

Guideline
For
Organizing a Data Submission Form and a Data
Recording Form for a Designated Factory
in accordance with Forms BorPorRor.1 and BorPorRor.2

In accordance with the Ministerial Regulation regarding criteria,
procedure and schedule for submission and recording of data on energy
conservation B.E. 2547 (2004)

Energy Consumption and Energy Conservation for a Designated Factory
according to Forms BorPorRor.1 and BorPorRor.2



Department of Alternative Energy Development and Efficiency (DEDE)
Ministry of Energy

April B.E. 2548 (2005)

Table of Contents

	<u>Page</u>
1. Background	1
2. Operating procedure for data submission and data recording	1
2.1. Data recording	1
2.2. Data verification	2
2.3. Schedule for data submission	2
2.4. Procedure for data submission	3
3. Direction for filing data in data submission form (Form BorPorRor.1)	4
3.1. Part 1: General data	4
3.2. Part 2: Production data	4
3.3. Part 3: Energy consumption data	6
3.4. Part 4: Energy conservation data and the result of an audit and analysis on operation in compliance with targets and plans	11
4. Direction for filing data in data recording form (Form BorPorRor.2)	13
4.1. Part 1: General data	13
4.2. Part 2: Production data	15
4.3. Part 3: Energy consumption data	16
4.4. Part 4: Installation or modification of machinery or equipment that improves energy consumption and contribute to energy conservation	24
 Annex	
Annex A	A-1
The Ministerial Regulation regarding criteria, procedure and schedule for submission and recording of data on energy conservation B.E. 2547 (2004)	
Annex B	B-1
Data submission form for data on production, energy consumption and energy conservation for a designated factory (Form BorPorRor.1)	
Annex C	C-1
Data recording form for data on energy consumption, installation or modification of machinery or equipment that improves energy consumption and contribute to energy conservation in a designated factory (Form BorPorRor.2)	

1. Background

Organizing a data submission form and a data recording form is a step in energy conservation that the owner of a designated factory must comply with the Energy Conservation and Promotion Act B.E.2535 (1992) in accordance with the scope as prescribed by the Ministerial Regulations. The Ministerial Regulation regarding criteria, procedure and schedule for submission and recording of data on energy conservation B.E. 2547 (2004), issued by the virtue of section 6 paragraph two, section 11(2) and (3), and section 22 of the Energy Conservation and Promotion Act B.E.2535 (1992), which became enforceable on the 29th day of April B.E. 2548 (2005), states that:

The owner of a designated factory shall submit information on energy production, consumption, and conservation to Department of Alternative Energy Development and Efficiency (DEDE) according to Form BorPorRor.1. Additionally, he shall keep records of information on energy consumption, installation or modification of machinery or equipment that affects energy consumption and conservation according to Form BorPorRor.2.

Department of Alternative Energy Development and Efficiency (DEDE) therefore sets up the guideline for organizing a data submission form and a data recording form for a designated factory to facilitate and clarify the step in organizing such forms so the owner of a designated factory can use the data as database for energy conservation in its business and to comply with the law.

2. Operating procedure for data submission and data recording

2.1 Data recording

The owner of a designated factory must keep records of information in the forms BorPorRor.1 and BorPorRor.2. Form BorPorRor.2 must be recorded in monthly format.

Any factory becoming a designated factory on the day or after the Royal Decree on designated factory coming into effect, information shall be kept according to form BorPorRor.2 since the date becoming a designated factory. For a new factory which has already become a designated factory under the Royal Decree yet has not operated and therefore no energy consumption, information shall be kept since the commencing date of a factory and shall be submitted according to form BorPorRor.1 within schedule of data submission.

2.2 Data verification: data verification shall be as follows:

Data recording form (Form BorPorRor.2): the personnel responsible for energy of a designated factory shall verify and endorse the information being recorded monthly in form BorPorRor.2.

Data submission form (Form BorPorRor.1): the personnel responsible for energy of a designated factory shall verify and endorse the information being recorded semiannually in form BorPorRor.1 and the owner of a designated factory shall endorse a record of data according to such form.

2.3 Schedule for data submission

The owner of a designated factory shall submit information according to forms BorPorRor.1 semiannually as follows:

First: submit monthly data of the first six months, from January to June, within the month of July of the same year.

Second: submit monthly data of the last six months, from July to December, within the month of January of the next year.

Any factory becoming a designated factory on the day or after the Royal Decree on designated factory coming into effect, information shall be submitted according to form BorPorRor.1 as previously mentioned schedule. For instance, a factory becoming a designated factory on August 1st, B.E.2548 (2005) shall submit the first information of the month of August to December of B.E.2548 (2005) by January 31st, B.E. 2549 (2006).

For a new factory which has already become a designated factory under the Royal Decree yet has not operated and therefore no energy consumption, information shall be submitted according to form BorPorRor.1 as previously mentioned schedule. For instance, a factory becoming a designated factory on January 1st, B.E.2548 (2005) which commenced its factory business and has consumed energy for the first time on February 1st, B.E.2548 (2005) shall submit the first information of the month of February to June of B.E.2548 (2005) by July 31st, B.E. 2548 (2005).

2.4 Procedure for data submission

The owner of a designated factory shall submit information according to form BorPorRor.1 to Department of Alternative Energy Development and Efficiency (DEDE) by the following means:

1) Submit in person: a person can submit the form BorPorRor.1 directly to DEDE and DEDE shall issue a receipt to a person. The date stamped on the receipt shall be considered as the date of submission.

2) Submit via certified mail: the date of certified mail shall be considered as the date of submission.

3) Submit via facsimile: the date of sending facsimile shall be considered as the date of submission. However, submission via facsimile is considered accomplished only when DEDE has received the original form BorPorRor.1 within seven days from the deadline of data submission as prescribed in 2.3, otherwise it shall be considered the form has not been submitted.

4) Submit via electronic mail with password: DEDE has not announced this method as a formal mean in submitting the form; however, the information can be submitted using electronic data submission system (E-form) as a practice before the announcement. Detail information can be requested at customer relation unit or can be founded at www.dede.go.th.

3. Direction for filing data in data submission form (Form BorPorRor.1)

3.1 Part 1: General data

- No. 1.1: specify the name of a designated factory
- No. 1.2: specify the location of a designated factory
- No. 1.3: specify the office location of a designated factory
- No. 1.4: specify type of industry of a designated factory
- No. 1.5: specify month and year that the factory has commenced its business
- No. 1.6: specify working hours of a factory; in case that a factory produces several products and has different working hours, please indicate the working hours of production process for main products of a factory.
- No. 1.7: specify working days per month per year and working hours per year.
- No. 1.8: specify operational period in month if a factory does not operated year-round.

3.2 Part 2: Production data

- Column 1: specify main product of a factory
- Column 2: specify raw material used to product such main products
- Column 3: month in operation. For the first half of the year, the first month to the sixth month is January to June, respectively. For the second half of the year, the first month to the sixth month is July to December, respectively.
- Column 4: specify unit of product such as kilogram, ton, square meter, etc. If a product unit is not of international standard unit, it needs to be changed into international standard unit. For example,

Example 1: A factory manufacturing canned food products which produces several sizes of can and dozen of can is used as a unit. In this case, it seems difficult to determine an actual quantity of product, therefore, unit of product should be in forms of unit weight such as kilogram or ton.

Example 2: A textile factory manufacturing pieces of cloth using yard as a unit length of cloth. In this case, it seems difficult to determine an actual quantity of product since the unit only shows the length not the width of a piece of cloth, therefore, unit of product should be in form of unit area such as square meter or in form of unit weight such as kilogram or ton.

Column 5: specify production quantity for each month.

Column 6: specify production installed capacity which is the maximum production capacity of installed machinery for each month.

Column 7: specify actual working hours in each month.

Remark: - In case there are many types of products, data should be filled separately, one table for one product.

- Using standard unit will allow determination of energy consumption per unit product, so called “specific energy consumption”, and will allow comparison of energy consumption level among factories in the same industry type.

3.3 Part 3: Energy consumption data

3.1: Energy consumption

Column 1: specify type of energy used in a designated factory. If other types of energy are used, other than those specified in the table No.1 to No.3, specify such type of energy following those in No.3, respectively.

Energy consumption cases

No.1 Maximum electrical power (kilowatt): fill out maximum electrical power data as shown in electricity bill issued by electricity supplier for a particular month. For some electricity users, there probably are maximum electrical power data at different time period such as user type TOD and TOU. Maximum electrical power data for all three period should be filled out. For TOD case, should fill out On peak, Partial peak, and Off peak. For TOU case, should fill out Peak, Off peak1, and Off peak2, respectively.

No.2 Purchased energy (Kilowatt-hour): fill out electricity data as shown in electricity bill issued by electricity supplier for a particular month. For user types TOD and TOU, should fill out total value of electricity for all three periods in the table.

In case a designated factory uses more than one electricity meters, data should be filed out separately for each meter, one table for one meter.

Example: For a designated factory that is a TOU-type user, should fill out data as follows:

3.1 Energy consumption

(1) Type of energy	(2) Unit	(3) Consumption quantity		
		Month 1 Jan or Jul	Month 2 Feb or Aug	Month 3 Mar or Sep
1.Maximum Electrical Power				
On peak	Kilowatt	1,200	1,210	1,220
Off peak1	Kilowatt	1,240	1,260	1,250
Off peak2	Kilowatt	1,280	1,330	1,300
2.Purchased electricity	Kilowatt - Hour	780,900	741,800	812,500

Case of Heat energy consumption

No. 3 Heat energy: A designated factory using bunker oil or gasoline should specify type of bunker oil or type of gasoline (type of bunker oil such as grade A, grade C and grade D; type of gasoline such as gasoline-95 and gasoline 91). If a factory using more than one type of bunker oil or gasoline should fill out data additionally under bunker oil or gasoline, as the case may be.

Example: For a designated factory using several types of bunker oil, for instance, a factory using grade A bunker oil and grade C bunker oil should fill out data as follows:

3.1 Energy consumption

(1) Type of energy	(2) Unit	(3) Consumption quantity		
		Month 1 Jan or Jul	Month 2 Feb or Aug	Month 3 Mar or Sep
3. Heat energy				
Grade A bunker oil	Liter	2,100	2,050	2,020
Grade C bunker oil	Liter	3,450	3,480	3,460
Diesel	Liter			
Gasoline	Liter			
Kerosene	Liter			
LPG	Kilogram			
Natural Gas	Million BTU			
Imported coal	Ton			
Lignite	Ton			
Other (specify)	unit (specify)			
		Total heat energy consumption from non-renewable energy		

A designated factory using renewable energy should specify type of renewable energy in the column for renewable energy. Renewable energy includes energy obtained from sources such as wood, firewood, paddy husk, bagasse, biomass, hydro power, solar power, geothermal power, wind power, waves and tides.

Column 2: specify unit for each type of consumed energy. If other types of energy are used, other than those specified in the table, specify unit of such energy as well.

Column 3: specify consumption quantity for each type of energy for 6-month period of monthly data submission in such following order. Data submission for the first 6-month period of the year, that is data from January to June, shall be as following order: Month 1 is January, Month 2 is February, ..., Month 6 is June, respectively. Data submission for the last 6-month period of the year shall be as following order: Month 1 is July, Month 2 is August, ..., Month 6 is December, respectively.

Remark:

- Energy consumption for each month should start counting from the first day of the month until the last day of such month.
- Amount of purchased electricity for column 3 No. 1 and No. 2 of Month 1 to Month 6 should use the electricity consumption quantity indicated in electricity bill for such month, but excluding the amount of electricity generated by the user which shall be filled out in the table No.2.2.
- Amount of heat energy consumption for column 3 No.3 shall not include energy used for transportation.

Column 4: specify heating value for each type of energy in unit of mega Jules per unit of such energy using low heating value obtained from the supplier. In case a designated factory do not have low heating value obtained from the supplier, average heating value specified by Department of Alternative Energy Development and Efficiency (DEDE) should be used. The heating value specified by DEDE shall be as that in reference to Thailand annual report for fuel, of the most recent year published by DEDE (see more detail in www.dede.go.th).

Column 5: specify total heating value for each type of energy for 6-month period in unit of Mega Jules by converting total amount of energy consumption in 6 month period from the original unit to heating value. It can be done by taking summation of energy consumption in column 3 and multiplied it with low heating value obtained from the supplier or multiplied it with average heating value specified by DEDE in column 4 as the case may be.

Remark: Calculation of total heating value in column 5 for each type of energy should be heating value in unit of Mega Jules to allow comparison of energy consumption ratio among each type of energy in such designated factory.

Example: Filling out part 3 data – energy consumption data

3.1 Energy consumption

(1) Type of energy	(2) Unit	(3) Consumption quantity							(4) ^{1/} average heating value (Mega Jules/unit)	(5) Total heating value (Mega Jules)	
		Month 1 Jan or Jul	Month 2 Feb or Aug	Month 3 Mar or Sep	Month 4 Apr or Oct	Month 5 May or Nov	Month 6 Jun or Dec	Total			
1. Maximum electrical power	(TOU rate)										
On peak	kilowatt	1,200	1,210	1,220	1,235	1,225	1,215	-	-		
Off peak1	kilowatt	1,240	1,260	1,250	1,265	1,255	1,240	-	-		
Off peak2	kilowatt	1,280	1,330	1,300	1,290	1,240	1,235	-	-		
2. Purchased electricity	kilowatt-hour	780,900	741,800	812,500	780,200	760,400	784,200	4,660,000	3.60 ^{2/}	16,776,000	
3. Heat energy											
Grade A bunker oil	Liter	2,100	2,050	2,020	2,030	2,010	2,015	12,225	39.77	486,188	
Grade C bunker oil	Liter	3,450	3,480	3,460	3,470	3,450	3,440	20,750	40.11	832,282	
Diesel	Liter										
Gasoline	Liter										
Kerosene	Liter										
LPG	Kilogram	5,400	5,200	5,500	5,450	5,350	5,250	32,150	49.3	1,584,995	
Natural Gas	Million BTU										
Imported coal	Ton										
Lignite	Ton										
Other (specify)	Unit (specify)										
		Total energy consumption									
Renewable energy (specify)	Unit (specify)										

Remark: 1/ In case there is no low heating value from the supplier, average heating value specified by Department of Alternative Energy Development and Efficiency should be used.

2/ converting from kilowatt-hour unit to Mega Jules unit.

3.2 : Fuel consumption for electricity generation

A designated factory generating electricity from its own generator should fill out data as follows:

Column 1: specify month/year that fuel is used in generating electricity in 6-month period of monthly data submission in such monthly order as same as that in part 3: section 3.1: column 3.

Column 2: specify installed production capacity of electricity generator in unit of kilowatt. The value can be obtained from guideline or specification of such generator or from the name plate.

Column 3: specify consumption quantity of principal fuel used in electricity generation for each month in sub-column (principal fuel means fuel that is used in large quantity comparing to other type of fuel in the same generator. A generator using two types of fuel generally is large in size and uses bunker oil as principal fuel and diesel as secondary fuel. A secondary fuel is only used during startup period.) as follows:

- Type of principal fuel used in electricity generation such as diesel, grade C bunker oil, etc.
- Quantity of principal fuel used in electricity generation.
- Unit of principal fuel used in electricity generation such as liter.

Energy consumption for each month should start counting from the first day of the month until the last day of such month.

Column 4: specify operating hour of generator in each month, start counting from the first day of the month until the last day of such month.

Column 5: specify amount of electricity generating in each month in unit of kilowatt-hour, start counting from the first day of the month until the last day of such month. In case electricity is also generated for sale, the quantity should be separately identified between those for consumption and those for sale (if any).

In case a designated factory installing generator as a back up during electricity blackout that may operate generator each month for warm-up, even there is no electricity blackout in such month, and operate generator with no electricity distributed, should fill out only consumed energy data and generator operating hour in columns 3 and 4, respectively. Amount of electricity generated in column 5 should remark "warm-up without electricity generating".

Column 6: For remark column, specify other additional data (if any).

Remark: In case a designated factory having more than one generator, data should be filed out separately for each generator, one table for one generator.

3.4 Part 4: Energy conservation data and the result of an audit and analysis on operation in compliance with targets and plans

Measure title: specify title of energy conservation measure being implemented in the 6-month period of monthly data submission, either from January to June or from July to December, as the cases may be.

Mark ✓ in for measure implemented in compliance with targets and plans if it is a measure implemented in compliance with targets and plans which a factory has submitted a report on energy conservation targets and plans to Department of Alternative Energy Development and Efficiency (DEDE) or

Mark ✓ in for measure not included in targets and plans if it is a measure other than those implemented in compliance with targets and plans.

Column 1: Implementation period can be divided into 2 sub-columns as follows:

Sub-column: as planned – specify day/month/year of plan scheduling for implementation of energy conservation measure such as 1 July B.E.2548 (2005) to 30 July B.E.2548 (2005).

Sub-column: as implemented – specify day/month/year of actual implementation period of energy conservation measure such as 20 July B.E.2548 (2005) to 10 August B.E.2548 (2005) or specify the anticipated time for completion if it still has been in progress.

Column 2: specify implementing status of energy conservation measure that still has been in progress such as it has been 60% completed or equipment has been installed and is in the process of test run.

Column 3: Investment can be divided into 2 sub-columns as follows:

Sub-column: as planned – specify invested money for such measure as estimated prior to implementation.

Sub-column: as invested – specify actual amount of money invested after accomplishing implementation of such measure.

Column 4: Energy conservation result can be divided into 2 sub-columns as follows:

Sub-column: as target – specify energy conservation result from such measure as anticipated prior to implementation as follows:

For heat-related measure: specify type of fuel used, annual amount of fuel conserved and annual saving value.

For electricity-related measure: specify maximum electrical power (kW) that can be saved, annual amount of electricity (kWh) conserved and annual saving value.

Sub-column: as existing – specify actual result of energy conservation after accomplishing implementation of such as existing measure. The detail should be as same as that in sub-column: as target.

Column 5: specify problem/obstacle encountered during implementing energy conservation measure (if any).

Column 6: specify comment and suggestion for improving energy conservation procedure of a factory (if any).

Column 7: specify other additional data (if any).

Example: Filling out energy conservation data and the result of an audit and analysis on operation in compliance with targets and plans

Measure title:Insulation of steam pipeline
 Measure order no.¹⁾1..... from total of.....4..... measures



measure implemented in compliance with targets and plans
 measure not included in targets and plans

(1) Implementation period ²⁾		(2) Implementing status ³⁾	(3) Investment ⁴⁾		(4) Result of energy conservation ⁵⁾	
As plan	As implemented		As plan	As invested	As plan	As existing
1 Aug 05 to 20 Aug 05	1 Aug 05 to 15 Aug 05		120,000 Baht	100,000 Baht	Grade C bunker oil 38,610 Liter/year 400,000 Bahts/year	Grade C bunker oil 38,700 Liter/year 400,932 Bahts/year
(5) Problem/obstacle encountered		(6) Comment and suggestion ⁶⁾		(7) Remark 1. actual result of energy conservation is determined from saving result achieved during the period from September to December 2005 and then converted to annual saving value.		

Explanation

- 1) Specify measures as in order of implementation and fill out one sheet per one measure.
- 2) Specify month/year beginning and end of implementation period.
- 3) Specify implementing status if still has been in progress.
- 4) Specify an estimated investment and actual invested money.
- 5) Specify type of fuel used, annual amount of fuel conserved and annual saving value. For electricity saving, specify in both units of kW and kWh.
- 6) Specify comment and suggestion for improving energy conservation procedure of a factory and government.

Certified true copy copies
 Signed Personnel responsible for energy
 (.....)
 Registration number
 Signed Factory owner
 (.....)

4. Direction for filing data in data recording form (Form BorPorRor.2)

4.1 Part 1: General data

No. 1.1: specify the name of a designated factory

No. 1.2: specify the location of a designated factory

No. 1.3: specify the office location of a designated factory

No. 1.4: specify type of industry of a designated factory

No. 1.5: specify month and year that the factory has commenced its business

No. 1.6: specify working hours of a factory; in case that a factory produces several products and has different working hours, please indicate the working hours of production process for main products of a factory.

No. 1.7: specify working days per month per year and working hours per year.

No. 1.8: specify operational period in month if a factory does not operated year-round such as January to May, etc.

No. 1.9: specify installed production capacity of each product as follows:

Column 1: specify order in product list.

Column 2: specify type of product manufactured by a factory.

Column 3: specify installed production capacity, which is the maximum production capacity of installed machinery in a factory, both production capacity and unit of product such as kilogram, ton, square meter, etc. If a product unit is not of international standard unit, it needs to be changed into international standard unit.

Column 4: For remark column, specify other additional data (if any).

Example 1: A factory manufacturing canned food products which produces several sizes of can and dozen of can is used as a unit. In this case, it seems difficult to determine an actual quantity of product, therefore, unit of product should be in forms of unit weight such as kilogram or ton.

Example 2: A textile factory manufacturing pieces of cloth using yard as a unit length of cloth. In this case, it seems difficult to determine an actual quantity of product since the unit only shows the length not the width of a piece of cloth, therefore, unit of product should be in form of unit area such as square meter or in form of unit weight such as kilogram or ton.

No. 1.10: specify installed production capacity that a factory has improved or modified as follows:

Column 1: specify order in product list that has been improved or modified its installed capacity.

Column 2: specify type of product that has been improved or modified its installed capacity.

Column 3: specify time period for improvement or modification of installed capacity, by indicating month and year of the beginning and the end of implementation.

Column 4: specify adjusted installed capacity after modification which can be either increased capacity or decreased capacity, as the case may be, by indicating both production capacity and unit of product.

Column 5: For remark column, specify other additional data (if any).

No. 1.11: specify production flow process and its explanation for each process starting from raw material passing through each process until finally obtaining a product. Also specify type of energy used in each process.

No. 1.12: For personnel responsible for energy, specify information of personnel responsible for energy as follows:

Column 1: specify order of personnel responsible for energy, in case a designated factory has more than one person responsible for energy.

Column 2: specify name and surname of personnel responsible for energy of a designated factory.

Column 3: specify registration number of personnel responsible for energy of a designated factory which is a number that is issued by Department of Alternative Energy Development and Efficiency (DEDE).

Column 4: specify working period of personnel responsible for energy as being designated as personnel responsible for energy of a designated factory.

Example: Filling out information of personnel responsible for energy of a designated factory

(1) Order number	(2) Name-Surname	(3) Registration number	(4) Working period	
			Start (day/month/year)	End (day/month/year)
1	Mr. Tontun Unjai	PRE. 1020	5 January 1997	-
2	Mr. Niyom Thaitam	PRE. 2569	25 March 2005	-

4.2 Part 2: Production data

Specify production data of a factory as follows:

Column 1: specify order in product list being manufactured in a factory.

Column 2: specify type of product being manufactured in a factory.

Column 3: specify working hours of each month for production process of such product.

Column 4: specify actual production quantity of each month for such product.

Column 5: specify unit of product such as kilogram, ton, square meter, etc. If a product unit is not of international standard unit, it needs to be changed into international standard unit as same as that in No. 1.9 Part 1 – general data.

Column 6: For remark column, specify other additional data (if any).

Remark: Using standard unit will allow determination of energy consumption per unit product, so called “specific energy consumption”, and will allow comparison of energy consumption level among factories in the same industry type.

4.3 Part 3: Energy consumption data

No. 3.1 Electricity purchase

(1) Mark ✓ in according to type of electricity user and fill out quantity of consumed electricity (kilowatt-hour) for each month in column for electricity quantity by specifying electricity data as shown in electricity bill issued by electricity supplier for a particular month. For user types TOD and TOU, should fill out summation value of electricity of all three periods.

(2) Maximum electrical power (kilowatt): fill out maximum electrical power data as shown in electricity bill issued by electricity supplier for a particular month. Normal rate user and TOD and TOU users should fill out separately by marking ✓ in according to type of electricity user and fill out maximum electrical power data in the table as follows:

For TOD case, should fill out On peak, Partial peak, and Off peak into 1), 2) and 3), respectively.

For TOU case, should fill out Peak, Off peak1, and Off peak2, into 1), 2) and 3), respectively.

- Specify average unit price of electricity (Baht/kilowatt-hour) which can be determined from data in electricity bill issued by electricity supplier for a particular month by dividing total cost with number of kilowatt-hour used.

In case a designated factory uses more than one electricity meters, data should be filed out separately for each meter.

Example 1: Filling out data of maximum demand electrical power for normal rate user.

- For normal rate user420.....Kilowatts.

Example 2: Filling out data of maximum demand electrical power for TOD rate user.

TOD Tariff

TOU Tariff

Period	Kilowatt
1)On peak	820
2)Partial peak	1,460
3)Off peak	1,210

No. 3.2 Electricity consumption for each system

Specify quantity of electricity consumption for a particular month by indicating each equipment system being employed in a designated factory separately as follows:

Column 1: specify name of equipment system being employed in a factory such as production system, air-conditioning system, lighting system and other. If there is system other than indicating in the table, should specify it as well.

Column 2: specify quantity of electricity consumption for each system being employed in a factory according to those specified in column 1. Quantity of electricity consumption may be obtained from reading meter installed for each system (if any) or estimating from installed capacity of electrical equipment in a factory. The estimation should be done as nearly as real condition as possible, that is, it shall consider proportion of electrical equipment in each system being operated a day, number of hour in operation per day, number of day in operation per month, etc.

Column 3: specify percentage of electricity consumption quantity for each system comparing to total electricity consumption of a designated factory.

Column 4: For remark column, specify other additional data (if any).

Example: Filling out data of electricity consumption for each system

(1) System	(2) Electricity consumption (Kilowatt-hour)		(3) Percentage	(4) Remark
	From meter	From estimation		
Production	585,675	-	75	
Air-conditioning		78,090	10	
Lighting	-	46,854	6	
Other	-	70,281	9	
Total	585,675	195,225	100	

No. 3.3 Electricity consumption for each production process/major machinery

Specify quantity of electricity consumption for a particular month by indicating equipment system being employed in each production process of a designated factory separately as follows:

Column 1: specify name of production process and major machinery being employed in such process.

Column 2: specify quantity of electricity consumption for each production process and specify separately for major machinery being employed in each production process according to those specified in column 1. Quantity of electricity consumption may be obtained from reading meter installed for each system (if any) or estimating from installed capacity of electrical equipment in a factory. The estimation should be done as nearly as real condition as possible, that is, it shall consider proportion of electrical equipment in each system being operated a day, number of hour in operation per day, number of day in operation per month, etc.

Column 3: specify percentage of electricity consumption quantity for each production process, classified by machinery, compare percentage of electricity consumption of each group of equipment under the same production process to total electricity consumption of all production processes.

Column 4: For remark column, specify other additional data (if any).

Example: Filling out data of electricity consumption for each production process/major machinery of a factory which has two production processes.

(1) Production process Major machinery	(2) Electricity consumption (Kilowatt-hour)		(3) Percentage		(4) Remark
	From meter	From estimation	of each production process	of all production processes	
Production process 1: Preparation of raw material List of major machinery					
(1) Grinder	-	80,000	33.33	11.51	
(2) Mixer	-	90,000	37.5	12.95	
(3) Roller	-	70,000	29.17	10.07	
Total	-	240,000	100.00	34.53	
Production process 2: product A List of major machinery					
(1) Electrical oven	-	350,000	76.92	50.36	
(2) Water cooler	-	85,000	18.68	12.23	
(3) Packing machine	-	20,000	4.40	2.88	
Total	-	455,000	100.00	65.47	
All production processes	-	695,000	-	100.00	

No. 3.4 Fuel consumption

Specify quantity of fuel consumption for a particular month by a designated factory as follows:

Column 1: specify type of fuel used in a factory such as bunker oil, gasoline or other fuel as specified in a table; specify additionally if such type is not indicated in the table.

A designated factory using bunker oil or gasoline should specify type of bunker oil or type of gasoline (type of bunker oil such as grade A, grade C and grade D; type of gasoline such as gasoline-95 and gasoline 91). If a factory using more than one type of bunker oil or gasoline should fill out data additionally under bunker oil or gasoline, as the case may be.

Column 2: specify unit of energy used. Also specify unit if using energy other than those specified in the table.

Column 3: specify amount of energy consumed each month.

Column 4: specify unit price of each type of fuel consumed in each month.

Column 5: specify cost of each type of fuel consumed in each month.

Column 6: For remark column, specify other additional data (if any).

Example...: Filling out fuel consumption data.

(1) Type of fuel	(2) unit	(3) Consumption quantity	(4) Price (Baht/unit)	(5) Fuel cost (Baht)	(6) Remark
1. Grade A bunker oil	Liter	2,100	11.00	23,100	
Grade C bunker oil	Liter	3,450	10.36	35,742	
2. Diesel	Liter				
3. Gasoline	Liter				
4. Kerosene	Liter				
5. LPG	Kilogram				
6. Natural Gas	Million BTU				
7. Other (specify)	unit (specify)				
.....					
.....					
.....					
Total					

No. 3.5 Fuel consumption in major machinery

Specify quantity of fuel consumption for major machinery being employed in a designated factory as follows:

Column 1: specify type of major machinery being employed in a factory such as boiler, hot oil boiler, furnace, oven and others. Specify additionally if there is machinery other than those specified in the table.

Column 2: specify amount of fuel consumed for a particular month by each machine as follows:

Type: specify type of fuel used in major machinery.

Quantity: specify amount of fuel consumed for a particular month by each machine.

Unit: specify unit of energy used.

Column 3: specify unit price of each type of fuel consumed.

Column 4: specify cost of each type of fuel consumed.

Column 5: For remark column, specify other additional data (if any).

Example...: Filling out fuel consumption data for machinery.

(1) Machinery	(2) Consumption quantity			(3) Price (Baht/unit)	(4) Fuel cost (Baht)	(5) Remark
	Type	Quantity	Unit			
Boiler	Grade A bunker oil	2,100	Liter	11.00	23,100	
	Grade C bunker oil	3,450	Liter	10.36	35,742	
Other (specify)						
Total						

No. 3.6 Fuel consumption for each production process/major machinery

Specify quantity of fuel consumption for a particular month by indicating equipment system being employed in each production process of a designated factory separately as follows:

Column 1: specify name of production process and major machinery being employed in such process.

Column 2: specify quantity of fuel consumption for each production process and specify separately for major machinery being employed in each production process according to those specified in column 1. Consumption quantity may be obtained from reading meter installed for each system (if any) or estimating from installed capacity of electrical equipment in a factory. The estimation should be done as nearly as real condition as possible, that is, it shall consider efficiency of such machine, number of hour in operation per day, number of day in operation per month, etc.

Column 3: specify percentage of fuel consumption quantity for each production process, classified by machinery, compare percentage of fuel consumption of each group of equipment under the same production process to total fuel consumption of all production processes, in the same way as done for electricity in No. 3.3.

Column 4: For remark column, specify other additional data (if any).

No. 3.7 Fuel consumption for electricity generation

A designated factory generating electricity from its own generator should fill out data as follows:

Column 1: specify order of generators.

Column 2: specify installed production capacity of electricity generator in unit of kilowatt. The value can be obtained from guideline or specification of such generator or from the name plate.

Column 3: specify consumption quantity of principal fuel used in electricity generation for each month in sub-column (principal fuel means fuel that is used in large quantity comparing to other type of fuel in the same generator. A generator using two types of fuel generally is large in size and uses bunker oil as principal fuel and diesel as secondary fuel. A secondary fuel is only used during startup period.) as follows:

- Type of principal fuel used in electricity generation such as diesel, grade C bunker oil, etc.
- Quantity of principal fuel used in electricity generation.
- Unit of principal fuel used in electricity generation such as liter.

Energy consumption for each month should start counting from the first day of the month until the last day of such month.

Column 4: specify operating hour of generator in each month, start counting from the first day of the month until the last day of such month.

Column 5: specify amount of electricity generating in each month in unit of kilowatt-hour, start counting from the first day of the month until the last day of such month. In case electricity is also generated for sale, the quantity should be separately identified between those for consumption and those for sale (if any).

In case a designated factory installing generator as a back up during electricity blackout that may operate generator each month for warm-up, even there is no electricity blackout in such month, and operate generator with no electricity distributed, should fill out only consumed energy data and generator operating hour in columns 3 and 4, respectively. Amount of electricity generated in column 5 should remark “warm-up without electricity generating”.

Column 6: If there is a cogeneration of electricity and heat, specify quantity of steam produced after the process of electricity generation in terms of ton steam, including pressure and temperature of steam. Specify total amount of steam generated in the first column and amount of steam putting for sale (if any) in the second column.

No. 3.8 Summary of energy consumption

It is a summary table for total energy consumption; both electricity and fuel consumption in a factory, which summarizes form data in No. 3.1 (1) and from data in table of No. 3.4 as follows:

Column 1: specify type of energy used in a designated factory. If other types of energy are used, other than those specified in No.1 to No.9, specify such type of energy additionally in No.10 – other (specify).

Column 2: specify unit for each type of consumed energy. If other types of energy are used, other than those specified in the table, specify unit of such energy as well.

Column 3: specify consumption quantity for each type of energy for a particular month.

Column 4: specify heating value for each type of energy in unit of mega Jules per unit of such energy using low heating value obtained from the supplier. In case a designated factory do not have low heating value obtained from the supplier, average heating value specified by Department of Alternative Energy Development and Efficiency (DEDE) should be used. The heating value specified by DEDE shall be as that in reference to Thailand annual report for fuel, of the most recent year published by DEDE (see more detail in www.dede.go.th).

Column 5: specify total heating value for each type of energy for a particular month in unit of Mega Jules by converting total amount of energy consumption from the original unit to heating value. It can be done by taking summation of energy consumption in column 3 and multiplied it with low heating value obtained from the supplier or multiplied it with average heating value specified by DEDE in column 4 as the case may be.

Remark: Calculation of total heating value in column 5 for each type of energy should be heating value in unit of Mega Jules to allow comparison of energy consumption ratio among each type of energy in such designated factory.

4.4 Part 4: Installation or modification of machinery or equipment that improves energy consumption and contributes to energy conservation

No. 4.1 Installation or modification of machinery or equipment that affects energy consumption and contributes to energy conservation

(1) Transformer: specify type, size and quantity of transformer installed in a designated factory. The value can be obtained from guideline or specification of such transformer or from the name plate as follows:

Type of transformer: mark ✓ in for either oil type or dry type transformer.

Capacity: specify capacity of transformer.

High voltage: specify primary voltage of transformer.

Low voltage: specify secondary voltage of transformer.

Ventilation system: specify characteristic of heat ventilation system such as ventilating using ambient air or using fan.

Manufacturer: specify brand name or manufacturer of transformer.

Month/year of installation: specify month and year that transformer is installed.

Location: specify area or facility to which transformer distributes electricity.

Remark column: specify other additional data (if any).

(2) Unitary air conditioning system: specify type, size and quantity of small air conditioner installed in a designated factory, either split type or window type. The value can be obtained from guideline or specification of such air conditioner or from the name plate as follows:

Type of air conditioner: specify type of air conditioner such as split type, window type, etc.

Chilling capacity: specify capacity of air conditioner in unit of “watt”. If unit of an air conditioner is “BTU/hour”, it should be converted to “watt” with the conversion factor that 1 watt equals 3.412 BTU/hour.

Electrical power capacity: specify total capacity of electrical power of air conditioner, including hot coil unit and cool coil unit.

Manufacturer: specify brand name of air conditioner.

Month/year of installation: specify month and year that air conditioner is installed.

Location: specify area or room installing air conditioner.

Remark column: specify other additional data (if any).

(3) Central air conditioning system: specify type, size and quantity of central air conditioning system installed in a designated factory. The value can be obtained from guideline or specification of such air conditioner or from the name plate as follows:

Type of water cooler: select type of water cooler by marking ✓ in according to type of water cooler being installed.

Type of compressor: specify type of compressor such as centrifuge type, screw type, etc.

Chilling capacity: specify capacity of water cooler in unit “ton/hour” .

Size of compressor: specify electrical power capacity of compressor motor.

Size of auxiliary unit of water chiller system: specify as follows:

- Cool water pump: specify electrical power capacity of motor of the water pump and pump flow rate.
- Cooling water pump: specify electrical power capacity of motor of the cooling water pump and pump flow rate.
- Cooling tower: specify electrical power capacity of electrical fan motor of the cooling water tower.

Size of auxiliary unit of air chiller system: specify as follows:

- Cool water pump: specify electrical power capacity of motor of the water pump and pump flow rate.
- Heat ventilating fan: specify electrical power capacity of electrical fan motor for heat ventilation of condensers.

Manufacturer: specify brand name of water cooler.

Month/year of installation: specify month and year that water cooler is installed.

Location: specify area, facility or room installing water cooler.

Remark column: specify other additional data (if any).

(4) Lighting system: specify type, size, and quantity of electrical bulb being installed in a factory as follows:

(4.1) Normal fluorescent bulb

Column 1: indicate type of normal fluorescent bulb of various sizes.

Column 2: mark ✓ in to select type of electrical lamp as shown in a table, specify it additionally if not found in a table.

Column 3: mark ✓ in to select type of shielding plate of electrical lamp as shown in a table, specify it additionally if not found in a table.

Column 4: mark ✓ in to select size of electrical power of the bulb and specify numbers of bulb used per lamp.

Column 5: mark ✓ in to select size of electrical power of the bulb and specify numbers of lamp used.

Column 6: specify size of electrical power of the bulb in watt/lamp and specify size of electrical power of the lamp for each size.

Column 7: specify size of power loss in ballast in watt/lamp and that of the lamp for each size.

Column 8: specify size of total electrical power of the bulb and ballast in watt/lamp and that of the lamp for each size.

Column 9: specify numbers of hour that electrical lamp is in operation.

(4.2) Other bulbs

Column 1: indicate type of bulb and its electric power capacity being used.

Column 2: specify number of bulb for each type being used.

Column 3: specify electrical power capacity of the bulb in watt/bulb for each type of bulb being used.

Column 4: specify size of power loss in ballast in watt/bulb for each type of bulb being used (if any).

Column 5: specify size of total electrical power of the bulb and ballast for each type of bulb.

Column 6: specify numbers of hour that each bulb is in operation.

(5) Air compressor: specify type, size and quantity of air compressor installed in a designated factory. The value can be obtained from guideline or specification of such air conditioner or from the name plate as follows:

Type of compressor: specify type of compressor such as reciprocating type, screw type, etc.

Air compressing capacity: specify free air delivery (FAD).

Heat ventilation system: specify type of heat ventilating compressor such as water type, air type, etc.

Motor: specify data of motor driving compressor as follows:

Electrical power capacity: specify capacity of electrical motor.

Electrical voltage: specify electrical voltage capacity of electrical motor.

Electrical current: specify electrical current capacity of electrical motor.

Power factor: specify power factor of electrical motor.

Efficiency: specify efficiency of electrical motor.

Manufacturer: specify brand name or manufacturer of electrical motor.

Month/year of installation: specify month and year that electrical motor is installed.

Location: specify area, location or room installing electrical motor.

Remark column: specify other additional data (if any).

(6) Other electrical motor with size of 10 kilowatt or more: specify type, size and quantity of electrical motor, with size of 10 kilowatt or more, installed in a designated factory. The value can be obtained from guideline or specification of such motor or from the name plate as follows:

Electrical power capacity: specify capacity of electrical motor.

Electrical voltage: specify electrical voltage capacity of electrical motor.

Electrical current: specify electrical current capacity of electrical motor.

Number of phase: specify number of phase of electrical motor such as one phase, three phases, etc.

Power factor: specify power factor of electrical motor.

Efficiency: specify efficiency of electrical motor.

Manufacturer: specify brand name or manufacturer of electrical motor.

Month/year of installation: specify month and year that electrical motor is installed.

Location: specify area, location or room installing electrical motor.

Remark column: specify other additional data (if any).

(7) Other machinery or electrical equipment with size of 10 kilowatt or more: specify type, size and quantity of other machinery or electrical equipment, with size of 10 kilowatt or more, installed in a designated factory.

The required data are as same as those in (6) for other electrical motor.

(8) Boiler: specify type, size and quantity of boiler installed in a factory as follows:

Type of boiler: specify type of boiler such as water-tube or fire-tube or others.

Designed size: specify capacity of a boiler as designed as follows:

- Steam pressure: specify steam pressure capacity as designed.
- Evaporization rate: specify steam producing capacity of a boiler as designed.

Exterior condition: specify physical condition of a boiler such as width, length, height, and diameter of a boiler.

Heat transmission surface area: specify surface area for heat transmission between fire side and water side of a boiler.

Type of fuel used: specify type of fuel used such as grade A bunker oil, grade C bunker oil, natural gas, paddy husk, bagasses, etc.

Fuel consumption rate: specify fuel consumption rate such as liter/hour, kilogram/hour, etc.

Efficiency: specify efficiency of a boiler (calculating from output of produced steam).

Manufacturer: specify brand name or manufacturer of a boiler.

Month/year of installation: specify month and year that a boiler is installed.

Location: specify area, location or room installing electrical motor.

Remark column: specify other additional data (if any).

(9) Hot oil boiler: specify type, size and quantity of boiler installed in a factory. The required data are as same as those in (8) for a boiler.

(10) Industrial furnace: specify type, size and quantity of industrial furnace installed in a factory. The required data are as same as those in (8) for a boiler.

(11) Machinery or equipment employed in heat recovery system: specify following information about machinery or equipment employed in heat recovery system being installed in a factory such as recovery of hot water from condensation process, recovery of hot water from cooling process or other heat recovery system.

Name of machinery or equipment: specify name of machinery or equipment employed in heat recovery system.

Model/type: specify model or type of machine.

Quantity: specify number of machinery or equipment of each model being installed.

Recovery temperature: specify temperature of heat being recovered.

Percentage of recovery: specify percentage of heat being recovered.

Manufacturer: specify brand name or manufacturer of machinery or equipment for heat recovery system.

Month/year of installation: specify month and year that machinery or equipment for heat recovery system is installed.

Location: specify area, location or room installing such equipment.

Remark column: specify other additional data (if any).

(12) Steam-utilizing machinery or equipment: specify following information about steam-utilizing machinery or equipment being installed in a factory.

Model/type: specify model or type of steam-utilizing machinery or equipment.

Capacity: specify capacity of steam-utilizing machinery or equipment.

Steam utilization: specify purpose of steam utilization in machinery or equipment, such as being directly used or being used through heat exchange equipment, including quantity of steam and steam pressure.

Working temperature: specify temperature of steam being utilized in machinery or equipment.

Exterior condition: specify physical condition of machinery or equipment such as width, length, height, and diameter.

Efficiency: specify efficiency of steam-utilizing machinery or equipment.

Manufacturer: specify brand name or manufacturer of steam-utilizing machinery or equipment.

Month/year of installation: specify month and year that steam-utilizing machinery or equipment is installed.

Location: specify area, location or room installing such steam-utilizing machinery or equipment.

Remark column: specify other additional data (if any).

(13) Electricity generation system: specify type, size and quantity of electricity generation system being installed in a factory as follows:

(13.1) Prime mover: specify data as follows:

Type: specify type of prime mover of electricity generation system such as motor engine, steam engine, gas turbine, steam turbine, etc.

Size: specify capacity of primer mover in kilowatt.

Velocity: specify rpm (revolution per minute) of a prime mover use to drive a generator.

Type of fuel used: specify type of fuel use in a prime mover such as bunker oil, diesel, etc.

Number of stage: specify number of stage of a primer mover.

Manufacturer: specify brand name or manufacturer of prime mover.

Month/year of installation: specify month and year that prime mover and generator is installed.

Location: specify area, location or room installing such prime mover and generator.

Remark column: specify other additional data (if any).

(13.2) Electricity generator: specify detail data of electricity generator as follows:

Installed capacity: specify installed capacity of a generator.

Rate voltage: specify rate voltage of a generator.

Rate current: specify rate current of a generator.

Power factor: specify power factor of a generator.

Angle velocity (rpm): specify rpm (revolution per minute) of a generator.

Manufacturer: specify brand name or manufacturer of a generator.

Month/year of installation: specify month and year that prime mover and generator is installed.

Location: specify area, location or room installing such prime mover and generator.

Remark column: specify other additional data (if any).

(14) Machinery or equipment using other type of fuel: specify data of machinery or equipment using other type of fuel which is installed in a factory as follows:

Name of machinery or major equipment: specify name of machinery or major equipment using other type of fuel.

Model/type: specify model or type of machinery or major equipment using other type of fuel.

Production capacity: specify production capacity of machinery or major equipment using other type of fuel.

Quantity: specify number of machinery or equipment of each model being installed.

Type of fuel used: specify type of fuel used in machinery or major equipment.

Fuel consumption quantity: specify fuel consumption quantity of machinery or major equipment.

Working temperature: specify working temperature of machinery or major equipment.

Exterior condition: specify physical condition of machinery or equipment such as width, length, height, and diameter.

Efficiency: specify efficiency of machinery or equipment.

Manufacturer: specify brand name or manufacturer of machinery or equipment.

Month/year of installation: specify month and year that machinery or equipment is installed.

Remark column: specify other additional data (if any).

No. 4.2 Improvement or modification of machinery or equipment and energy conservation measures

Specify data about improvement or modification of machinery or equipment and energy conservation measures being implemented in a factory as follows:

Column 1: specify order of implementation in the list of improvement or modification of machinery or equipment and energy conservation measures.

Column 2: specify detail information about improvement or modification of machinery or equipment and energy conservation measures.

Column 3: specify implementation period of improvement or modification of machinery or equipment and energy conservation measures, by indicating starting time and completing time.

Column 4: specify amount of money invested in improvement or modification of machinery or equipment and energy conservation measures.

Column 5: specify energy saving as a result of improvement or modification of machinery or equipment and energy conservation measures, by indicating type of energy, amount and value of energy that are saved per year (annual saving energy can be estimated from multiplying monthly saving with 12).

Column 6: For remark column: specify other additional data (if any).

Once the form BorPorRor.2 has been completed, a person responsible for energy of a designated factory shall endorse data for its validity and keep record of the form at a designated factory.

Annex A

The Ministerial Regulation regarding criteria, procedure and schedule for submission and recording of data on energy conservation B.E. 2547 (2004)



The Ministerial Regulation

Re: Criteria, procedure and schedule for submission
and recording of data on energy conservation
B.E. 2547 (2004)

By the virtue of section 6 paragraph two, section 11 (2) and (3), and section 22 of the Energy Conservation Promotion Act B.E. 2535 (1992), which contains some provisions concerning the limitation of the people rights and liberties that is permissible by the provisions of section 29 together with section 35, section 48 and section 50 of the Constitution of the Kingdom of Thailand, the Minister of Energy, with the recommendation of the National Energy Policy Council, hereby issues the Ministerial Regulation as follows:

Clause 1 The following regulation shall be annulled:

(1) The Ministerial Regulation No.2 (B.E. 2538 (1995)) issued pursuant to Energy Conservation Promotion Act B.E. 2535 (1992).

(2) The Ministerial Regulation No.5 (B.E. 2540 (1997)) issued pursuant to Energy Conservation Promotion Act B.E. 2535 (1992).

Clause 2 In this Ministerial Regulation,

“Designated factory” shall mean a factory being designated by the Royal Decree under the provision of the Energy Conservation Promotion Act B.E. 2535 (1992).

“The owner of a designated factory” shall mean a person who is responsible for the management of a designated factory.

“Designated building” shall mean a building being designated by the Royal Decree under the provision of the Energy Conservation Promotion Act B.E. 2535 (1992).

“The owner of a designated building” shall mean a person who possesses a designated building.

Clause 3 The owner of a designated factory shall submit information about production, energy consumption and energy conservation to Department of Alternative Energy Development and Efficiency using the form BorPorRor.1 annexed to this Ministerial Regulation.

The owner of a designated building shall submit information about building utilization data, energy consumption and energy conservation to Department of Alternative Energy Development and Efficiency using the form BorPorAor. 1 annexed to this Ministerial Regulation.

Clause 4 Monthly data of January to June shall be submitted by July of such year and those of July to December shall be submitted by January of the next year. The data shall be endorsed for validity by personnel responsible for energy.

If data of paragraph one are submitted via post, it shall be through certified mail and the date of certified mail shall be considered as the date of submission. If submit via facsimile, the date of sending facsimile shall be considered as the date of submission. However, submission via facsimile is considered accomplished only when the owner of a designated factory or the owner of a designated building has submitted the original form (Form BorPorRor.1 or Form BorPorAor. 1) within seven days from the deadline of data submission. If submit via electronic mail with password, it shall be in accordance with the law governing electronic business. The effective date and criteria for submission date shall be as announced by Department of Alternative Energy Development and Efficiency.

The announcement in paragraph two may prescribe procedural step in submitting data via electronic mail with password so far as it is not contrary to the law governing electronic business.

Clause 5 The owner of a designated factory or the owner of a designated building shall keep and maintain record of energy consumption data and installation or modification of machinery that may affect energy consumption and energy conservation using Form BorPorRor.2 or Form BorPorAor. 2 as annexed to this Ministerial Regulation.

The data in paragraph one shall be recoded in monthly basis and shall be endorsed for validity by personnel responsible for energy.

Clause 6 This Ministerial Regulation shall come into effect one hundred and twenty days after its publication in the Government Gazette.

Given on the 27th day of December B.E. 2547 (2004)

Signed Prommin Lertsuriyadej
(Mr. Prommin Lertsuriyadej)
Minister of Energy

Remark: The reason for the enactment of this ministerial regulation is that the existing forms for submission of data on production, energy consumption and energy conservation of a designated factory or a designated building (Form BorPorRor.1 or Form BorPorAor. 1) are not clear and there is several energy units used. It therefore deems appropriate to revise for the easiness of data recording and to resolve confusion on energy unit. Also it deems appropriate to combine the provisions under the Ministerial Regulation No.2 (B.E. 2538 (1995)) and the Ministerial Regulation No.5 (B.E. 2540 (1995)), issued pursuant to the Energy Conservation Promotion Act B.E. 2535 (1992), which are enacted on the same principle, for the reference and assessment purpose; it is therefore necessary to issue this ministerial regulation.

Annex B

**Submission Form for Data on Production, Energy Consumption and Energy
Conservation for a Designated Factory
(Form BorPorRor.1)**

**Submission Form for Data on Production, Energy Consumption and Energy Conservation
(For a Designated Factory)**

For the months of Year to Year

Part 1: General data

1.1 Name of a factory: (If any)

1.2 Location of a factory:

Street numberSoiRoad.....Tambon

DistrictProvincePostal code

TelephoneFax.....

1.3 Location of an office

Street numberSoiRoadTambon

DistrictProvincePostal code

Telephone Fax.....

1.4 Type of Industry

Food Textile Wood Paper

Chemicals Non-metal Metal Metallic product

Others (specify)

1.5 A factory has commenced its business in the month of year

1.6 Normal working hour of a factory

8 hours 16 hours 24 hours

others (specify) hours

1.7 A factory in operation:

..... days/month

..... days/year

..... hours/year

1.8 Specify operational period in month if a factory does not operated year-round.

.....
.....

Part 2: Production data

(1) Main product						
(2) Main raw material						
(3) Production month	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
(4) Unit of product						
(5) Production quantity						
(6) Installed production capacity						
(7) Working hour						

Remark: One table for production data of one product.

Part 3: Energy consumption data

3.1 Energy consumption (Name of product/Total)

(1) Type of energy	(2) Unit	(3) Consumption quantity							(4) Average heating value ^{1/} (Mega Jules/unit)	(5) Total heating value Total (3) x (4) (Mega Jules)
		Month 1 Jan or Jul	Month 2 Feb or Aug	Month 3 Mar or Sep	Month 4 Apr or Oct	Month 5 May or Nov	Month 6 Jun or Dec	Total (3) Month 1 to 6		
1. Maximum electrical power	Kilowatt									
2. Purchased energy	Kilowatt-hour								3.6 ^{2/}	(6)
3. Heat energy										
Bunker oil	Liter									
Diesel	Liter									
Gasoline	Liter									
Kerosene	Liter									
LPG	Kilogram									
Natural gas	Million BTU									
Imported coal	Ton									
Lignite	Ton									
Other (specify)	Unit (specify)									
Total heat energy consumption from non-renewable energy										(7)
Renewable energy (specify)	Unit (specify)									
Total energy consumption										

Remark: 1/ In case there is no low heating value from the supplier, average heating value specified by Department of Alternative Energy Development and Efficiency should be used.
 2/ converting from kilowatt-hour unit to Mega Jules unit.

Part 4: Energy conservation data and the result of an audit and analysis on operation in compliance with targets and plans

Measure title:
 Measure order no.¹⁾ from total of..... measures

Measure implemented in compliance with targets and plans
 Measure not included in targets and plans

(1) Implementation period ²⁾		(2) Implementing status ³⁾	(3) Investment ⁴⁾		(4) Result of energy conservation ⁵⁾	
As plan	As implemented		As plan	As invested	As plan	As existing
(5) Problem/obstacle encountered		(6) Comment and suggestion ⁶⁾		(7) Remark		

Explanation

- 1) Specify measures as in order of implementation and fill out one sheet per one measure.
- 2) Specify month/year beginning and end of implementation period.
- 3) Specify implementing status if still has been in progress.
- 4) Specify an estimated investment and actual invested money.
- 5) Specify type of fuel used, annual amount of fuel conserved and annual saving value.
For electricity saving, specify in both units of kW and kWh.
- 6) Specify comment and suggestion for improving energy conservation procedure of a factory and government.

Certified true copy copies
 Signed Personnel responsible for energy
 (.....)
 Registration number
 Signed Factory owner
 (.....)

Annex C

**Recording Form for Data on Energy Consumption and Installation or Modification of
Machinery or Equipment Affecting Energy consumption and Energy Conservation
for a Designated Factory
(Form BorPorRor.2)**

**Recording Form for Data on Energy Consumption and Installation or
Modification of Machinery or Equipment Affecting Energy consumption and
Energy Conservation**

(For a Designated Factory)

For the months of Year

Part 1: General data

- 1.1 Name of a factory: (If any)
- 1.2 Location of a factory:
 - Street numberSoiRoad.....Tambon
 - DistrictProvincePostal code
 - TelephoneFax.....
- 1.3 Location of an office
 - Street numberSoiRoadTambon
 - DistrictProvincePostal code
 - Telephone Fax.....
- 1.4 Type of Industry
 - Food Textile Wood Paper
 - Chemicals Non-metal Metal Metallic product
 - Others (specify)
- 1.5 A factory has commenced its business in the month of year
- 1.6 Normal working hour of a factory
 - 8 hours 16 hours 24 hours
 - others (specify) hours
- 1.7 A factory in operation:
 - days/month
 - days/year
 - hours/year
- 1.8 Specify operational period in month if a factory does not operated year-round.
 -
 -

1.9 Installed Production Capacity

(1) Order number	(2) Type of product	(3) Installed production capacity		(4) Remark
		Quantity	Unit	

1.10 Improved or Modified Installed Production Capacity

(1) Order number	(2) Type of product	(3) Period of improvement or modification		(4) Increased or decreased production capacity		(5) Remark
		Started Month/year	Completed Month/year	Quantity	Unit	

1.11 Production flow process and explanation for each process

--

1.12 Personnel responsible for energy

(1) Order number	(2) Name-Surname	(3) Registration number	(4) Working period	
			Start (day/month/year)	End (day/month/year)

Part 2: Production data

(1) Order number	(2) Type of product	(3) Working hours	(4) Production quantity	(5) Unit of product	(6) Remark

Part 3: Energy Consumption Data

3.1 Electricity Purchase

(1) Quantity of electricity being purchased

Normal rate TOD Tariff

TOU Tariff

- Quantity of electricity Kilowatt-hour

(2) Maximum electricity demand

- For normal rate userKilowatt

- For electricity user type:

TOD Tariff TOU Tariff

Period	Kilowatt
1)	
2)	
3)	

- Average electricity cost Baht/Kilowatt-hour

3.2 Electricity consumption for each system

(1) System	(2) Electricity consumption (Kilowatt-hour)		(3) Percentage	(4) Remark
	From meter	From estimation		
Production				
Air-conditioning				
Lighting				
Other				
Total			100	

3.3 Electricity consumption for each production process/major machinery

(1) Production process/ Major machinery	(2) Electricity consumption (Kilowatt-hour)		(3) Percentage		(4) Remark
	From meter	From estimation	of each production process	of all production processes	
Production process 1: List of major machinery (1) (2) (3) (4)					
Total			100		
Production process 2: List of major machinery (1) (2) (3) (4)					
Total			100		
Production process 3: List of major machinery (1) (2) (3) (4)					
Total			100		
All production processes				100	

3.4 Fuel consumption

(1) Type of fuel	(2) unit	(3) Consumption quantity	(4) Price (Baht/unit)	(5) Fuel cost (Baht)	(6) Remark
1. Bunker oil	Thousand liter				
2. Diesel	Thousand liter				
3. Gasoline	Thousand liter				
4. Kerosene	Thousand liter				
5. LPG	Ton				
6. Natural Gas	Million BTU				
7. Imported Coal	Ton				
8. Lignite	Ton				
9. Other (specify)	unit (specify)				
Total					

3.5 Fuel consumption in major machinery

(1) Machinery	(2) Consumption quantity			(3) Price (Baht/unit)	(4) Fuel cost (Baht)	(5) Remark
	Type	Quantity	Unit			
Boiler						
Hot oil boiler						
Furnace						
Oven						
Other (specify)						
Total						

3.6 Fuel consumption for each production process/major machinery

(1) Production process/ Major machinery	(2) Fuel consumption			(3) Percentage of total heating value		(4) Remark
	Type	Quantity	Unit	of each production process	of all production processes	
Production process 1: List of major machinery (1) (2) (3) (4)						
Total				100		
Production process 2: List of major machinery (1) (2) (3) (4)						
Total				100		
Production process 3: List of major machinery (1) (2) (3) (4)						
Total				100		
All production processes					100	

3.7 Fuel consumption for electricity generation

Electricity generation only

Cogeneration of electricity and heat

(1) Order number	(2) Installed production capacity (Kilowatt)	(3) Consumption quantity of principal fuel			(4) Hour in operation (Hour)	(5) Quantity of electricity being generated (Megawatt-hour)		(6) Quantity of steam being generated (ton equivalent)	
		Type	Quantity	Unit		For own use	For sale	For own use	For sale
Total									

3.8 Summary of energy consumption

(1) Type of energy	(2) Unit	(3) Consumption quantity	(4) Average heating value (Mega Jules/unit)	(5) Total heating value (Giga Jules)
1. Purchased electricity	Kilowatt-hour			
2. Bunker oil	Thousand liter			
3. Diesel	Thousand liter			
4. Gasoline	Thousand liter			
5. Kerosene	Thousand liter			
6. LPG	Ton			
7. Natural Gas	Million BTU			
8. Imported coal	Ton			
9. Lignite	Ton			
10. Others (Specify)	Unit (specify)			
Total energy consumption				

Part 4: Installation or modification of machinery or equipment affecting energy consumption and energy conservation

4.1 Installed machinery or equipment

(1) Transformer

Description	Unit 1	Unit 2	Unit 3	Unit 4
Type of transformer	[] dry type [] oil type	[] dry type [] oil type	[] dry type [] oil type	[] dry type [] oil type
Capacity (Kilovolt-ampere)				
High voltage (Kilovolt)				
Low voltage(volt)				
Heat ventilation system				
Manufacturer				
Month/year of installation				
Location of installation				
Remark				

(2) Unitary air conditioning system

Description	Unit 1	Unit 2	Unit 3	Unit 4
Type of air conditioner				
Chilling capacity (Watt) ¹⁾				
Electrical power capacity (Kilowatt)				
Manufacturer				
Month/year of installation				
Location of installation				
Remark				

Explanation

¹⁾ Chilling capacity: 1 watt equals 3.412 BTU/hour

(3) Central air conditioning system

Description			
Type of air conditioner		[] water cooler using water chiller	
		[] water cooler using air chiller	
Type of compressor			
Chilling capacity		Ton/hour	
Compressor capacity		Kilowatt	
Size of auxiliary unit of water chiller system	Water pump	Kilowatt	
		Liter/hour	
	Cooling water pump	Kilowatt	
		Liter/hour	
Cooling tower	Kilowatt		
Size of auxiliary unit of air chiller system	Water pump	Kilowatt	
		Liter/hour	
	Ventilating fan	Kilowatt	
Manufacturer of water cooler			
Month/year of installation			
Location of installation			
Remark			

(4) Lighting system

(4.1) Normal fluorescent bulb

(1) Type of electrical bulb	(2) Type of electrical lamp	(3) type of shielding plate of electrical lamp	(4) numbers of bulb per lamp (bulb/lamp)	(5) numbers of lamp (lamp)	(6) electrical power of the lamp (watt-lamp)	(7) power loss in ballast (watt/lamp)	(8) total watt (watt)	(9) hours in operation (hours/day)
Fluorescent bulb: 58-watt size	<input type="checkbox"/> hanging lamp <input type="checkbox"/> embedded lamp <input type="checkbox"/> Other (specify)	<input type="checkbox"/> opened <input type="checkbox"/> off white <input type="checkbox"/> prismatic <input type="checkbox"/> Other (specify)						
Fluorescent bulb: 36-watt and 40-watt size	<input type="checkbox"/> hanging lamp <input type="checkbox"/> embedded lamp <input type="checkbox"/> Other (specify)	<input type="checkbox"/> opened <input type="checkbox"/> off white <input type="checkbox"/> prismatic <input type="checkbox"/> Other (specify)	<input type="checkbox"/> 36 watt <input type="checkbox"/> 40 watt	<input type="checkbox"/> 36 watt <input type="checkbox"/> 40 watt				
Fluorescent bulb: 32-watt size	<input type="checkbox"/> hanging lamp <input type="checkbox"/> embedded lamp <input type="checkbox"/> Other (specify)	<input type="checkbox"/> opened <input type="checkbox"/> off white <input type="checkbox"/> prismatic <input type="checkbox"/> Other (specify)						
Fluorescent bulb: 18-watt and 20-watt size	<input type="checkbox"/> hanging lamp <input type="checkbox"/> embedded lamp <input type="checkbox"/> Other (specify)	<input type="checkbox"/> opened <input type="checkbox"/> off white <input type="checkbox"/> prismatic <input type="checkbox"/> Other (specify)	<input type="checkbox"/> 18 watt <input type="checkbox"/> 20 watt	<input type="checkbox"/> 18 watt <input type="checkbox"/> 20 watt				

(4.2) other bulb type

(1) Type of electrical bulb	(2) number of bulb	(3) electrical power of the lamp (watt/bulb)	(4) power loss in ballast (watt/bulb)	(5) total watt (watt)	(6) hours in operation (hours/day)
Incandescent bulb size watt size watt size watt size watt					
Tungsten Halogen bulb size watt size watt size watt					
Complex fluorescent bulb size watt size watt size watt size watt					
Fluorescent bulb: high pressure mercury vapor size watt size watt					
Metal halide bulb size watt size watt					
High pressure sodium vapor bulb size watt size watt					
Low pressure sodium vapor bulb size watt size watt					

(5) Air compressor

Description		Unit 1	Unit 2	Unit 3
Type of air compressor				
Air compressing capacity (cubic meter/hour (Nm ³))				
Heat ventilating system				
Motor	Electrical power capacity (Kilowatt)			
	Electrical pressure (volt)			
	Electrical current (ampere)			
	number of phasing			
	Power factor (%)			
	Efficiency (%)			
Manufacturer				
Month/year of installation				
Location of installation				
Remark				

(6) Other electrical motor with size of 10 kilowatt or more

Description	Unit 1	Unit 2	Unit 3	Unit 4
Electrical power capacity (Kilowatt)				
Electrical pressure (volt)				
Electrical current (ampere)				
number of phasing				
Power factor (%)				
Efficiency (%)				
Manufacturer				
Month/year of installation				
Location of installation				
Remark				

(7) Other machinery or electrical equipment with size of 10 kilowatt or more

Description	Unit 1	Unit 2	Unit 3	Unit 4
Name of machinery and equipment				
Electrical power capacity (Kilowatt)				
Electrical pressure (volt)				
Electrical current (ampere)				
number of phasing				
Power factor (%)				
Efficiency (%)				
Manufacturer				
Month/year of installation				
Location of installation				
Remark				

(8) Boiler

Description		Unit 1	Unit 2	Unit 3
Type of boiler (water-type, fire-type, or others)				
Designed size	Steam pressure (kg/cm ²)			
	Evaporization rate (ton/hour)			
Exterior condition	Width (meter)			
	Length (meter)			
	Height (meter)			
	Diameter (meter)			
Heat transmission surface area (square meter)				
Type of fuel used				
Fuel consumption rate (Specify unit such as liter/hour, kilogram/hour, etc.)				
Efficiency (%)				
Manufacturer				
Month/year of installation				
Location of installation				
Remark				

(9) Hot oil boiler

Description		Unit 1	Unit 2	Unit 3
Designed size	Hot oil temperature (°C)			
	Oil pressure in the system (kg/cm ²)			
	Heat generating rate (Giga Jules/hour)			
Heat transmission surface area (square meter)				
Type of fuel used				
Fuel consumption rate (Specify unit such as liter/hour, etc.)				
Power factor (%)				
Efficiency (%)				
Manufacturer				
Month/year of installation				
Location of installation				
Remark				

(10) Industrial Furnace

Description		Unit 1	Unit 2	Unit 3
Name of industrial furnace				
Type (such as tunnel kiln, etc.				
Exterior condition	Width (meter)			
	Length (meter)			
	Height (meter)			
Production capacity (specify unit)				
Type of fuel used				
Fuel consumption rate (Specify unit such as liter/hour, etc.)				
Power factor (%)				
Efficiency (%)				
Manufacturer				
Month/year of installation				
Location of installation				
Remark				

(11) Machinery or equipment employed in heat recovery system

Heat recovery system	Recovery of hot water from		Recovery of heat/hot gas from			Other heat recovery system (specify)
	Condense	Cooling	condenser	Cooling	Stack	
Name of machinery or equipment						
Model/Type						
Quantity						
Recovery temperature (°C)						
Percentage of recovery (%)						
Manufacturer						
Month/year of installation						
Location of installation						
Remark						

(12) Steam-utilizing machinery or equipment

Name of machinery or major equipment		Unit 1	Unit 2	Unit 3	Unit 4
Model/Type					
Production capacity (specify unit)					
Quantity					
Steam utilization	Directly used or through heat exchanger (specify)				
	Steam quantity (kg/hour)				
	Pressure (kg/cm ²)				
Steam temperature (°C)					
Exterior condition	Width (meter)				
	Length (meter)				
	Height (meter)				
	Diameter (meter)				
Efficiency (%)					
Manufacturer					
Month/year of installation					
Location of installation					
Remark					

(13) Electricity generating system

(13.1) Prime mover

Description	Unit 1	Unit 2	Unit 3	Unit 4
Type (such as motor engine, steam engine, gas turbine, steam turbine, etc.)				
Size (Kilowatt)				
Angle velocity (rpm)				
Type of fuel used (such as diesel, bunker oil, natural gas, etc.)				
Numbers of cylinder or stage				
Manufacturer				
Month/year of installation				
Location of installation				
Remark				

(13.2) Electricity generator

Description	Unit 1	Unit 2	Unit 3	Unit 4
Installed capacity (Kilowatt)				
Rate voltage(volt)				
Rate current (ampere)				
Power factor (%)				
Angle velocity of generator (rpm)				
Manufacturer				
Month/year of installation				
Location of installation				
Remark				

(14) Machinery or equipment using other type of fuel

Description		Unit 1	Unit 2	Unit 3	Unit 4
Name of machinery or major equipment					
Model/type					
Production capacity (specify unit)					
Quantity					
Type of fuel used					
Fuel consumption quantity (specify unit)					
Working temperature (°C)					
Exterior condition	Width (meter)				
	Length (meter)				
	Height (meter)				
	Diameter (meter)				
Efficiency (%)					
Manufacturer					
Month/year of installation					
Location of installation					
Remark					

4.2 Improvement or modification of machinery or equipment and energy conservation measures

(1) Order number	(2) Description of Improvement or modification of machinery or equipment and energy conservation measures	(3) Implementing period		(4) Investment (Baht)	(5) Energy saving outcome			(6) Remark
		Start (Month/year)	Completed (Month/year)		Type of energy	Quantity ^{1/} (Unit)	Value (Baht)	
Total								

1/ Energy saving in terms of electricity should specify quantity both in unit, kilowatt and kilowatt-hour.

Certified true copy Copies

Signed Personnel responsible for energy
(.....)