Energy Conservation Guideline

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The Energy Conservation Center, Japan

Table of Contents

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The Energy Conservation Guideline (EC Guideline) is prepared based on “Standards of Judgment for business operators on the rational use of energy at factories etc. from “Bulletin No.59 under of Ministry of Economy, Trade and Industry, Japan on 30th March 2018”

Part-1 General Requirements

Standard Components	**1-1 General Requirements those apply to all Business Operators** Persons or organizations who operate a business consuming energy (hereafter called “Business Operators”) at factories, offices, or other premises (hereafter called “Factories”) shall make the efforts described below in items (1) to (8) to appropriately manage energy, with the aim of conserving total energy generated from fuels as well as heat and electricity, by not only taking full account of the characteristics of fuels, heat, and electricity but also overlooking Factories of the operators. (1) Energy Policy Business Operators shall set policies on efforts for energy conservation in all of their Factories (Specified Business Operators shall include a mid- to long-term plan in the policy; hereafter called “Energy Policy”). The Energy Policy shall include energy conservation targets and policies on operating facilities, installing new ones or replacing existing ones with the aim of achieving the targets. (2) Energy Management Organization Business Operators shall develop a management organization for efficient and effective overall energy conservation in all of their Factories. (3) Responsibilities Business Operators shall assign the following personnel in the Energy Management Organization i.e. (a) Energy Management Representative, (b) Energy Management Planning Promoter who is a person assists Energy Management Representative, (c) Energy Manager who is a person manages actual energy managemnet activities at a workplace, and esure that each person fulfills his or her responsibilities associated with energy conservation based on each role defined below. A. Responsibilities of Energy Management Representative (a) To keep track of the status of implementation processes of energy conservation (maintenance, installation, modification and removal of facilities that consume energy or relate to energy conservation as well as improvement and monitoring of energy usage) in all Factories that the organization has. (b) To supervise processes for achieving targets concerning energy conservation defined in the Energy Policy by, for example, giving instructions about processes that should be implemented to persons who manage business activities at a workplace according to the Energy Policy. (c) To prepare a plan for a next-term Energy Policy based on the status of compliance with the Energy Policy as well as report from persons who manage business activities at a workplace, and report the plan to the board of directors or other equivalent organization responsible for making decisions on execution of business. (d) To develop human resources who contribute to energy conservation (including persons who manage business activities at a workplace). B. Responsibilities of Energy Management Planning Promoter To assist the manager by, for example, facilitating smooth communication between the manager and persons who manage business activities at a workplace.

Standard Components	C. Responsibilities of Energy Manager (a) To keep track of the status of implementation processes of energy conservation (maintenance of facilities that consume energy or relate to energy conservation as well as improvement and monitoring of energy usage) in each of the Factories that the organization has. (b) To firmly implement processes associated with energy conservation based on, for example, the Energy Policy and instructions from the manager. (c) To report results of analysis concerning the status of energy conservation in the Factories based on the energy management described in item A. above. (4) Resource Management Business Operators shall secure the funds and human resources necessary for energy conservation. (5) Communication and Education Business Operators shall communicate the Energy Policy to employees of all of their Factories, and provide training in the area of energy conservation in the Factories. (6) Monitoring and Evaluation Business Operators shall study necessity of utilizing internal audit or other means to improve the objectivity, and monitor and evaluate compliance with the Energy Policy in their Factories. The operators shall take improvement measures if compliance is found to be insufficient as the result of the evaluation. (7) Review of Energy Policy Business Operators shall periodically review the evaluation methods for the Energy Policy and compliance, and modify them as necessary. (8) Document Control Business Operators shall keep track of the current situation by creating, updating, and storing a document that describes (1) establishment of the Energy Policy, (2) development of a management organization, (3) assignment of a manager, etc., (6) monitoring, etc. of compliance with the Energy Policy, and (7) results of review, etc. of the Energy Policy. **1-2 Fundamental Requirements applicable to factories and/or facilities** Business Operators shall thoroughly implement detailed energy management measures for every factory and facility (or every group of facilities or every process if it is not appropriate to apply separate measures to individual facilities; the same applies hereinafter) described below in items (1) to (6) as far as those measures are technologically and economically applicable. Further, the operators shall appropriately and effectively conserve energy at the Factories through complying with the various standards, as described in the Part 2 or 3, concerning major facilities used in different processes associated with use of energy. (1) To conserve energy by improving productivity through improvement in operating efficiency of facilities, rationalization of production processes, etc. (2) To provide and maintain gauges and other devices relating to energy management. (3) To keep track of and analyze conditions of the facilities that consume a large amount of energy such as genertion of waste heat to identify issues while prioritizing the conditions. (4) To keep track of and analyze conditions of existing facilities including their energy efficiency and level of deterioration, and prioritize neccesities of updating, modification, and other actions from the perspective of energy conservation. (5) To give priority to equipment with a high energy efficiency when selecting and introducing a facility that consumes energy, and optimize the margin of its capability and capacity. (6) To minimize energy usage such as on holidays and in periods when facilities are not operated by taking energy losses caused by starting and stopping of operation and other related factors into consideration.

Target Components	A. Business operators shall manage their energy consumption intensity. With the aim of reducing, in medium- to long-term, at least one percent (on an annual average basis) of the energy consumption intensity of their factories as a whole or each of the factories, the operators shall make efforts to achieve various targets and actions for energy saving in the factories, as far as technologically and economically applicable. B. Those who use energy over a predetermined amount, which is equivalent to the amount generated from 1,500 kiloliters of crude oil, during an energy year (starting April 1 and ending March 31 of the following year) for the businesses listed in the Table (8) shall make efforts to achieve improvements or reductions toward the benchmark indexes in the table. In the course of the efforts, they shall aim to achieve the indexes in medium- to long-term, as far as technologically and economically applicable, while keeping track of the situation of their factories. C. Business operators must systematically work on the efforts from a medium- to long-term perspective, so that these actions can be taken most effectively in the future. Use of ISO 50001, which is a standard for energy management systems, shall also be considered. D. Business operators being a lessor and lessee shall cooperate to promote energy conservation activities and make efforts to establish mechanisms to reflect the results of the activities to the method of sharing costs associated with use of energy and energy conservation, so that appropriate and effective energy conservation can be encouraged. E. Business operators shall study efforts to contribute to promotion of energy conservation by others, through provision of technologies, advices, and coalition of business, in order to eventually promote energy conservation by the entire nation. F. Efficient use of thermal energy: Data on total energy usage in terms of available energy (exergy) shall be developed and maintained to achieve efficient heat utilization. Improvements in thermal consistency in heat utilization shall also be studied. G. Utilization of surplus steam: (a) If high-temperature combustion gas or steam that is useful can be obtained at the factories, business operators shall study ways to utilize it, for example, in power generation and as driving power in operation, taking item (1) into consideration. Improvements in efficiency in converting heat to power through combined-cycle power generation and improved steam conditions shall also be studied. (b) If surplus heat and steam that are useful can be obtained at the factories, the business operators shall study ways to utilize them in other factories or consumer sector, taking item (1) into consideration. H. Utilization of unused energy: (a) Fuels and energy generated while burning or processing combustible waste shall be recovered as much as possible so that they can be utilize for other purposes. (b) If energy can be obtained, by thermal energy conversion, from industrial wastewater, sewage, river water, and seawater at the factories or around them, the business operators shall study possible use of the energy in a thermally efficient facility using, for example, a heat pump. (c) If waste heat is generated in factories of other business operators around the factories and it is usable, the business operators shall study possible use of the energy as much as possible. I. Use of a provider of services related to energy conservation: Before taking actions necessary to promote total energy conservation, the business operators shall study to take advantage of some services including diagnosis and advice on energy efficiency improvements, and a method of guarantee concerning efficient use of energy. Such services are available from Energy Service Companies (ESCOs), which are providers of comprehensive services concerning energy conservation.

Target Components	J. Regional energy sharing: If it is possible to promote total energy conservation by sharing energy between neighboring city blocks, regions, or buildings having a variety of energy demands, areal utilization of energy shall be studied. K. Use of tools and approaches for energy conservation: Before taking actions for energy conservation of commercial buildings, use of some useful tools shall be considered. They include the tool that estimates energy consumption by a building before and after implementing energy conservation measures for comparison and evaluates the reduction effect gained, and a tool that puts together operation process data of air conditioning facilities and creates graphical representation to allow easier analysis.

Part -2 Items related to Rational Use of Energy in Buildings

1. Air-conditioning Facilities and Ventilation Facilities		
Standard Components	(1) Management & Control	A. Air conditioning shall be managed by limiting zones of air conditioning, reducing a load using window shades, and according to the instructions concerning facilities depending on how air conditioning is used in the zones, which shall be described in the **EM Manual**. The instructions include thoese for operational time, room temperature, air changes per hour, humidity, and effective use of outdoor air. Note that air cooling/heating temperatures in the **EM Manual** shall be determined considering the preset temperatures recommended by the government. B. Heat source facilities for combustion (e.g. absorption chiller or chilled/hot water generator) for air conditioning facilities shall be controlled according to the instructions concerning air ratios, which shall be described in the **EM Manual**. C. Heat source facilities, facilities that transport heat from a heat source facility to an air conditioner facility with chilled water (hereafter, “heat transport facilities”), and air conditioner facilities, which are included in air conditioning facilities, shall be controlled in a way that improves total energy efficiency of air conditioning facilities, which shall be described in the **EM Manual**. The improvement shall be achieved by presetting cooling water temperatures, chilled/hot water temperatures and pressures based on seasonal variations in outdoor air conditions. D. If a heat source facility in air conditioning facilities includes more than one unit of heat source equipment of the same model or more than one unit of heat source equipment using different types of energy, the facility shall be managed in a way that improves total energy efficiency of the heat source facility, which shall be described in the **EM Manual**. The improvement shall be achieved by adjusting the numbers of units in operation or selecting equipment to be operated depending on seasonal variations in outdoor air conditions and load fluctuations. E. If a heat transport facility includes more than one pump, the facility shall be managed in a way that improves total energy efficiency of the heat transport facility, which shall be described in the **EM Manual**. The improvement shall be achieved by adjusting the numbers of units in operation or selecting equipment to be operated depending on seasonal variations. F. If an air conditioner facility includes more than one air conditioner of the same model in one zone or more than one air conditioner of different types, the facility shall be managed in a way that improves total energy efficiency of the air conditioner facility, which shall be described in the **EM Manual**. The improvement shall be achieved by preventing mixing loss, and adjusting the numbers of units in operation or selecting equipment to be operated based on the load status. G. Ventilating facilities shall be managed by limiting zones to be ventilated and according to the instructions concerning ventilation volume, operational time and temperature, which shall be described in the **EM Manual**. The instructions shall be determined based on the purpose and place of the ventilation.

Standard Components	(2) Measurement & Recording	A. For each of the zones of air conditioning, factors necessary to keep track of air conditions (e.g. temperature and humidity levels) and improve air conditioning efficiency shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**. B. For heat source facilities, heat transport facilities, and air conditioner facilities included in air conditioning facilities, factors necessary to improve efficiency of each unit and total efficiency of the HVAC System shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**. C. For each of the zones to be ventilated, factors necessary to keep track of air conditions (e.g. temperature and carbon dioxide levels) and improve ventilation efficiency shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**.
	(3) Maintenance & Inspection	A. Heat source facilities, heat transport facilities, and air conditioner facilities included in air conditioning facilities shall be periodically maintained and inspected to be kept in good condition according to the instructions concerning maintenance and inspection necessary to improve efficiency of the air conditioner facilities, which shall be described in the **EM Manual**. The improvement shall cover both each unit and total efficiency of the HVAC System and shall be achieved by, for example, maintaining thermal insulation materials, cleaning clogged filters, and removing scale formed on a surface of the condenser or heat exchanger. B. Automatic control devices of air conditioning and ventilating facilities shall be periodically maintained and inspected to be kept in good condition according to the instructions concerning maintenance and inspection necessary to manage the devices, which shall be described in the **EM Manual**. C. Fans and ducts included in ventilating facilities shall be periodically maintained and inspected to be kept in good condition according to the instructions concerning maintenance and inspection necessary to improve efficiency of the ventilating facilities, which shall be described in the **EM Manual**. The improvement shall cover both efficiency of each unit and total efficiency of the facilities and shall be achieved by, for example, cleaning clogged filters.

Standard Components	(4) Necessary Measures when Installing New Facilities	A. When installing a new air conditioning facility, ventirating facility, etc., a proper type & capacity of facility shall be selected in accordance with loads and ventilation requirement. B. When installing a new air conditioning facility, actions including the following shall be taken to improve efficient use of energy. The actions shall be determined based on the information concerning air conditioning. (a) If at all possible, individual control shall be available for each zone of air conditioning. (b) To introduce a heat source facility with highly energy efficiency that utilizes, for example, a heat pump. (c) To select a heat transport facility of less energy loss with considering shortening of piping/ducts, thermal insulation, etc. (d) To introduce a system capable of high efficiency operation in heat source and heat transport facilities included in air conditioning facilities that are expected to have load fluctuations. The high efficiency operation includes appropriately splitting and controlling the number of units to be operated, controlling the rotation speed, use of equipment with high efficiency during partial load operation, and use of a heat storage system. In addition, use of heat transport facilities with variable pump head control shall be considered. (e) To introduce variable air-volume and flow-rate systems with a rotation speed control device so that the air conditioner facility can be controlled in response to a current load when the facility is used under the condition with large load fluctuations. (f) To consider introducing a total heat exchanger for reduction of an air cooling/heating load required to supply outdoor air in summer and winter. Further, when air cooling is needed in winter or during intermediate seasons, controlling room temperatures by outdoor air cooling shall be considered. If indoor air needs to be humidified during the control, use of water humidification shall be considered so that the air cooling load can be reduced. (g) To reduce pump head using a heat exchanger if a heat transport facility that receives heat from a heat storage system and district heating and cooling system has a large head. (h) To determine where and how to install an outdoor unit of an air conditioner based on solar radiation and ventilation condition of the installation location, and ventilation condition in case the units are installed closely together. (i) To ensure that the air conditioning facility allows proper control of air conditioning and analysis of its operation. This shall be achieved by, for example, installing equipment and sensors required to measure factors necessary to keep track of air conditions (e.g. temperature and humidity levels) for each zone of air conditioning and to improve air conditioning efficiency, and by introducing a building energy management system (hereafter, “BEMS “). C. When installing new equipment for air conditioning or ventilating facilities that is regarded as energy consumption equipment (as specified in Article 78, item 1 of the Act on the Rational Use of Energy; hereafter, “**Specified Energy Consuming Equipment**”), a proper type of the equipment shall be selected with due consideration to the applicable performance regulation with regard to the equipment in question.

		D. When installing a new ventilating facility, the following actions to improve efficient use of energy shall be taken. (a) To adopt proper control system for load flactuations. (b) To select a facility of less energy loss with considering shortening of piping/ducts, thermal insulation etc.
Target Components		For air conditioning facilities, ways to efficiently use energy for air conditioning facilities shall be studied, including the following actions. A. To use, for air conditioning facilities, systems using heat source equipment with high energy efficiency such as a heat pump and storage system and gas cooling/heating system. If both air cooling and heating loads are present at the same time in factories, use of heat recovery system shall be considered. Further, if exhaust heat can be effectively used, use of a heat recovery heat pump and exhaust-heat-driven heat source equipment shall also be considered. B. To improve thermal insulation for walls and roof in the areas to be air-conditioned, such as by increasing the thickness of the walls and roof, using materials with low thermal conductivity, applying double-layer thermal insulation. Other measures shall also be exploered to shield solar radiation through windows using, for example, window shades, heat reflecting glasses, heat shield window films, and thermal buffer zone with double insulation structure. C. To introduce air volume control for outdoor air supply for air conditioning facilities, using a carbon dioxide sensor or the like, in order to reduce a load required for outdoor air processing. Further, for air cooling during seasons except for summer, reduction of energy consumed by heat source facilities through, for example, air cooling utilizing water cooled by a cooling tower shall be considered. D. To introduce a large temperature difference system that can reduce air flow volume and circulation water volume for air conditioning facilities. E. To improve thermal insulation of pipes and ducts by, for example, using thermal insulation material with low thermal conductivity. F. To reduce power to drive ventilating facilities for indoor parking areas, machine rooms and electric rooms using air volume control with various sensors.

2. Items related to Boiler Facilities and Hot Water Suplly Facilities		
Standard Components	(1) Management & Control	A. Boiler facilities shall be managed according to the instructions concerning air ratios based on boiler capacities and fuel types, which shall be described in the **EM Manual**. B. The **EM Manual** shall be established so that the air ratio is reduced below the reference air ratio specified in Table (1) as standard value. C. Boiler facilities shall be managed according to the instructions concerning steam pressure, temperature, and operational time, which shall be described in the **EM Manual**. The facilities shall be properly operated, eliminating excessive steam and fuel supplies. D. Quality of boiler feed-water shall be controlled according to the instructions concerning water quality, which shall be described in the **EM Manual**. Note that the feed water quality shall be controlled according to Japanese Industrial Standards (JIS) B8223 (Water conditioning for boiler feed water and boiler water) or an equivalent standard. E. When more than one boiler facility is used, the facilities shall be managed in a way that improves total energy efficiency, which shall be described in the **EM Manual**. Based on the manual, the proper number of units shall be operated. F. Hot water supply facilities shall be managed by limit supply points depending on seasons and work and according to the instructions, which shall be described in the **EM Manual**. The instructions are concerned with factors necessary to improve the efficiency of hot water supply (e.g. a supply period, hot water supply temperature, and hot water supply pressure). G. Heat source facilities included in hot water supply facilities shall be managed in a way that improves total energy efficiency including auxiliary equipment (e.g. heat source equipment and pump) in response to load fluctuations, which shall be described in the **EM Manual**. H. If a heat source facility for hot water supply facilities includes more than one unit of heat source equipment, the facility shall be managed in a way that improves total energy efficiency of the heat source facility, which shall be described in the **EM Manual**. The improvement shall be made by adjusting the numbers of units in operation based on the load status.
	(2) Measurement & Recording	A. For boiler facilities, factors necessary to improve the boiler efficiency shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors (e.g. amount of fuel supply, steam pressure, hot water temperature, residual oxygen content in exhaust gas, waste gas temperature, and boiler feed water volume), which shall be described in the **EM Manual**. B. For hot water supply facilities, factors necessary to improve the efficiency of hot water supply shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors (e.g. feed water volume and hot water supply temperature), which shall be described in the **EM Manual**.

Standard Components	(3) Maintenance & Inspection	A. Boiler facilities shall be periodically maintained and inspected to be kept in good condition according to the instructions concerning maintenance and inspection of the factors necessary to improve the efficiency, which shall be described in the **EM Manual**. B. Boiler facilities shall be periodically maintained and inspected to be kept in good condition in a way that keeps temperatures of the facilities, maintains thermal insulation, and prevents steam leak and clogging of steam traps, which shall be described in the **EM Manual** concerning maintenance and inspection. C. Hot water supply facilities shall be periodically maintained and inspected to be kept in good condition according to the instructions concerning maintenance and inspection, which shall be described in the **EM Manual**. The instructions include those necessary to improve the efficiency of hot water supply (e.g. removing scales formed on a surface of the heat exchanger) and to control automatic control devices.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new boiler facility or hot water supply facility, a proper type & capacity of facility shall be selected in accordance with loads. B. When the temperature of waste gas from boiler facilities exceeds the temperature listed in Table (2) as standard value, actions to utilize the waste heat shall be taken. When waste heat from steam drain can be effectively used, actions to recover and use the heat shall be taken. C. When installing a new boiler facility, the following actions to improve efficient use of energy shall be taken. (a) To select high efficiency boiler facility equipped with economizer or the like (b) To select a facility of less energy loss with considering shortening of piping/ducts, thermal insulation etc. D. If load fluctuations are expected with boiler facilities, a system capable of high efficiency operation shall be introduced. The high efficiency operation shall be achieved by, for example, properly splitting and controlling the number of units to be operated. E. When installing a new hot water supply facility, actions including the following shall be taken to improve efficient use of energy. (a) To select a facility that is capable of operation in response to load changes on hot water supply. (b) To introduce a local hot water supply system for sections where demand for hot water is low. (c) To examine possible introduction of a heat pump system and/or a latent heat recovery system for heat source facilities. (d) To select a facility of less energy loss with considering shortening of piping/ducts, thermal insulation, etc. F. When installing new equipment for hot water supply or boiler facilities that is regarded as the **Specified Energy Consuming Equipment**, a proper type of the equipment shall be selected with due consideration to the applicable performance regulation with regard to the equipment in question.

Target Components		A. For boilers, efforts shall be made to reduce their air ratio toward the reference air ratio listed in Table (1) as target value. B. For waste heat recovery from exhaust gas of boilers, efforts shall be made to reduce the waste gas temperature and enhance the waste heat recovery rate targeting the values of the waste gas temperature and heat recovery rate listed in Table (2) as target value. C. For hot water supply facilities, ways to efficiently use energy for the hot water supply facilities shall be studied including introduction of hot water supply facilities with higher energy efficiency (such as by combining a heat pump system or a latent heat recovery system for heat source facilities).

3. Items related to Lighting Systems, Elevators and Motive Power Facilities		
Standard Components	(1) Management & Control	A. Lighting systems shall be managed according to the instructions based on JIS Z9110 (General rules of recommended lighting levels), JIS Z9125 (Lighting of indoor work places), or their equivalent standards, which shall be described in the **EM Manual**. Dimming or turning-off the light shall be managed in a way that eliminates excessive or unnecessary lighting, which shall be described in the **EM Manual**. B. Elevators shall be operated efficiently according to the instructions concerning efficient elevator operation, which shall be described in the **EM Manual**. The efficient operation includes limiting the floors to stop in certain time slots or in certain days of the week and limiting the number of elevators in operation (if there is more than one).
	(2) Measurement & Recording	A. Illuminance of lighting systems shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of illuminance in workplaces to be lit, which shall be described in the **EM Manual**.
	(3) Maintenance & Inspection	A. Lighting systems shall be periodically maintained and inspected according to the instructions concerning maintenance and inspection, which shall be described in the **EM Manual**. The instructions include cleaning and replacement of lighting fixtures and lamps. B. Elevators shall be periodically maintained and inspected in a way that reduces mechanical losses of their electric motors, power transmission units and machines that apply loads to the motors, which shall be described in the **EM Manual** concerning maintenance and inspection. C. Motive Power facilities of plumbing facilities and mechanical parking facilities shall be periodically maintained and inspected in a way that reduces mechanical losses of their electric motors, power transmission units and machines that apply loads to the motors, which shall be described in the **EM Manual** concerning maintenance and inspection. If a fluid machine (e.g. a pump or fan) is used as the machine that apply a load, the machine shall be periodically maintained and inspected in a way that prevents leaks of the fluid and reduces resistance of pipes and ducts, which shall be described in the **EM Manual** concerning maintenance and inspection.

Standard Components	(4) Necessary Measures when Installing New Facilities	A. When installing a new lighting facility, elevator, etc., a proper type of the equipment shall be selected in accordance with necessary illuminance or a required transportation capacity. B. When installing a new lighting system, actions including the following shall be taken to improve efficient use of energy. (a) To consider introducing energy-conserving lighting facilities such as inverter fluorescent lamps. (b) To consider introducing energy-conserving lighting facilities such as lighting fixtures with high efficiency lamps (e.g. HID lamps). (c) To select lighting fixtures that can be easily maintained, allowing easy cleaning and light source replacement. Ease of maintenance shall also be taken into consideration for the place and method of installation. (d) To select lighting fixtures, considering factors for total lighting efficiency. The factors include illuminance efficiency of the light sources, efficiency of lighting circuits and lighting fixtures, and light radiation efficiency. (e) To consider separating lighting system circuits for places with natural lighting from others. (f) To consider measures to prevent unnecessary lighting in some places and time slots by turning the lights off or dimming. The measures include installing a motion sensor, use of timers, and interlocking with security systems. C. When installing new equipment for lighting systems that is regarded as the **Specified Energy Consuming Equipment**, a proper type of the equipment shall be selected with due consideration to the applicable performance regulation with regard to the equipment in question. D. When installing a new elevator, such actions to improve efficient use of energy shall be taken like adopting higher energy efficiency control system and/or driving system. E. When installing a new AC motor that is regarded as the Specified Energy Consuming Equipment or a new motive power facility equipped with such an AC motor, a proper type of the equipment shall be selected with due consideration to the applicable performance regulation (see table(7) for Top-Runner Standards*see footnote) with regard to the equipment in question. When installing a new AC motor that is not regarded as the Specified Energy Consuming Equipment (limited to a three-phase squirrel-cage induction motor) or a new motive power facility equipped with such an AC motor, a proper type of the equipment shall be selected with due consideration to the JIS C4212 (Low-voltage three-phase squirrel-cage high-efficiency induction motors)*see footnote.
Target Components		A. For lighting systems, when natural lighting can be used, selecting lighting fixtures with a dimming function and introduction of automatic control devices for lighting shall be considered. Introduction of lighting systems that is capable of properly offsetting high illuminance of a new light source (e.g. at the initial installation of the lighting system, immediately after the replacement of a light source) for power saving shall also be considered. B. Introducing light-emitting diode (LED) lighting fixtures shall be considered. C. For elevator and escalator facilities, efficient operation based on their usage shall be studied. The efficient operation includes use of a motion sensor to stop the facilities while no passenger is around.

*Top-Runner Standard for high efficiency motors specifies motors in accordance with IE3, while JIS C4212 specifies motors in accordance with IE2.

4. Items related to Power Receiving and Transforming Facilities and BEMS		
Standard Components	(1) Management & Control	A. Transformers and uninterruptible power systems shall be managed in a way that increases efficiency of the transformers and uninterruptible power systems as a whole, which shall be described in the **EM Manual**. In the management, efficiency during partial load operation shall be taken into consideration. Adjustment of the numbers of units in operation and proper load allocation shall be implemented. B. The power factor at the receiving end shall be controlled in a way that allows the factor to be basically 95% or higher, which shall be described in the **EM Manual**. The control shall be achieved by controlling, for example, phase advance capacitors.
	(2) Measurement & Recording	B. Factors necessary to reduce electric consumption losses shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors (e.g. electric consumption in offices and other premises, and voltages and currents in power receiving and transforming facilities), which shall be described in the **EM Manual**.
	(3) Maintenance & Inspection	C. Power receiving and transforming facilities shall be periodically maintained and inspected in a way that keeps them in good condition, which shall be described in the **EM Manual** concerning maintenance and inspection.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new power receiving and transforming facility, equipment with less energy losses shall be introduced. The actual record and future trends of power demand shall be fully examined to determine the layout, distribution voltage, and capacity of the facilities. B. When installing new equipment for power receiving and transforming facilities that is regarded as the **Specified Energy Consuming Equipment**, a proper type of the equipment shall be selected with due consideration to the applicable performance regulation with regard to the equipment in question. C. Introducing BEMS shall be considered for total management and evaluation of the facilities that use electric power and air conditioning facilities.
Target Components		A. BEMS shall assume a main role in managing energy. The management activities shall be planned for each system so that they are made periodically (e.g. yearly, for each season, monthly, weekly, daily, and hourly), and the results are clearly compared with past records using data and graphs to keep track of the current energy consumption trends. B. Use of integrated energy conservation control shall be considered for air conditioning and electrical facilities. C. Maintenance condition, operational time, and operating characteristics of facilities and equipment shall be compared and reviewed to figure out their current degradation and timing of maintenance needed. D. Improving the power factor, at the receiving end, of the facilities listed in Table (6) (except for those with a capacity smaller than the values in the table) or power transforming facilities shall be studied. The improvement shall basically target 98% or higher and shall be achieved by, for example, installing phase advance capacitors.

5. Items related to Dedicated Power Generation Facilites and Cogeneration Facilities		
Standard Components	(1) Management & Control	A. Operation of facilities that are used solely for the purpose of power generation, such as gas turbines, steam turbines, and gas engines (hereafter, “dedicated power generation facilities”), shall be managed in a way that maintains efficient operation of the facilities, which shall be described in the **EM Manual**. Further, when multiple dedicated power generation facilities are operated in parallel, they shall be managed in a way that allows the load to be properly distributed to the facilities in response to increase/decrease of the load, which shall be described in the **EM Manual**, in order to improve total efficiency. Characteristics of different facilities shall be taken into consideration when determining how the load should be distributed. B. Operation of equipment used in cogeneration facilities (e.g. gas turbines, gas engines, and diesel engines) shall be managed in a way that allows generated heat and electric power to be fully utilized in response to increase/decrease of the load, which shall be described in the **EM Manual**, in order to improve total efficiency. Further, when multiple cogeneration facilities are operated in parallel, they shall be managed in a way that allows the load to be properly distributed to the facilities in response to increase/decrease of the load, which shall be described in the **EM Manual**, in order to improve total efficiency. Characteristics of different facilities shall be taken into consideration when determining how the load should be distributed.
	(2) Measurement & Recording	A. For dedicated power generation facilities and cogeneration facilities, factors necessary to improve total efficiency of the facilities (including auxiliary equipment) shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**.
	(3) Maintenance & Inspection	A. If dedicated power generation facilities and cogeneration facilities are used, they shall be periodically maintained and inspected in a way that maintains a high level of total efficiency of the facilities (including auxiliary equipment), which shall be described in the **EM Manual** concerning maintenance and inspection.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new dedicated power generation facility, the actual record and future trends of power demand shall be fully examined to select a type of the facility with an optimal capacity. B. When installing a new dedicated power generation facility, generation efficiency of the facility at the receiving end shall not be significantly lower than the average level of domestic dedicated thermal power generation facilities throughout a year. C. When installing a new cogeneration facility, the actual record and future trends of heat and power demands shall be fully examined. It shall be confirmed that exhaust heat and electricity are fully available on a full year basis to select a type of the cogeneration facility with an optimal capacity.
Target Components		N/A

6. Items related to Office Equipment and Consumer Equipment		
Standard Components	(1) Management & Control	A. Office equipment shall be managed in a way that prevents unnecessary operation, which shall be described in the **EM Manual**.
	(2) Measurement & Recording	N/A
	(3) Maintenance & Inspection	A. Office equipment shall be periodically maintained and inspected, as required.
	(4) Necessary Measures when Installing New Facilities	A. When installing new office equipment or consumer equipment that is regarded as the **Specified Energy Consuming Equipment**, a proper type of the equipment shall be selected with due consideration to the applicable performance regulation with regard to the equipment in question.
Target Components		N/A

7. Items related to Commercial Equipment		
Standard Components	(1) Management & Control	A. Commercial equipment shall be managed according to the instructions concerning factors necessary for the management (e.g. seasons, days of the week, time slots, and load), which shall be described in the **EM Manual**. Examples of the commercial equipment are kitchen equipment, commercial refrigerators, commercial chillers, showcases, medical equipment, broadcast equipment, communication equipment, computers, experimental apparatus, and amusement machines.
	(2) Measurement & Recording	A. Factors necessary to keep track of and improve operation status of commercial equipment shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**.
	(3) Maintenance & Inspection	A. Commercial equipment shall be periodically maintained and inspected to be kept in good condition according to the instructions concerning maintenance and inspection, which shall be described in the **EM Manual**.
	(4) Necessary Measures when Installing New Facilities	A. When installing new commercial equipment, a type of the equipment with high energy efficiency shall be selected. B. When installing new commercial equipment that generates heat, increase in air conditioning load shall be prevented (by, for example, limiting zones of air conditioning or limiting outdoor air volumes). In addition, heat shall be discharged directly outside of the zones of air conditioning (by, for example, use of a duct or refluxing heat media) to prevent the increase in the air conditioning load. C. When installing new commercial equipment that is regarded as the **Specified Energy Consuming Equipment**, a proper type of the equipment shall be selected with due consideration to the applicable performance regulation with regard to the equipment in question.
Target Components		A. If vending machines of canned or bottled beverage are installed, measures for efficient operation based on their usage shall be considered. The measures include suspending the machines during night and on weekends using a timer and turning off light in the machines when unnecessary.

8. Items related to Other Rational Use of Energy		
Standard Components		- A business operator that leases a room in its premises to other operator (hereafter, “lessor”) and a business operator that leases the room from the lessor (hereafter, “lessee”) shall cooperate to promote energy conservation activities. The lessor shall keep track of the energy consumptions by the lessee and provide the lessee with the consumption information so that the lessee would know its energy conservation performance. The information shall be measured values if the lessor owns a measuring instrument. If not, estimated figures based on a reasonable calculation method shall be provided.
Target Components		N/A

Part - 3 Items Related to Rational Use of Energy in Factories

1. Rationalization of Fuel Combustion		
Standard Components	(1) Management & Control	A. Fuel combustion process shall be managed according to the instructions concerning air ratios, which shall be described in the **EM Manual**. The ratio shall be determined based on facilities that burn fuel (hereafter, “combustion facilities”) and fuel types. B. The **EM Manual** shall be established so that the air ratio is reduced below the reference air ratio specified in Table (1) as standard value. C. If more than one combustion facilities are used, combustion load for each facility shall be adjusted in a way that achieves a high level of thermal efficiency of the combustion facilities as a whole, which shall be described in the **EM Manual**. The thermal efficiency herein means a ratio of heat quantity that has been used to increase the value added to the burned objects to the input heat quantity. D. When fuel is burned, combustion facilities shall be properly operated in a way that achieves a high level of combustion efficiency under specific operating conditions, which shall be described in the **EM Manual**. The conditions shall be determined based on fuel particle size, moisture content, viscosity and other properties.
	(2) Measurement & Recording	A. For every combustion facility, factors necessary to keep track of and improve fuel combustion state shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**. The factors include an amount of fuel supply, temperature of exhaust gas generated during combustion, and residual oxygen content in exhaust gas.
	(3) Maintenance & Inspection	A. Combustion facilities shall be periodically maintained and inspected to be kept in good condition according to the instructions concerning maintenance and inspection, which shall be described in the **EM Manual**.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new combustion facility, a proper type & capacity of facility shall be selected in accordance with loads. B. When installing a new combustion facility, proper combustion equipment (e.g. burner) shall be selected based on the combustion facility and the type of fuel to be used. In addition, the equipment shall be capable of adjusting the amount of fuel supply and air ratio according to load fluctuations and changes in combustion state. C. When installing a new combustion facility, a draft control system that is capable of adjusting air flow rate and combustion chamber pressure shall be selected.

Target Components		A. For combustion facilities, efforts shall be made to reduce their air ratio toward the reference air ratio listed in Table (1) as target value. B. Installing combustion control devices shall be considered to allow control of the air ratio as described in the **EM Manual**. C. Selecting and introducing proper combustion equipment (e.g. burners) shall be considered, based on the combustion facility and the type of fuel to be used. In addition, the equipment shall be capable of adjusting the amount of fuel supply and air ratio according to load fluctuations and changes in combustion state. Further, when installing a new burner or replacing an existing one, introducing a type of burner with a heat exchanger function (e.g. regenerative burners) shall be considered (if improvement of thermal efficiency is expected). D. Introducing a draft control system that is capable of adjusting the air flow rate and combustion chamber pressure shall be considered. E. For each combustion facility, introducing proper combustion management using computers or similar means shall be considered. The management shall be achieved by installing measurement devices to measure the factors necessary to keep track of and improve the combustion state. The factors include an amount of fuel supply, temperature of exhaust gas generated during combustion, and residual oxygen content in exhaust gas.

2. Rationalization of Heating, Cooling and Heat Transfer (2-1) Heating Equipment, etc.		
Standard Components	(1) Management & Control	A. Facilities that use steam or other heat media (e.g. heating facilities, cooling facilities, dryers, and heat exchangers) shall be managed according to the instructions, which shall be described in the **EM Manual**. The instructions are concerned with temperatures, pressures, and volumes of heat media required for heating, cooling, or hear transfer (hereafter, “heating, etc.”) and those of heat media supplied. Accordingly, excessive supply of heat quantity by the heat media shall be prevented. B. Industrial furnaces for heating and heat treatment shall be managed to improve heat patterns in a way that improves thermal efficiency of the equipment, which shall be described in the **EM Manual**. The heat patterns herein mean the temperature changes of heated objects over time. The structure of the equipment, characteristics of heated objects, and pre- and post-process of the heating or heat treatment shall be taken into consideration for the improvement of the efficiency. C. Facilities for heating, etc. shall be managed to prevent overloading and underloading according to the instructions concerning volumes of heated or cooled objects and their arrangement in a furnace, which shall be described in the **EM Manual**. D. If more than one facility for heating, etc. is operated, load for each facility shall be adjusted in a way that achieves a high level of thermal efficiency of the facilities as a whole, which shall be described in the **EM Manual**. E. Processes that involve repeated heating shall be managed in a way that shortens waiting time between processes, which shall be described in the **EM Manual**. F. Facilities for heating, etc. that are capable of intermittent operation shall be managed in a way that streamlines the operation, which shall be described in the **EM Manual**. G. Boiler feed-water shall be supplied in a way that prevents scale formation on a surface of a heat transfer pipe and sludge accumulation, which shall be described in the **EM Manual** concerning water quality. The feed water quality shall be controlled according to JIS B8223 (Water conditioning for boiler feed water and boiler water) or an equivalent standard. H. While facilities for heating, etc. that use steam are not in use, their steam supply valves shall be closed. I. Dryness of the steam in facilities for heating, etc. shall be kept at an appropriate level. J. Other factors related to heating, etc. (e.g. temperature of heated or cooled objects, and temperature, pressure, and flow rate of heat media (such as steam) used in heating, etc.) shall be controlled according to the instructions, which shall be described in the **EM Manual**.
	(2) Measurement & Recording	A. Factors necessary to improve and keep track of heat transfer conditions shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**. The factors include temperature of heated or cooled objects, and temperature, pressure, and flow rate of heat media (such as steam) used in heating.
	(3) Maintenance & Inspection	A. Components related to heat transfer of the equipment, such as heat-transfer surfaces of boilers, industrial furnaces and heat exchangers, shall be maintained according to the instructions concerning their maintenance and inspection, which shall be described in the **EM Manual**. Based on the manual, the facilities shall be periodically cleaned to remove soot, dust and scale to prevent deterioration of their heat transfer performance.

Standard Components	(4) Necessary Measures when Installing New Facilities	When installing a new facility for heating, etc., actions including the following shall be taken to improve efficient use of energy. A. When installing a new facility for heating, a proper type & capacity of facility shall be selected in accordance with loads. B. When installing a new facility for heating, actions including the following shall be taken to improve efficient use of energy. (a) To use materials with high thermal conductivity for heat exchanging components. (b) To arrange heat exchangers properly to improve total thermal efficiency.
Target Components		A. Increasing dryness of steam used in facilities for heating, etc. shall be considered if such dry steam contributes to energy conservation. The dryness shall be increased through preventing heat radiation during transport and installing a steam separator B. Improving properties and shapes of wall surfaces of industrial furnaces shall be considered to improve emissivity of such surfaces. C. Improving properties and shapes of heat-transfer surfaces of facilities for heating, etc. shall be considered to improve heat transfer coefficient of such surfaces. D. Using materials with high thermal conductivity for heat exchanging components of facilities for heating, etc. shall be considered. E. Direct heating of the objects using a direct fire burner or through submerged combustion shall be considered, if possible. F. When heating, etc. is applied using multiple-effect evaporators, increasing the stages of the evaporators shall be considered to improve total thermal efficiency. G. Improving efficiency of distillation towers shall be considered. The improvement measures include optimization of operating pressure, reduction of reflux ratio by increasing number of stages, vapor recompression, and use of multiple-effect distillation towers. H. Increasing the number of stages of heat exchangers and arranging them more properly shall be considered to improve total thermal efficiency. I. Multistep utilization of heat shall be considered to improve total thermal efficiency. It shall be achieved by, for example, combining industrial furnaces operated at high temperatures and those operated at low temperatures. J. Efforts to improve the method to control facilities for heating, etc. shall be made for more effective use of heat. K. Processes that require repeated heating, etc. shall be streamlined by, for example, serialization, integration, cut down, or partial elimination of the processes. L. Preliminary treatment methods for heated materials that may contribute to energy conservation shall be studied and reviewed. The methods include removal of moisture content, preheating, and pre-grinding. M. When installing heat-using facilities (e.g. boilers and chillers), ways to implement distributed arrangement of compact boilers or to install heat storage facilities that may contribute to energy conservation shall be studied. N. When installing boilers, industrial furnaces, and heating/drying facilities that use heat media (e.g. steam and hot water), facilities with high thermal efficiency shall be selected taking account of temperature levels to be used. Further, the facilities shall have a capacity appropriate for required performance based on their types, operating characteristics and operational status. O. Heating with vacuum steam media shall be considered as an alternative to hot water media used in heating facilities.

2. Rationalization of Heating, Cooling and Heat Transfer (2-2) Air Conditioning Facilities and Hot Water Supply Facilities		
Standard Components	(1) Management & Control	A. Air conditioning to maintain proper environment required for manufacturing and storage and work environment for workers shall be managed by limiting zones of air conditioning, reducing a load, and according to the instructions concerning facilities depending on how air conditioning is used in the zones, which shall be described in the **EM Manual**. The instructions include those for operational time, temperature, air changes per hour, and humidity. B. Air conditioning of an office in a factory shall be managed by limiting zones of air conditioning, reducing a load using window shades, and according to the instructions concerning facilities depending on how air conditioning is used in the zones, which shall be described in the **EM Manual**. The instructions include those for operational time, room temperature, air changes per hour, humidity, and effective use of outdoor air. Note that air cooling/heating temperatures in the **EM Manual** shall be determined considering the preset temperatures recommended by the government. C. Heat source facilities, heat transport facilities, and air conditioner facilities included in air conditioning facilities shall be controlled in a way that improves total energy efficiency of air conditioning facilities, which shall be described in the **EM Manual**. The improvement shall be achieved by presetting cooling water temperatures, chilled/hot water temperatures and pressures based on seasonal variations in outdoor air conditions. D. If a heat source facility in air conditioning facilities includes more than one unit of heat source equipment of the same model or more than one unit of heat source equipment using different types of energy, the facility shall be managed in a way that improves total energy efficiency of the heat source facility, which shall be described in the **EM Manual**. The improvement shall be achieved by adjusting the numbers of units in operation or selecting equipment to be operated depending on seasonal variations in outdoor air conditions and load fluctuations. E. If a heat transport facility includes more than one pump, the facility shall be managed in a way that improves total energy efficiency of the heat transport facility, which shall be described in the **EM Manual**. The improvement shall be achieved by adjusting the numbers of units in operation or selecting equipment to be operated depending on load fluctuations. F. If an air conditioner facility includes more than one air conditioner of the same model in one zone or more than one air conditioner of different types, the facility shall be managed in a way that improves total energy efficiency of the air conditioner facility, which shall be described in the **EM Manual**. The improvement shall be achieved by preventing mixing loss, and adjusting the numbers of units in operation or selecting equipment to be operated based on the load status. G. Hot water supply facilities shall be managed by limit supply points depending on seasons and work and according to the instructions, which shall be described in the **EM Manual**. The instructions are concerned with factors necessary to improve the efficiency of hot water supply (e.g. hot water supply temperature, and hot water supply pressure). H. Heat source facilities included in hot water supply facilities shall be managed in a way that improves total energy efficiency including auxiliary equipment (e.g. heat source equipment and pump) in response to load fluctuations, which shall be described in the **EM Manual**.

Standard Components	(1) Management & Control	I. If a heat source facility for hot water supply facilities includes more than one unit of heat source equipment, the facility shall be managed in a way that improves total energy efficiency of the heat source facility, which shall be described in the **EM Manual**. The improvement shall be made by adjusting the numbers of units in operation based on the load status.
	(2) Measurement & Recording	A. For each of the zones of air conditioning, factors necessary to keep track of air conditions (e.g. temperature and humidity levels) and improve air conditioning efficiency shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**. B. For heat source facilities, heat transport facilities, and air conditioner facilities included in air conditioning facilities, factors necessary to improve efficiency of each unit and total efficiency of the HVAC System shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**. C. For hot water supply facilities, factors necessary to improve the efficiency of hot water supply shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors (e.g. feed water volume and hot water supply temperature), which shall be described in the **EM Manual**.
	(3) Maintenance & Inspection	A. Heat source facilities, heat transport facilities, and air conditioner facilities included in air conditioning facilities shall be periodically maintained and inspected to be kept in good condition according to the instructions concerning maintenance and inspection necessary to improve efficiency of the air conditioner facilities, which shall be described in the **EM Manual**. The improvement shall cover both each unit and total efficiency of the HVAC System and shall be achieved by, for example, maintaining thermal insulation materials, cleaning clogged filters, and removing scale formed on a surface of the condenser or heat exchanger. B. Hot water supply facilities shall be periodically maintained and inspected to be kept in good condition according to the instructions concerning maintenance and inspection, which shall be described in the **EM Manual**. The instructions include those necessary to improve the efficiency of hot water supply (e.g. removing scales formed on a surface of the heat exchanger). C. Automatic control devices of air conditioning and hot water supply facilities shall be periodically maintained and inspected to be kept in good condition according to the instructions concerning maintenance and inspection necessary to manage the devices, which shall be described in the **EM Manual**.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new air conditioning facility, hot water supply facility and etc., a proper type & capacity of facility shall be selected in accordance with loads. B. When installing a new air conditioning facility, actions including the following shall be taken to improve efficient use of energy. (a) To select a facility that has a sufficient capacity to respond to heat demand changes. If at all possible, individual control shall be available for each zone of air conditioning. (b) To introduce a heat source facility with highly energy efficiency that utilizes, for example, a heat pump.

Standard Components	(4) Necessary Measures when Installing New Facilities	(c) To introduce a system capable of high efficiency operation in heat source and heat transport facilities included in air conditioning facilities that are expected to have load fluctuations. The high efficiency operation includes appropriately splitting and controlling the number of units to be operated, controlling the rotation speed, use of equipment with high efficiency during partial load operation, and use of a heat storage system. In addition, use of heat transport facilities with variable pump head control shall be considered. (d) To introduce variable air-volume and flow-rate systems with a rotation speed control device so that the air conditioner facility can be controlled in response to a current load when the facility is used under the condition with large load fluctuations. (e) To consider introducing a total heat exchanger for reduction of an air cooling/heating load required to supply outdoor air in summer and winter. Further, when air cooling is needed in winter or during intermediate seasons, controlling room temperatures by outdoor air cooling shall be considered. If indoor air needs to be humidified during the control, use of water humidification shall be considered so that the air cooling load can be reduced. (f) To manage production facilities that generate heat, if installed, in a way that would not increase the air conditioning load by directly discharging heat outside of zones of air conditioning (by, for example, use of a duct or refluxing heat media). (g) To introduce local air conditioning around workers or reduce the load required for the air conditioning by radiant heating if air conditioning of the entire workplace is unnecessary. The volume of air to be air-conditioned shall be minimized. (h) To close gaps and openings of buildings as much as possible if there are noticeable ones, to reduce the load required for air conditioning. (i) To determine where and how to install an outdoor unit of an air conditioner based on solar radiation and ventilation condition of the installation location, and ventilation condition in case the units are installed closely together. (j) To ensure that the air conditioning facility allows proper control of air conditioning and analysis of its operation. This shall be achieved by, for example, installing equipment and sensors required to measure factors necessary to keep track of air conditions (e.g. temperature and humidity levels) for each zone of air conditioning and to improve air conditioning efficiency, and by introducing a factory energy management system. B. When installing a new hot water supply facility, actions including the following shall be taken to improve efficient use of energy. (a) To select a facility that is capable of operation in response to load changes on hot water supply. (b) To introduce a local hot water supply system for sections where demand for hot water is low. (c) To examine possible introduction of a heat pump system and/or a latent heat recovery system for heat source facilities. C. When installing new air-conditioning or hot water supply facilities that is regarded as the **Specified Energy Consuming Equipment**, a proper type of the equipment shall be selected with due consideration to the applicable performance regulation with regard to the equipment in question.

Target Components		A. For air conditioning facilities, ways to efficiently use energy for air conditioning facilities shall be studied. (a) To use, for air conditioning facilities, systems using heat source equipment with high energy efficiency such as a heat pump and storage system and gas cooling/heating system. If both air cooling and heating loads are present at the same time in factories, use of heat recovery system shall be considered. Further, if exhaust heat can be effectively used, use of a heat recovery heat pump and exhaust-heat-driven heat source equipment shall also be considered. (b) To improve thermal insulation for walls and roof in the areas to be air-conditioned, such as by increasing the thickness of the walls and roof, using materials with low thermal conductivity, applying double-layer thermal insulation. Other measures shall also be studied to shield solar radiation through windows using, for example, window shades, heat reflecting glasses, heat shield window films, and thermal buffer zone with double insulation structure. (c) To introduce air volume control for outdoor air supply for air conditioning facilities, using a carbon dioxide sensor or the like, in order to reduce a load required for outdoor air processing. Further, for air cooling during seasons except for summer, reduction of energy consumed by heat source facilities through, for example, air cooling utilizing water cooled by a cooling tower shall be considered. (d) To introduce a large temperature difference system that can reduce air flow volume and circulation water volume for air conditioning facilities. (e) To improve thermal insulation of pipes and ducts by, for example, using thermal insulation material with low thermal conductivity. B. For hot water supply facilities, ways to efficiently use energy for hot water supply facilities shall be studied. (a) To introduce hot water supply facilities with high energy efficiency (such as by combining a heat pump system or a latent heat recovery system for heat source facilities). (b) To introduce a heat pump system or a latent heat recovery system for heat source facilities into the hot water supply facilities for heating and drying equipment. C. Reduction of power to drive ventilating facilities using air volume control with various sensors shall be studied for indoor parking areas, machine rooms and electric rooms.

3. Waste Heat Recovery and Usage		
Standard Components	(1) Management & Control	A. Recovery and use of waste heat from exhaust gas shall be managed according to the instructions concerning waste gas temperature or waste heat recovery rate for different types of facilities that discharge exhaust gas, which shall be described in the **EM Manual**. B. The **EM Manual** shall be established so that waste gas temperature is reduced and the waste heat recovery rate is enhanced based on the values of waste gas temperature and waste heat recovery rate specified in Table (2) and (4) as standard value. C. Recovery and use of waste heat from steam drain shall be managed according to the instructions concerning temperatures, volumes, and properties of the steam drain used in waste heat recovery, which shall be described in the **EM Manual**. D. Recovery of sensible heat, latent heat, pressure, and combustible constituents of heated solid or fluid shall be managed according to the instructions concerning range of recovery, which shall be described in the **EM Manual**. E. Waste heat from exhaust gas shall be properly utilized according to temperature conditions (e.g. preheating temperature) and operating conditions of facilities.
	(2) Measurement & Recording	A. Factors necessary to keep track of conditions of waste heat and promote its utilization shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**. The factors include temperature of waste heat, heat quantity, and components of heat media discharging waste heat.
	(3) Maintenance & Inspection	A. Heat exchangers and waste heat boilers that are used to recover waste heat (hereafter, “waste heat recovery facilities”) shall be periodically maintained and inspected according to the instructions concerning maintenance and inspection necessary to maintain efficient recovery and use of waste heat, which shall be described in the **EM Manual**. The efficiency shall be maintained by, for example, cleaning heat transfer surfaces and repairing the leaks of heat media.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new flue or pipe that transports waste heat from a facility that discharges the heat to a waste heat recovery facility, actions to keep waste heat at a high temperature level shall be taken. The actions include preventing air intrusion and enhancing thermal insulation. B. When installing a new waste heat recovery facility, actions to increase the waste heat recovery rate shall be taken. The actions include improving properties and shapes of heat transfer surfaces and increasing heat transfer area.

Target Components		A. Efforts shall be made to decrease temperatures at the inlets of coolers and condensers toward a target of 200 ° C or less so that efficient heat recovery can be achieved. However, this rule shall not apply to solid, highly contaminated fluid, highly corrosive fluid, and other materials with low cooling heat quantity (less than 2,100 MJ per hour) or a low heat recovery capacity (less than 630 MJ per hour). B. For waste heat recovery from exhaust gas, efforts shall be made to reduce the waste gas temperature and enhance the waste heat recovery rate toward the reference values listed in Table (2) and (4) as target values. C. For flues and pipes that transport waste heat from a facility that discharges the heat to a waste heat recovery facility, taking measures to keep waste heat at a high temperature level shall be considered. The actions include preventing air intrusion and enhancing thermal insulation. D. For waste heat recovery facilities, taking measures to increase the waste heat recovery rate shall be considered. The actions include improving properties and shapes of heat transfer surfaces and increasing heat transfer area. Additionally, installing heat storage facilities shall also be considered if they allow waste heat utilization. E. Ways to effectively use waste heat shall be studied and reviewed, depending on how it is released. F. Ways to effectively use sensible heat, latent heat, pressure, combustible constituents, and reaction heat of heated solid or fluid shall be studied and reviewed, depending on how they are released.

4. Rationalization of Conversion of Heat to Motive Power (4-1) Dedicated Power Generation Facilities		
Standard Components	(1) Management & Control	A. Operation of dedicated power generation facilities shall be managed in a way that maintains efficient operation of the facilities, which shall be described in the **EM Manual**. Further, when multiple dedicated power generation facilities are operated in parallel, they shall be managed in a way that allows the load to be properly distributed to the facilities in response to increase/decrease of the load, which shall be described in the **EM Manual**, to improve total efficiency. Characteristics of different facilities shall be taken into consideration when determining how the load should be distributed. B. If pressure can be lowered when a partial load is put on the steam turbines of thermal power station, the station shall be managed in an optimized way, which shall be described in the **EM Manual**.
	(2) Measurement & Recording	A. For dedicated power generation facilities, total efficiency of the facilities shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of the efficiency, which shall be described in the **EM Manual**.
	(3) Maintenance & Inspection	A. If dedicated power generation facilities are used, they shall be periodically maintained and inspected in a way that maintains a high level of total efficiency of the facilities, which shall be described in the **EM Manual** concerning maintenance and inspection.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new dedicated power generation facility, the actual record and future trends of power demand shall be fully examined to select a type of the facility with an optimal capacity. B. When installing a new dedicated power generation facility, generation efficiency of the facility at the receiving end shall not be significantly lower than the average level of domestic dedicated thermal power generation facilities throughout a year. When installing a new dedicated power generation facility for electricity supply business as listed in Table (8), the facility shall have power generation efficiency equal to or more than the efficiency listed in Table (9).
Target Components		N/A

4. Rationalization of Conversion of Heat to Motive Power (4-2) Cogeneration Facilities		
Standard Components	(1) Management & Control	A. Operation of equipment used in cogeneration facilities (e.g. boilers, gas turbines, steam engines, gas engines, and diesel engines) shall be managed in a way that allows generated heat and electric power to be fully utilized in response to increase/decrease of the load, which shall be described in the **EM Manual**, to improve total efficiency. Further, when multiple cogeneration facilities are operated in parallel, they shall be managed in a way that allows the load to be properly distributed to the facilities in response to increase/decrease of the load, which shall be described in the **EM Manual**, to improve total efficiency. Characteristics of different facilities shall be taken into consideration when determining how the load should be distributed. B. If bleeder turbines or back pressure turbines are used in cogeneration facilities, minimum allowable values of bleed pressure for the bleeder turbine or back pressure for the back pressure turbine shall be controlled according to the instructions concerning the values, which shall be described in the **EM Manual**.
	(2) Measurement & Recording	A. For equipment used in cogeneration facilities (e.g. boilers, gas turbines, steam turbines, gas engines, and diesel engines), factors necessary to improve total efficiency in response to increase/decrease of load shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**. B. When bleeder turbines or back pressure turbines are operated under a low pressure close to the minimum allowable bleed or back pressure, management factors shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**. The factors include operational time, inlet/outlet pressure, bleed or back pressure, and amount of steam.
	(3) Maintenance & Inspection	A. Cogeneration facilities shall be periodically maintained and inspected in a way that maintains a high level total efficiency, which shall be described in the **EM Manual** concerning maintenance and inspection.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new cogeneration facility, the actual record and future trends of heat and power demands shall be fully examined. It shall be confirmed that exhaust heat and electricity are fully available on a full year basis to select a type of the cogeneration facility with an optimal capacity.
Target Components		A. If there is large steam or hot water demand and exhaust heat is expected to be fully available on a full year basis in the future, installing cogeneration facilities shall be considered. B. If efficiency of bleeder turbines or back pressure turbines in cogeneration facilities can be improved under different bleeding or back pressure conditions, modifying the turbines shall be considered.

5. Prevention of Energy Loss due to Radiation and Resistance (5-1) Prevention of Heat Loss due to Radiation, Conduction and etc.		
Standard Components	(1) Management & Control	A. Thermal insulation work for pipes and other equipment that transport heat media and process fluid and facilities for heating, etc. (hereafter, “heat-using facilities”) shall be completed according to JIS A9501 (Standard practice for thermal insulation works) and equivalent standards. B. When building a completely new industrial furnace, the furnace shall be thermally insulated in a way that improves insulation performance of furnace walls, taking account of the temperatures of the external surfaces of a furnace listed in Table (5) as standard value. More specifically, if the furnace is intermittently operated or operated for 12 hours or less in a day and its internal temperature is 500°C or higher, the insulation shall be based on the temperatures listed in Table (5) as standard value or at least 70% of its interior wall surface area shall be made of thermal insulating material having a weighted average bulk density of 1.0 or less. Further, existing industrial furnaces shall also be thermally insulated, if possible, based on the temperature of the external surface of a furnace listed in Table (5) as standard value.
	(2) Measurement & Recording	A. For each of facilities for heating, etc., factors necessary to keep track of and improve heat losses shall be periodically measured, and the results shall be analyzed for heat balance and recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**. The factors include temperature of the external surface of a furnace, heated object temperature, and waste gas temperature.
	(3) Maintenance & Inspection	A. Heat-using facilities shall be periodically maintained and inspected according to the instructions concerning maintenance and inspection of the measures (e.g. heat insulation work) that have been taken to prevent heat losses, which shall be described in the **EM Manual**. B. Steam traps shall be periodically maintained and inspected in a way that prevents steam leaks and clogged traps caused by malfunction of the steam traps, which shall be described in the **EM Manual** concerning maintenance and inspection.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new heat-using facility, actions to improve thermal insulation shall be taken. The actions include increasing the thickness of thermal insulation materials, using thermal insulation materials with low thermal conductivity, and applying double-layer thermal insulation. Additionally, if fire-retardant heat insulation materials are used, such materials with sufficient fire-retardant heat insulation performance shall be selected. B. When installing a new heat-using facility, measures to prevent heat losses due to heat dissipation and air intrusion at the openings of heat-using facilities shall be taken. The measures include reducing the size of the openings, sealing, installing double doors, and insulation using air flows. C. When installing a new heat-using facility, a heat radiation area shall be reduced by measures such as using a more streamlined pipe route for transporting heat media and implementing distributed arrangement of heat source facilities.

Target Components		A. Measures to reduce thermal capacity of the bodies, bases, and fixtures of industrial furnaces, and wagons to carry heated objects to the furnaces shall be studied. B. Efforts to improve thermal insulation of furnace walls shall be made, taking account of the temperatures of the external surfaces of an industrial furnace listed in Table (5) as target value. More specifically, if the furnace is intermittently operated or operated for 12 hours or less in a day and its internal temperature is 500°C or higher, the insulation shall be based on the temperatures listed in Table (5) as target value or at least 80% of its interior wall surface area shall be made of thermal insulating material having a weighted average bulk density of 0.75 or less. C. Improving thermal insulation of heat-using facilities shall be studied. The improvement shall be achieved by, for example, increasing the thickness of thermal insulation materials, using thermal insulation materials with low thermal conductivity, and applying double-layer thermal insulation. D. Taking measures to prevent heat losses due to heat dissipation and air intrusion at the openings of heat-using facilities shall be studied. The measures include reducing the size of the openings, sealing, installing double doors, and insulation using air flows. E. Taking measures (e.g. sealing) to prevent leaks of heat media from rotation parts and joints of heat-using facilities shall be studied. F. Using a more streamlined pipe route for transporting heat media shall be studied to reduce a heat radiation area. G. Covering open type facilities steam-using facilities and transport facilities for high-temperature materials shall be studied to reduce heat losses due to dissipation or diffusion of heat media. However, this rule shall not apply to the cases where it is necessary to cool the facilities while transporting them.

5. Prevention of Energy Loss due to Radiation and Resistance (5-2) Prevention of Electricity Loss due to Resistance and etc.		
Standard Components	(1) Management & Control	A. Transformers and uninterruptible power systems shall be managed in a way that increases efficiency of the transformers and uninterruptible power systems in whole, which shall be described in the **EM Manual**. In the management, efficiency during partial load operation shall be taken into consideration. Adjustment of the numbers of units in operation and proper load allocation shall be implemented. B. Power receiving and transforming facilities shall be managed to have proper arrangement, shorter distribution lines due to change in the method of distribution of electricity, and appropriate distribution voltage according to the instructions concerning such measures, which shall be described in the **EM Manual**, in order to reduce distribution losses. C. The power factor, at the receiving end, of the facilities listed in Table (6) as standard value (except for those with a capacity smaller than the values in the table) or power transforming facilities shall be improved to basically 95% or higher. The improvement shall be achived by, for example, installing phase advance capacitors. Note that this rule shall not apply to auxiliary equipment in a power station. D. Phase advance capacitors shall be controlled in a way that allows the capacitors to be started or stopped together with the operation of the facilities in which the capacitors are installed, which shall be described in the **EM Manual**. E. When a single-phase load is connected to a three-phase power supply, the equipment shall be controlled in a way that prevents voltage imbalance, which shall be described in the **EM Manual**. F. Facilities that use electricity (hereafter, “electricity-using facilities”) shall be managed and adjusted according to the instructions concerning operation of the facilities, which shall be described in the **EM Manual**. Based on the manual, the facilities shall be controlled to reduce the maximum current by equalizing the power consumption in factories. G. Supply of electricity to electricity-using facilities shall be managed according to the instructions concerning such factors as voltage, current and etc. that are necessary to reduce electrical losses in power receiving and transforming facilities and power distribution facilities (according to the type of electricity-using facilities, operational status, and capacity), which shall be described in the **EM Manual**.
	(2) Measurement & Recording	A. Such factors as voltage, current and etc. that are necessary to reduce electrical losses in power receiving and transforming facilities shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**.
	(3) Maintenance & Inspection	A. Power receiving and transforming facilities and power distribution facilities shall be periodically maintained and inspected to be kept in good condition, which shall be described in the **EM Manual** concerning maintenance and inspection.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new power receiving and transforming facility or power distribution facility, the actual record and future trends of power demand shall be fully examined to determine the layout, distribution voltage, and capacity of the facilities. B. When installing new equipment for power receiving and transforming facilities that is regarded as the **Specified Energy Consuming Equipment**, a proper type of the equipment shall be selected with due consideration to the applicable performance regulation with regard to the equipment in question.

Target Components		A. Regarding the facilities listed in Table (6) or power transforming facilities, improvement of the power factor at the receiving end by installing phase advance capacitors or other measures shall be studied. The target of power factor shall be 98%. B. For each electricity-using facility, introducing proper measurement management using computers or similar means shall be considered. The management shall be achieved by keeping track of factors showing how electricity is used in the electricity-using facilities (e.g. electric consumption, motive power converted from electricity, thermal status, and temperature of exhaust gas generated while the motive power and heat is used).

6. Rationalization of Conversion of Electricity to Motive Power, Heat and etc. (6-1) Motor Applied Facilities, Electric Heaters and etc.		
Standard Components	(1) Management & Control	A. Motor applied facilities shall be stopped when the operation is unnecessary in a way that reduces electrical losses due to idle motor operation, which shall be described in the **EM Manual**. In the management, relationship with the electricity consumption at the start shall be taken into consideration. B. When more than one electric motor is used, the motors shall be managed in a way that increases efficiency of the motors as a whole, which shall be described in the **EM Manual**. In the management, efficiency during partial load operation shall be taken into consideration. Adjustment of the numbers of units in operation and proper load allocation shall be implemented. C. After reviewing the current use end pressure and discharge rate of fluid machines (e.g. pumps, fans, blowers, and compressors), they shall be managed to reduce the load of their electric motors according to the instructions, which shall be described in the **EM Manual**. The instructions include those for selection of the number of units to be operated and change of rotation speed depending on the load. Additionally, if the machines have a constant load fluctuation range, measures such as modification of pipe/duct arrangement and reduction of the impeller size shall also be considered. D. Electric heating facilities (e.g. induction furnaces, arc furnaces, and resistance furnaces) shall be managed to improve their thermal efficiency according to the instructions, which shall be described in the **EM Manual**. The instructions include those for improvement in the way of loading heated objects, reduction of electrical losses due to no-load operation, thermal insulation and waste heat recovery (if applicable). E. For electrolytic facilities, electrodes with an appropriate shape and characteristics shall be used. The facilities shall be managed to improve their efficiency of electrolysis according to the instructions, which shall be described in the **EM Manual**. The instructions include those for a distance between electrodes, electrolyte concentration, and contact resistance of conductors. F. Use of electricity shall be managed according to the instructions concerning such factors as voltage, current and etc. that are necessary to reduce electrical losses of different types of electricity-using facilities (e.g. motor applied facilities and electric heating facilities), which shall be described in the **EM Manual**.
	(2) Measurement & Recording	A. For motor applied facilities and electric heating facilities, such factors as voltage, current and etc. that are necessary to reduce electrical losses shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of such factors, which shall be described in the **EM Manual**.

Standard Components	(3) Maintenance & Inspection	A. Motor applied facilities shall be periodically maintained and inspected in a way that reduces mechanical losses of electric motors, power transmission units, and machines that apply loads to the motors, which shall be described in the **EM Manual** concerning maintenance and inspection. B. Fluid machines (e.g. pumps, fans, blowers, and compressors) shall be periodically maintained and inspected in a way that prevents leaks of the fluid and reduces resistance of pipes and ducts for transporting fluid, which shall be described in the **EM Manual** concerning maintenance and inspection. C. Electric heating facilities and electrolytic facilities shall be periodically maintained and inspected in a way that reduces resistance losses at wire connections and contacts of a switch, which shall be described in the **EM Manual** concerning maintenance and inspection.
	(4) Necessary Measures when Installing New Facilities	A. When installing a new motor applied facility, an electric heating facility, etc., a proper type of the equipment shall be selected in accordance with a necessary load. B. When installing a new motor applied facility that is expected to be used constantly under the condition with large load fluctuations, a facility configuration that is easily adjusted for operation in response to load fluctuations shall be selected. C. When installing a new AC motor that is regarded as the Specified Energy Consuming Equipment or a new motive power facility equipped with such an AC motor, a proper type of the equipment shall be selected with due consideration to the applicable performance regulation (see table(7) for Top-Runner Standards*see footnote) with regard to the equipment in question. When installing a new AC motor that is not regarded as the Specified Energy Consuming Equipment (limited to a three-phase squirrel-cage induction motor) or a new motive power facility equipped with such an AC motor, a proper type of the equipment shall be selected with due consideration to the JIS C4212 (Low-voltage three-phase squirrel-cage high-efficiency induction motors)*see footnote.
Target Components		A. When a motor applied facility is used under the condition with large load fluctuations, installing a rotation speed control device shall be considered so that the operation can be controlled in response to a current load. B. Installing electric motors with a capacity appropriate for the required output shall be considered, taking account of characteristics and types of the motors, as well as operating characteristics and operational status of machines that apply loads to the motors. C. Electric heating facilities to be installed shall be selected after comparing and reviewing the characteristics of different heating methods (more specifically, heating with a fuel combustion process, heating with steam, and electric heating). Additionally, electric heating facilities with an appropriate heating scheme shall be introduced based on the temperature level. D. If air compressors are to be installed, ways to implement distributed arrangement of compact boilers that may contribute to energy conservation shall be studied. Additionally, using low-pressure blowers/ fans for low-pressure application shall be considered, instead of decompressing high-pressure air from an air compressor. E. If vending machines of canned or bottled beverage are installed, measures for efficient operation based on their usage shall be considered. The measures include suspending the machines during night and on weekends using a timer and turning off light in the machines when unnecessary.

*Top-Runner Standard for high efficiency motors specifies motors in accordance with IE3, while JIS C4212 specifies motors in accordance with IE2.

6. Rationalization of Conversion of Electricity to Motive Power, Heat and etc. (6-2) Lighting Systems, Elevators, Office Equipment and Consumer Equipment		
Standard Components	(1) Management & Control	A. Lighting systems shall be managed according to the instructions based on JIS Z9110 (General rules of recommended lighting levels), JIS Z9125 (Lighting of indoor work places), or their equivalent standards, which shall be described in the **EM Manual**. Dimming or turning-off the light shall be managed in a way that eliminates excessive or unnecessary lighting, which shall be described in the **EM Manual**. B. Elevators shall be operated efficiently according to the instructions concerning efficient elevator operation, which shall be described in the **EM Manual**. The efficient operation includes limiting the floors to stop in certain time slots or in certain days of the week and limiting the number of elevators in operation (if there is more than one). C. Office equipment shall be turned off when unnecessary and a low power mode shall be used.
	(2) Measurement & Recording	A. Illuminance of lighting systems shall be periodically measured and the results shall be recorded according to the instructions concerning measurements and records of illuminance in workplaces to be lit, which shall be described in the **EM Manual**.
	(3) Maintenance & Inspection	A. Lighting systems shall be periodically maintained and inspected according to the instructions concerning maintenance and inspection, which shall be described in the **EM Manual**. The instructions include cleaning and replacement of lighting fixtures and lamps. B. Elevators shall be periodically maintained and inspected in a way that reduces mechanical losses of their electric motors, power transmission units and machines that apply loads to the motors, which shall be described in the **EM Manual** concerning maintenance and inspection. C. Office equipment shall be periodically maintained and inspected, as required.

Standard Components	(4) Necessary Measures when Installing New Facilities	A. When installing a new lighting system, elevator, etc., a proper type & capacity of facility shall be selected in accordance with necessary luminous intensity or capacity. B. When installing a new lighting system, actions including the following shall be taken to improve efficient use of energy. (a) To consider introducing energy-conserving lighting facilities such as inverter fluorescent lamps. (b) To consider introducing energy-conserving lighting facilities such as lighting fixtures with high efficiency lamps (e.g. HID lamps). (c) To select lighting fixtures that can be easily maintained, allowing easy cleaning and light source replacement. Ease of maintenance shall also be taken into consideration for the place and method of installation. (d) To select lighting fixtures, considering factors for total lighting efficiency. The factors include illuminance efficiency of the light sources, efficiency of lighting circuits and lighting fixtures, and light radiation efficiency. (e) To consider separating lighting system circuits for places with natural lighting from others. (f) To consider measures to prevent unnecessary lighting in some places and time slots by turning the lights off or dimming. The measures include installing a motion sensor, use of timers, and interlocking with security systems. C. When installing a new elevator, such actions to improve efficient use of energy shall be taken like adopting higher energy efficiency control system and/or driving system. D. When installing new equipment for lighting systems, new office equipment or consumer equipment that is regarded as the **Specified Energy Consuming Equipment**, a proper type of the equipment shall be selected with due consideration to the applicable performance regulation with regard to the equipment in question.
Target Components		A. For elevator and escalator facilities, efficient operation based on their usage shall be studied. The efficient operation includes use of a motion sensor to stop the facilities while no passenger is around. B. For lighting systems, when natural lighting can be used, selecting lighting fixtures with a dimming function and introduction of automatic control devices for lighting shall be considered. Introduction of lighting systems that is capable of properly offsetting high illuminance of a new light source (e.g. at the initial installation of the lighting system, immediately after the replacement of a light source) for power saving shall also be considered. C. Introducing light-emitting diode (LED) lighting fixtures shall be considered.

7. Factory Energy Management System (FEMS)		
Standard Components		N/A
Target Components		For factory energy management systems, actions including the following shall be taken to study efficient use of energy. A. To have the system assume a main role in managing energy. The management activities shall be planned for each system so that they are made periodically (e.g. yearly, for each season, monthly, weekly, daily, and hourly), and the results are clearly compared with past records using data and graphs to keep track of the current energy consumption trends. B. To implement integrated energy conservation control for various facilities (e.g. combustion, heat-using, waste heat recovery, cogeneration, electricity-using, air conditioning, ventilating, and hot water supply facilities). C. To compare and review the maintenance condition, operational time, and operating characteristics of facilities and equipment in order to figure out their current degradation and timing of maintenance needed