Energy Conservation for Hospitals

Major points, measures, and successful cases of energy conservation for Hospitals

The Energy Conservation Center, Japan

Introduction

The first commitment period of Kyoto Protocol started in FY2008, which requires us to achieve a target of reducing greenhouse gas emissions to 6% below the base year (FY1990) levels by FY2012. Approximately 87% of the greenhouse gas is comprised of carbon dioxide (CO_2) from energy. The CO_2 emissions have been significantly growing especially in commercial business sectors and enhancement of drastic measures has become an urgent need.

Energy conservation must also be promoted in hospitals on condition that the environment for medical care is ensured.

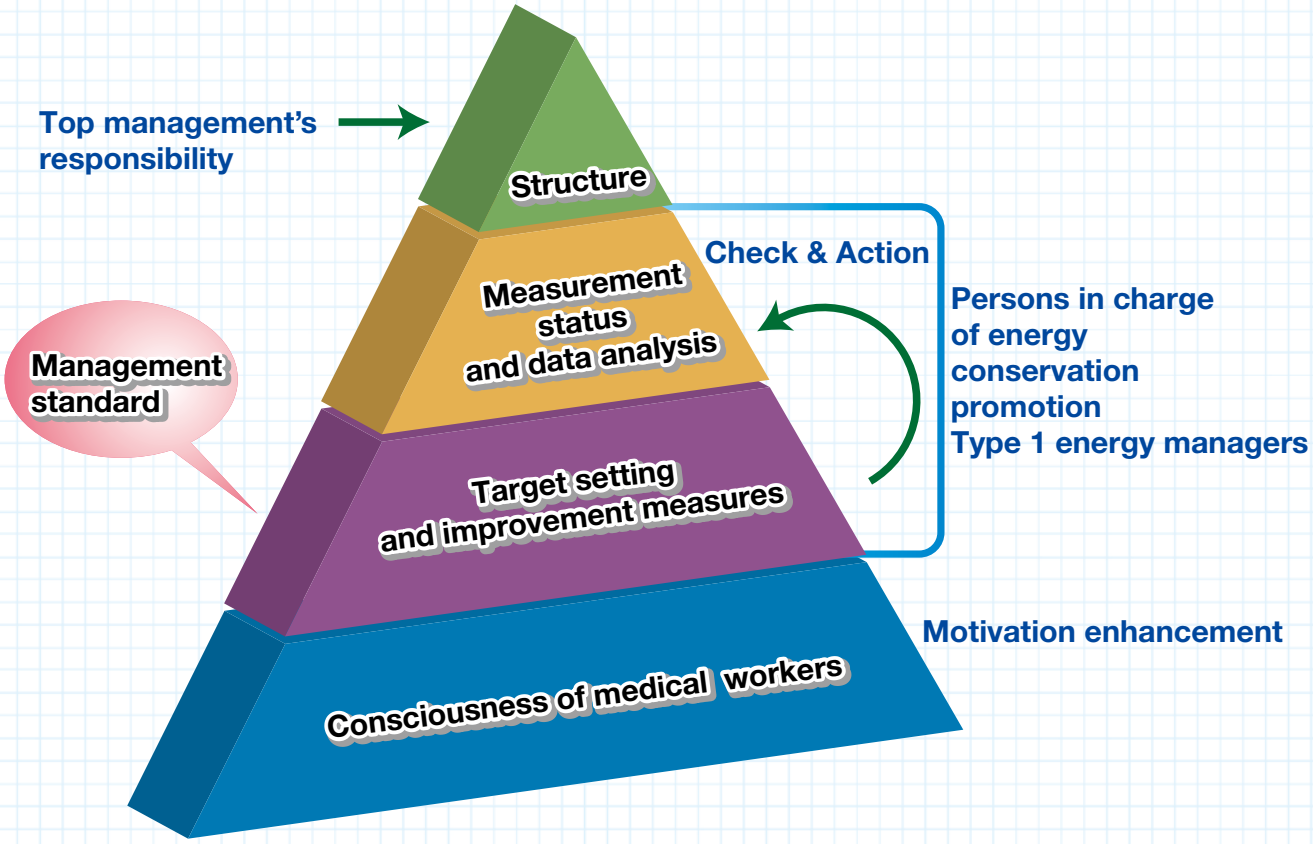
This brochure is intended for owners of hospitals and persons in charge of energy conservation promotion or energy facility management, explaining the points, measures and the case examples of energy conservation based on our investigation data.
We hope that you will find the information taking account of characteristics in energy consumption particularly seen in hospital operations helpful for your activities toward better energy conservation practices.

Contents

1 Energy Management and Energy Conservation Promotion in Hospitals

■ Establishment of organization and structure

The entire hospital must work together to promote energy conservation. As shown in the pyramid below, it is essential to fulfill one's role in each position.



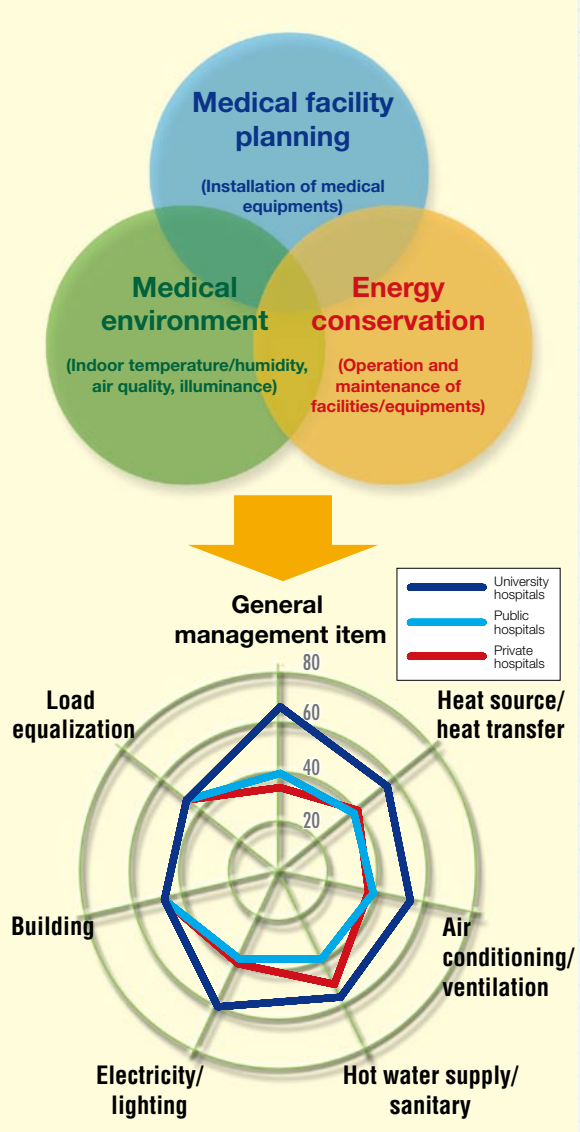
■ Energy conservation by organization activities

- It is essential that the management layer should unify the energy conservation organization
- Appoint persons who is responsible for energy conservation from each division and display their name at the key points
- Follow-ups the energy consumption status at the energy conservation promotion meetings which are held periodically
- Motivate medical workers that "Energy conservation is money conservation"
- Conduct periodical patrols by participants from each division, check whether lightings and air conditioning are left in operation, etc., and notifications to the applicable divisions
- Enlighten employee by in-house magazines, posters, stickers, and etc.
- Raise suggestions for energy conservation and motivate it by commending the results
- Share the sense of accomplishment by making presentations on activity results

Energy Management and Energy Conservation Promotion in Hospitals

Energy conservation promotion by Type 1 energy managers

Facility management of hospitals should be promoted by balancing the three elements shown in the right figure. Also, a radar chart in the bottom right indicates the progress level of energy conservation management by the current facility item, based on the result of the energy conservation audit conducted by our center. Assuming the desired value as 100, the average of the hospital's administration by each management item is displayed. Considering the fact that the scores of the "general management item" including structure, intensity management, and PDCA management, etc. of all hospitals except for university hospitals were below 50, enhancement of this item is expected.



Execution of continuous PDCA

As shown in the below figure, it is essential to promote continuous PDCA management with the facility's operation manager as a leader. The duty of the person in charge of the facilities operation management is to work out a plan for improving facility operation, to design installation of high-efficiency systems / equipments, and making suggestion to top management. Please refer to the points and hints for energy conservation.

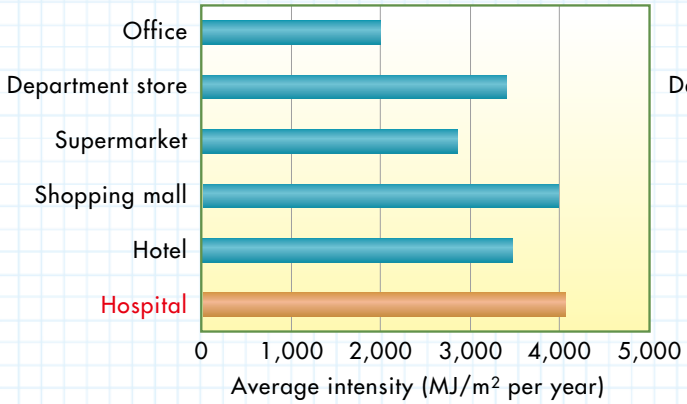
Arrangement of measurement environment Data analysis

Visualization is essential in convincing top management!

2 Characteristics of Energy Consumption in Hospitals

1. Energy intensity is large. (The largest in the type of business)
2. Fuel consumption ratio is large.
   (The largest in the type of business: 40%)
3. Energy consumed at night is large.

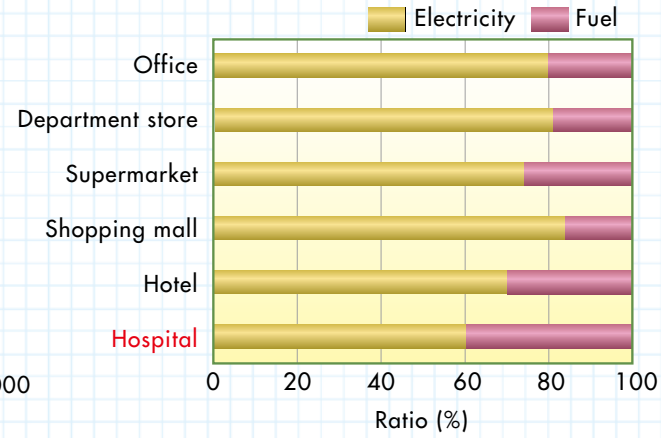
Intensity of the facilities corresponding to Type 2 (and above) designated energy management factories by business type



According to the investigation on energy conservation use in buildings (FY2003) by the Energy Conservation Center, Japan

The energy intensity of hospitals is the largest in the business type!

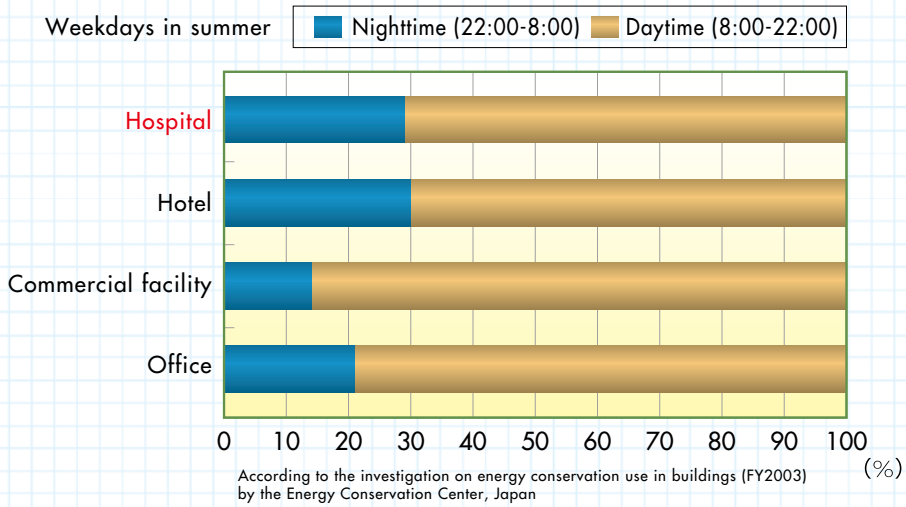
Fuel ratio of the primary energy in facilities corresponding to Type 2 (and above) designated energy management factories



According to the investigation on energy conservation use in buildings (FY2003) by the Energy Conservation Center, Japan

Fuel ratio of hospitals is the largest in the business type!

Consumption ratio of nighttime in the daily energy consumption (Primary energy base)



According to the investigation on energy conservation use in buildings (FY2003) by the Energy Conservation Center, Japan

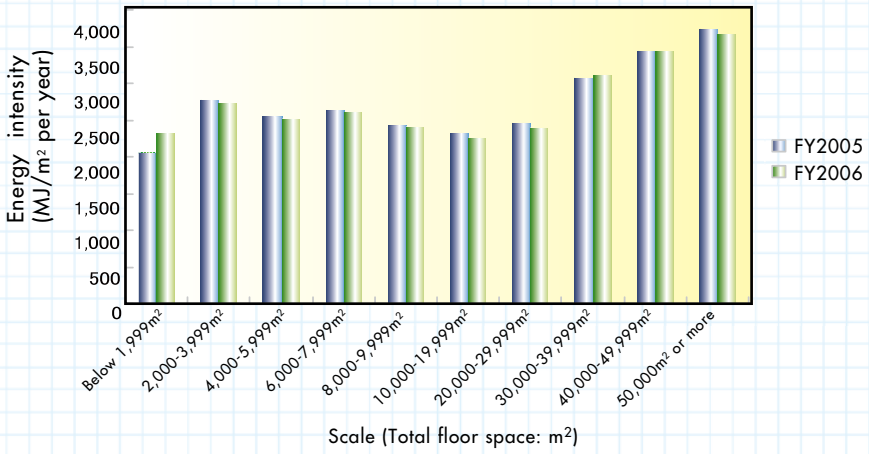
As with hotels, nighttime energy consumption in hospitals is large!

Characteristics of Energy Consumption in Hospitals

Difference in energy consumption depending on scale and type of hospitals

It is necessary to know whether your hospital's energy consumption is larger or smaller than other hospitals. The below figure indicates private hospitals' energy intensity by scale, based on the Project Committee Investigation organized by the "Japan Medical Association Research Institute" and the correlation of the energy consumption by hospital type and the total floor space which is based on our survey.

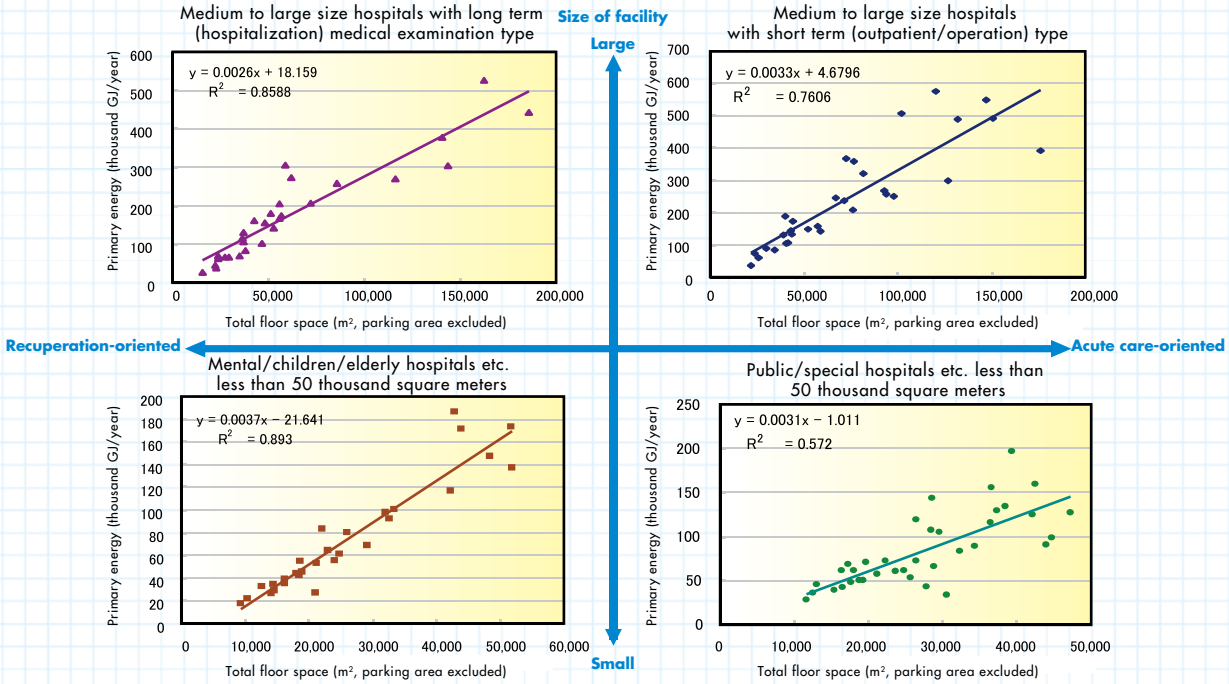
Private hospitals' intensity by scale



From the "Operating Procedure of Energy Conservation in Hospitals" (Released by the Ministry of Health, Labor and Welfare in March, 2008)

* Project Committee Investigation: Analysis based on the data of 973 hospitals including private hospitals (with more than 300 beds) which correspond to the designated factories mentioned in the Act on the Rational Use of Energy (Energy Conservation Act), private hospital specific buildings (hospitals with total floor space of 2,000 square meters or more) based on the Act on the Rational Use of Energy (Energy Conservation Act), and private hospitals with more than 50 beds (which includes specific generator including private hospitals mentioned in the Act on Promotion of Global Warming Countermeasures).

Types of hospitals and energy consumption



Based on the survey by the Energy Conservation Center, Japan in FY2004 (Number of answers: 237)

Characteristics of Energy Consumption in Hospitals

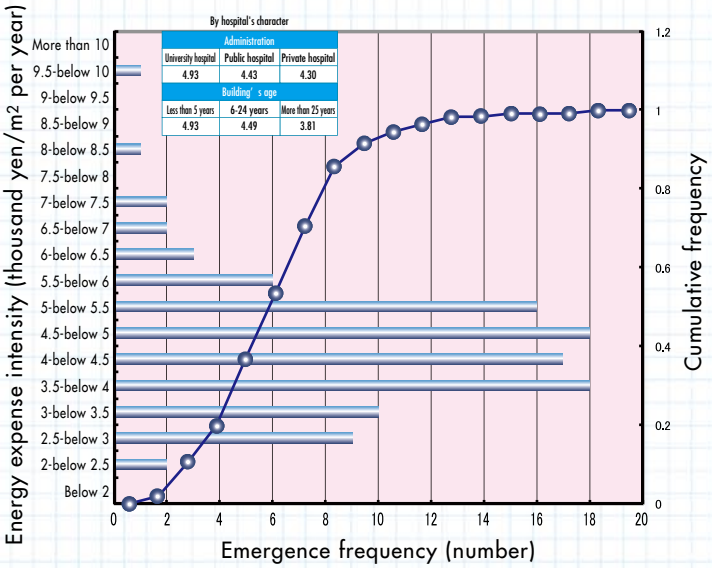
As to the hospitals in which we conducted energy conservation diagnosis, the energy consumption intensity by hospital type is shown in the table below. The following trends are seen in general.

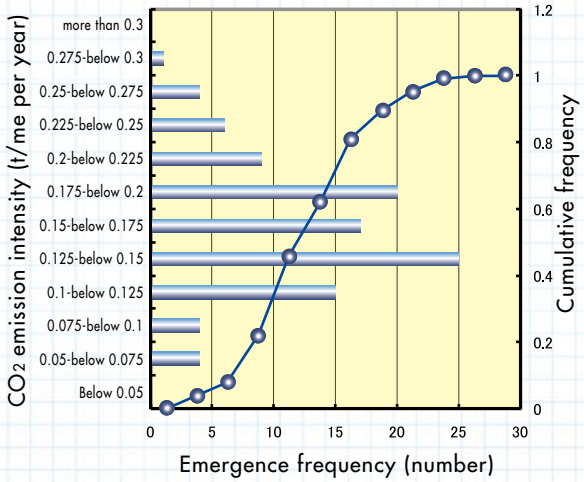
- **University hospitals have large scale and intensity, while private hospitals' intensity is small.**
- **The younger the building's age, the larger the intensity.**
- **Recuperation-oriented hospitals' intensity is about 70% of that of acute care-oriented hospitals.**

Type		Total floor space (m^2)	Number of beds (beds)	index (MJ/m^2 per year)
Administration	University hospital	75,700	740	4,000
	Public hospital	32,600	400	3,100
	Private hospital	25,800	490	2,800
Building's age	Less than 5 years	32,700	410	3,500
	6-24 years	34,500	460	3,200
	More than 25 years	50,900	580	2,700
Character	Care-oriented	41,400	490	3,300
	Recuperation-oriented	16,400	360	2,400

From the results of the Energy Conservation Diagnosis (FY2005-FY2007)

The figure in the right shows the annual energy expense per unit floor space.
Also, the figure below describes the amount of CO_2 emissions per unit floor space.





3 Energy Conservation Measures by Hospitals Division

■ Energy conservation depending on the characteristic of the division

Hospitals consist of multiple divisions. The following table indicates the average value of each division according to our investigation. As shown below, there is a unique characteristic in energy consumption of each division. It is essential to grasp the characteristic of the energy consumption by each division and to take adequate measures.

Division structure and energy consumption

Division	Area ratio	Operation hour	Energy consumption ration
Ward	35%	24hours	34%
Outpatient	13%	9hours	11%
Central consultation division	22%	10hours	29%
Supply division	8%	10hours	8%
Management division	10%	9hours	8%
Kitchen	2%	18hours	5%
Common-use space	10%	24hours	5%

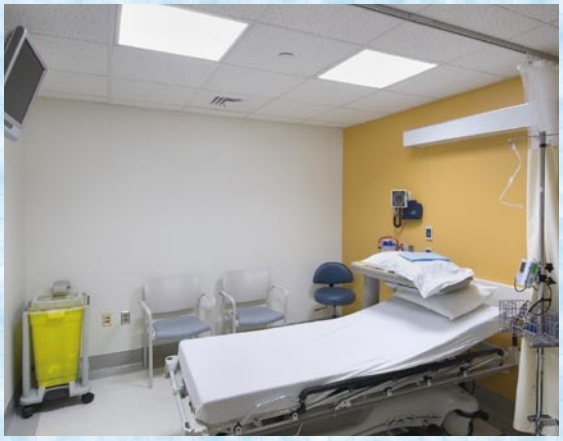
This data is based on the data of 54 hospitals (Type 1 designated factories) according to the investigation on energy consumption conducted by the Energy Conservation Center, Japan in 2003-2004.

Characteristic of the wards

Though this is a division with small energy density, 24 hours operated and large area ratio cause the largest energy consumption among the divisions.
Energy consumption can be significantly changed by switching on/off the air conditioning of the general patients rooms in the night-time. Also, due to personnel and their working hours, water consumption is the largest.

Points for measures

(1) Be careful not to cause excessive cooling or heating.
(2) Turn off the air conditioning and open the window when the outside air is comfortable.
(3) Consider installing a four-tube system with zero-energy band control.
(4) Attach a water-saving top in a faucet used for washing.
(5) Check and adjust the water supply pressure as needed to prevent excessive pressure.
(6) Check whether the shower's water temperature is adjustable. -> If not, consider a replacement.

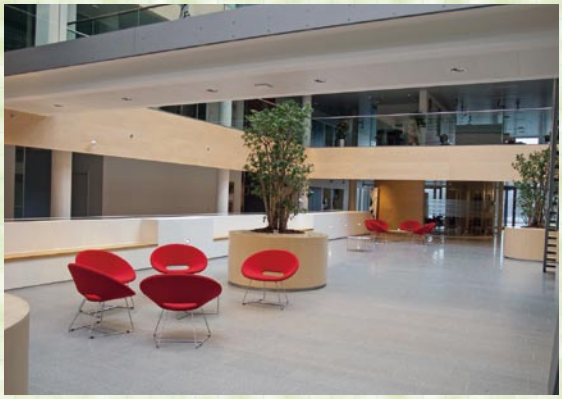


Characteristic of the outpatient division

Though this is a division with a regular energy density, the energy consumption is about 10% of the overall divisions due to short operation time.
With many comings and goings of people, outside air be brought to inside through the door way leads to large air conditioning load.
Also, there is a significant difference in a number of people depending on the time.

Points for measures

(1) Adopt a windbreak room at door way. (Offset flow line is preferable.)
(2) Consider shorter operation hours of the air conditioning.
(3) Consider to increase/decrease the outside air intake according to the number of patients by schedule control etc.
(4) Enable to switch the illuminance of the lighting equipments, about three stages according to the consultation hours.

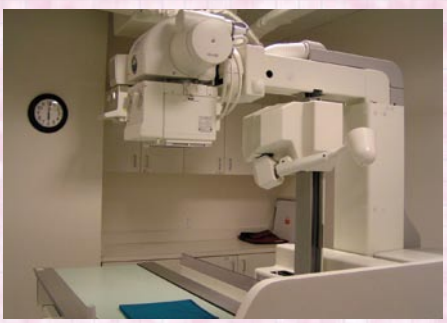


Characteristic of the central consultation division

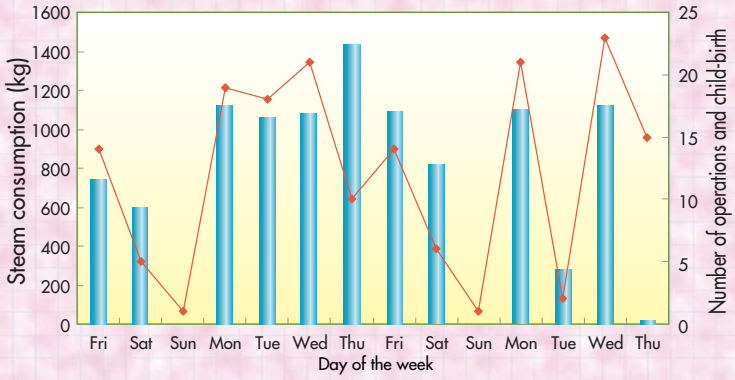
With large area ratio and energy density, the energy consumption ratio is the second largest to the ward, and also with the largest steam consumption due to sterilization purposes, this division consumes the largest heat consumption in the hospital. Also, use of city water and hot water supply mainly used for cleaning are large as well.
In addition, with many high-tech medical equipments operating even at night such as MRI, standby power requirement is large, resulting in large electricity consumption at night.

Points for measures

(1) Conduct washing work efficiently.
-> Compile the same kinds, eliminate waste of water, and etc.
(2) Objects to be sterilized should be washed well in advance.
(3) Be careful not to pack the autoclave in too much.
(4) Preheat the outer tube of the autoclave sufficiently.
(5) Conduct periodical cleaning and inspection of the autoclave.
(6) Consider minimizing the air volume (to the extent that positive pressure is maintained) of the operating rooms when they are not used.
(7) Switch off the medical equipments as possible during the nighttime and holidays.

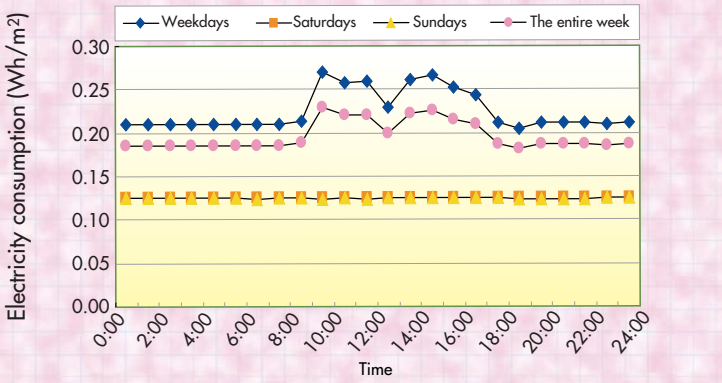


Number of operations and steam consumption for autoclave
(Scale which corresponds to a general hospital in Tokyo with 600 beds: 6 operating rooms)



From the investigation on energy status (FY2004) by the Energy Conservation Center, Japan

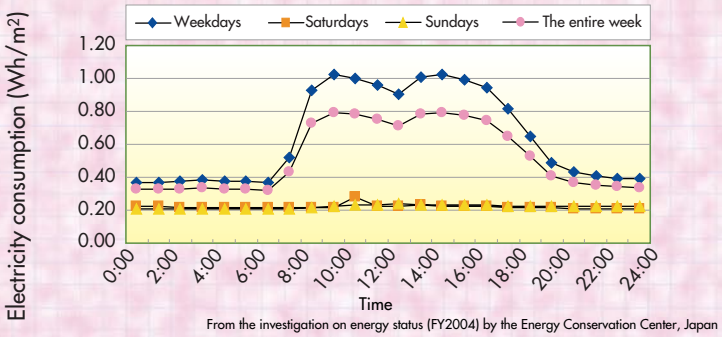
Time trend of MRI/CT electricity consumption
(Scale which corresponds to a general hospital in the Koshinetsu district with 600 beds)



From the investigation on energy status (FY2004) by the Energy Conservation Center, Japan

Electricity consumption during non-operating hours (standby power requirement) is large.
-> Wish to switch to weekend mode also at nighttime of weekdays, if possible.

Time trend of X-ray electricity consumption
(Scale which corresponds to a general hospital in the Koshinetsu district with 600 beds)



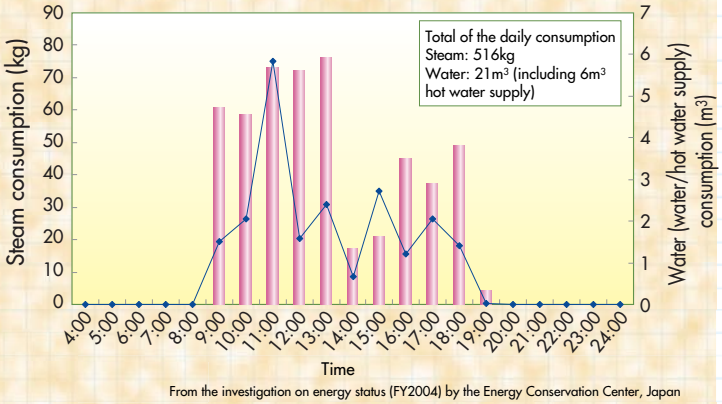
From the investigation on energy status (FY2004) by the Energy Conservation Center, Japan

Electricity consumption during non-operating hours (standby power requirement) is large.
-> Wish to cut down power, except for emergency use.

Characteristic of the supply division

Though with an average energy density, the operation time of the overall division corresponds to general business hours, resulting in small energy consumption ratio.
However, steam and water/hot water supply are largely consumed for laundry, cleaning/sterilization of beds etc.
Also, electricity consumption arising from the air conditioning (cooling)/ventilation system for deodorizing the waste storage is large.

Time trend of steam/water (water/hot water supply) consumption in laundry room
(Scale which corresponds to a general hospital in the Koshinetsu district with 600 beds)



From the investigation on energy status (FY2004) by the Energy Conservation Center, Japan

Points for measures

(1) Review the temperature of washing water.
(2) Consider effective drying since it is no use the dryness above the indoor humidity.
(3) Conduct periodical cleaning of the lint screen and exhaust duct.
(4) Consider heat recovery from the laundry room.
(5) Air-tight doors should be employed to the waste storage, and try to shorten the operation time of the cooling/ventilation equipments.

Characteristic of the management division

Along with a small energy density in the entire hospital, the energy consumption ratio is also small due to the division's operation time, which corresponds to general business hours. It has a similar characteristic as that of a general office building. Due to the evolution of OA and IT, electricity consumption by computers accounts for a large ratio.
In contrast, though the kitchen attached to the dining room/coffee shop has a similar characteristic as the kitchen already mentioned, it is different in a way that the load decreases significantly in the weekdays and the holidays.

Points for measures

(1) Ensure thorough management of the OA equipments.
Switch to stand-by mode during lunch break or when leaving your desk for a long time.
The last one to leave the office should confirm whether all the powers are turned OFF.
(2) Ensure thorough management of the window shades.
During the winter, the last one to leave the office should close all the shades.
During the summer, the last one to leave the office should close the shades of the east and the west windows.
(3) Ensure that the air-conditioning and lightings in unused meeting rooms etc. are turned OFF.

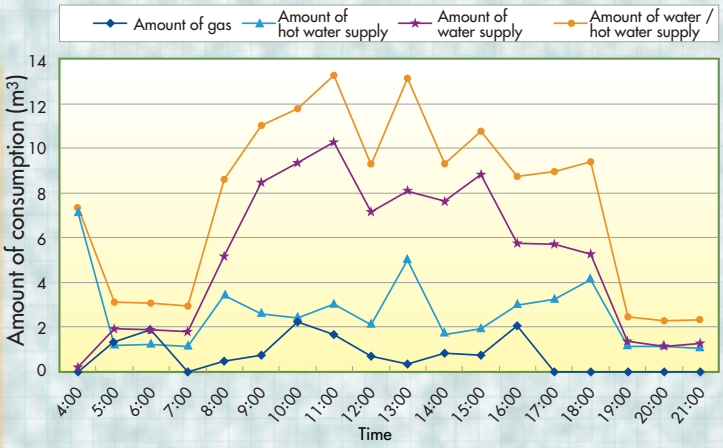
Characteristic of the kitchen

This is a division in which energy density is the largest within a hospital. Since gas consumption for cooking is large, plenty of outside air-intake is necessary for combustion, as well as a large amount of energy is necessary to treat them.
Also the refrigerators/freezers for food storage are operating 24 hours, the energy consumption of them can not be disregarded.
Thus, consumptions of steam and water/hot water supply are large as well.

Points for measures

(1) Frequently extinguish the pilot flame of the gas appliance for cooking.
(2) Adjust the gas appliance to the adequate heating power for perfect combustion.
(3) Increase/decrease the air flow of the exhaust fan and the outside air processing air-conditioning according to gas consumption to minimize electricity consumption.
(4) Remove food leftovers before washing to reduce water/hot water supply consumption.
(5) Be careful not to pack in the refrigerators/freezers for food storage excessively, and control the number/time of openings.
(6) Check the installation status of the outdoor condensing units of refrigerators/freezers to eliminate short path or cross path.
(7) Conduct periodical maintenance to check the air-tightness of the refrigerators/freezers doors, stains on the condenser, and etc.
(8) Review the steps and the sequence of the work to minimize the operation time in the kitchen.
(9) Consider installing IH cooking equipments which are effective on saving HVAC loads.

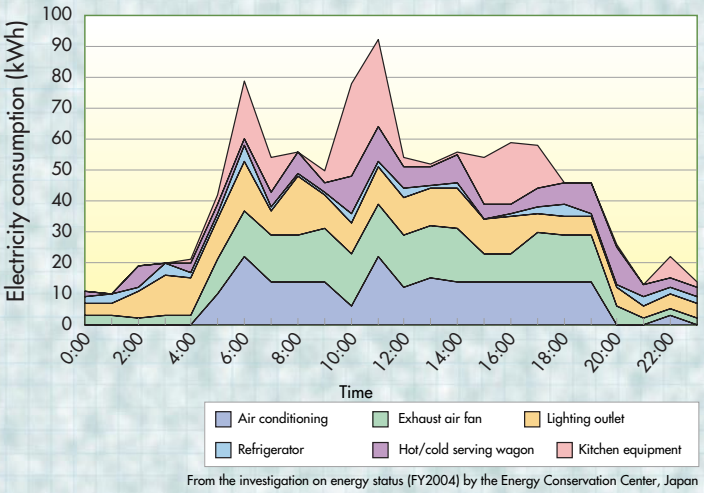
Gas/water consumption
(Scale which corresponds to a general hospital in the Koshinetsu district with 600 beds)



From the investigation on energy status (FY2004) by the Energy Conservation Center, Japan

Both gas and water are linked to the working hours.
-> Reduction of working hours is the point.

Time trend of the main kitchen's electricity consumption
(Scale which corresponds to a general hospital in the Tohoku district with 600 beds: Winter)



From the investigation on energy status (FY2004) by the Energy Conservation Center, Japan

The air flow from the air conditioning (all fresh air) fans increases/ decreases in conjunction with the operation of the combustion appliances.

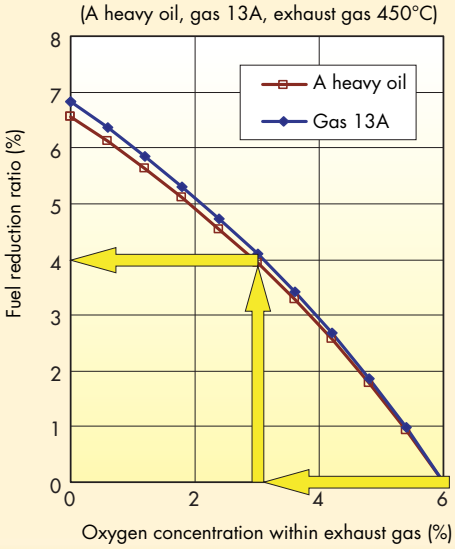
4 Major Methods for Energy Conservation Measures in Hospitals

Fuel-air ratio management of the boiler

Ensure thorough management of the air ratio of the combustion equipments including boilers, etc. to save fuels

The air ratio of the boilers in the business division is often set to be high. With high air ratio, fuels are consumed excessively.
According to the standards of judgment in the Act on the Rational Use of Energy (Energy Conservation Act), the target air ratio of the boiler with amount of steam less than 30t/hour is from 1.15 to 1.25.
Measurement of air ratio can be simply derived from the oxygen concentration within the exhaust gas.
As shown in the right figure, when oxygen concentration within the exhaust gas: 6% (air ratio 1.35) is adjusted to 3% (air ratio 1.2), fuels can be saved by about 4%.

Energy conservation result by improving air ratio

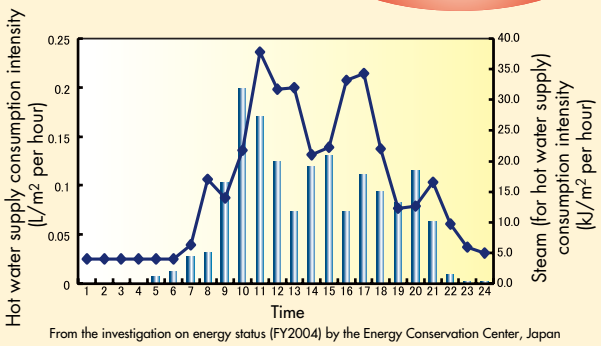


Measures for steam-related heat loss

Reduce steam-related heat loss

Heat loss of steam is about 20-30%!!

It is said that steam-related heat loss is about 20-30% of the total loss.
The right figure indicates the time trend of the hot water supply consumption and the steam consumption for hot water supply, based on our investigation on energy consumption. Note that steam for hot water supply is consumed even at midnight, when there is no hot water supply demand. The following measures are to be taken.



From the investigation on energy status (FY2004) by the Energy Conservation Center, Japan

Trap inspection/ maintenance

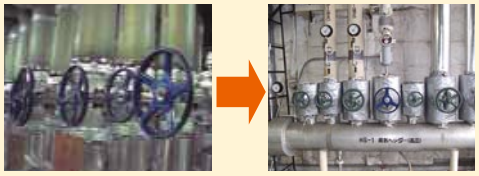
Prevent steam loss by conducting inspection/maintenance on the steam traps.

Enforcement of piping-related heat insulation

Prevent heat loss by employing heat insulation to the raw part of steam valves, extension joints, flanges, and etc.

Stop the supply when unnecessary

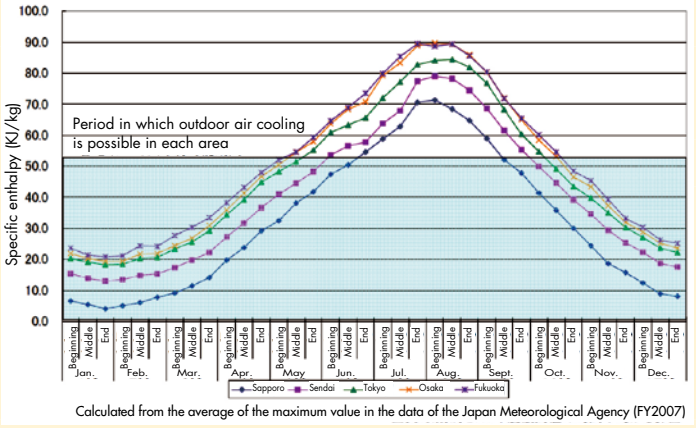
As to systems in which steam is not necessary during holidays and nighttime, close the valves at the header's outlet.



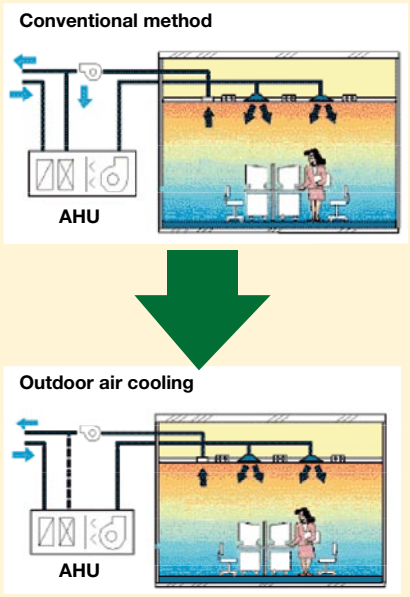
Major Methods for Energy Conservation Measures in Hospitals

Outside air cooling

As shown in the right figure, this is a method to take in a large amount of outside air when the outside temperature is lower than the indoor temperature, and exhaust return air to outside instead of return them to the AHU(Air handling Unit) .



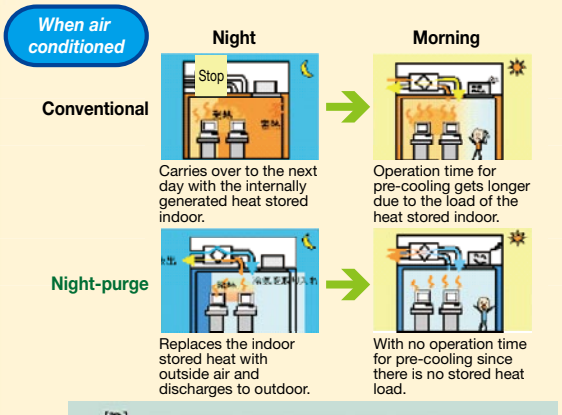
Calculated from the average of the maximum value in the data of the Japan Meteorological Agency (FY2007)

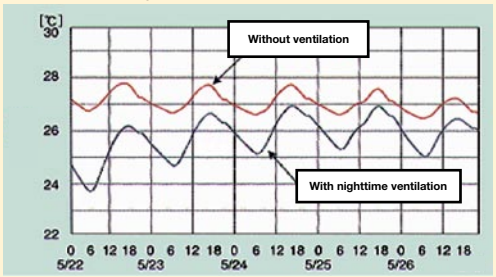


From the website of Hitachi Plant Technologies, Ltd.

A period in which outdoor air cooling is possible is determined by the indoor and outside air enthalpies. The above figure is created based on the average of the maximum value in the data of the Japan Meteorological Agency (FY2007). Outdoor air cooling is enabled in Tokyo from the middle of October to the middle of May.

Night-purge





Case example of effective use of night-purge
According to Kajima Corporation

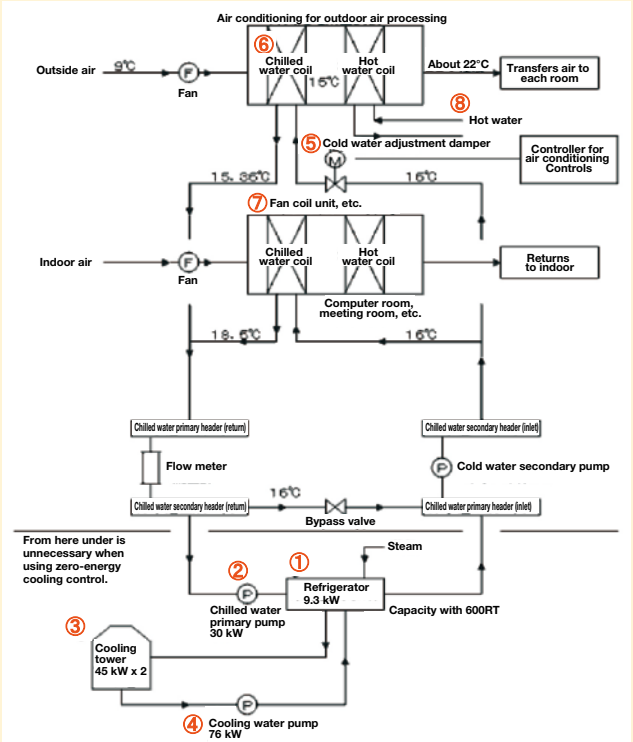
As shown in the above left figure, this is a method for cooling the heat stored in concrete building frames or indoors at night (while the air conditioning is not operated) when the outside temperature is low, in order to reduce air conditioning load required for start-up. The figure in the bottom left indicates the comparison of the indoor temperatures of a building; with or without (standard) employing night-purge. This method will be effective in a management division, where heavily equipped with OA equipments for clerical works and in examination rooms, and a zone where heat is stored in internally installed equipments or building frames, and air conditioning is turned off at night. Consider employing this method during the season or a day in which there is a large difference between the “indoor temperature of start-up air conditioning” and the “outdoor temperature (from the point air conditioning is turned off on the previous day to the next day’s activation)”.

5 Successful Cases of the Energy Conservation Measures in Hospitals

Free cooling using outdoorair conditioning

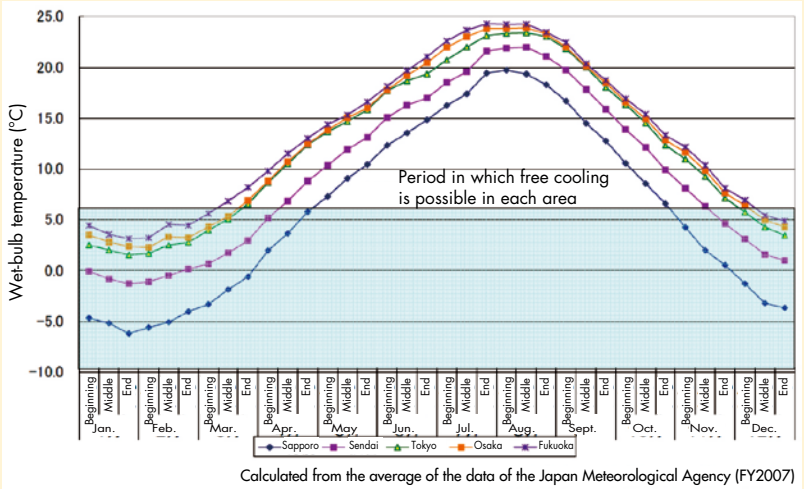
A system to cool with outside air by using outdoor air processing air conditioning to resemble a cooling tower.

In the right figure, stop the (1) refrigerator, (2) chilled water primary pump, (3) cooling tower, and (4) cooling water pump depending on the outside air requirements, and open the (5) chilled water control valve is opened and water is cooled with the (6) outdoor air conditioner's coiling coil. The chilled water cooled by the outdoor air conditioner is supplied to the (7) fan coil unit, etc. to be used for the air conditioning. At the same time, since the outside air is preheated by the chilled water coil, load of the (8) hot water becomes small. In this example, a refrigerator of 600RT can be stopped, resulting in an annual reduction of 170 thousand m^3 of city gas, 220 thousand kWh of electricity, and about 12 million yen in energy cost.



From the presentation of Energy Conservation Outstanding Case Examples (FY2004)

A period in which free cooling is possible is determined by the outdoor wet-bulb temperature. The below figure is created from the average of the wet-bulb temperature in the data of the Japan Meteorological Agency. In the previous example, the outdoor temperature is 9°C and the wet-bulb temperature is 6.5°C. Thus, the period in which free cooling is possible is assumed to be a little longer. It should be worthful to consider employing this method if the outdoor air conditioner has two coils and with cooling demands even in the winter.



Calculated from the average of the data of the Japan Meteorological Agency (FY2007)

Successful Cases of the Energy Conservation Measures in Hospitals

Energy Efficiency Improvement of Refrigerator by Temperature Setting Change of Cold Water

There are some areas where the air conditioning is necessary through the year, such as medical equipment room of MRI, CT, etc. or a laboratory room. Outside air cooling is effective for the air conditioning of the winter season, but there are many running cases to use freezers for reasons of the structure and the control. It is expected the refrigerator to run efficiently in the winter season when the load becomes smaller than the summer season. This is the sample to set coolant temperature low while cold water temperature high for inspection of improvement of COP at a certain hospital.

A refrigerator shown in the right photograph was run with the following mode, and the input (electricity) and the output (quantity of production coldness) were measured. A direct wattmeter was installed in a board as shown in the lower right photograph, and the electric energy was recorded in a data logger. And the amount of cold heat was calculated from the outlet temperature of cold water recorded on a central monitor board and the flow quantity measured by the supersonic type flow meter temporary installed. wave flowmeter.

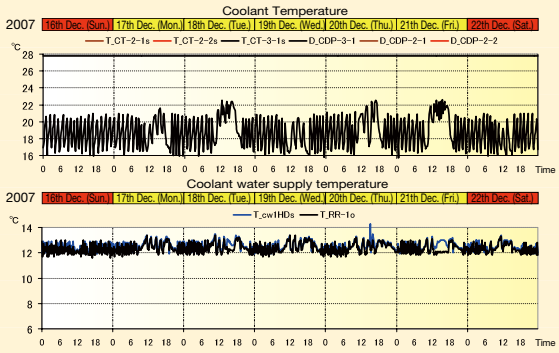
360RT Screw Chiller
(3 aspect 400V/70kW/4 machines)

Measuring Equipment

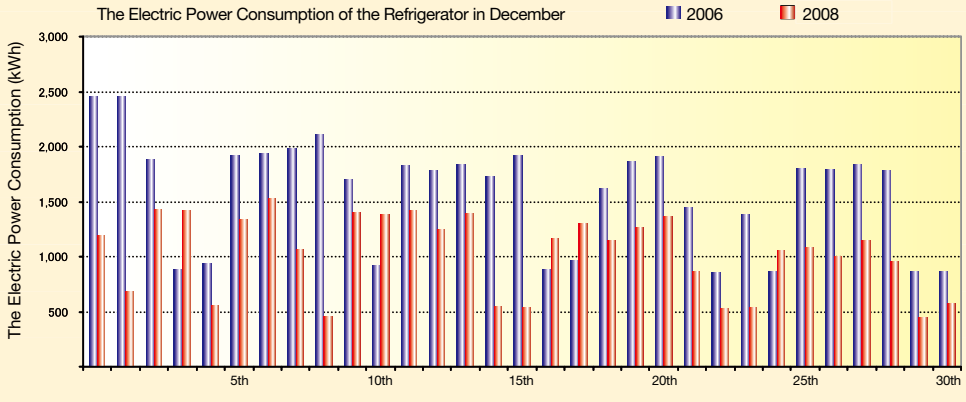
Operation Mode / Temperature Conditions	Normal Operation	Energy Saving Operation
Temperature of Cold Water Outlet	7℃	12℃
Temperature of Coolant Inlet	25℃	18℃

	Average of Heat Quantity	Electric Power Consumption	Running Time	Consumption / Time	C.O.P	Cold Water	Coolant
	MJ	kW	Hr			℃	℃
2006	795	115,859	1,791	57	3.86	7.2	25.0
2008	767	72,659	2,015	34	6.20	12.2	17.8

2006 in the chart above means Dec.2005 to Feb.2006
2008 in the chart above means Dec.2007 to Feb.2008



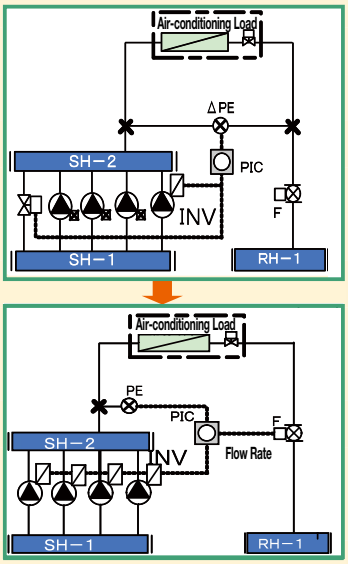
The chart below is a graph of the comparison of data of 2006 by the standard driving as a result of energy saving driving carried out in 2008.

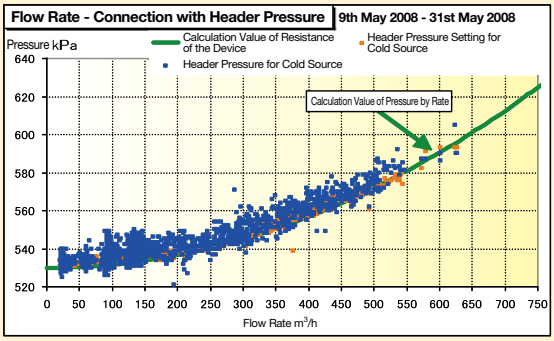


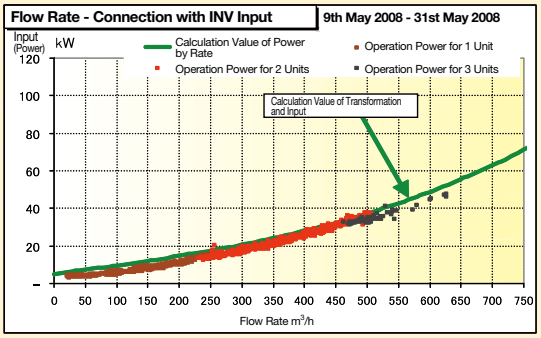
Comparison Between 2006 and 2008

The Driving Control of the Second Pump

Plural second pumps for cold water are installed at the large-scale hospital, and various flow quantity controls are performed including number control. The right figure showing the case of a certain large-scale hospital is the case of which introduces the inverter system to all pump from number control system + one inverter system. The device characteristics was calculated by driving actual survey data of (1) constant pressure force control and the (2) transformation force control with all inverter system, and simulation was performed based on the driving results of last year. The bottom chart shows the calculation results of four cases, that is bypass dialect control system, one inverter + number control system, constant pressure force control with all inverter and the transformation force control system. It was recognized that 56% (about 70,000kWh/ year) reduction of power consumption from the original system might be possible by performing the transformation force control system.

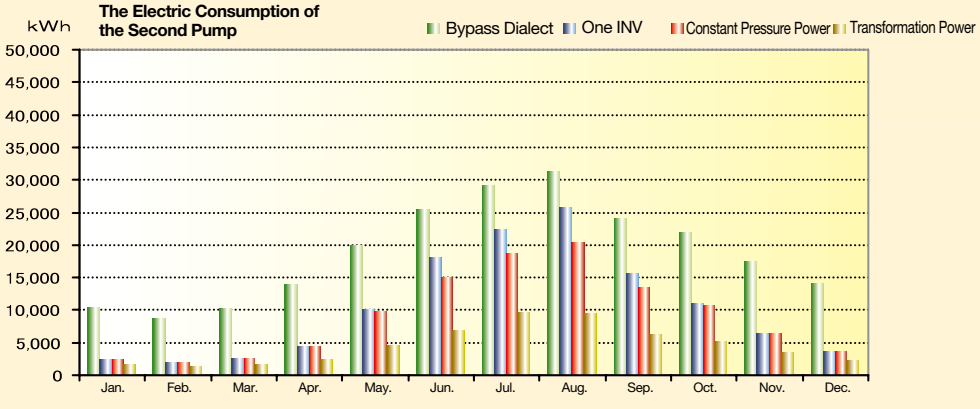






Upper figure shows the actual survey value and the theory values of both water supply pressure and the power consumption. They are extremely correspondent to each other. The right chart shows device characteristics provided from these data. In the case of large-scale hospital which has plural second pumps, the most effective case is estimated when the system adopts the inverter system to all pumps and run them with pressure control by flow rate.

Device Characteristic	
The Number of Pumps CMH	799
The Number of Pumps	3
Resistance Coefficient 1	0.0003914
Resistance Coefficient 2	0.0003131
Control Pressure	550
Minimum Pressure	350
Hydrostatic Head	300
Power kW	37
Minimum Power kW	5
Power Coefficient	0.0198707
Pa → m Conversion Coefficient	0.102

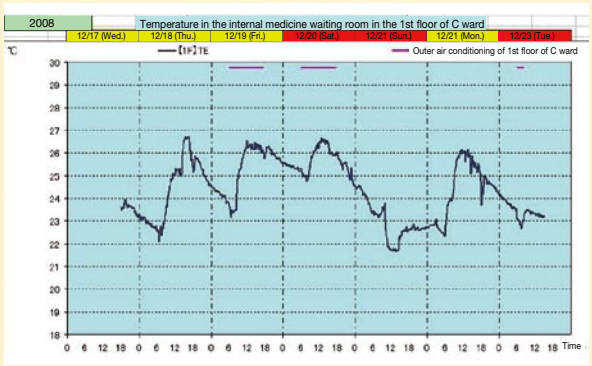


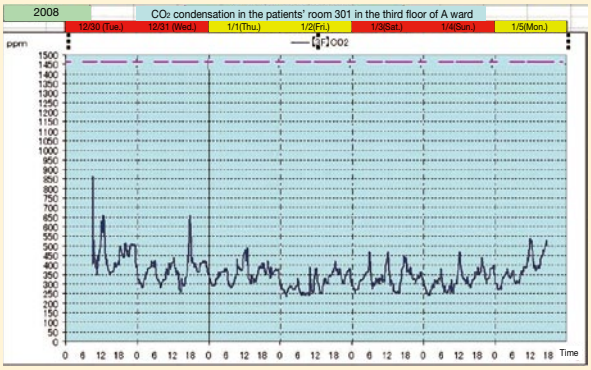
■ Intermittent operation of the outside air conditioning

There are numbers of patients in hospitals with weak resistance to infection. As to the air conditioning, not only temperature and humidity but also air quality should be taken into consideration. Thus, it may result in excessive operation with equipments large in scale.

It is essential to ensure safe and comfortable air environment while reviewing excessive operation of the equipments in order to prevent energy loss. As to the air conditioning/ventilation systems that assure the air environment, there is a “Design and Management of Hospital Air-conditioning Guideline (HEAS-02-2004)", set up by the Healthcare Engineering Association of Japan. According to the guideline, requirements of the air quality should be as follows: the outside air volume of the general clean area shall be 2 times/h (at minimum) against the indoor air volume, and the CO_2 condensation of the indoor environment shall be less than 1,000 ppm, which is mentioned in the Management Standard of Environmental Sanitation for Buildings. By complying with the standard, it is essential to rationalize operation management of the air conditioning/ventilation systems to promote energy conservation.

The following is an example of improving the outside air conditioning of a hospital and the energy conservation results.
The two figures below show the result of measuring the time trend of the CO_2 condensation after shortening the operation time of the outside air conditioning of the internal medicine outpatient waiting room in the first floor and the patients’ room in the third floor by four hours a day. Environment degradation caused by intermittent operation of the air conditioning cannot be seen in either of the results.





The total rating and the total shaft power of the fan capacity of the 13 outside air conditioning units in the general clean area-related excluding the operating room-related is 42.75 kW and 36 kW, respectively. By delaying the operation start time by an hour in the winter and by performing intermittent operation throughout the year, operation time is shortened by three hours a day, resulting in reduced fan power as calculated in the following:

36 kW x 1h/day x 120 days/year≒4,320 kWh/year
36kW×3h/day×365days/year≒39,420kWh/year
→ 43,740kWh/year

Thus, assuming that the electricity cost is 15 yen/kWh (flat rate), 43,740 kWh/year x 0.015 thousand yen/kWh ≒ 656 thousand yen reduction.

In addition, since heat quantity required for temperature/humidity processing of the outer air can be reduced as well, the reduced amount will be larger. However, this is excluded because verification by actual measurement could not be conducted at this time.

6 Effective Tools and Techniques for Promoting Energy Conservation by Improved Operation

ECCJ provides tools and techniques for further energy conservation useful for improving operations of large-scale buildings for business use without charge.
The three tools and techniques are:

(1)ESUM : Energy Specific Unit Management Tool

ESUM is computer software which estimates energy consumptions of a building and compares the consumptions before and after implementing an energy conservation measure to demonstrate the energy reduction effect.

(2)TuBE :Tuning of Building Systems for Energy Conservation

TuBE is a document which defines how to select and carry out operational improvement actions among various energy conservation measures.

(3)EAST : Energy Analysis Support Tool

EAST is computer software which compiles operation process data of air-conditioning units and heat source equipment and make a graphic presentation of the trends to help you analyze their operation conditions.

Combined use of the above three tools helps your making smoother energy conservation activities throughout the necessary steps for the activities; analysis on operation status and conditions, selection of improvement method, estimation of its effectiveness, and implementation of the measure.

How to obtain more detailed information on energy conservation of buildings for business use

ECCJ has a website to provide various kind of information on energy conservation of buildings.

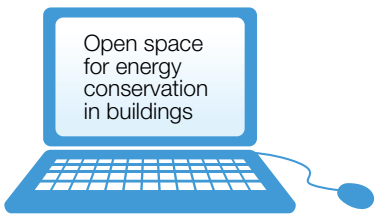
The site includes:

- inputs from actual users of tools (e.g. ESUM and EAST) useful for enhancing your energy conservation activities for buildings;
- various forums for different types of facilities (e.g. office buildings, commercial facilities, hotels, and hospitals), which serve as an information exchange forum among members; and
- invitations to seminars and lecture classes which provides information on successful cases of improved energy conservation of buildings for business use and examples of effective use of various tools as well as materials for those seminars and lectures

URL **http://eccj06.eccj.or.jp/bldg/index.php**

Owners of buildings for business use
Persons in charge of energy conservation promotion
Persons in charge of energy facility management
Energy conservation business operators

ACCESS!



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For precise information and nuances, please refer to the original.

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