	2397	2549	2676
Cancel Lampang #1, add 200 MW gt	1316	1421	1524	1611	1714	1807	1909	2009	2145	2291	2397	2549	2676
Cancel Lampang #4	1316	1421	1524	1611	1714	1807	1909	2009	2145	2291	2397	2549	2676
Cancel Lampang #4, add 100 MW gt	1316	1417	1519	1605	1709	1785	1905	2005	2142	2288	2392	2544	2669
Cancel Lampang #4, add 200 MW gt	1316	1417	1519	1605	1709	1785	1905	2005	2142	2288	2392	2544	2669
Cancel Lampang #5	1316	1417	1519	1605	1709	1785	1905	2005	2142	2288	2392	2544	2669
Cancel Ao Phai #1	1316	1417	1519	1605	1709	1785	1905	2005	2142	2288	2392	2544	2669
Cancel Saba Yoi #1	1316	1417	1519	1605	1709	1785	1905	2005	2142	2288	2392	2544	2669
Cancel Saba Yoi #1, add 135 MW gt	1316	1417	1519	1605	1709	1785	1905	2005	2142	2288	2392	2544	2669
Cancel Saba Yoi #1, add 200 MW gt	1316	1417	1519	1605	1709	1785	1905	2005	2142	2288	2392	2544	2669

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Discount rate (real):	7%
Gas Turbine Cost (\$/kW)	540
PIF for capital investment	1.2
Multiplier	0.648

Proxy Plant Valuation of Conservation Scenarios Through Production-Costing of the EGAT Power System Using ELFIN.

File	1991				1991				1991			
	Sum	1991	%	Change	Sum	1991	%	Change	Sum	1991	%	Change
	Total	NPV	Base	to 2030	Total	NPV	Base	to 2006	Total	NPV	Base	to 2006
Building Energy Standard, 100% Penetration												
Cancel Lampang #2 - #5	92434	24963	-4%	976	27334	14683	-4%	676	897	974	1133	
Cancel Lampang #1 - #4	94003	25526	-2%	413	28053	15113	-2%	247	939	1016	1185	
Cancel Lampang #1 - #5	93831	25481	-2%	458	28006	15087	-2%	273	939	1016	1185	
Cancel Lampang #1 - #5	94322	25583	-1%	356	28097	15126	-2%	234	939	1016	1185	
Cancel Lampang #1 - #5, add 900 MW gt	94759	25858	0%	81	28559	15405	0%	-45	939	1016	1185	
Cancel Lampang #1 - #5, Saba Yoi #1, add 1000 MW gt	95119	26044	0%	-105	28769	15568	1%	-208	939	1016	1185	
Cancel Lampang #1 - #5, Saba Yoi #1, add 800 MW gt	94973	25904	0%	35	28623	15427	0%	-67	939	1016	1185	
Cancel Lampang #1 - #6	94948	25706	-1%	233	28198	15166	-1%	194	939	1016	1185	
Cancel Lampang #1 - #6, add 600 MW gt	95315	25913	0%	26	28590	15377	0%	-17	939	1016	1185	
Cancel Lampang #1 - #6, add 800 MW gt	95444	25989	0%	-50	28719	15453	1%	-93	939	1016	1185	
Cancel Lampang #1 - #7	25666	14319	-45%	11620	25666	14319	-7%	1040	939	1016	1185	
Building Energy Standard, 54% Penetration												
Cancel Nam Phong #2 cc	94090	25563	-1%	376	28115	15146	-1%	214	939	1016	1185	
Cancel Khanom #1	94110	25572	-1%	367	28135	15155	-1%	205	939	1016	1185	
Cancel Lampang #1	94072	25562	-1%	377	28122	15148	-1%	212	939	1016	1185	
Cancel Lampang #1, #2	94343	25639	-1%	300	28218	15198	-1%	162	939	1016	1185	
Cancel Lampang #1, #2, add 300 MW gt	94630	25715	-1%	224	28305	15242	-1%	118	939	1016	1185	
Cancel Lampang #1 - #3	94824	25833	0%	86	28499	15381	0%	-21	939	1016	1185	
Cancel Lampang #1 - #3, add 300 MW gt	94902	25782	-1%	157	28377	15278	-1%	82	939	1016	1185	
Cancel Lampang #1 - #3, add 400 MW gt	95096	25921	0%	18	28571	15417	0%	-57	939	1016	1185	
Cancel Lampang #1 - #3, add 500 MW gt	95161	25954	0%	-15	28636	15450	1%	-90	939	1016	1185	
Cancel Lampang #2 - #4, add 400 MW gt	95226	25981	0%	-42	28701	15477	1%	-117	939	1016	1185	
Cancel Lampang #1 - #4	95147	25935	0%	4	28622	15430	0%	-71	939	1016	1185	
Cancel Lampang #1 - #4, add 600 MW gt	95200	25853	0%	86	28450	15313	0%	46	939	1016	1185	
Cancel Lampang #1, #2, #5	95589	26130	1%	-191	28839	15591	2%	-231	939	1016	1185	
Cancel Lampang #5	95035	25801	-1%	138	28385	15277	-1%	83	939	1016	1185	
Cancel Ao Phai #1	94472	25654	-1%	285	28222	15194	-1%	166	939	1016	1185	
Cancel Saba Yoi #1	93721	25489	-2%	450	28046	15119	-2%	240	939	1016	1185	
	94082	25568	-1%	371	28132	15155	-1%	205	939	1016	1185	

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	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Building Energy Standard, 100% Penetration													
Cancel Lampang #2 - #5	1275	1357	1453	1519	1621	1714	1811	1923	2061	2183	2329	2480	2604
Cancel Lampang #1 - #4	1310	1413	1482	1573	1671	1788	1867	1963	2100	2245	2355	2508	2638
Cancel Lampang #1 - #5	1310	1377	1488	1582	1678	1785	1863	1959	2096	2242	2350	2503	2633
Cancel Lampang #1 - #5	1310	1377	1488	1582	1678	1794	1875	1970	2105	2251	2362	2516	2649
Cancel Lampang #1 - #5, add 900 MW gt	1310	1377	1682.4	1582	1873.4	1795	1939.8	1971	2107	2253	2363	2517	2648
Cancel Lampang #1 - #5, Saba Yoi #1, add 1000 MW gt	1310	1377	2136	1582	1679	1794	1880	1973	2106	2252	2366	2520	2654
Cancel Lampang #1 - #5, Saba Yoi #1, add 800 MW gt	1310	1377	1476	1578	2197.4	1794	1880	1973	2106	2252	2366	2520	2654
Cancel Lampang #1 - #6	1310	1377	1488	1582	1678	1794	1875	1989	2119	2262	2380	2534	2670
Cancel Lampang #1 - #6, add 600 MW gt	1310	1377	1617.6	1582	1679	1794	1875	2247.2	2120	2263	2381	2535	2669
Cancel Lampang #1 - #6, add 800 MW gt	1310	1377	1617.6	1582	1808.6	1795	2004.6	1988	2248.6	2263	2381	2535	2669
Cancel Lampang #1 - #7	1310	1377	1488	1582	1678	1794	1875	2025	2146	2276	2411	2564	
Building Energy Standard, 54% Penetration													
Cancel Nam Phong #2 cc	1310	1408	1508	1584	1681	1764	1877	1977	2114	2235	2363	2515	2639
Cancel Khanom #1 cc	1310	1404	1504	1589	1689	1768	1877	1974	2110	2256	2362	2513	2639
Cancel Lampang #1	1310	1404	1503	1588	1688	1762	1877	1973	2110	2256	2361	2512	2638
Cancel Lampang #1, #2	1310	1413	1513	1597	1697	1771	1884	1980	2117	2263	2368	2520	2645
Cancel Lampang #1, #2, add 300 MW gt	1310	1413	1519	1604	1703	1805	1888	1984	2121	2267	2373	2525	2653
Cancel Lampang #1 - #3	1310	1607.4	1519	1604	1703	1805	1888	1984	2121	2267	2373	2525	2653
Cancel Lampang #1 - #3, add 300 MW gt	1310	1413	1527	1613	1710	1816	1893	1988	2125	2271	2379	2531	2661
Cancel Lampang #1 - #3, add 400 MW gt	1310	1607.4	1527	1613	1710	1816	1893	1988	2125	2271	2379	2531	2661
Cancel Lampang #1 - #3, add 500 MW gt	1310	1607.4	1527	1613	1710	1816	1893	1988	2125	2271	2379	2531	2661
Cancel Lampang #2 - #4, add 400 MW gt	1310	1408	1713.4	1613	1710	1808	1958.8	1989	2126	2273	2380	2532	2661
Cancel Lampang #1 - #4	1310	1413	1527	1628	1717	1821	1900	1994	2130	2276	2386	2538	2670
Cancel Lampang #1 - #4, add 600 MW gt	1310	1801.8	1527	1628	1717	1821	1900	1994	2130	2276	2386	2538	2670
Cancel Lampang #1, #2, #5	1310	1413	1519	1604	1703	1819	1897	1992	2129	2274	2383	2536	2666
Cancel Lampang #5	1310	1408	1508	1584	1681	1789	1887	1983	2120	2266	2372	2524	2650
Cancel Ao Phai #1	1310	1408	1508	1584	1679	1786	1864	1959	2094	2241	2347	2499	2627
Cancel Saba Yoi #1	1310	1408	1508	1584	1690	1764	1877	1973	2110	2256	2361	2513	2638

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Discount rate (real):	7%
Gas Turbine Cost (\$/kW)	540
PIF for capital investment	1.2
Multiplier	0.648

Proxy Plant Valuation of Conservation Scenarios Through Production-Costing of the EGAT Power System Using ELFIN.

File	1991				1991				1991			
	Sum	1991	%	NPV	Sum	1991	%	NPV	Sum	1991	%	NPV
	Total	NPV	Change	Savings	Total	NPV	Change	Savings	Total	NPV	Change	Savings
	to 2030 to 2030	to 2030	Base	to 2030	to 2006 to 2006	to 2006	Base	to 2006	to 2006 to 2006	to 2006	Base	to 2006
Building Energy Standard, 67% Penetration												
stand	93715	25463	-2%	476	27990	15085	-2%	275	938	1016	1184	1184
stddef2	93760	25484	-2%	455	28035	15106	-2%	254	938	1016	1184	1184
stddef2	93726	25476	-2%	463	28026	15102	-2%	258	938	1016	1184	1184
stddef2	93997	25553	-1%	386	28122	15151	-1%	209	938	1016	1184	1184
stddef2	94277	25625	-1%	314	28202	15192	-1%	168	938	1016	1184	1184
stddef2	94555	25696	-1%	243	28280	15231	-1%	129	938	1016	1184	1184
stddef2	94849	25765	-1%	174	28349	15264	-1%	96	938	1016	1184	1184
stddef9	95088	25939	0%	0	28613	15442	1%	-83	938	1016	1184	1184
stddef9	95141	25985	0%	-46	28666	15489	1%	-129	938	1016	1184	1184
stddef10	95155	25965	0%	-25	28680	15468	1%	-108	938	1016	1184	1184
stddef11	95309	25998	0%	-59	28684	15478	1%	-118	938	1016	1184	1184
stddef2	94690	25715	-1%	224	28290	15231	-1%	129	938	1016	1184	1184
stddef2	94108	25558	-1%	381	28108	15137	-1%	223	938	1016	1184	1184
stddef2	93372	25401	-2%	538	27947	15071	-2%	289	938	1016	1184	1184
stddef2	93728	25477	-2%	462	28028	15103	-2%	256	938	1016	1184	1184
Building Energy Standard, 3% Penetration												
stand	95480	25920	0%	19	28530	15349	0%	11	941	1020	1194	1194
stddef3	95486	25925	0%	14	28536	15354	0%	6	941	1020	1194	1194
stddef10	95539	25954	0%	-15	28589	15383	0%	-23	941	1020	1194	1194
stddef12	95525	25944	0%	-5	28575	15372	0%	-13	941	1020	1194	1194
stddef12	95522	25942	0%	-3	28572	15371	0%	-11	941	1020	1194	1194
stddef12	95518	25940	0%	-1	28568	15369	0%	-9	941	1020	1194	1194
Load Shifting, 100% Penetration												
tspar	96055	26088	1%	-149	28730	15458	1%	-98	951	1026	1201	1201
tspar	95729	25984	0%	-45	28604	15385	0%	-25	942	1020	1195	1195
tspar	95654	25964	0%	-25	28579	15373	0%	-13	942	1020	1195	1195

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	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Building Energy Standard, 67% Penetration													
Cancel Nam Phong #2 cc	1307	1405	1504	1575	1669	1755	1861	1968	2105	2216	2353	2505	2639
Cancel Khanom #1 cc	1307	1401	1500	1584	1683	1756	1869	1964	2101	2247	2352	2504	2629
Cancel Lampang #1	1307	1401	1500	1583	1683	1753	1869	1964	2100	2246	2351	2503	2628
Cancel Lampang #1, #2	1307	1410	1509	1592	1692	1762	1876	1971	2108	2254	2358	2510	2635
Cancel Lampang #1 - #3	1307	1410	1515	1599	1697	1792	1880	1975	2111	2257	2363	2515	2643
Cancel Lampang #1 - #4	1307	1410	1523	1608	1703	1809	1885	1979	2115	2262	2369	2521	2651
Cancel Lampang #1 - #4, add 400 MW gt	1307	1410	1523	1622	1711	1814	1891	1984	2120	2266	2375	2528	2660
Cancel Lampang #1 - #4, add 500 MW gt	1307	1410	1523	1622	1711	1815	1891	1985	2121	2267	2376	2529	2659
Cancel Lampang #1 - #4, add 500 MW gt	1307	1410	1523	1622	1711	1815	1891	1985	2121	2267	2376	2529	2659
Cancel Lampang #2 - #5, add 500 MW gt	1307	1405	1504	1575	1669	1754	1869	1964	2100	2246	2351	2503	2628
Cancel Lampang #1, #2, #5	1307	1405	1504	1575	1669	1754	1869	1964	2100	2246	2351	2503	2628
Cancel Lampang #5	1307	1405	1504	1575	1669	1754	1869	1964	2100	2246	2351	2503	2628
Cancel Ao Phai #1	1307	1405	1504	1575	1669	1754	1869	1964	2100	2246	2351	2503	2628
Cancel Saba Yoi #1	1307	1405	1504	1575	1669	1754	1869	1964	2100	2246	2351	2503	2628
Building Energy Standard, 3% Penetration													
Cancel Saba Yoi #1	1318	1419	1522	1609	1714	1791	1912	2013	2150	2296	2401	2552	2678
Cancel Saba Yoi #1, add 100 MW gt	1318	1419	1522	1609	1712	1814	1909	2010	2147	2293	2399	2551	2678
Defer Saba Yoi #1 two yrs, add 35 MW gt	1318	1419	1522	1609	1712	1814	1909	2010	2147	2293	2399	2551	2678
Defer Saba Yoi #1 three yrs, add 35 MW gt	1318	1419	1522	1609	1712	1814	1909	2010	2147	2293	2399	2551	2678
Defer Saba Yoi #1 four yrs, add 35 MW gt	1318	1419	1522	1609	1712	1814	1909	2010	2147	2293	2399	2551	2678
Load Shifting, 100% Penetration	1325	1427	1532	1620	1726	1815	1926	2028	2165	2311	2416	2568	2693
Load Shifting, 40% Penetration	1319	1421	1525	1613	1719	1798	1918	2021	2157	2303	2408	2560	2685
Load Shifting, 20% Penetration	1318	1420	1524	1612	1717	1795	1916	2018	2155	2301	2406	2557	2683

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Multiplier	0.648

Proxy Plant Valuation of Conservation Scenarios Through Production-Costing of the EGAT Power System Using ELFIN.

File	1991				1991				1991			
	Sum	1991	%	NPV	Sum	1991	%	NPV	Sum	1991	%	NPV
	Total	NPV	Change	Savings	Total	NPV	Change	Savings	Total	NPV	Change	Savings
	to 2030	to 2030	Base	to 2030	to 2006	to 2006	Base	to 2006	to 2006	to 2006	Base	to 2006
Non-electric Cooling, 100% Penetration												
Cancel Lampang #1 - #4	engch	93084	25183	-3%	756	14848	-3%	511	904	983	1991	1146
Cancel Lampang #1 - #4, add 600 MW gt	gcdef2	94228	25502	-2%	437	15049	-2%	311	904	983	1991	1146
Cancel Lampang #1 - #5	gcdef2	94617	25779	-1%	160	15326	0%	33	904	983	1991	1146
Cancel Lampang #1 - #5, add 700 MW gt	gcdef3	94748	25610	-1%	329	15090	-2%	270	904	983	1991	1146
Cancel Lampang #2 - #6, add 700 MW gt	gcdef3	95148	25907	0%	32	15391	0%	-31	904	983	1991	1146
Cancel Lampang #3 - #7, add 800 MW gt	gcdef4	95292	25891	0%	48	15347	0%	13	904	983	1991	1146
Cancel Lampang #3 - #7, add 900 MW gt	gcdef4	95495	25910	0%	29	15331	0%	29	904	983	1991	1146
Cancel Lampang #3 - #7, add 1000 MW gt	gcdef4	95556	25951	0%	-12	15372	0%	-12	904	983	1991	1146
Cancel Lampang #1 - #4, Ao Phai #1	gcdef4	95584	25973	0%	-34	15394	0%	-34	904	983	1991	1146
Cancel Lampang #1 - #4, Nam Phong #2	gcdef2	94137	25469	-2%	470	15020	-2%	340	904	983	1991	1146
Cancel Khanom #1 cc, Nam Phong #2	gcdef2	94303	25514	-2%	425	15049	-2%	311	904	983	1991	1146
Cancel Khanom #1 cc, add 100 MW gt	engch	93190	25230	-3%	709	14892	-3%	468	904	983	1991	1146
Cancel Khanom #1 cc, add 200 MW gt	engch	93245	25271	-3%	668	14933	-3%	427	904	983	1991	1146
Non-electric Cooling, 20% Penetration	engch	93300	25312	-2%	627	14973	-3%	386	904	983	1991	1146
Cancel Lampang #5	engch	95136	25835	0%	104	15303	0%	57	941	1019	1991	1191
Cancel Lampang #4, add 100 MW gt	gcdef1	95538	25930	0%	9	15351	0%	9	941	1019	1991	1191
Cancel Lampang #4, add 135 MW gt	gcdef3	95432	25930	0%	9	15370	0%	-10	941	1019	1991	1191
Cancel Khanom #1 cc, add 200 MW gt	gcdef4	95455	25939	0%	0	15379	0%	-20	941	1019	1991	1191
Cancel Khanom #1 cc, add 100 MW gt	gcdef5	95233	25909	0%	30	15378	0%	-18	941	1019	1991	1191
Cancel Nam Phong #2, add 100 MW gt	gcdef5	95172	25866	0%	73	15334	0%	26	941	1019	1991	1191
Cancel Nam Phong #2, add 200 MW gt	gcdef5	95213	25878	0%	61	15342	0%	18	941	1019	1991	1191
Cancel Nam Phong #2, add 200 MW gt	gcdef5	95267	25918	0%	21	15382	0%	-22	941	1019	1991	1191

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Proxy Plant Valuation of Conservation Scenarios Through Pr

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Non-electric Cooling, 100% Penetration													
Cancel Lampang #1 - #4	1283	1376	1474	1542	1640	1729	1843	1958	2095	2205	2343	2495	2618
Cancel Lampang #1 - #4, add 600 MW gt	1283	1386	1498	1594	1690	1797	1876	1974	2110	2256	2365	2518	2648
Cancel Lampang #1 - #5	1283	1374.8	1498	1594	1690	1797	1876	1974	2110	2256	2365	2518	2648
Cancel Lampang #1 - #5, add 700 MW gt	1283	1386	1498	1594	1690	1806	1889	1985	2120	2265	2378	2531	2665
Cancel Lampang #2 - #6, add 700 MW gt	1283	1804.6	1499	1594	1690	1808	1889	1985	2121	2267	2379	2531	2664
Cancel Lampang #3 - #7, add 800 MW gt	1283	1376	1925.6	1577	1674	1784	1882	1992	2125	2271	2384	2539	2671
Cancel Lampang #3 - #7, add 900 MW gt	1283	1376	1966.4	1538	1642	1759	1876	1999	2131	2275	2392	2545	2680
Cancel Lampang #3 - #7, add 1000 MW gt	1283	1376	2031.2	1537	1642	1759	1873	1999	2131	2275	2392	2545	2680
Cancel Lampang #1 - #4, Ao Phai #1	1283	1376	2087	1536	1639	1747	1861	1999	2131	2275	2392	2545	2680
Cancel Lampang #1 - #4, Saba Yoi #1	1283	1386	1498	1594	1696	1783	1871	1965	2097	2241	2357	2511	2647
Cancel Khanom #1 cc, Nam Phong #2	1283	1373	1473	1559	1660	1795	1852	1951	2088	2234	2340	2492	2619
Cancel Khanom #1 cc, Nam Phong #2, add 100 MW gt	1283	1438.8	1473	1559	1660	1747	1852	1951	2088	2234	2340	2492	2619
Cancel Khanom #1 cc, Nam Phong #2, add 200 MW gt	1283	1503.6	1473	1559	1660	1736	1853	1951	2088	2234	2340	2492	2619
Non-electric Cooling, 20% Penetration													
Cancel Lampang #5	1315	1416	1519	1605	1709	1784	1904	2004	2141	2287	2391	2542	2668
Cancel Lampang #4, add 100 MW gt	1315	1416	1519	1605	1709	1828	1911	2011	2148	2293	2400	2552	2680
Cancel Lampang #4, add 135 MW gt	1315	1416	1519	1675.8	1714	1796	1908	2008	2145	2290	2396	2548	2675
Cancel Khanom #1 cc, add 200 MW gt	1315	1541.6	1515	1602	1705	1781	1901	2001	2138	2284	2389	2541	2668
Cancel Khanom #1 cc, add 100 MW gt	1315	1476.8	1515	1602	1705	1788	1900	2001	2137	2283	2389	2541	2668
Cancel Nam Phong #2, add 100 MW gt	1315	1476.8	1515	1603	1706	1796	1901	2001	2138	2284	2390	2542	2669
Cancel Nam Phong #2, add 200 MW gt	1315	1542.6	1515	1603	1706	1784	1901	2001	2138	2284	2390	2542	2669

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Proxy Plant Valuation of Conservation Scenarios Through Pr

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Deferrals Only (w/o Conservation):													
Cancel Lampang #1-#4, add 500 MW gt	1318	1747	1543	1654	1745	1851	1937	2036	2172	2318	2429	2582	2715
Cancel Lampang #2-#5, add 500 MW gt	1318	1420	1860	1637	1735	1855	1944	2043	2176	2322	2435	2589	2723
Cancel Lampang #4, add 100 MW gt	1318	1420	1523	1681.8	1721	1811	1918	2020	2156	2302	2408	2561	2688
Cancel Lampang #2-#4, add 400 MW gt	1318	1420	1535	1766.6	1735	1845	2058.6	2029	2166	2312	2421	2574	2705
Cancel Lampang #1-#4, add 500 MW gt	1318	1489.8	1737.4	1654	1745	1851	1937	2036	2172	2318	2493.8	2582	2715
Defer Saba Yoi #1 four yrs, add 35 MW gt	1318	1420	1523	1611	1714	1816	1933.7	2012	2152	2298	2403	2555	2680
Cancel Lampang #3-#7, add 900 MW gt	1318	1420	2076.2	1602	1701	1816	1933	2083	2207	2339	2470	2623	2761
Cancel Lampang #4, add 135 MW gt	1318	1420	1523	1681.8	1721	1811	1918	2042.7	2156	2302	2408	2561	2688
Cancel Nam Phong #2 cc, add 200 MW gt	1318	1545.6	1520	1609	1713	1798	1911	2013	2150	2296	2402	2554	2682
Cancel Lampang #1-#6, add 800 MW gt	1318	1424	1672.6	1654	1874.6	1861	2090.6	2096	2345.6	2344	2481	2633	2773
Cancel Lampang #1-#7, Saba Yoi #1-#2, add 1000 MW gt	1318	1424	1543	1654	2079	1875	2003	2521	2312	2415	2575	2726	2866

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Exchange Rate (B/U.S.\$)	25
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File for calculating the capital costs of PDP 90-01.

Project	Local Cost	Foreign Cost	Total Cost	Local Cost	Foreign Cost	Total Cost
	(M. Baht)	(M. Baht)	(M. Baht)	(M. U.S.\$)	(M. U.S.\$)	(M. U.S.\$)
Rayong cc unit 4	1762	3100	4862			
Nam Phong cc unit 2	2624.4	4334.6	6959			
Bhumibol renovation	136.3	556.1	692.4			
North Bangkok renovation	435.9	897.1	1333			
Pak Mun units 1-4	1940	1940	3880			
Sirikit unit 4	460	785	1245			
Khanom cc unit 1	3041	4568	7609			
kaeng krung units 1-2	1748	1362	3110			
Bhumibol unit 8	1040	1310	2350			
Lampang unit 1	4738	6365	11103	189.5	254.6	444.1
Lampang unit 2	3573	5305	8878	142.9	212.2	355.1
Lampang unit 3	3766	5249	9015	150.6	210.0	360.6
Lampang unit 4	3708.5	5363.5	9072	148.3	214.5	362.9
Lampang unit 5	7203	10068	17271	288.1	402.7	690.8
Lampang unit 6	6019.5	8760.5	14780	240.8	350.4	591.2
Lampang unit 7	6173	8668	14841	246.9	346.7	593.6
Lam Takhong units 1-4	2690	3690	6380			
Mae Taeng units 1-2	585	650	1235			
Saba Yoi unit 1	5038.4	7321.1	12359.5	201.5	292.8	494.4
Saba Yoi unit 2	5456.5	7504	12960.5	218.3	300.2	518.4
Saba Yoi unit 3	4930	7171.5	12101.5	197.2	286.9	484.1
Sai Puri units 1-2	1495	955	2450			
Ao Phai units 1-4	48633	49730	98363			
New Thermal 1-5	129279.5	125381.5	254661			
Mae Lama Luang units 1-3	5713.2	5855.1	11568.3			
Mae Kok units 1-2	2740	2165	4905			
Nam Ngao units 1-2	4418.3	4444.4	8862.7			
Nam Khek units 1-2	3260	3261	6521			
Sin Pun units 1-2	4193.3	6721.7	10915			
Gas Turbines	1734.1	3746	5480.1			
Plant Sub-Total (Billions)	268.5	297.2	565.8	10.7	11.9	22.6
Transmission Projects*	53506.7	22108.4	75615.1	2140.3	884.3	3024.6
TOTAL (Billions)	322.0	319.3	641.4	12.9	12.8	25.7

* Transmission investment data up to 1996 only.

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Discount rate: 7%

File for calculating the stream of annual incremental investment in conservation scenarios of Thai commercial buildings.
 Note: all values in millions of U.S.\$

Scenario	NPV	Nominal											
		Sum	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
High-Efficiency, 100%	584	748	341	41	37	39	39	42	39	42	44	46	40
High-Efficiency, 50%	235	373	15	19	22	26	30	34	37	41	46	51	52
High-Efficiency, 10%	47	75	3	4	4	5	6	7	7	8	9	10	10
Load-Shifting, 100%	84	108	48	6	5	6	6	6	6	6	7	7	6
Load-Shifting, 40%	28	44	2	2	3	3	3	4	4	5	6	6	6
Load-Shifting, 20%	14	22	1	1	1	1	2	2	2	2	3	3	3
Non-electric Cooling, 100%	231	296	135	16	15	15	16	17	15	17	18	18	16
Non-electric Cooling, 20%	37	59	2	3	4	4	5	5	6	7	7	8	8

END

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