

7.3 Items of Data Entry and Explanation

7.3.1 Factory Energy Consumption File

This data file records the energy consumption data (by month, total in the period), production quantity and energy intensity submitted periodically from designated factories. The items of entry are as follows.

(1) Types of used energy

1) Type and unit of each used energy

The unit specified for electric power and for each fuel type shown in Table 7.1 is used for the consumption of each used energy. At the same time, electric power and fuels of various types are converted into standardized calorific value unit [MJ] by the equivalent calorific value conversion coefficients shown in Table 7.1 in order to seize the total energy. However, [GJ (GJ = $10^3 \times$ MJ)] may be used as required.

Furthermore, provisions are made so that electric energy consumption can be unified to kWh and that consumption of various fuels can be unified to values converted into crude oil equivalent converted value (kl), in order to permit grasping as classified into electric power and other fuels.

Table 7.1 Equivalent Calorific Value Conversion Coefficients

Energy type	Unit	Crude oil equivalent converted value	Equivalent calorific value conversion coefficient
Electric power	kWh		3.60
Fuel oil	litre		39.77
Diesel fuel	litre		36.42
Gasoline	litre		31.48
Light oil	litre		34.54
Natural gas	$10^6 \times$ MBtu		1.02
LPG	litre		26.62
Imported coal	kg		26.37
Lignite	kg		18.42
Steam	ton		

2) Make totaling of data on energy consumption in three types indicated below as total values.

A: Electric energy: kWh

B: Fuel energy: kl (kl as converted into crude oil)

C: Total energy: MJ (GJ = $10^3 \times$ MJ)

(2) Energy consumption data

- 1) Enter the actual consumption value in month units as the energy consumption, and obtain the total for six months (or 12 months). At the same time, indicate as data the planned consumption value of the total of six months (or 12 months) in parallel. Comparison with actual values is permitted as a result.
- 2) If any by-product energy is used or if electric power of private generation is used, its consumption is included in the energy consumption. If any portion of the by-product energy is sold to outside, it should be subtracted from the used energy consumption.

(3) Production quantity data

- 1) Enter the total value of one month and of six months (or 12 months) as the production quantity. At the same time, indicate as data the planned production quantity of the total of six months (or 12 months) in parallel. Comparison with achieved values is permitted as a result.
- 2) In the case of a factory having multiple production items, make entry by each product. As a criteria, the number of items of product types to be entered should cover around 80% of the entire production quantity of the subject factory.
- 3) In the case of a factory of small batch production of many product types, product types of similar energy consumption structure may be arranged to one type.
- 4) For selection of unit of production quantity, the unit that is customarily used for production management at the factory may be used. But it is desirable that a unit that is of strong correlation with energy consumption is uniquely contrived.
- 5) The production cost of the factory or a substitute index that is suitable for management of energy intensity can be used as the unit of production quantity.
- 6) Enter the actual value per month and the actual value of the total of six months also for the production quantity.
- 7) A suitable unit may be selected at each factory for production quantity. But the same unit should be used throughout the term and year.

(4) Energy intensity data

- 1) Calculate the energy intensity at a factory at which both of electric energy and fuel energy are used.

A: Intensity of electric power

B: Intensity of fuel

C: Intensity of total energy

(total energy = electric power + fuel, etc.)

In the case where any of used energy occupies more than 80% of the total energy consumption, it is satisfactory if two efficiencies, i.e., the intensity of the main energy and the intensity of total energy, are calculated.

- 2) Calculate each intensity by the expression indicated below.

A: Intensity of electric power: Electric power consumption (MJ)/production quantity

B: Intensity of fuel, etc.: Fuel, etc. consumption (MJ)/production quantity

C: Intensity of total energy: Total energy consumption (MJ)/production quantity

- 3) The production quantity by a suitable unit, production cost or a substitute index may be used for the production quantity.
- 4) As the total production quantity used for calculation of intensity of total energy, the following may be entered: the quantity obtained by totaling values converted by product using the quantity of energy required for production of the main product type at the subject factory as the reference.

[Remarks]

- (1) Situation of production equipment operation

Enhancement of the energy intensity is achieved as an ancillary effect as a result of enhancement of productivity, and drop in the energy intensity occurs as a result of drop in the production equipment operation rate. Therefore, it is advisable that data on the rate capacity (yield per hour) of production lines and data on operation time, scheduled shut-down time (shut-down time for periodic maintenance, shut-down time for adjustment of production quantity), scheduled operation time, etc. are recorded.

- (2) Situation of equipment changes

(3) Data on private power generation

- 1) In the case where power generation is made with private power generation equipment (equipment for emergency are excluded) using gas turbines, steam turbines or alike in the factory, the data on their rated capacity, running time and power generation rate should be grasped individually.
- 2) Record the data on the steam generation rate using waste heat recovery boilers or alike at the same time.
- 3) If electric power, steam and/or other energy is sold to outside of the factory, its transaction rate should also be recorded.

(4) Monthly consumption of purchased electric power by time zone

- 1) Record the following electric power consumption in every month to seize the electric energy by used time zone of purchased electric power.

Partial Peak	(8:00 ~ 18:30):	kWh/month
On Peak	(18:30 ~ 21:30):	kWh/month
Off Peak	(21:30 ~ 8:00):	kWh/month

- 2) Record the following data at the same time, to seize the monthly peak demand by time zone in every month.

Partial Peak	(8:00 ~ 18:30):	kW
On Peak	(18:30 ~ 21:30):	kW
Off Peak	(21:30 ~ 8:00):	kW

7.3.2 Factory Energy Conservation Project File

This is the data file for recording the data submitted periodically from designated factories regarding target and planning of energy conservation and for follow-up of the results. The items of data entry are as follows.

(1) Energy conservation project

- 1) Project name
- 2) Project description

3) Energy conservation measure classification

Energy conservation measure classification is determined and coded, for classification of contents of the energy conservation project. An example is given below.

- ① Improvement of fuel combustion efficiency
- ② Prevention of energy loss
- ③ Recovery and reuse of energy
- ④ Conversion and use of energy
- ⑤ Use of electric power at high efficiency by improvement of power factor, reduction of peak load in the peak use period of the electric power system, use of equipment having suitable load and other approaches
- ⑥ Use of machines and/or equipment of high energy efficiency and use of running controllers and materials which make contribution to energy conservation
- ⑦ Introduction of facilities and/or equipment of high efficiency by replacement of equipment of low efficiency.
- ⑧ Energy conservation by improvement such as enhancement of productivity or enhancement of quality
- ⑨ Other measures of energy conservation specified in government ordinances

4) Target of energy conservation

- 5) Energy conservation rate : kWh/month, MJ/month
- 6) Time of implementation (planned) : Start, completion
- 7) Amount of investment : $10^3 \times$ Baht
- 8) Energy conservation effect : Unit (MJ, GJ)
- 9) Annual profit : $10^3 \times$ Baht/year

10) Investment payback period (years)

Investment payback years in this case means simple payback years obtained by the calculation formula indicated below.

$$\text{Amount of investment (10}^3 \times \text{Baht)} / \text{Annual profit (10}^3 \times \text{Baht)}$$

7.3.3 Building Energy Consumption File

This is the data file that records the energy use data submitted periodically from designated buildings. The data items are as follows.

(1) Types of used energy

Correspond to 7.3.1 Factory Energy Consumption File.

(2) Energy consumption data

1) The energy consumption data of every month should be recorded as a rule, and they should be reported together with the total value of the reporting period (six months, for instance).

2) Electric power consumption of principal processes (by application)

The applications of use of energy include air conditioning, sanitation, illumination and transportation. If diversified data such as data on heat source system (chiller, cooling tower, small-size air conditioner, etc.), pump system (chilled water, cooling water, etc.) and fan system (air conditioners, fan coil units, etc.) are available for the energy for air conditioning, for instance, they are useful from the standpoint of management of energy conservation.

Therefore, it is desirable that recording and reporting of such diversified data are made.

- For air conditioning : kWh/month
 - (heat source system) : kWh/month
 - (pump system) : kWh/month
 - (fan system) : kWh/month

- For sanitation : kWh/month
 - (heat source system) : kWh/month
 - (pump system) : kWh/month

- For illumination : kWh/month
- For transportation equipment : kWh/month
- (elevators) : kWh/month
- (escalators) : kWh/month
- For others : kWh/month

3) Fuel consumption at principal processes (by application)

Boilers are considered to be mainly used for sanitation. But record the main application for verification.

With a generator, record the application of the electric power generated with it and the generation rate. Furthermore, in the case where exhaust heat is used, record the application and exhaust heat utilization rate.

- Steam boiler

Fuel type :
 Fuel consumption : ℓ/month
 Main application :

- Hot-water boiler

Fuel type :
 Fuel consumption : ℓ/month
 Main application :

- Generator (excluding generator for emergency use)

Generation capacity : kW
 Running time : hrs/month
 Generation rate : kWh/month
 Fuel type :
 Fuel consumption : ℓ/month
 Main application of electric power :
 Exhaust heat utilization rate : kWh/month
 Application of exhaust heat utilization :

4) Number of patients of hospital

The following data are required for calculation of energy intensity.

Total number of inpatients	:	persons·day/month
Total number of outpatients	:	persons·day/month

5) Number of used guest rooms of hotel

The following data is required for calculation of energy intensity.

Total number of used guest rooms	:	rooms·day/month
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6) Air conditioner running time : hrs/month

7) Illumination lighting time : hrs/month

Evaluation excluding the influence of the number of running hours during the reporting period is permitted by obtaining the energy consumption of air conditioning and illumination per running hour.

(3) Energy intensity data

1) Primary energy consumption per unit area

For air conditioning	:	MJ/m ² month
For sanitation	:	MJ/m ² month
For illumination	:	MJ/m ² month
Total	:	MJ/m ² month

2) Primary energy consumption per unit area and unit running time

For air conditioning	:	MJ/m ² hour
For sanitation	:	MJ/m ² hour
For illumination	:	MJ/m ² hour
Total	:	MJ/m ² hour

3) Primary energy consumption per person·day of inpatients (or outpatients) in a hospital

For air conditioning	:	MJ/person·day
For sanitation	:	MJ/person·day
For illumination	:	MJ/person·day
Total	:	MJ/person·day

4) Primary energy consumption per room•day of use of guest rooms in a hotel

For air conditioning	:	MJ/room•day
For sanitation	:	MJ/room•day
For illumination	:	MJ/room•day
Total	:	MJ/room•day

[Remarks]

(1) Monthly consumption of purchased electric power by time zone

- 1) Record the following electric power consumption in every month to grasp the electric energy by used time zone of purchased electric power.

Partial Peak (8:00 ~ 18:30):	kWh/month
On Peak (18:30 ~ 21:30):	kWh/month
Off Peak (21:30 ~ 8:00):	kWh/month

- 2) Record the following data at the same time, to grasp the monthly peak demand by time zone in every month.

Partial Peak (8:00 ~ 18:30):	kW
On Peak (18:30 ~ 21:30):	kW
Off Peak (21:30 ~ 8:00):	kW

7.3.4 Building Energy Conservation Project File

This is the data file for recording the data submitted periodically from designated buildings regarding target and planning of energy conservation and for follow-up of the results.

Multiple energy conservation projects may occur with one building. Therefore, register the following data for each project.

- ① Building registration number
- ② Process code
- ③ Project number: Project number set arbitrarily for each building
- ④ Project name
- ⑤ Project description

- ⑥ Energy conservation measure classification: Classification by the Energy Conservation Promotion Act
Same as the case of 7.3.2 Factory Energy Conservation Project File
- ⑦ Target of energy conservation: Type of energy intensity used for target setup and its target value
- ⑧ Energy conservation rate
- ⑨ Time of implementation: Modification period of equipment and structure
- ⑩ Amount of investment: Expenses required for implementation of energy conservation project
- ⑪ Energy conservation effect
- ⑫ Annual profit
- ⑬ Investment payback period

7.3.5 Energy Conservation Promotion Fund Utilization File

This data file records a project approval application form submitted by the one who files application for financial support through the energy conservation promotion fund for investment and implementation of energy conservation projects based on Section 25 (2) of the Energy Conservation Promotion Act, implementation report and results of examination made by DEDP. The drawings and documents appended to the application form are stored in the drawing and document file.

The follow-up method for energy conservation promotion fund includes subsidy, grant and loan; however this section describes loan, which also applies to subsidy and grant.

- (1) Project approval application number
 - 1) Date of acceptance of project approval application form: Date of acceptance by DEDP
 - 2) Project approval application acceptance number: Acceptance rearrangement number of DEDP
- (2) Outline of project application form
 - 1) Enterprise name : Company name or group name
 - 2) Representative's name : Representative's name

- 3) Location, telephone number : Location of head office and telephone number
 - 4) Date of establishment : Date of establishment of the company or group
 - 5) Number of employees: Number of company employees
 - 6) Capital or amount of investment
 - 7) Composition of capital or of invested money: Indicate the composition of principal shareholders or investors.
 - 8) Organization chart: Enter the drawing file number.
 - 9) Business report: Business reports, balance sheets and statements of accounts for recent two years of the enterprise. Documents that describe the situation of business in recent two years or outline of assets for business, if the said documents are not available. Enter document file numbers.
- (3) Time of implementation (period) of project activities
 - 1) Time of implementation: Month xx of year xx ~ Month yy of year yy
 - (4) Target of project activities
 - 1) Target: Object and purpose of implementation of project activities related to energy conservation
 - (5) Outline of factory or building with which project activities are implemented
 - 1) Name : Name of factory or building
 - 2) Location: Location of factory or building
 - 3) Person responsible for management: Name of factory superintendent or name of building manager
 - 4) Liaison staff: Name of liaison staff, name of energy manager, telephone number, FAX number
 - 5) Product code: Enter the application code for a building.
 - 6) Registration number: Enter the factory-building registration number. No entry is required if the factory or building is other than designated factories and designated buildings.
 - 7) Outline drawing of production process of the whole factory: Enter the drawing file number.

(6) **Applicable equipment**

Create data for each equipment, if there are multiple applicable equipment.

- 1) **Name:** Name of equipment
- 2) **Specific equipment classification:** As per energy conservation equipment classification chart
- 3) **Outline:** Including specification and capacity of applicable equipment
- 4) **Outline of processes:** Outline of the process to which the equipment is introduced and annual production level (recent achievements)
- 5) **Energy consumption:** Annual energy consumption (MJ) at the applicable equipment and process in the case where the production level remains unchanged

	Before introduction of equipment	After introduction of equipment
Energy consumption at the equipment concerned	MJ	MJ
Energy consumption at the process concerned	MJ	MJ

In the case of a new factory or building, use the average value of other factories or buildings of an undertaker performing similar operations as the energy consumption, and enter its basis.

- 6) **Energy conservation amount:** Estimated reduction (MJ) of annual energy consumption at the applicable process as a result of introduction of equipment
- 7) **Equipment drawing:** Enter the file number of the drawing and process of the applicable equipment.
- (7) **Energy conservation project other than introduction of equipment**

If there are multiple projects, enter data for each one of them.

- 1) **Outline**
- 2) **Energy conservation amount:** Estimated reduction (MJ) of annual energy consumption at the applicable process as a result of implementation of the subject project and its basis (using numeric values)

In the case of a new factory or building, use the average value of other factories or buildings of an enterprise performing similar operations as the energy consumption, and enter its basis.

(8) Expected effect

- 1) Production level: Annual production level of the whole factory or the like (recent achievements and planned value after implementation of the project)

Recent achievements	Planned value after implementation of the project
Production level	

- 2) Energy consumption: Annual energy consumption (MJ) of the whole factory or the like before implementation of the project.

In the case of a new factory or building, use the average value of other factories or buildings of an enterprise performing similar operations as the energy consumption, and enter its basis.

- 3) Energy conservation amount: Estimated reduction (MJ) of annual energy consumption at the whole factory as a result of introduction of equipment and of implementation of project activities other than introduction of equipment as well as energy consumption improvement rate (%)

(9) Funding program

- 1) Amount of fund required for project activities and method for raising the said fund

Raising source	Funds on hand	Borrowing from public organs	Borrowing from private finance institutions	Others	Total
Item					
Equipment					
Item required for implementation of project activities other than introduction of equipment					

- 2) Interest subsidy: Amount of interest subsidy loan

(10) Result of examination

- 1) Date of completion of examination: Date of completion of examination of DEDP
- 2) Result of examination: Approved, partially approved or rejected

3) Reason for permit: Loan repayment ability (assets, business achievements, borrowing ratio)

Applicable equipment (specific equipment)

Energy consumption amount (annual energy consumption or improvement rate)

Amount of interest subsidy loan (criteria of Fund Committee)

Feasibility of project (technology, profit)

(11) Project implementation report

- 1) Date of acceptance of report: Date of acceptance of project implementation report
- 2) Time of implementation of project activities: Month xx of year xx ~ Month yy of year yy
- 3) Applicable equipment and processes: Differences from project description

Copies of equipment specification and of delivery notes (for the portion of interest subsidy loan)

4) Energy conservation amount:

	Before introduction of equipment	After introduction of equipment	Differences
Production level of the whole factory (A)			
Energy consumption at the applicable equipment (B)			
Energy consumption at the applicable process (C)			
Energy conservation project activities other than introduction of equipment (D)			
Annual energy consumption of the whole factory (E)			
Energy consumption intensity of the whole factory (E/A)			

Read "the whole factory" as "the building", and read "production level" as "floor space" for a building. Collate the energy consumption with the periodic report.

- 5) Loan result: Amount of interest subsidy loan, time of completion of repayment, bank name

7.3.6 Factory outline file

Create a data file that contains the following information regarding the outline of the factory and the outline of the equipment of the designated factory (or the factory where the energy consumption, etc. are reported autonomously; same hereinafter).

This data file is created once for each factory. But it is updated as required upon acceptance of a report if any change occurs.

- (1) Outline of the company

The outline data related to the head office of a designated factory is registered.

Company name

Industry type

Company address

Telephone number & FAX number

Date of establishment and representative's name

Capital (Baht): To be used as data for classification of company scale (large, medium, small)

Total number of employees (persons): To be used as reference data for classification of company scale.

- (2) Outline of the factory

The outline data for each designated factory is registered.

MOI registration number: Registration number of Ministry of Industry

Name of factory

Factory registration number: Code number of designated factory

Area of location of factory

Address of factory

Telephone number & FAX number

Date of establishment

Number of employees of factory (persons)

Representative's name: Factory superintendent or the like

Name of energy manager: Including date of selection

MEA (PEA) customer number

Industry group classification

Names of principal products

TISI code number

Annual energy consumption: Fuel consumption (kℓ/year), electric power consumption (kWh/year)

Electric power contract type: Electric power contract number, contracted electric power, contracted voltage

Work shift: 8 hours, 16 hours, 24 hours, others

Operation time (days and hours): hours/day, hours/month, days/month, hours/year, days/year

(3) Outline of principal utility equipment

This is registration of data on the outline of common utility equipment of a factory. These data should be reviewed regarding extension and abandonment of equipment at the time of periodic reporting.

1) Power receiving and transforming equipment

Transformer number	Total
Rated output (kVA)	
Rated voltage (kV)	
Quantity	

2) Boiler

This is registration of data on the outline of boiler (including hot-water boilers).

Boiler number
Application
Type
Maximum working pressure
Rated maximum evaporation rate
Fuel type
Fuel consumption
Date of installation
Situation of use

3) Private generation equipment

Distinction between normal use and emergency use
Rated generation capacity

4) Air-conditioning equipment

This is registration of specification data for principal air-conditioning equipment of the factory.

① Air-conditioning equipment for production process

Equipment number	Total
Type	
Application	
Rated capacity (Btu/hr)	
Total electrical capacity (kW)	
Date of installation	
Quantity	

- ② This is registration of total data for principal equipment of the factory other than the equipment for production.

Total electrical capacity (kW)

Total quantity

5) Air compressor equipment

This is registration of specification data for principal air compressor equipment of the factory.

Equipment number	Total
Type	
Delivery rate (m ³ /hr)	
Delivery pressure (kg/cm ² g)	
Compressor capacity (kW)	
Date of installation	
Quantity	

(4) Outline of principal production equipment

This is registration of specification data on the production equipment of intensive energy consumption.

1) Industrial furnace, kiln, drying furnace

Process name	Total
Equipment name	
Application	
Type	
Material being heated	
Heating temperature	
Heat source	
Energy consumption	
Date of installation	
Situation of use	
Quantity	

2) Principal equipment using steam

This is registration of specification data on the production equipment using steam, hot water, etc. as heat sources.

Process name	Total
Equipment name	
Application	
Type	
Material being heated	
Treating capacity	
Steam supply pressure	
Steam consumption	
Date of installation	
Situation of use	
Quantity	

3) Principal production equipment using electric power

This is registration of specification data on the production equipment of intensive electric power consumption.

Process name	Total
Equipment name	
Application	
Type	
Equipment capacity (kW)	
Material being treated	
Date of installation	
Situation of use	
Quantity	

4) Waste heat recovery/and reuse equipment

This is registration of specification data on the equipment that make use of recovered exhaust heat.

Process name	Total
Equipment name	
Application	
Type	
Material being treated	
Exhaust heat generation source	
Exhaust heat consumption	
Date of installation	
Situation of use	
Quantity	

7.3.7 Building Outline File

Create a data file containing the following information as the outline of the designated building (or the building the energy consumption of which is autonomously reported; same hereinafter) and as the outline of the equipment.

This data file is what is created only once for each building. But it is updated as required when any change is reported at the occasion of periodic reporting.

- (1) Outline of the building
 - 1) Building registration number
 - 2) Building name
 - 3) If the building is a designated building
 - 4) Application of the building: 1. Office 2. Hospital 3. Hotel 4. Department store 5. Others
 - 5) Location of the building: Address, telephone, FAX, area
 - 6) Name of owner of the building
 - 7) Year/month of completion
 - 8) Date of designation
 - 9) Name of energy manager
 - 10) MEA (PEA) customer number
 - 11) Electric power contract type
 - 12) Structure: 1. Reinforced concrete structure 2. Steel structure 3. Steel framed reinforced concrete structure 4. Wood structure 5. Others
 - 13) Scale
 - Above the ground : floors
 - Under the ground : floors
 - Eaves height : m
 - 14) Site area : m²
 - 15) Building area : m² (horizontal projected area of the roof)

16) Gross floor space

Excluding parking lot : m²
Parking lot only : m²

17) Air-conditioned area : m²

18) Building heat insulation performance

Outside wall heat transmission coefficient : [W/m²°C]

Roof heat transmission coefficient : [W/m²°C]

Window glass type: 1. Transparent glass 2. Heat absorbing glass 3. Heat reflecting glass 4. Others

Window area ratio: % (Entire window area)/(Entire outside wall area including windows)×100

19) Building used time

Weekday : __: __ ~ __: __

Holiday : __: __ ~ __: __

20) Air conditioned time

Weekday : __: __ ~ __: __

Holiday : __: __ ~ __: __

21) (Office) Number of occupants in the building

22) (Hospital) Number of beds

23) (Hotel) Number of guest rooms

24) (Department store) Store area

25) Electrical equipment

Incoming transformer : kVA (total capacity)

Incoming voltage : kV

Generator : kVA (total capacity of generator)

Total lighting capacity : kW

26) Air conditioning equipment

Total chiller capacity : USRT (for large-size chillers)

USRT (for small-size distributed air conditioners)

Total chilled water flow rate: m³/h (for large-size chillers)

Total cooling water flow rate: m³/h (for large-size chillers)
Air conditioner airflow rate : m³/h (total airflow rate)
Pump motor : kW (total capacity)
Fan motor : kW (total capacity)
Set room temperature : °C (main set room temperature)

27) Sanitary equipment

Total boiler capacity : kcal/h
Pump motor : kW (total capacity)

28) Transportation equipment

Elevator : kW (maximum input)
persons (capacity)
m/min (speed)

Escalator : kW (maximum input)
persons (capacity)
m/min (speed)

29) Lighting equipment : kW (total capacity)

30) Company outline

Company name, business type, address, telephone number, FAX number, representative's name, date of establishment, capital, number of employees

7.3.8 Qualified Energy Manager File

This file is used for grasping and management of the situation of allocation and repletion of energy managers at designated factories and buildings, and it is also used as a reference for implementation of training (and national examination) based on the data on the persons who finished (and persons who cleared) training (and national examination).

Items for entry

1) Manager number

The manager number is specific to each person. In the case where an energy manager was displaced at a business establishment is then newly selected as an energy manager at another business establishment, a new manager number should be determined.

- 2) Name
- 3) Sex
- 4) Date of birth
- 5) Applicable qualification item (Item 3 of Section 13 of the Energy Conservation Promotion Act)

① Higher vocational certificate

② Degree

③ Training

a. Factory

b. Building

(c. Heat)

(d. Electricity)

(④ National examination)

(a. Heat)

(b. Electricity)

Make provisions to permit dealing with matters even after revision of training items and introduction of national examination in the future.

- 6) Certificate number
- 7) Training completion certificate number (or national examination passing certificate number)

This number is specific to each person. Make provisions to permit verification of data such as the year for his attendance at the training course and the test score.

8) Specialized field

① Heat management

② Electricity management

9) Whether the person is appointed as an energy manager

① Currently appointed as an energy manager

- a. Heat manager
- b. Electricity manager

② Currently not appointed as an energy manager

Make provisions to permit dealing even if designated factories and buildings are to be further classified by heat sector or by electricity sector in the future and appointment of an energy manager is to be required for each sector.

10) Designated establishment registration number at which he is appointed as an energy manager

Provide a column in the energy manager application form for entry of this number.

11) Belonging Section

12) Position

13) Contact telephone number

14) Date of appointment

15) Date of discharge

16) Reason for discharge

① Retirement (excluding death)

② Death

③ Others

10') Designated factory or building registration number at which he is appointed as an energy manager (Past 1)

11') Belonging Section

12') Position

13') Contact telephone number

14') Date of appointment

15') Date of discharge

16') Reason for discharge

① Retirement (excluding death)

② Others

10") Designated factory or building registration number at which he is selected as an energy manager
(Past 2)

11") Belonging Section

12") Position

13") Contact telephone number

14") Date of appointment

15") Date of discharge

16") Reason for discharge

① Retirement (excluding death)

② Others

Keep and manage the data in items 10)~ 16) at the time when he was selected as an energy manager in the past.

7.3.9 National Energy Consumption File

This file is created with data picked up from national energy statistics.

National energy statistics include the following.

- 1) Thailand Energy Situation: DEDP
- 2) Oil and Thailand: DEDP
- 3) Electric Power in Thailand: DEDP

The data items are as follows.

(1) Primary energy final consumption

- 1) By energy source (whole country): Each fiscal year. Data should include the period of first oil crisis (1973).
- 2) By energy source (sector): Each fiscal year. Sectors are industries.
- 3) By sector: Each fiscal year. Sectors are agriculture, mining, manufacturing, construction, residential & commercial and transportation.
- 4) By subsector of industrial sector: Each fiscal year. Subsectors are food manufacturing, textile, wood products and furniture manufacturing, pulp and paper manufacturing, chemical, non-ferrous metal manufacturing, fundamental metal manufacturing, metal products and machinery manufacturing.

(2) Petroleum products consumption

- 1) By area: Each fiscal year. Areas are Bangkok metropolitan circle, central area, northern area, northeastern area and southern area.
- 2) By subsector of industrial sector: Each fiscal year. Subsectors are food and beverage, textile, wood & furniture, paper, chemical, non-metallic, basic metal, fabricated metal and others.

(3) Electric power consumption

- 1) By area: Each fiscal year. Areas are Bangkok metropolitan area, central area, northern area, northeastern area and southern area.
- 2) By subsector of industrial sector: Each fiscal year. Subsectors are food and beverage, fabrics, wood & furniture, paper, chemical, non-metallic, basic metal, fabricated metal and others.

(4) Gross national product (GNP)

- 1) By fiscal year: Each fiscal year. GNP is what is obtained by subtracting values of raw materials and other intermediate products from gross product.

(5) Gross domestic product (GDP)

- 1) By fiscal year: Each fiscal year. $GDP = GNP - (\text{net income from outside of the nation})$

7.4 Output Sample

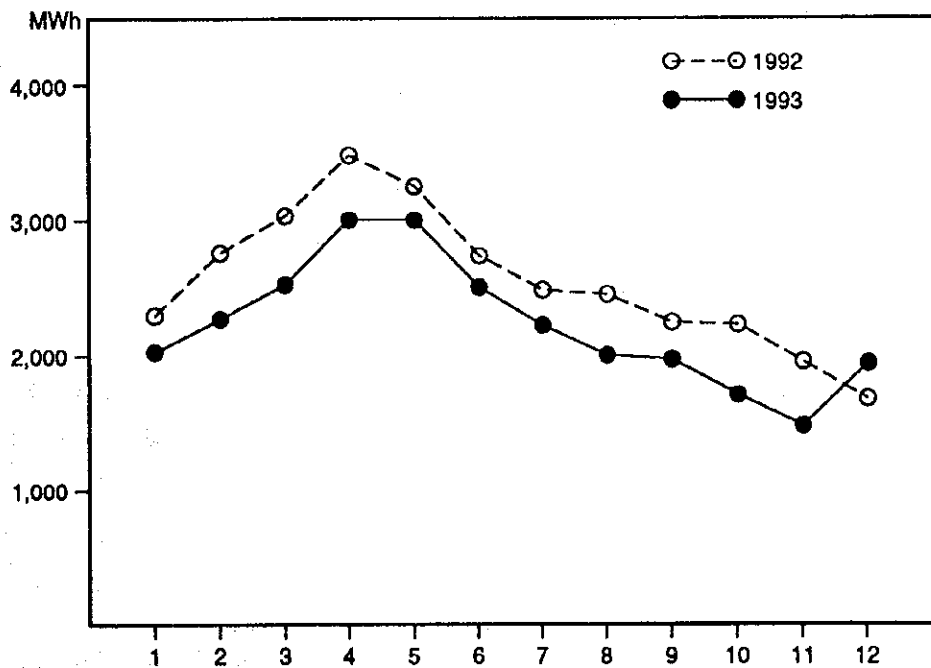
7.4.1 Factory Energy Consumption File Output Sample

(1) Annual energy consumption (electric power)

Table 7.2 Electric Power Consumption

	1992		1993	
January	2,250 MWh		2,000 MWh	
February	2,750		2,250	
March	3,000		2,500	
April	3,500		3,000	
May	3,250		3,000	
June	2,750	17,500	2,500	15,250
July	2,500		2,250	
August	2,500		2,000	
September	2,250		2,000	
October	2,250		1,750	
November	2,000		1,500	
December	1,750	13,250	2,000	11,500
Total		30,750 MWh		26,750 MWh

Figure 7.2 Transition In Electric Power Consumption

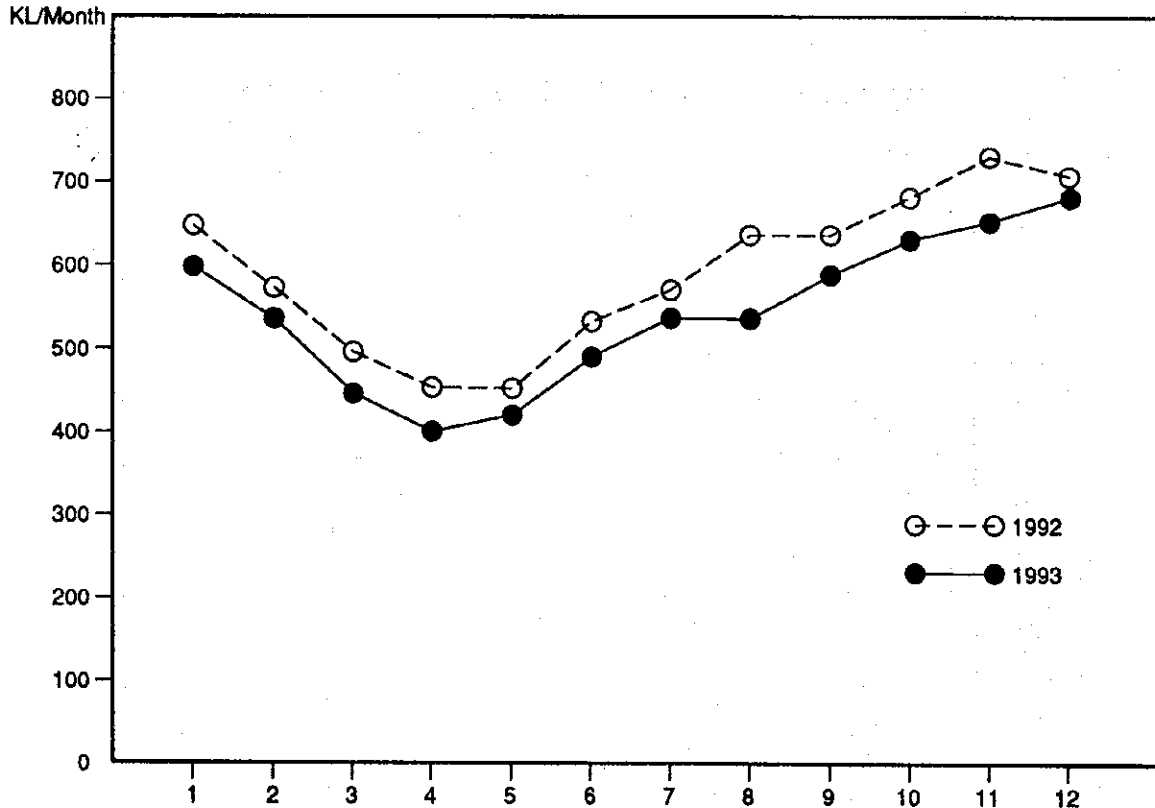


(2) Annual energy consumption (fuel)

Table 7.3 Fuel Consumption

	1992		1993	
January	650 kℓ		600 kℓ	
February	575		550	
March	500		450	
April	450		400	
May	450		425	
June	550	3,175	500	2,925
July	575		550	
August	650		550	
September	650		600	
October	700		650	
November	750		675	
December	725	4,050	700	3,725
Total	7,225 kℓ		6,650 kℓ	

Figure 7.3 Transition In Fuel Consumption

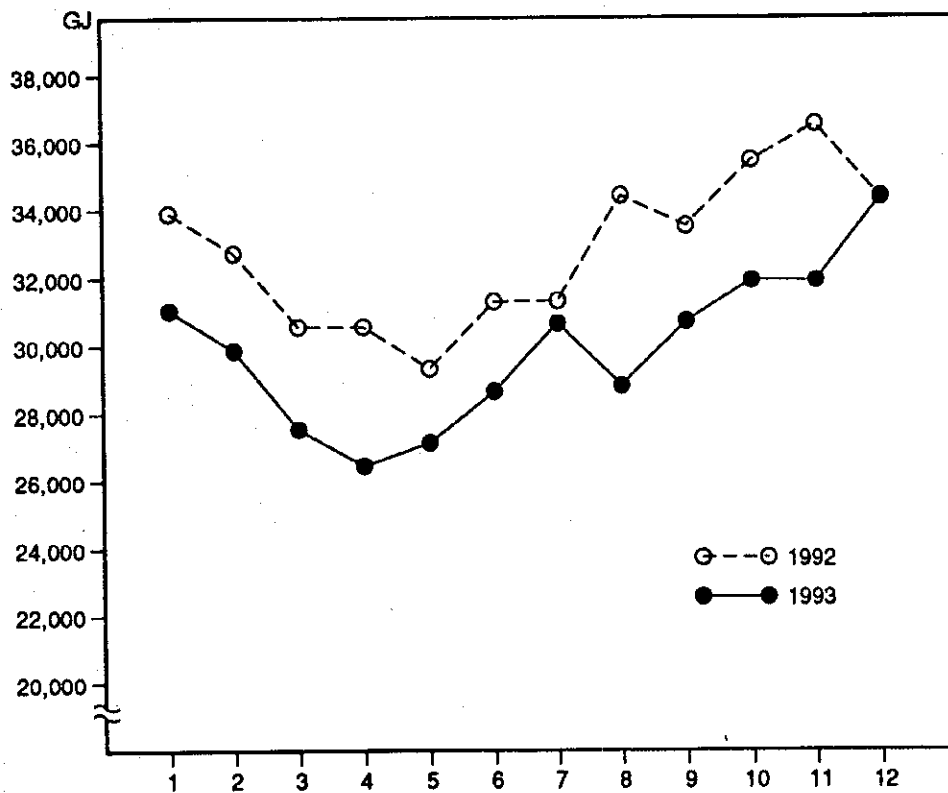


(3) Annual energy consumption (total energy)

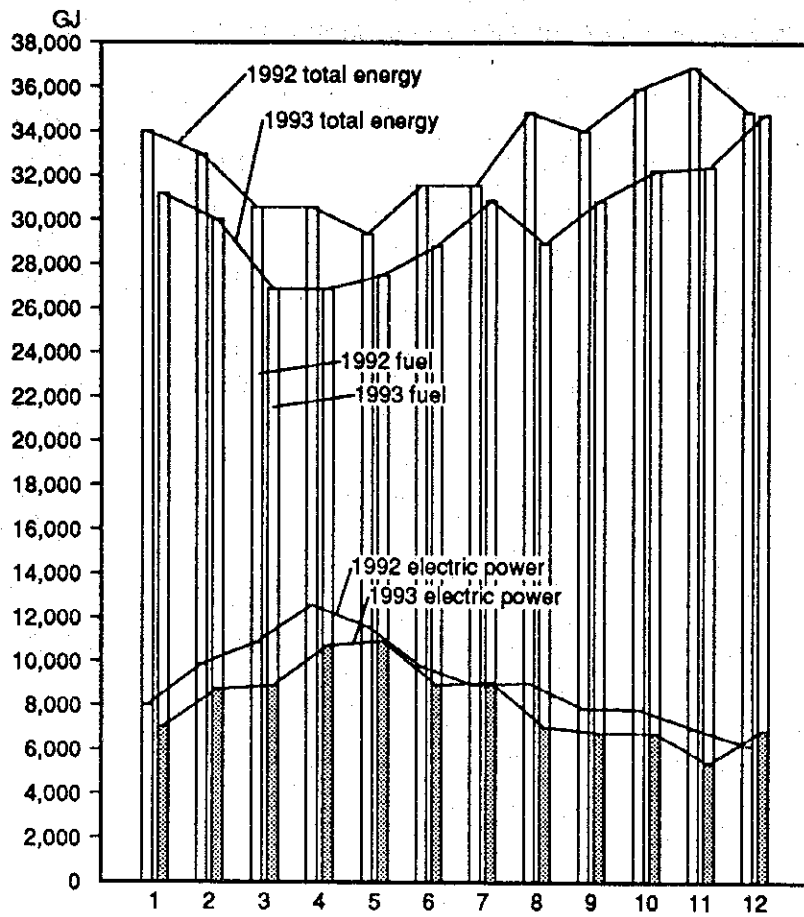
Table 7.4 Consumption of Total Energy by Month as Converted to GJ (1992-1993)

	1992			1993		
	Electric power	Fuel	Total	Electric power	Fuel	Total
January	8,100 GJ	25,850 GJ	33,950 GJ	7,200 GJ	23,862 GJ	31,062 GJ
February	9,900	22,867	32,767	8,100	21,875	29,975
March	10,800	19,885	30,685	9,000	17,896	26,896
April	12,600	17,896	30,496	10,800	15,908	26,708
May	11,700	17,896	29,596	10,800	16,902	27,702
June	9,900	21,873	31,773	9,000	19,885	28,885
July	9,000	22,867	31,867	9,180	21,873	31,053
August	9,000	25,850	34,850	7,200	21,873	29,073
September	8,100	25,850	33,950	7,200	23,862	31,062
October	8,100	27,839	35,939	6,300	25,850	32,150
November	7,200	29,827	37,027	5,400	26,844	32,244
December	6,300	28,833	35,133	7,200	27,839	35,039
Total	110,700	287,333	398,033	97,380	264,469	361,849

Figure 7.4 Transition In Consumption of Total Energy as Converted to GJ



**Figure 7.5 Transition in Consumption of Total Energy
(Ratios of Electric Power and Fuel)**

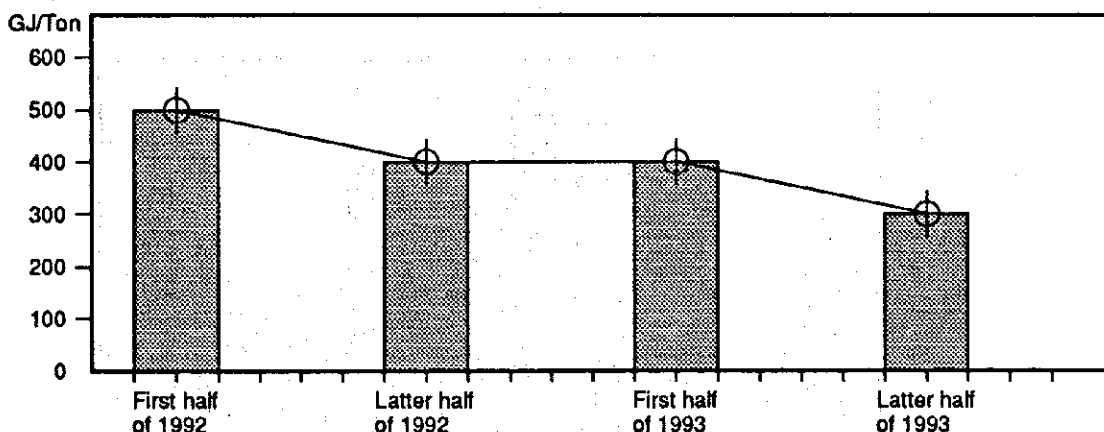


(4) Energy intensity by fiscal year

Table 7.5 Energy Intensity

	1992		1993	
	First half	Latter half	First half	Latter half
Energy intensity (GJ/ton)	500	400	400	300

Figure 7.6 Transition In Energy Intensity



(5) Energy consumption by fiscal year at all factories (total energy)

Used for appointment of designated energy management factories by the ratio of the energy consumed at designated factories to the energy consumed by each subsector of industry sector.

Data: Primary energy final consumption (by subsector of industry sector) in a single fiscal year and energy consumption at designated factories, industry subsector code

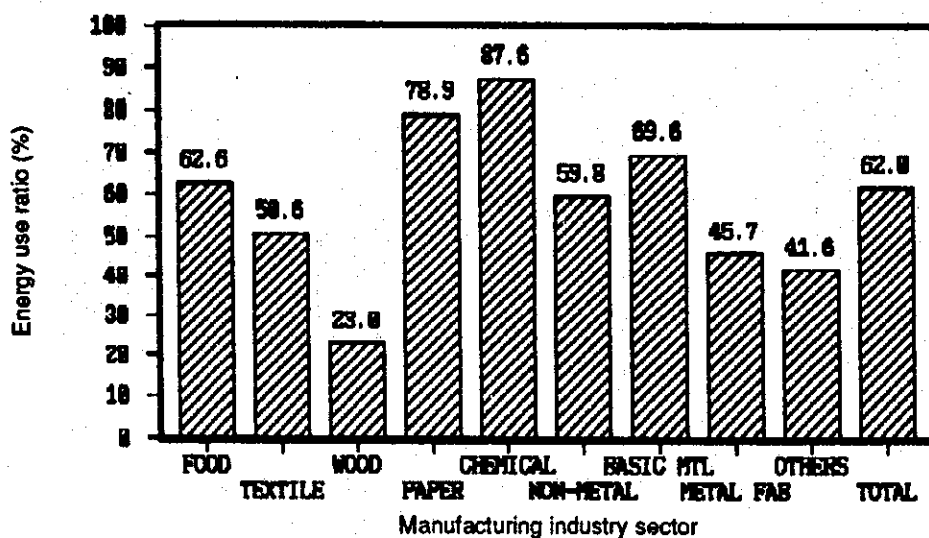
Ratio of energy consumption at designated factories:

$(\text{Energy consumption at designated factories by industry type}) / (\text{Primary energy final consumption by industry type})$

Table 7.6 Ratio of Energy Consumption at Designated Factories (Fiscal 1992)

Industry subsector	SUB-SECTOR	Energy final consumption ktoe	Energy final consumption 1000*GJ	Energy consumption at designated factories 1000*GJ	Ratio of energy consumption at designated factories %
Food and beverage	FOOD	3,782	159,767	100,000	62.6
Textile	TEXTILE	936	39,540	20,000	50.6
Wood and furniture	WOOD	103	4,351	1,000	23.0
Pulp and paper	PAPER	360	15,208	12,000	78.9
Chemical	CHEMICAL	946	39,963	35,000	87.6
Non-metallic	NON-METAL	2,773	117,143	70,000	59.8
Basic metal	BASIC MTL	510	21,544	15,000	69.6
Fabricated metal	METAL FAB	259	10,941	5,000	45.7
Others	OTHERS	569	24,037	10,000	41.6
Total	TOTAL	10,238	432,494	268,000	62.0

Figure 7.7 Ratio of Energy Consumption at Designated Factorles (Fiscal 1992)



7.4.2 Factory Energy Conservation Project File Output Sample

- (1) List of factory energy conservation projects

Table 7.7 Factory Energy Conservation Projects

Factory registration number	Company name	Factory name	Industry subsector	Current energy consumption MJ/Y (A)	Target energy consumption MJ/Y (B)	Planned amount of energy conservation MJ/Y (A) - (B) - (C)	Planned energy conservation improvement ratio % (C)/(A)*100

7.4.3 Building Energy Consumption File Output Sample

(1) Analysis of trend of primary energy consumption

The building applications on which emphasis should be made in guidance become apparent through grasping of the trend of annual primary energy consumption by building application.

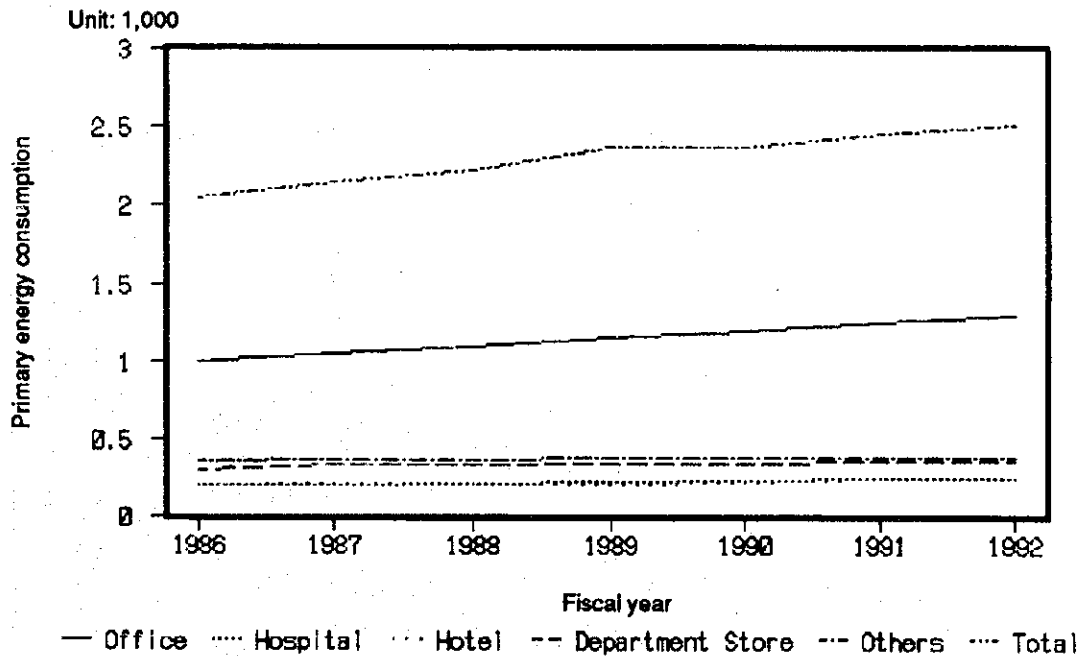
Data: Annual primary energy consumption of each building

Data totaling item: Building application

Table 7.8 Annual Primary Energy Consumption by Building Application [GJ/year]

Building application	1986	1987	1988	1989	1990	1991	1992
Office	1000	1050	1100	1150	1200	1250	1300
Hospital	200	200	210	220	230	240	240
Hotel	200	210	215	215	220	240	240
Department store	300	330	330	340	345	350	355
Others	350	360	370	375	375	380	380
All applications	2050	2150	2225	2300	2370	2460	2515

Figure 7.8 Annual Primary Energy Consumption by Building Application



(2) Analysis of electric power intensity by building application and by electric power use application

It is possible to find themes for energy conservation projects in the future when the electric power intensity by electric power applications such as air conditioning, lighting, sanitation and transportation is grasped for every building application.

Data: Electric power consumption by application and gross floor space of each building

Electric power intensity: (Electric power consumption totaled value)/(Gross floor space totaled value)

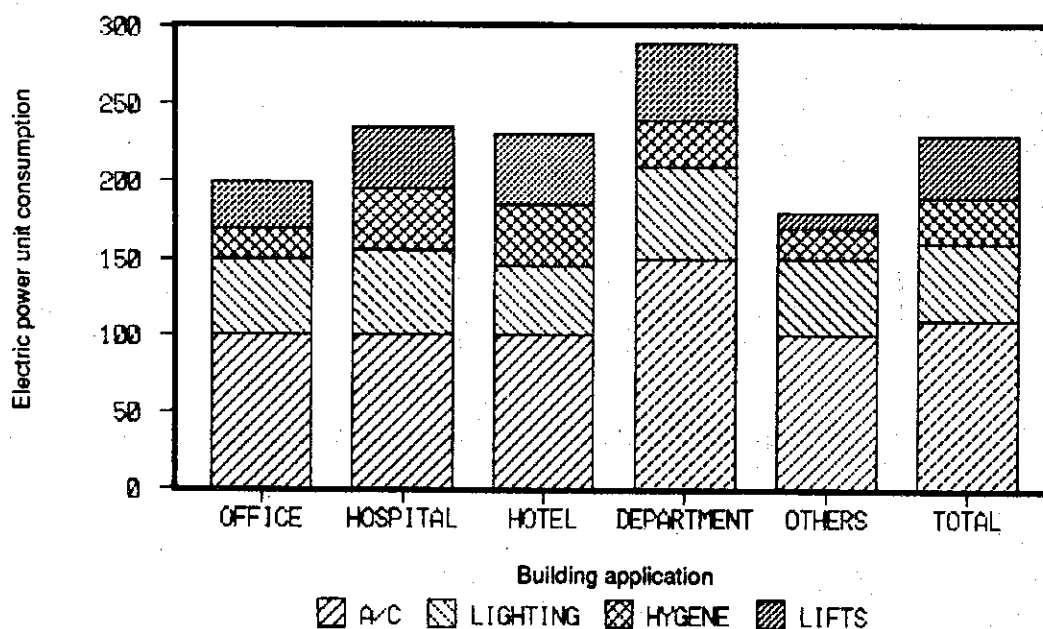
Data totaling item: Building application

Electric power application (air conditioning, lighting, sanitation, transportation, total)

Table 7.9 Electric Power Intensity by Building Application and by Electric Power Application [kWh/year/m²]

Building application	(Electric power application)	Air conditioning	Lighting	Sanitation	Transportation	Total
Office		100	50	20	30	200
Hospital		100	55	40	40	235
Hotel		100	45	40	45	230
Department store		150	60	30	50	290
Others		100	50	20	10	180
All applications		110	50	30	40	230

Figure 7.9 Electric Power Intensity by Building Application and by Electric Power Application



(3) Analysis of trend of primary energy intensity by application at individual buildings

It is possible to find themes for energy conservation projects by grasping the trend of primary energy intensity by application at individual buildings.

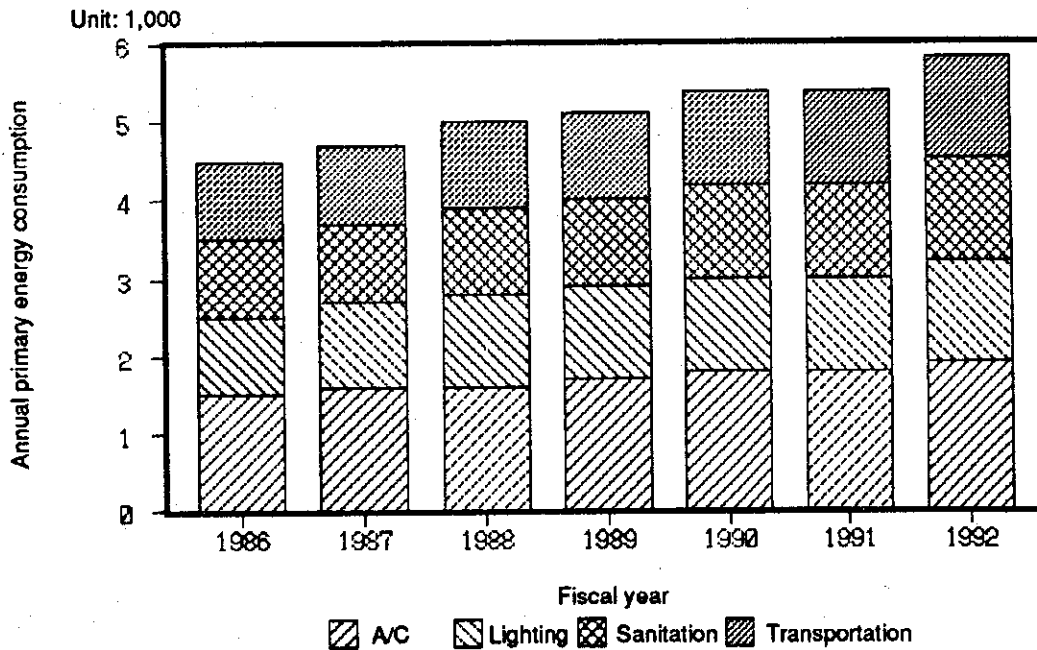
Data: Electric power (fuel) consumption by application

Primary energy intensity by application: Electric power (fuel) consumption × Primary energy conversion factor

Table 7.10 Annual Primary Energy Consumption by Application [MJ/year]

Application	1986	1987	1988	1989	1990	1991	1992
Air conditioning	1500	1600	1600	1700	1800	1800	1900
Lighting	1000	1100	1200	1200	1200	1200	1300
Sanitation	1000	1000	1100	1100	1200	1200	1300
Transportation	1000	1000	1100	1100	1200	1200	1300
Total	4500	4700	5000	5100	5400	5400	5800

Figure 7.10 Changes In Annual Primary Energy Consumption by Application [MJ/year]



7.4.4 Building Energy Conservation Project File Output Sample

(1) Analysis of cost performance of energy conservation projects

Optimum appropriation of the energy conservation promotion fund can be made by grasping the correlation between the cost and effect of each energy conservation project.

Data: Investment amount of each energy conservation project

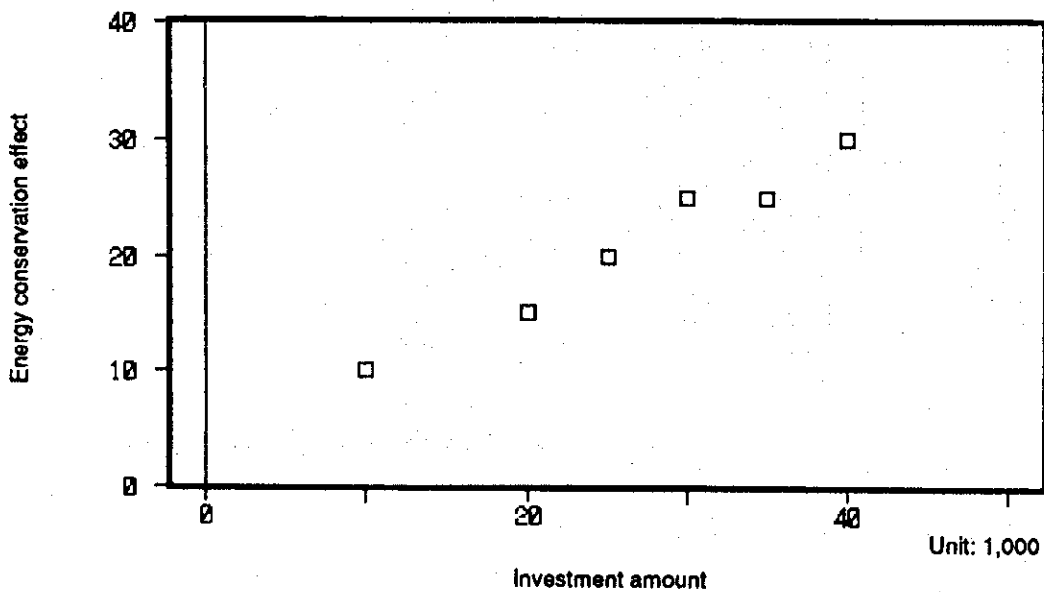
Energy conservation effect (annual primary energy consumption reduced value per unit floor space, for instance)

Data totaling item: Energy conservation measure code (code number)

Table 7.11 Technique, Cost and Effect of Energy Conservation Projects

Project name	Building name	Energy conservation measure code	Investment amount [1000Bhat]	Effect [MJ/year/m ²]
A1	A	1	10000	10
A2	A	2	20000	15
A3	A	5	25000	20
B1	B	5	30000	25
C1	C	2	35000	25
C2	C	3	40000	30

Figure 7.11 Correlation between Energy Conservation Project Investment Amount and Energy Conservation Effect



7.4.5 Energy Conservation Promotion Fund Utilization File Output Sample

- (1) Situation of approval of application for interest subsidy loan (for management of interest subsidy budget)

Number of cases of approval, loan amount (monthly, cumulative)

- (2) Energy conservation amount

Object of loan, energy conservation in the whole factory (monthly, cumulative)

Table 7.12 Achievements of Energy Conservation Promotion Fund Loan

Year/month	Number of case of application	Cumulative total of application	Number of cases of approval	Cumulative total of approval	Loan amount	Cumulative total of loan amount	Scheduled loan amount
					million B	million B	million B
199x/1	10	10	10	10	400	34,000	2,000
2	20	30	15	25	600	4,600	4,000
3	35	65	30	55	1,000	5,600	6,000
4	40	105	30	85	200	6,800	8,000
5	30	135	25	110	1,000	7,800	10,000
6	50	185	40	150	2,000	9,800	12,000
7	50	235	45	195	2,000	11,800	14,000
8	70	305	60	255	2,500	14,300	16,000
9	100	405	90	345	3,500	17,800	18,000
10	80	485	60	405	2,000	19,800	20,000
11	80	565	70	475	2,000	21,800	22,000
12	60	625	50	525	2,000	23,800	24,000

Figure 7.12 Cumulative Total of Energy Conservation Promotion Fund Loan

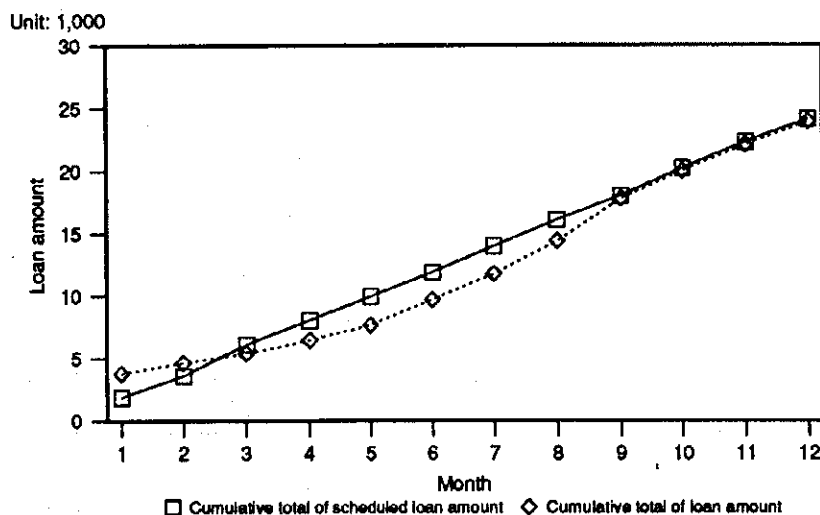


Table 7.13 Estimated Amount of Energy Conservation at Factories which are Objects of Loan in 199x

Factory registration number	Industry subsector	Loan object equipment/process	Required investment amount	Interest subsidy amount	Estimated reduction of energy consumption at the whole factory	Estimated reduction of energy consumption by introduction of equipment (process) MJ/Y	Estimation reduction of energy consumption vs. interest subsidy
			1000*Bahat (A)	Bahat/Y (B)	MJ/Y (C)	(D)	MJ/Bahat (D)/(B)
Total							

7.4.6 Factory Outline File Output Sample

- (1) List of designated energy management factories

Table 7.14 List of Designated Energy Management Factories

Factory registration number	Company name	Factory name	Industry subsector	Contracted electric energy kW	Receiving transformer capacity kVA	Annual energy consumption MJ	Date of designation	Remarks

7.4.7 Building Outline File Output Sample

(1) Analysis of chiller capacity intensity

The chiller capacity intensity defined below is useful for obtaining mean value of chiller capacity and for setting up the target in terms of energy conservation in the basic design of buildings for various applications.

Data: Total chiller capacity and gross floor space of each building

Chiller capacity intensity: (Chiller capacity totaled value)/(Gross floor space totaled value)

Data totaling item:

Building application 1. Office 2. Hospital 3. Hotel 4. Department store 5. Others 6. All applications

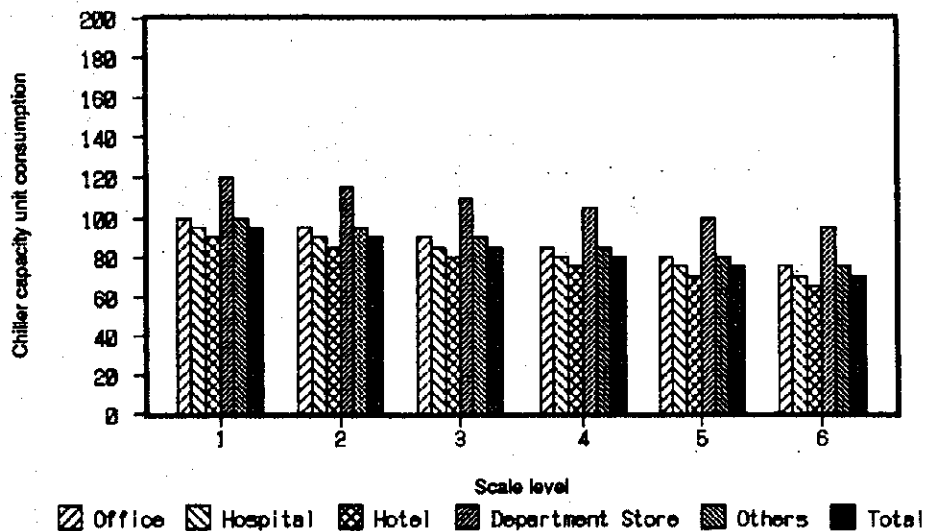
Building scale (gross floor space)

- a. Less than 5,000 m²
- b. 5,000 m² ~ less than 10,000 m²
- c. 10,000 m² ~ less than 20,000 m²
- d. 20,000 m² ~ less than 40,000 m²
- e. 40,000 m² ~
- f. All buildings

Table 7.15 Chiller Capacity Intensity by Building Application and Scale [kcal/h/m²]

Building application	(scale level)	1.	2.	3.	4.	5.	6.
Office		100	100	100	95	95	90
Hospital		95	95	90	90	90	90
Hotel		100	100	95	90	90	90
Department store		120	120	115	115	115	110
Others		100	100	100	100	100	100
All applications		105	105	100	95	95	96

Figure 7.13 Chiller Capacity Intensity by Building Application and Scale



(2) Analysis of gross floor space by application

When the gross floor space by building application in the nation is seized, the data is useful for forecasting energy demand to cope with increase in buildings for various applications estimated in the future.

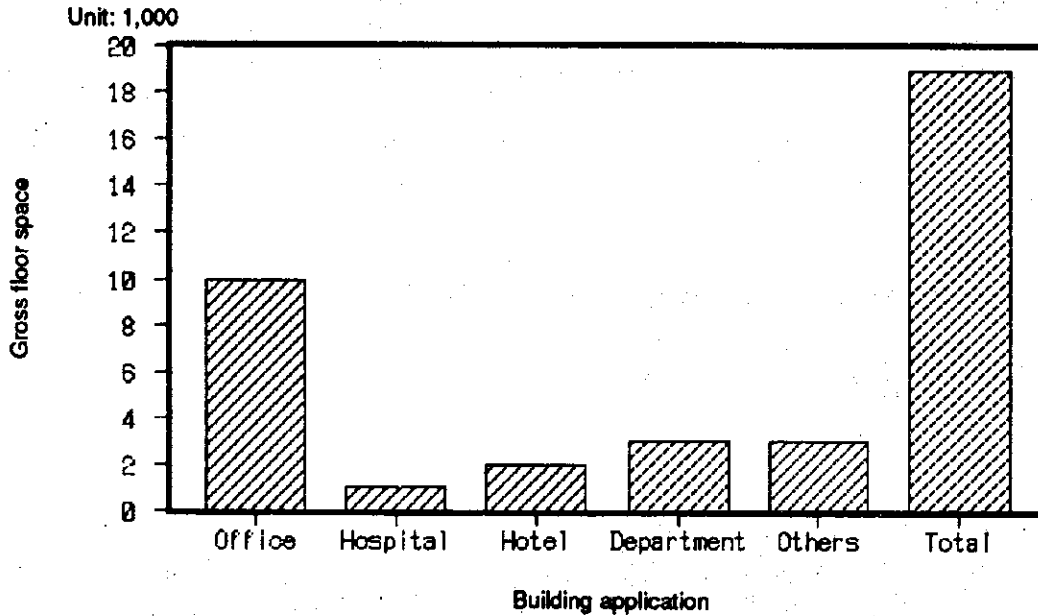
Data: Floor space of each building

Data totaling item: Building application

Table 7.16 Gross Floor Space by Building Application [1,000 m²]

Building application	Gross floor space
Office	10000
Hospital	1000
Hotel	2000
Department store	3000
Others	3000
All applications	19000

Figure 7.14 Gross Floor Space by Application



7.4.8 Qualified Energy Manager File Output Sample

Table 7.17 List of Qualified Energy Managers

Manager number		Specialized field	
Manager name		Sex	Date of birth
Applicable item of qualification	Training completion certificate number		Certificate number
Whether appointed as an energy manager		Date of appointment	
Designation number			
*Company name		*Name of establishment	
Belonging Section		Position	
*Business establishment location		Contact telephone number	
Date of discharge		Reason for discharge	

Note: Data with * marks are loaded from separate files. (Same for typical documents indicated below)

Table 7.18 Energy Manager Selection List (1)

Designation number	*Company name	*Name of establishment	Manager name	Belonging Section	Position	Manager number	Specialized field
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Table 7.19 Energy Manager Selection List (2)

Designation number		Date of designation		
*Company name		*Name of establishment		
*Company location		*Telephone number		
Manager name		Manager number	Specialized field	
Belonging Section		Position		
Contact telephone number		Date of appointment		
Manager name		Manager number	Specialized field	
Belonging Section		Position		
Contact telephone number		Date of appointment		
Manager name		Manager number	Specialized field	
Belonging Section		Position		
Contact telephone number		Date of appointment		

Note: Multiple columns related to manager information are provided so that it is possible to deal with such a situation that designated factories and buildings are to be designated by heat sector or electricity sector and the number of appointed persons is to be determined by the fuel (or electricity) consumption in the future.

Table 7.20 List of Factorles and Buildings where Energy Managers have not yet been Appointed

Designation number	*Company name	*Name of establishment	*Company location	*Telephone number	Date of designation
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Figure 7.15 Energy Manager Address Label

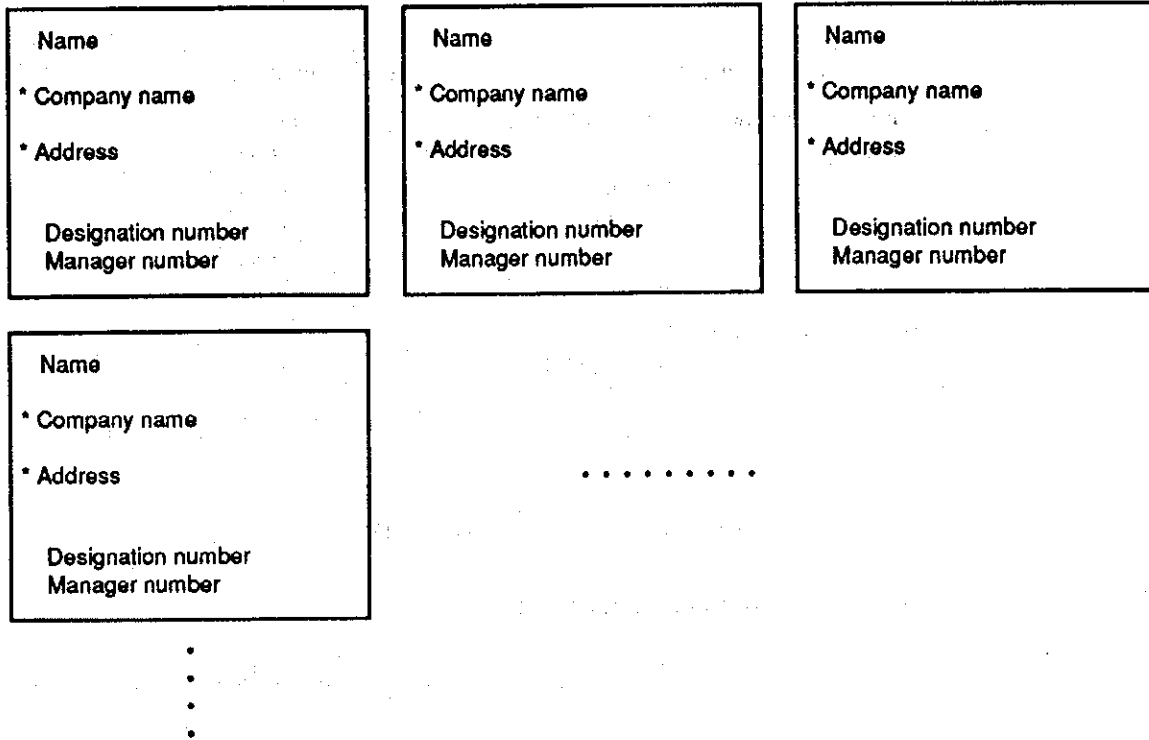


Table 7.21 List of Those who Completed ___th Factory Management Training Course

Training completion certificate number	Name	Manager number
<hr/> ___ persons in total <hr/>		

Table 7.22 Breakdown of Applicable Qualification Requirements for Appointed Persons (Cumulative Total of the Past)

Qualification requirements	Number of persons
1. Higher vocational training certificate	___ persons
2. Degree	___ persons
3. Training	___ persons
Factory	___ persons
Building	___ persons
(Heat)	___ persons
(Electricity)	___ persons
(4. National examination (Heat))	___ persons
(Electricity)	___ persons
Total	___ persons

7.4.9 National Energy Consumption File Output Sample

- (1) Energy final consumption to GDP unit consumption

This figure can be used as an index that indicates the fruits of energy conservation.

Data: Primary energy final consumption of each fiscal year (whole nation) and GDP

Energy intensity: (Primary energy final consumption)/(GDP)

Table 7.23 Transition of Energy Intensity (Energy Final Consumption per GDP)

Fiscal year	Energy final consumption ktoe	GDP 1988 price million Bhat	Energy intensity ktoe/1000 Baht
1983	15,846	1,076,432	14.7
1984	17,420	1,138,353	15.3
1985	18,554	1,191,255	15.6
1986	19,698	1,257,177	15.7
1987	21,560	1,376,847	15.7
1988	23,749	1,559,804	15.2
1989	27,799	1,751,515	15.9
1990	30,642	1,954,229	15.7
1991	32,407	2,108,249	15.4
1992	35,104	2,267,970	15.5

Figure 7.16 Transition of Energy Intensity (Energy Final Consumption per GDP)

