2006 Prize of Director General of Agency for Natural Resources and Energy

Achievement of Energy Conservation that Complies with Control Standards at Sewage Plant

Yamato River downstream of sewage union
Western District Management Center (Imaike Treatment Plant),
Committee for Inheriting Four Seasons of Japan

◎ **Keywords: Rationalization of fuel combustions**
Rationalization of conversion of electric energy to motive power, heat, etc., (lighting facilities, elevators, business equipment and consumer equipment)

◎ Outline of Theme

A large amount of energy is consumed at the sewage plant in order to sustain environment for activities of microorganisms, which play a central role in the treatment of water, as well as treatment processes for sludge, etc. Considerations were made with purpose of achieving permanent energy conservation, based on energy management standards. Practical operating procedures were established and they bore fruits in terms of reduction in amount of energy used (primarily fuel and electric power but also chemicals as secondary objectives). Case examples of such efforts are introduced.

◎ Implementation Period for the said Example

- Project Planning Period: April 2004 through March 2005 Total of 12 months
- Measures Implementation Period: April 2005 to the present time Total of 16 months
- Period for verifying effectiveness of action:
  April 2005 through March 2006 Total of 12 months

◎ Outline of the Business Establishment

- Description of business: Final sewage treatment plant

- Number of control and maintenance personnel:

  (labor union members: 12 persons; contracted employees: 61 persons; total 73 persons)

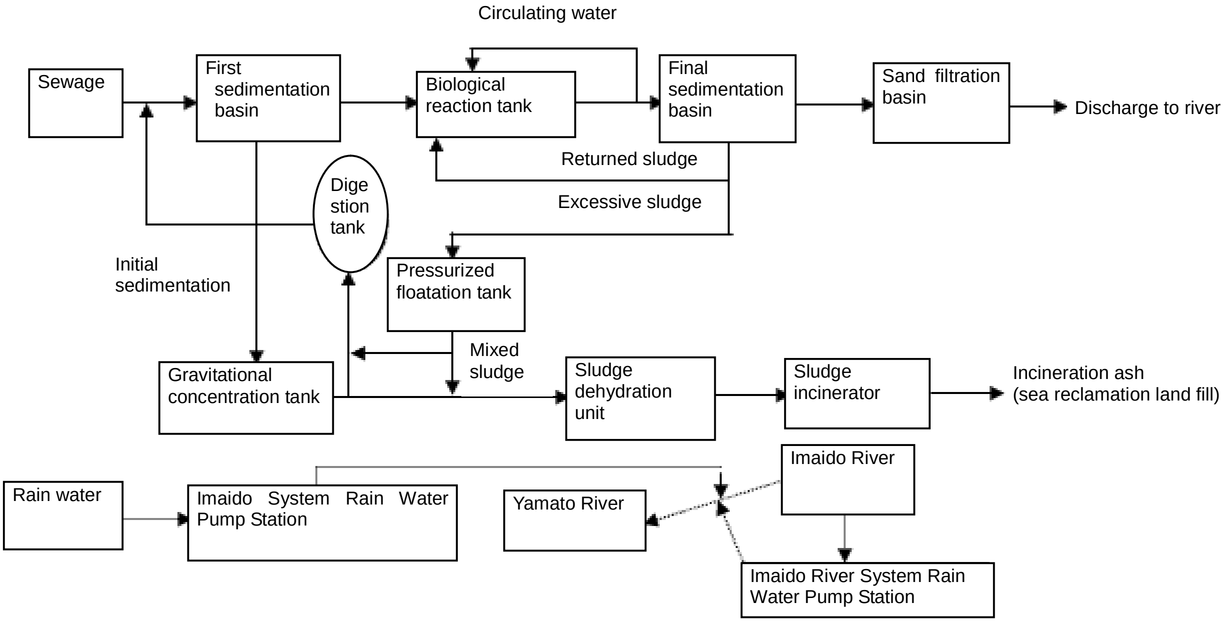
- Annual energy consumption (record for FY2005):

  Crude oil: 347 kl.

  Digested gas 287,659 m^3

  Electric power: 20,334,000 kWh

◎ Summary of Process of Target Facility



1. Reasons for Theme Selection

Due to the amendment of the Act on the Rational Use of Energy (Law No. 145 of December 11, 2002) resulted in the change in designation of the Imaike Sewage Treatment Plant from Type 2 Designated Energy Management Factory to Type 1 Designated Energy Management Factory. This led to a further demand on the plant to make further effort of implementing systematic strategies to reduce energy usage. Although energy conservation actions were implemented in the past, including turning off unnecessary lighting, termination of air conditioners, etc., but there had been no documents which were organized as a rally of the organization. For this reason, decision was made to implement systematic energy reduction activities, with control standards as the pillar of the framework, starting from FY2004.

2. Understanding and Analysis of Current Situation

The Imaike Sewage Treatment Plant contains installations of 1. sewage treatment facilities, 2. stormwater drainage facilities, 3. river water discharge facilities, 4. air supply and exhaust, air conditioning, lighting and other facilities with each of these facilities containing a diverse range of equipment and instruments for different purposes that are operating day and night. Facilities that are subject to energy conservation under this program have been classified into seven categories, as shown in Table 1, as there is an enormous number of facilities involved. Participating members that number 23 persons (12 union members and 11 maintenance company employees) have been divided into four groups and were allotted to take charge of facilities. Conceptual range was broken down to details in order to raise the certainty of obtaining proposals for improvements. Furthermore, premises of 1. Exclusion of additions and changes of facilities, as the project is intended primarily to improve operating methods and operating times of existing facilities, and 2. Strict observance of sustaining conditions for treated water quality and labor environment.

Table 1: Facility categorization table

Facility No.	Facility name	Common	Group in charge
1	Administrative building facilities (including private generator building and special high tension building)	Lighting	G1
2	Water Treatment System I building facilities (including Imaido System Rain Water Pump Station and Service Water Treatment Building)	Lighting	G2
3	Water Treatment System II building facilities	Lighting	G2
4	Blower building and Sand Filtration building facilities	Lighting	G3
5	Egg-shaped digester tanks and mechanical condensation building facilities	Lighting	G3
6	Sludge Treatment building facilities (including Imaido River System Rain Water Pump Station)	Lighting	G4
7	Incineration building facilities (including gas holder facilities)	Lighting	G4

(1) Understanding of Current Situation

First, it is checked whether there are any facilities which can be reduced energy consumption in each facility allocated to the four groups. Instead of abruptly going through all equipment, the checking work was focused initially on those equipment (facilities) that are operated regularly and have larger capacities, while those equipment (such as discharge pumps, etc.) that are not operated regularly and have smaller capacities were to be dealt with next.

Once equipment subject to implementation and applicable energy are specified, the next work became verification of current operating methods and selection of problems, followed by consideration for improvement strategies. In order to consider improvement strategies, however, there is a need to take actions by first going back to the basics and reviewing operating and manipulating conditions in accordance with conventional practices.

Furthermore, recording of intensity (example: Required quantity for processing one cubic meter of water) is also an essential work for preparing before and after improvement comparison materials. Forms were shown with examples, in order to unify among groups the expressions used to describe status of these activities. Unified format was used by these groups to submit reports on the update for progress of activities at the committee meeting held once a month, to secure opportunities for groups to exchange information and to encourage each other.

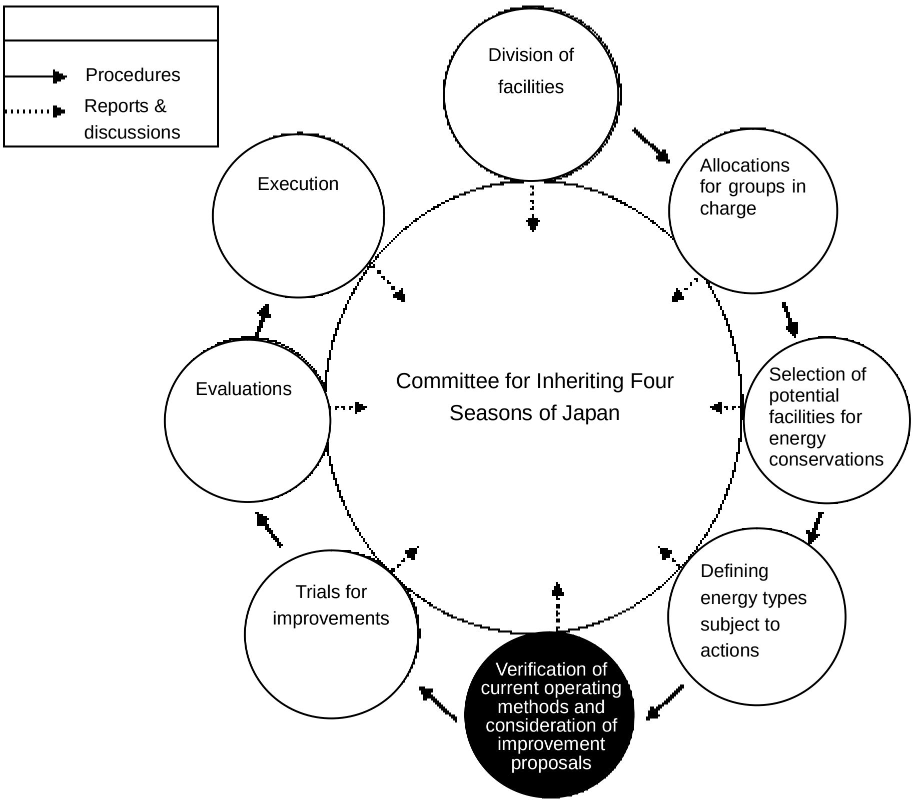
(2) Analysis of Current Situation

Once facilities and energy types subject to actions taken by the project were decided, it was then possible to consider how contributions can be made in reducing consumption of energy, by figuring out where problems and wastes lie and what needs to be improved. Taking air conditioning facilities for example, if energy conservation is to be promoted by improving (changing) of setting external temperatures as triggers for starting and stopping operations or setting operation room temperature, etc, external air temperature or room temperature is set as items (control items) subject to improvements. And with setting values defined as “control standard value” the figures within the range between existing actual values leading up to after implementation of improvements are considered to be “control values”, while figures after completion of improvements are considered to be “target values”. Furthermore, control standards were set and records of improvement proposals were created by making records of inspections of facilities and measurements taken, as needed, in order to sustain target values.

Also with regards to implementation of energy conservation activities, there were no need for trials relating to turning on and off of lighting or number of times private power generators were operated, since the act of “turning off” in each instance results in an immediate conclusion so there was no need for trials. Comparison analysis on status before and after improvements was conducted by keeping the trial period as short as possible (since the plan for energy conservation was intended for comparisons between fiscal years, having trials taking too long would be undesirable as it causes slack in the range) with regards to improvement activities that require trials, since on and off operations of air supply and exhaust facilities require planned and continuing investigations with regards to room temperature when facilities are turned off, humidity, odor and other details.

3. Progress of Activities

Figure 1: Flow diagram for energy conservation activities complying with control standards



Reduction in snow accumulations in the plains, high temperatures that exceed 35 degrees Celsius in summer and heavy rain that exceed diurnal rainfall of 100 mm are undeniable prognosis for "global warming" that is occurring even in the Minamikawachi area, where we reside. For this reason, we decided to rename the committee that holds a meeting each month to gather groups together with activity proposals to "Committee for Inheriting Four Seasons of Japan", with the slogan of passing on the mild and beautiful four seasons of Japan experienced by many of our forefathers to future generations. The committee performed many activities according to the activity flow diagram shown in Figure 1. In the figure, processes leading up to the "Evaluations" are taken care of in FY2004 and all improvement proposals accumulated are all transferred to the "Execution" process on April 1, 2005. The entire FY2005 was used as a period for verifying their effects and also as a period for formulating new improvement proposals.

4. Details of Measures

As a result of the verification activity of each proposal in FY2005, we verified multiple improvement proposals that did not bear fruits due to unforeseen drawbacks that are derived from execution of improvement proposals or some simply did not bring about any effects. Those improvement proposals that did bear fruit are summarized below:

1) Reduction of fuel consumption and reduction of electric power consumed by ancillary facilities , by changing intervals of periodical test operations within ranges that do not deviate from the objectives such as inspection of equipment loads, with regards to engine pumps for sludge pumping, rain water discharging and river water discharging.

2) Reduction of electric power by changing start and stop timing for cooling and heating by air conditioning facilities and strictly adherence of setting temperatures and shutting out external air during operational periods.

3) Reduction of electric power by reviewing required operating times and time periods for air supply and exhaust facilities.

4) Reduction of electric power by reducing revolution of agitators within ranges that do not deteriorate agitation efficiency in egg-shaped digester tanks.

5) Rise in sludge concentration from 3 % to 4.5 % by changing non-chemical injected operations into chemical injected operations in the pressurized floatation enrichment facilities. This rise in concentration resulted in the reduced rates of chemical injections during dehydration in subsequent processes, reduction in operating time for dehydration units and led furthermore to the reduction in moisture content of dehydrated cakes that reduced amount of fuel used for incineration.

6) Reduction in fuel (crude oil and digestive gases) consumption due to review of control indices for silica sand in fluidized incineration facilities, as well as through the limitation on moisture contents of cakes by decomposition of organic matter, resulting from shortening of retention time in storage tanks for cakes (dehydrated sludge).

7) Widening intervals of lighting locations inside buildings and external lighting facilities, as well as enforcing extinction of unnecessary lighting.

The above represents a summary and those specific representative cases that brought about significant effects in terms of fuel and electric power are introduced below.

(1) Fuel

A representative example that proved to be effective for reduction of fuel was the reduction in consumption of grade A crude oil and gas by fluidized incinerator. The annual reduction by equivalent of 120 kl/year in crude oil conversion was made possible through contribution by multiple factors, such as improvement of sludge density and shortening of cake storage time. An example that is speculated to have brought about the most significant impact is introduced here.

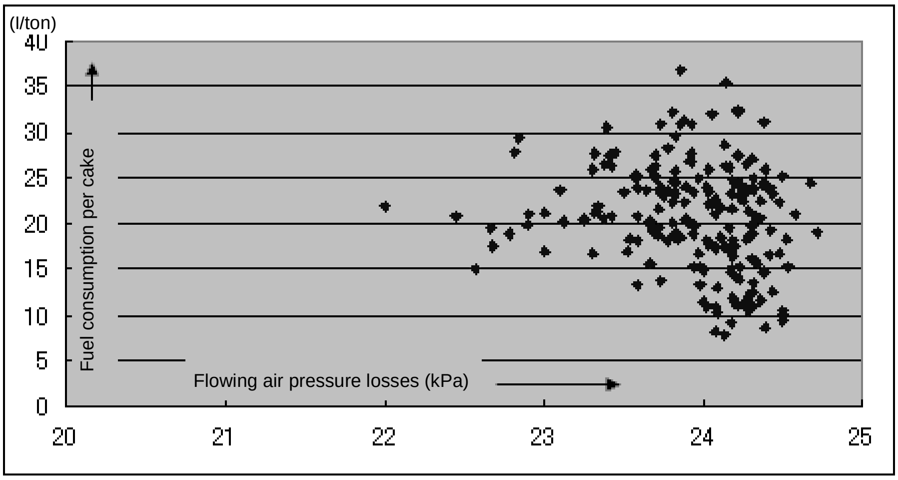


Figure 2: Air pressure losses and fuel consumptions

In terms of fuel consumptions, a natural operation with balanced of cake moisture content rates and incinerator internal temperature is optimum for the operation of fluidized incinerator (auxiliary fuel becomes nil, with cakes themselves supplying heat to sustain the temperature inside incinerators). In most cases, however, internal temperatures of incinerators tend to rise naturally, requiring limitations on input of cakes and thus resulting in operations that are unavoidably below rated capacities. Furthermore, the moisture content of cakes fluctuate anytime due to multiple factors including mixture ratios of initial sedimentary and excessive sludge, as well as anaerobic sludge due to rise in water temperature, etc. Although attempts are made to control this situation by managing chemical insertion rates and dehydration unit filter speeds, it is not an easy task. Consequently, as other factor for influencing fuel consumption the amount of silica sand that is contained inside incinerators was considered. The fluctuation of temperature inside the incinerator, while cakes were being input, could be controlled its limitation by the amount of heat stored in floating silica sand and auxiliary fuel could be reduced, and the amount of silica sand could be easily controlled by flowing air pressure losses (one ton of silica sand is equivalent to about 1 kPa loss in flowing air pressure) (Previously, air pressure loss control range was specified between 22 to 24kPa). Figure 2 depicts findings of the investigation on fuel consumptions by varying the amount of silica sand while maintaining the flowing air rate constant (4,800 Nm^3/h) for a specific period of time in FY2004. The figure shows that even with a constant pressure loss, fuel consumption can vary between 10 to 30 liters/ton, which is primarily due to the difference in moisture content. Pressure losses for which consumption of about ten liters per ton occur are concentrated within the 24 to 24.5 kPa range. Based on this finding, the 24 to 25 kPa range was specified as control standard for FY2005 to control incinerators, which we believe contributed to the reduction in fuel consumption.

(2) Electric Power

The air supply and exhaust facilities with control standard settings, for which most reduction effects were verified (reduction by about 50 % of electric power), is shown as a representative example from among a diverse range of load facilities consuming electric power in the treatment plant.

Verifications were made on the current status of operation for air supply and exhaust facilities installed in buildings of the treatment plant for the purpose of ventilation in buildings, findings indicated that [1] there were areas where facilities were in operation only for supplying air, while other areas were operating facilities for both air supply and exhaust and thus operating methods through four seasons in the year are therefore not fixed; [2] there were also areas where such facilities had not been in operation in long term due to malfunctions; [3] there were also areas where automated operations were not possible as no start and stop timers were available; [4] there were also areas where such facilities were in continuous operation 24 hours a day, etc; revealing some common issues among various buildings. An investigation was conducted in FY2004 on facilities that were selected based on the selection criteria shown in Table 2 below, among those facilities that were malfunctioning or could not be operated automatically after as much provisions for improvements as possible were implemented, with the purpose of gaining information of the control range without causing deterioration of work environment and damage of facilities (particularly electrical apparatuses and instrumentations that have lower thermal resistance) .

Table 2: Table of investigation items on condition variations for operation of air supply and exhaust facilities

(Operating condition)	Weather	Temperature	Room temperature	Humidity	(Odor related)	Condensation status
・Day time only ・Summer season only ・Continuous 24 hour operation ・Operation terminated					・Odor index ・Hydrogen sulfide concentration	

Numerous instances of cases that lead to rise of room temperature, external discharge of untreated odor and other such incidents of environmental deterioration, as well as existence of seasons or time period for which operations are not required, were identified. These details were incorporated in detailed operation manual that covers control items of the control standard and implemented to operations starting from FY2005. Air supply and exhaust facilities of grit basins at the Imaido System Rain Water Pump Station are shown as an example below.

(A) Operating methods prior to implementation of improvements

Facilities were in operation throughout the year, 16 hours daily, using 24-hour timers, as shown in Table 3.

Table 3: Operating methods of air supply and exhaust facilities for grit basins prior to implementation of improvements

Equipment name	Subject area	Rated electric power Kw	Actually measured electric power Kw	Cumulative operating time h	Electric power consumption kWh/day
Air supply fan for machine room of grit basins	Grit basin machine room	7.5	7.1	16	113.6
Air exhaust fan for machine room of grit basins	Grit basin machine room	11.0	8.2	16	131.2
				Total	244.8

(B) Verification of improvement methods

Findings of verifications on status regarding the three conditions of routine operations (16 hours per day), half-time operations (8 hours per day) and stop of operation, conducted on the above mentioned equipment, are shown in Table 4. According to these findings, room temperature, humidity, odor and condensation status remained favorable even at stop of operation during seasons with lower temperatures, while necessity to improve air supply and exhaust facilities has been identified for seasons with higher temperatures, as room temperature, humidity and odor levels rise.

Table 4: Verification on operating status of air supply and exhaust facilities for grit basins

	Measurement item	Unit	March 8	March 12	March 13	March 14	March 15	July 5	July 6	July 7	July 10	July 11
Operating condition	-	-	Routine operation	Half-time operation		Operation stop for all units		Routine operation	Half-time operation		Operation stop for all units	
Outdoors	External air temperature	℃	12.5	8.2	6.0	7.1	6.5	27.2	23.5	27.5	28.0	25.0
	External humidity	%	32	35	23	13	20	65	84	40	75	75
Grit basin	Room temperature	℃	11.0	9.0	7.0	9.5	9.0	26.0	25.0	26.0	26.0	26.0
	Humidity	%	63	60	57	73	87	84	84	72	95	100
	Odor index	-	0	0	0	0	0	0	3	3	5	1
	Condensation status	Presence	No	No	No	No	No	No	No	No	No	Slightly

(C) Effects

The findings of the above investigation resulted in our decision to implement operations complying with the control standard, which calls for ventilation operation for the summer season (July, August and September) while ventilation operation is stopped for the rest of the time (October through June). The reduction effects obtained as a result are described below.

Current electric power consumption: 244.8 kWh x 365 days = 89,352 kWh/year

Consumption after implementation of control standard operation:

244.8 kWh x 92 days = 22,522 kWh/year

Reduction effect: 89,352 kWh – 22,522 kWh = 66,830 kWh/year

5. Effects achieved after Implementing Measures

Measurements or figures derived from calculations for major items of reduction in energy consumption obtained through the year by implementing improvement proposals in facilities that have been divided into seven sectors, as well as their summaries are provided in Table 5. Furthermore, although there are a number of facilities that were subject to implementation of improvements, those for which reduction effects are not clear or where impact was low, have been omitted.

Table 5: Breakdown of reduction in consumption of energy

Facility subject to improvements			Outline of Improvement	Energy type subject to improvements	Amount of reduction
Administrative building	Administrative building	Sewage pump facilities	Reduction of fuel consumption by changing periodical operating interval of diesel engines	Grade A heavy oil	1,815 l
		Air conditioning facility	Reduction of electric power by changing operating times and time periods for cooling and heating facilities (air conditioners in Administrative building, air handling units, water cooled packaged air conditioners, etc.)	Electric power	56,651 kWh
		Air supply and exhaust as well as deodorizing facilities	Since the odor arising from water treatment were disperses outside by using air exhaust fan on grit basis, this was terminated. The number of deodorizing fans was changed from one unit to two units to respond to the situation. Although the net amount of electric power consumption is increase, the total amount of electric power consumption is reduced by shortening operating time of air supply and exhaust fans for engine rooms and pump rooms throughout the year.	Electric power	82,129 kWh
	Private power generator building	Air supply and exhaust facilities	Decrease in the operating frequency of ventilating facilities by changing operating frequency of diesel engines.	Electric power	28,160 kWh
		Private power generator engines	Reduction of fuel consumption by changing operating frequency of diesel engines.	Grade A heavy oil	3,595 l
	Lighting	Administrative building	Fluorescent lamps in vending machines located on the first floor turned off. Dressing rooms located inside labor union office on the second floor turned off at all times. Lights in the aforementioned labor union office, corridors and clerical offices on the second floor, as well as maintenance office on the third floor turned off during breaks. Size of fluorescent lamps installed in the central monitoring room on the third floor changed from 48 inch to 24 inch tubes.	Electric power	66,489 kWh
Water Treatment	Water Treatment	Water reuse facilities	Reduction of operating time of defoaming pump, which is interlocked with operation of sukamusukima.	Electric power	21,695 kWh

System I building	building	Air supply and exhaust facilities	Reduction of electric power consumption by shortening operating time and reviewing operating periods of air exhaust fans on roof top of Water Treatment building, air exhaust fans for final sedimentation basin, as well as air supply and exhaust fans for deodorizing machine room.	Electric power	70,604 kWh
	Rain Water Pump Station	Rain water pump facilities	Reduction of fuel consumption by changing the periodic test operation of diesel engine and reduction of electric power consumption of auxiliary equipments.	Electric power Grade A heavy oil	5,138 kW
		Air supply and exhaust facilities	Reduction of electric power consumption by reviewing operating times and operating periods of air supply and exhaust fans of grit basin machine room, electric room and hopper room.	Electric power	25,600 kWh
	Lighting	Water Treatment building	Strict conformance with extinction of lighting at all times, except for times when they are required, as well as clarification of mapping for sectors to be lit.	Electric power	96,826 kWh
		Rain Water Pump Station	Same as above.	Electric power	6,130 kWh
Water Treatment System II building facilities	Water Treatment building	Air supply and exhaust facilities	Reduction of electric power consumption by reviewing operating times and operating periods of air supply and exhaust fans of sterilization facility room and electric room.	Electric power	238,445 kWh
	Lighting	Water Treatment building	Strict conformance with extinction of lighting at all times, except for times when they are required, as well as clarification of mapping for sectors to be lit.	Electric power	31,987 kWh
Sand filtration building	Sand filtration facilities	Air supply and exhaust facilities Cooling and heating facilities Water supply facilities	Since the increase in supply of energy for treatment of water due to the implementation of the new “Seseragi” (murmuring) facility for co-operation starting from FY2005, exceeded the amount of electric power reduced by reviewing operating times and operating periods of air supply and exhaust fans, as well as heating and cooling facilities for electric room and utility room, the reduction amount was in the negative.	Electric power	-34,492 kWh
Egg shaped digester tank	Digester tank	Tank internal agitation facility	Electric power reduction by changing revolution of agitation facility for digestion tank of egg shaped digester tank from 60 % to 40 %.	Electric power	46,340 kWh
Sludge Treatment building	Sludge treatment facilities	Air supply and exhaust facilities	Reduction of electric power for air supply and exhaust facilities of Sludge Treatment building is not possible due to impact of odors, but since the power meter that monitors electric power consumption is also connected to the Egg shaped Digester tank, Machine Accessory building and Incineration building, the reduction of total electric power consumption was possible by reviewing operating times and operating periods of these other facilities.	Electric power	61,057 kWh
		Dehydration facilities	Reduction of electric power consumption through a rise in the sludge concentration (from 3 % to 4.5 %), which was made possible by adding chemicals to pressurized floatation enrichment facilities, which reduced the amount of dehydrating agents used in subsequent processes, together with the shortening of operation time for dehydration units, which became possible. Since electric power consumption increased for chemical injection facilities and the amount of chemicals used in the pressurized floatation enrichment facilities, however, the reduction amount resulted in the negative.	Electric power (dehydration) Electric power (pressurization) Chemicals (dehydration) JPY1,029/kg Chemicals (pressurization) JPY381/kg	6,353 kWh -2,470 kWh 3, 196 kg -4,456 kg
	River pump	River pump facilities	Reduction of fuel consumption by changing the periodic test operation of diesel engine and reduction of electric power consumption of auxiliary equipments.	Grade A heavy oil Electric power	120 l 288 kWh
	Lighting	Sludge Treatment building	Strict conformance with extinction of lighting at all times, except for times when they are required, as well as clarification of mapping for sectors to be lit.	Electric power	194,859 kWh
Incineration building	Incineration facilities	Incineration facilities	(1) Reduction of fuel consumption through lowering of moisture contents in cakes due to injection of chemicals in pressurized floatation enrichment facilities.; (2) reduction of fuel consumption through limitation on moisture content rates of cakes due to low level operations of cake depository tanks; (3) reduction of fuel through review of silica sand used in incinerators.	Grade A crude oil Digested gas (heavy oil conversion)	71,159 l 44,622 m3 (30,345 l)

Total	Electric power	○ Amount of reduction in electric power relating to air supply and exhaust facilities	505,995 kWh
		○ Amount of reduction in electric power relating to lighting facilities	396,291 kWh
		○ Others	99,503 kWh

		Subtotal	1,001,787 kWh
	Fuel	○ Reduction of heavy oil consumption relating to diesel engines	13,306 l
		○ Reduction of fuel consumption (grade A heavy oil conversion) relating to incinerators	101,482 l
		Subtotal	114,790 l

The major factors that determine how much or little energy is consumed in operating a treatment plant are represented by the quantity of treated sewage and quantity of treated sludge, except for new services launched into operation at such treatment facilities. Such quantities are on the rise in this treatment sector year after year, where sewage system is spreading at an increasing rate. Table 6 and Figure 3 represent verifications of figures provided in Table 5, by comparing actual records of energy consumption from FY2004, which was planning and formulating period of this case example, with estimated energy consumption figures for FY2005 without implementation of the case example, as well as actual records for FY2005.

Table 6: Energy consumption factors and reductions in consumption of fuel and electric power

	Fuel					Electric power	
	Amount of incinerated cakes tons/year	(1) Incineration fuel (heavy oil conversion) liters/year	Amount of rainfall mm/year	(2) Diesel fuel liters/year	Total for (1) + (2)	Water quantity on clear days m^3/year	Amount of electric power kWh/year
FY2004 record	25,544	601,069	1,290	100,214	701,283	30,137,400	20,984,320
FY2005 forecast, A	26,658	627,282	954	49,168	676,450	31,452,400	21,461,940
FY2005 actual record, B	26,658	506,930	954	35,860	542,790	31,452,400	20,334,630
Comparison B – A	0	-120,352	0	-13,308	**-133,660**	0	**-1,127,310**

* Diesel is used primarily for the purpose of eliminating river water and rain water. The reason behind lower figures for fuel in FY2005 forecast in comparison with record figures for FY2004 is due to the decreased amount of elimination arising from reduced amount of rain fall.

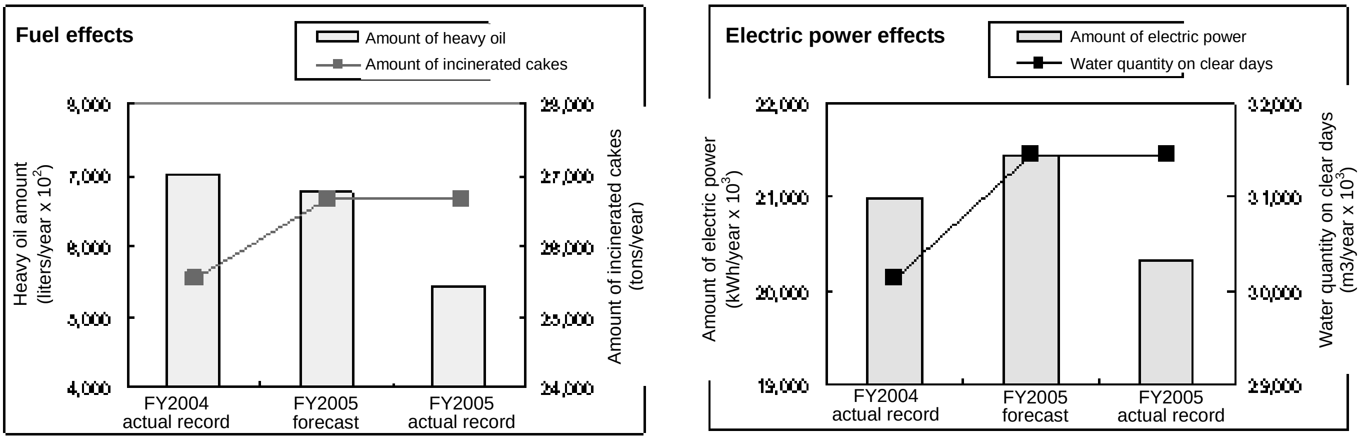


Figure 3: Energy consumption factors and effects on fuel and electric power

Table 5 and Table 6 above indicate that the reduction in fuel consumption was approximately 124 liters per year and the reduction effect on electric power was 1,064,000 kilowatt-hours per year. In terms of carbon dioxide emission conversion, this resulted in a reduction of 710 tons of carbon dioxide per year.

6. Summary

Such undertakings are similar to gathering grain left behind by reapers and require much patience in order to pick up and review one grain at a time, which might be considered a "waste", by conducting detailed review of current operating status. Although each individual improvement proposal may not bring about abundant results in contrary to amount of efforts that is put in, as the saying goes, a penny saved is a penny gained. We are also confident that the ability to achieve targets and to persist with motivation is dramatically greater in comparison to having told what needs to be done, as individual persons working at the Imaike Treatment Plant become more energy conscious.

7. Future Plans

In comparison to figures derived, based on assumption that this case example was not implemented, fuel consumption was slashed by 20 % and electric power consumption was cut down by 5 % at once. Sustaining actions taken will enable us to continue reaping this amount of benefits each year. Furthermore, the "Committee for Inheriting Four Seasons of Japan" continues with their activities to this day and has since continued with their efforts to formulate proposals that offer effective improvements in the future. Since the "Treasure Chest" of improvements have been almost completely emptied with the current activity methods (implementing improvements primarily in operating methods and operating times, without adding or changing facilities), however, it would be difficult to offer constructive improvement proposals along the same line over medium to long terms.

At this treatment plant, we do however have in our installation magic wands known as egg shaped digestive tanks. Digestive gases generated can be used as auxiliary fuel for incinerators and there is adequate capacity to make an efficient use of the entire amount. Due to the environment constraint that prevents such use based on structure of incinerators, grade A crude oil is combined at the present time. Furthermore, half the amount of water treated is processed through an advanced processing method intended to remove phosphorus and nitrogen. As aeration in biological reaction tanks are conducted by stir in water mechanical aeration system, the average pneumatic magnification reaches seven times and in comparison with fine bubble system with diffusion plate which pneumatic magnification reaches three to five times the amount of energy consumed for electric power used by air blowers is indeed inefficient. It is still possible to transform the treatment plant through the study of cost performance and really get it off the ground by adding on improvements. Since there are multiple treatment plants to which this case example is implemented, we believe that energy conservation activities with facility improvements in sight must certainly be implemented in the future.