Energy Conservation Activities under the ISO14001-compliant Environmental Management System

YAKULT HONSHA CO., LTD.
Kyoto Factory
38, Tohachi, Makishima-cho, Uji City

- Factory Overview
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Factory Overview

Factory Milestones

Jul 1963	Newly built the factory on the present site and started production of Yakult
May 1978	Started production of Mil-Mil
Mar 1990	Installation of Septic Tank of the Yakult Filter Element System using Yakult containers
Jan 1998	Acquisition of HACCP Certification
Jul 1999	New Energy Building Completed (Electric room/Refrigerators/Compressors/Boiler equipment were replaced) Shifted the boiler fuel from LPG to City Gas
Oct 1999	*Acquisition of ISO14001 Environmental Management System*
Feb 2001	Acquisition of an in-house certification in conformity with ISO9002 Quality Assurance System
Feb 2001	Replaced the Production Equipment of Mil-Mil

No. of employees

110

(Male 76 / Female 5 / Part-timer 29 Average age 42.1)

[As of April 1, 2003]

Site area

19,180 m^2 (Approximately 5,812 *tsubo*)

Production item

・Yakult 65 concentrate

Yakult 400 concentrate

(77,400 l/day 2,772 thousand bottles/day)

・Mil-Mil, Mil-Mil E, Bifiel

(Filling line: 8 lines, 570 thousand bottles /day)

Chief energy

Electricity (contract demand 1200kwh)

City Gas (Approximately 61,000 m^3/month)

Quantity and Kinds of wastes

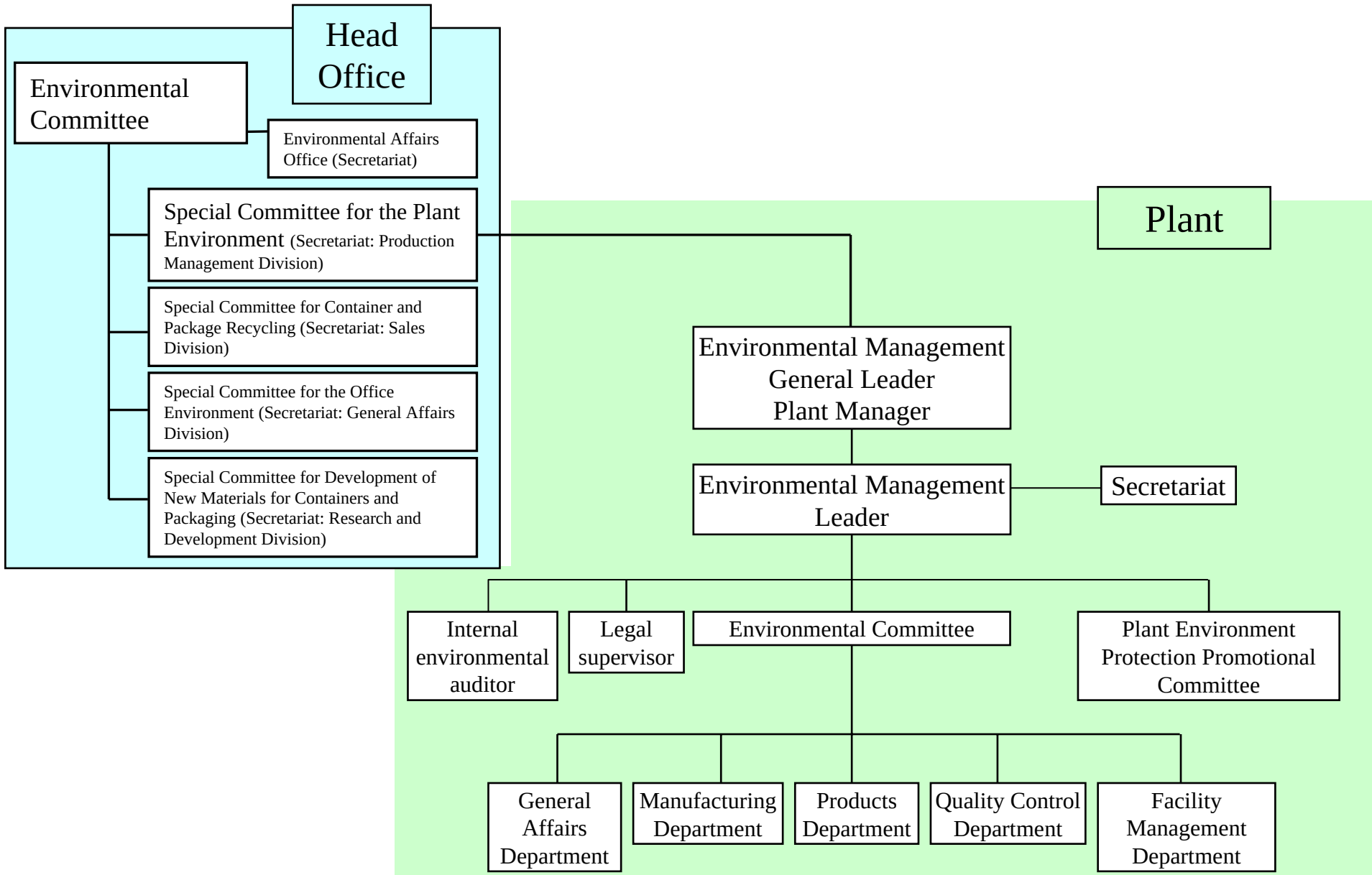
16,900 kg/month Recycling Rate: 95.8 % (FY 2002)

Sludge for Wastewater Treatment (58%); Packing Materials for Raw and Indirect materials (33%)

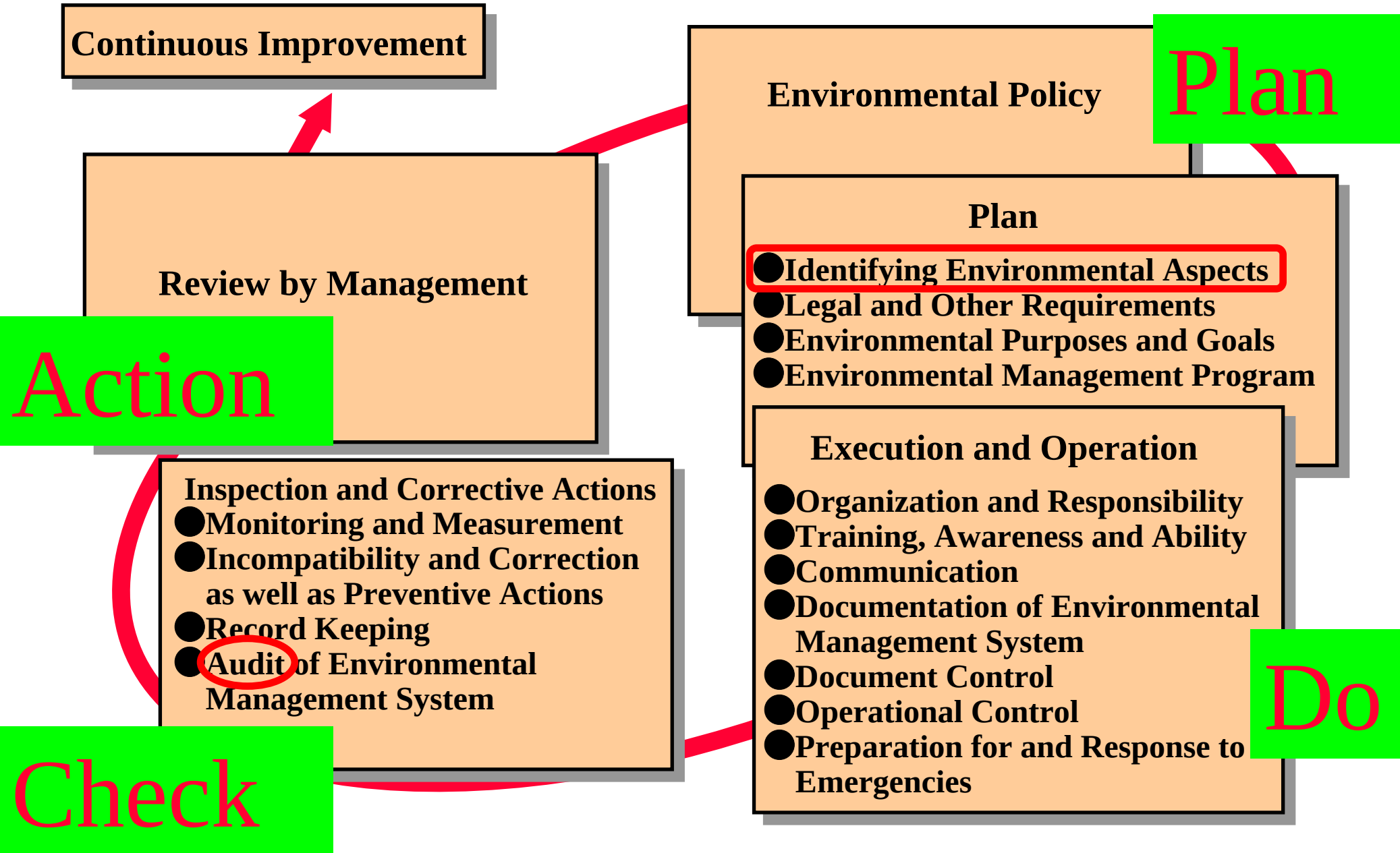
Management System

Name of System	HACCP	ISO9002	ISO14001
	Abbreviation of Hazard Analysis and Critical Control Point. It is also called the Sogo Eisei Kanri Seizou Katei or 'Hasappu' in the Ministry of Health, Labor and Welfare.	Quality Management System	Environmental Management System
For Whom	Customers	Customers	Community/Citizens/Ecology
Purpose	Securing the Product Safety and Stabilizing the Quality through Hazard Prevention	Enhancement and Improvement of Product-related Quality Control	Environmentally Friendly Corporate Behavior and Product Development Continuous Reduction in Environmental Load
Technique	Analyze the hazard concerning the food safety and specify a process that can manage the hazard as the critical control point, which is targeted for such management as standard setting and monitoring. There are 12 procedures.	There are 138 requirements for the standard	Evaluate influences on the details of business activities and identify remarkable environmental influences out of them. Carry out improvement activities by setting their purposes and goal focusing on them. Carry out continuous improvement by the PDCA Cycle for all time to come. There are 52 requirements for the standard.
Sections that can be integrated	Organization and Responsibility, Educational System, Document Control, Record Keeping, Internal Audit, Resources, Communication. HACCP is part of the "Process Control" in the ISO9002.		

Organization for Environmental Protection



Model for Environmental Management System



Merits in Constructing Environmental Management System based on the ISO14001

1. **Employees' awareness will be increased and the company image will be enhanced (Environmentally Friendly Enterprise) by implementing production activities in consideration of the environment based on the ISO standard**

2. **Favorable communication with the community and the industry**

3. **Costs will be improved (reduction of wastes, energy conservation, resources conservation)**

4. **Survival of the company will be secured by preventing accidents from occurring**
   (Risk Management/Crisis Management)

5. **Recurrence will be prevented and improvement will be continued through the pursuit of the true causes by the internal audit**

Remarkable Environmental Aspects

Drain	(Drain in the production process)
Boiler Exhaust Gas	(2t Boiler ✕ 7 units)
Use of City Gas	(Boiler Fuel)
Use of Electrical Power	(Individual facility)
Use of Organic Solvent	(Inkjet)
Use of CFCs	(Refrigerator/Air conditioner)
Non-industrial Wastes	(Wastepaper/Solid Waste Refuse)
Industrial Waste	(Sludge/Packing Material)
Special Control Industrial Waste	(PCB Transformer)
Noise	(Chiller/Blower)

Environmental Policy

Corporate Philosophy

We will contribute to creation of healthy and happy life of people around the world through the pursuit of the life science.

Environmental Philosophy

Yakult Honsha and all the business unit of the Yakult Group will behave in consideration of the environmental protection in all aspects of corporate activities with the understanding that conservation of the global environment is one of the most important issues for the ‘management to coexist with the society’.

Environmental Policy of Kyoto Plant

Code of Conduct

The Kyoto Factory will implement the environmental management in accordance with the following guidelines based on the understanding that it is a plant to manufacture lactic acid bacteria dairy drinks and cultured milk.

1. **It will establish the 'Plant Environmental Committee' with members composed of managerial workers and grapple with environmental problems associated with business activities actively and continuously with all employees in a body under the policy.**
2. **Needless to say observing environment related laws and regulations and industry standards, it will strive to continuously improve the environmental management levels and plan prevention of the environmental pollution by setting up voluntary standards.**
3. **In manufacturing products, it will give consideration to reducing and recycling wastes, optimizing the treatment and the disposal of them and use of recyclable resources.**
4. **It will promote reduction of electric power and gas fuels in order to prevent global warming.**
5. **It will actively support and cooperate in the environmental protection activities in the society and the community as a good corporate citizen with a global view.**
6. **In order to achieve this environmental policy, it will set up environmental purposes and goals in individual section and promote the environmental management in all over the sections with all employees. Also it will regularly review the environmental purposes and goals and revise them as needed.**
7. **It will implement and maintain the environmental policy through the Environmental Management System. It will make it known to all employees by electronic documents or bulletin boards and will disclose it to outsiders upon request.**

Revised on April 25, 2000
Kyoto Plant, Yakult Honsha Co., Ltd.
Tetsuo Ishikawa, Plant Manager

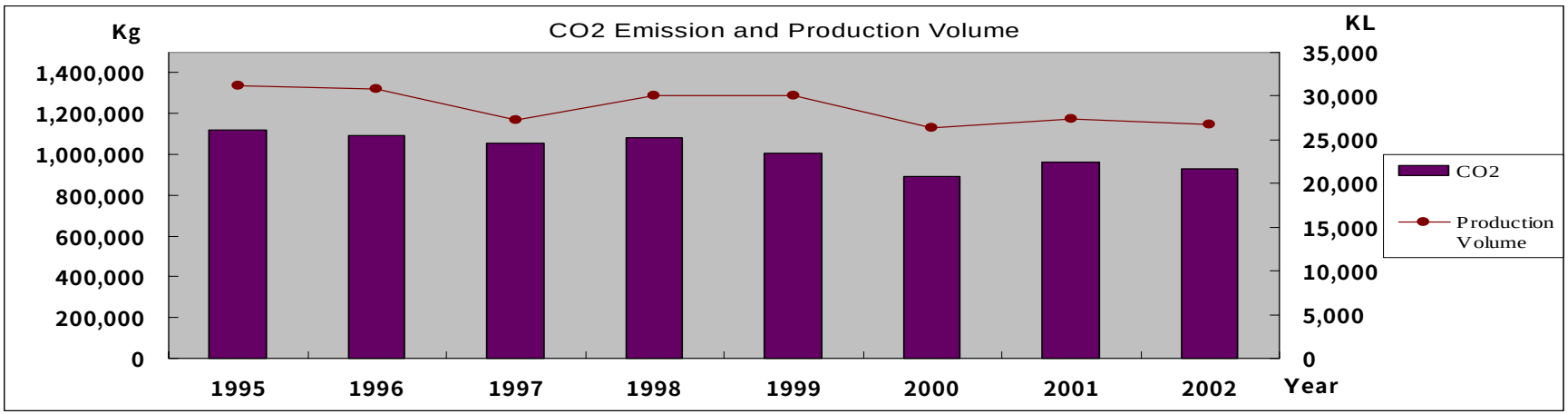
Setting up Environmental Purposes and Goals

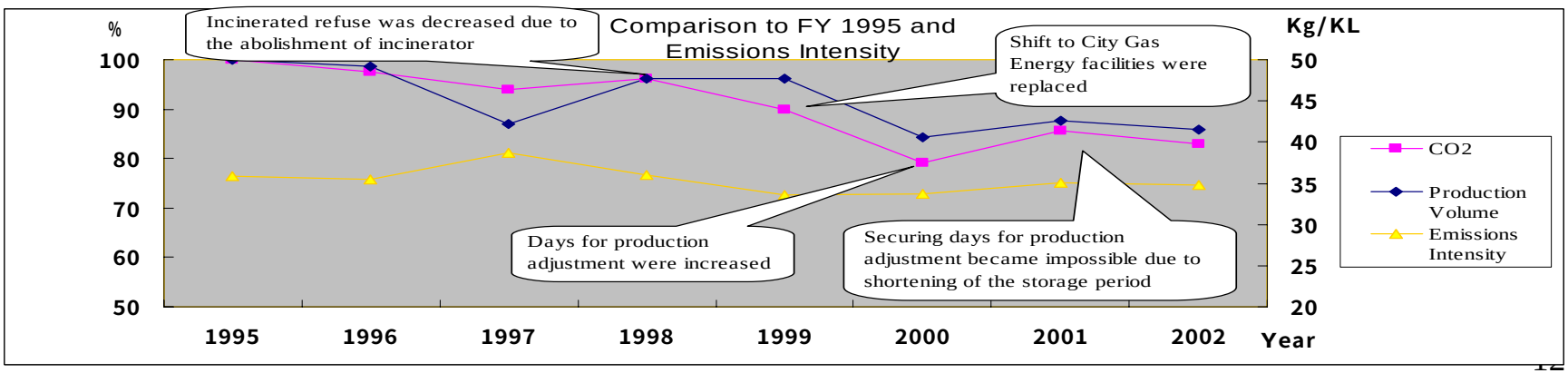
	Purposes	Mid-term goals
1	Improve the reduction of industrial waste and non-industrial wastes and the recycling rate.	Reduce 50% compared to FY 1995 by 2005. (Cut by half) Aim at achieving Zero Emissions which is within the law regulation by FY 2004.
2	Reduce the CO2 emission	Reduce 17% compared to FY 1995 by 2005.
3	Improve the pollution control level	Maintain the water quality under the voluntary standard value. Reduce the amount of water usage.
4	Plan use of recycled resources in order to effectively use the resources.	Reduce the consumption of paper. Promote the Green Purchasing.
5	Support and cooperate in the environmental protection activities in the local community.	Keep continuous activities.

Energy Conservation Activities

CO2 Emission and Production Volume

		Unit	1995	1996	1997	1998	1999	2000	2001	2002
	CO2	Kg	1,121,945	1,094,306	1,054,359	1,079,886	1,007,827	888,881	960,318	931,241
	Production Volume	KL	31,245	30,796	27,206	30,030	30,051	26,336	27,424	26,805
	Emissions Intensity	kg/KL	35.9	35.5	38.8	36.0	33.5	33.8	35.0	34.7
Comparison to FY 1995	CO2	%	100	97.5	94.0	96.3	89.8	79.2	85.6	83.0
	Production Volume	%	100	98.6	87.1	96.1	96.2	84.3	87.8	85.8





Cases of Energy Conservation

Item	Details	Merit	Demerit	Calculable Merit
Restricting the number of boilers	Control the number of boilers to operate in accordance with the necessary steam pressure by replacing the 10t large boiler with 7 units of small boilers	Reduce the fuel by minutely controlling operation in accordance with the demand of users. Production can be continued even if one boiler breaks down.	None	・Reduction of fuel cost:
Restricting the number of compressors	Restrict the number of necessary compressors in operation by operation signals transmitted from facilities that use compression air in large quantity (such as 8 units of filling machines and a package opener of skim milk powder).	Reduce the electric energy by supplying it in accordance with the demand of users. Especially extra operation of compressors during the time zones of production start and end can be controlled. This method has a larger effect on an old model machine with weaker unload function. Production can be continued even if one boiler breaks down.	None	・Reduction of extra operation time during the time zones of production start, process shutdown, and production start: Preparation time before operating the facility to use + process down time (setup time or trouble down time) × number
Intermittent operation of machines in 24-hour service	Change the operation of such motors in 24-hour service as the product storage tank and the effluent treatment blower to such intermittent operation as every other hour.	This method can be easily implemented just by addition of a timer. It certainly works by the stop time.	The product temperature in every season or the condition of effluent treatment needs to be investigated or changed.	・Reduced electric energy: Motor electrical power × down time
DO control of the blower for drainage	Control the amount of air supply for effluent treatment by the DO value in the tank.	Facilitation of operation control by stable supply of air. Reduction of electric energy.	None	・Reduction of electric energy for extra operation during the time zones and seasons when drainage load is small: Comparison of electric energy Before control 371 kwh/day After control 315 kwh/day Reduced amount 56 kwh/day (Note: The amount will vary due to drainage load or seasons)
Effluent treatment using the Yakult container filter element	Use Yakult containers as filter elements for the contact aeration system in effluent treatment.	Reduction of electric energy. Reduction of sludge waste. Easy maintenance.	Increase of the tank installation area.	・Reduction of electric energy by decreasing the air amount: Example of comparing electric energy unit prices Activated sludge system 49.26 yen/m3 Yakult filter element system 33.40 yen/m3 ・Sludge disposal cost: Sludge incidence rate Activated sludge system 25% Yakult filter element system 3%

Cases of Efficiencies

Item	Details	Merit	Demerit	Calculable merit
Shift to City Gas	Replace the boiler fuel from LPG to City Gas	Reduction of CO2 emission Reduction of such costs as labor costs required for daily and legal inspection and test of LPG tanks	Increase in fuel unit prices	・CO2 emission: CO2 emission coefficient 1.8 (LPG)→0.64 (City Gas) ・Labor costs: For one maintenance personnel
Ice storage	Make ice using only low-cost nighttime power and use the ice during the daytime production hours as chilled water.	Effective use of nighttime power Reduction of electric power expense	Increase of area for ice storage tanks	・Contract demand: 1380 kw→1200 kw ・Eco Ice Power: ・Electric power expense:
Equalization of time zones to use steam	Reduce the contract amount of City Gas fuel by dividing the steam amount of usage per hour into two production processes.	The contract amount by the maximum amount of usage per hour can be lowered.	The time chart of production process needs to be changed.	・Reduction of the contract amount: 600 m3/h→510 m3/h (600-510) × 1270 yen × 12 months = Approximately 1.37 million yen

Effluent Treatment Using Yakult Package Filter Elements

Characteristics

(1) Fill all aerating tanks with Yakult packages whose bottoms have been cut off (5,600 bottles/m^3)
250 m^3 × 5,600 bottles = 1,400 thousand bottles

(2) In the aerating tanks, water circulates upward by aerators (all aerators) and downward by airlift.

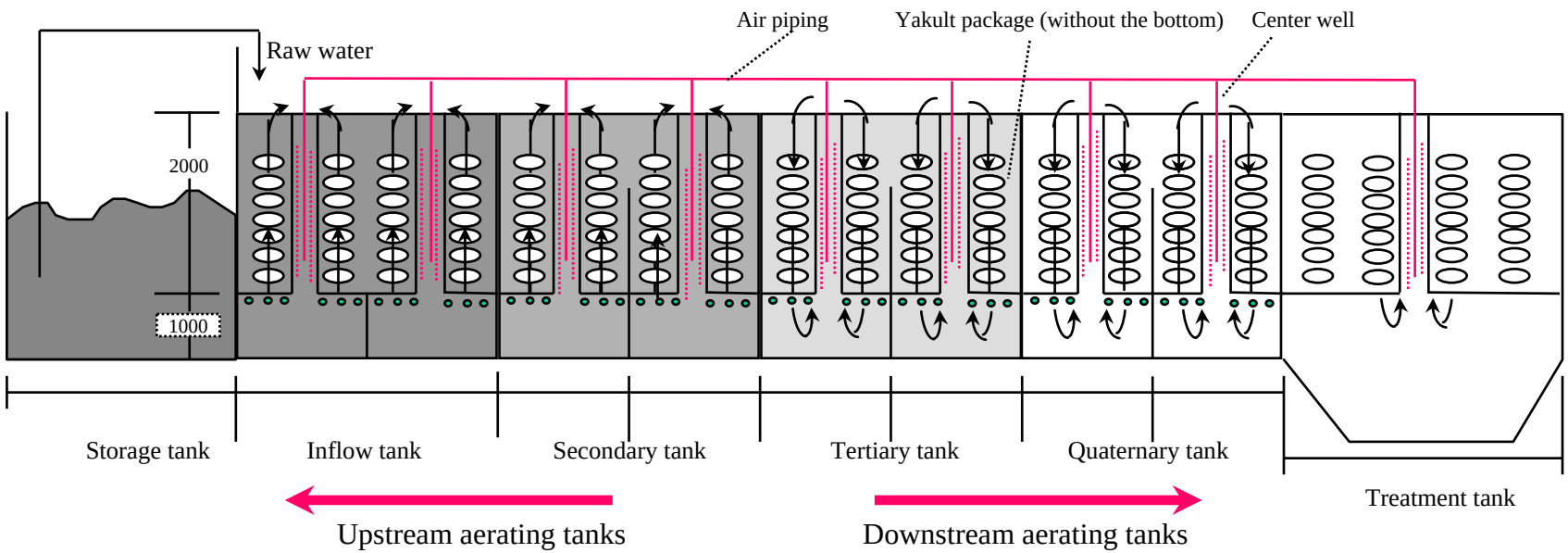
Yakult package whose bottom has been cut off

Wrapped in a net

65 ml ×

1,100 bottles

<Cross section of the effluent treatment tank>



Comparison of Costs and Maintenance

(1) Running cost

	Activated Sludge System Results in '95 and '96	Yakult Filter Element System Results in '97 and '98
Quantity of Treated Effluent (m3/year)	43,615	78,845
Quantity of Treated Sludge (m3/year)	50	0
Electric Power Expense (yen/year)	2,148,611	2,633,144
Quantity of Treated Sludge (yen/year)	625,500	0
Chemical Expense (yen/year)	55,652	27,720
Electric Power Unit Price (yen/m3)	**49.26**	**33.4**
Treatment Unit Price (yen/m3)	64.88	33.75
BOD Unit Price (yen/kgBOD)	112.17	51.9

(2) Maintenance against Rapid Load Changes

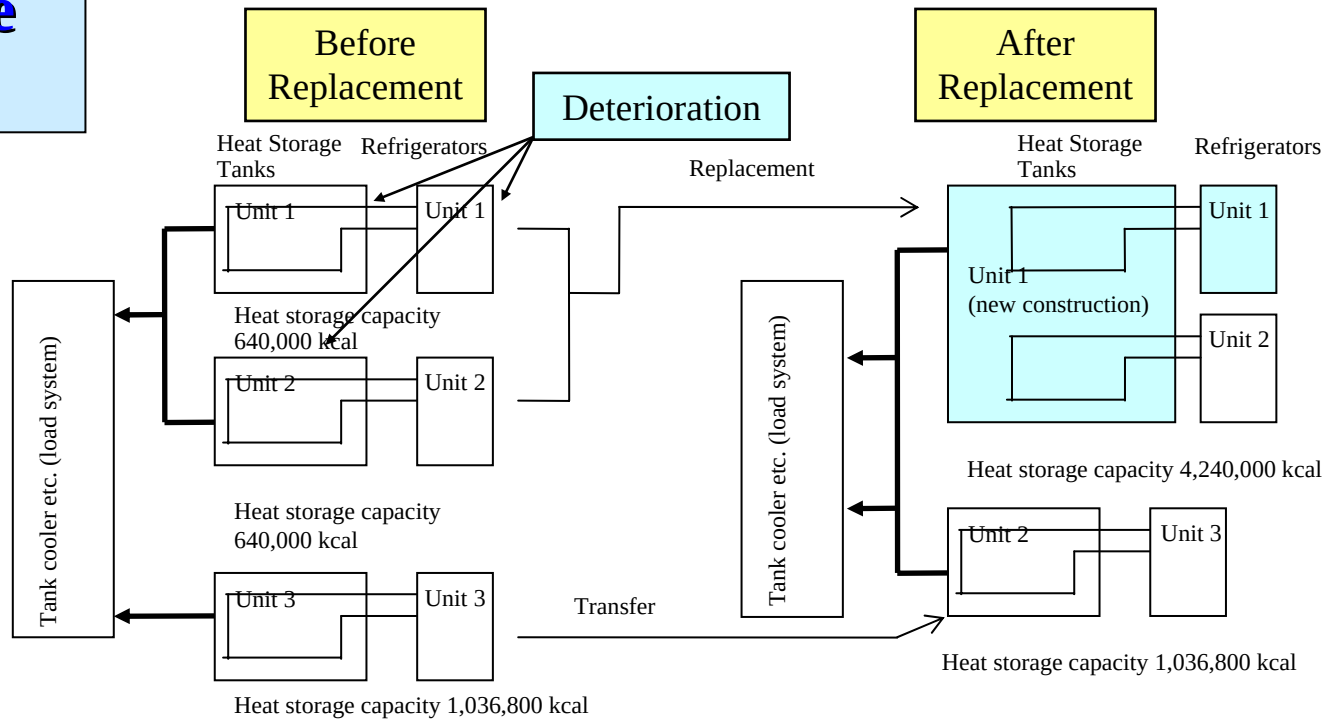
Activated Sludge System	Yakult Filter Element System
It takes three months to recover from occurrence of bulking	It recovers from a rapid load change the day after its occurrence by decreasing the inflow

Ice Storage

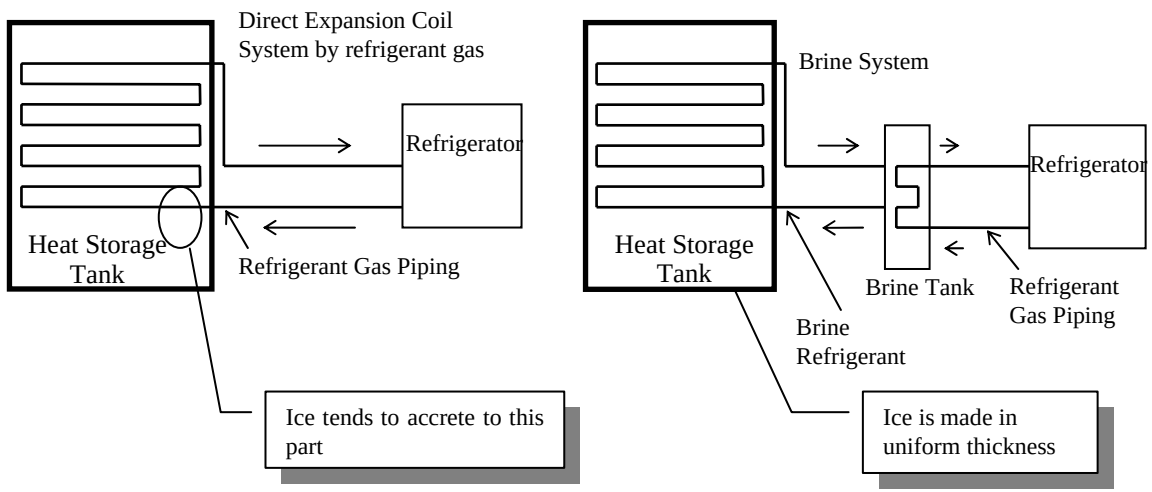
Ice Storage Facilities Before Replacement
Refrigerators 3 units (75 kw×3) Ice Storage Tanks: 3 units (All direct expansion system) Provided chilled water
Problems of the Old Facilities
(1) The heat storage capacity of the heat storage tanks was too small to meet the heat load required in the daytime use. Therefore the refrigerators had to be operated during the production peak hours in the daytime, resulting in a large contract demand. (2) There was a variance in the condition of ice accretion in the heat storage tanks that made it impossible to make ice in uniform thickness.
Details of Improvements
The following two improvements were made in time with the replacement of one refrigerator and heat storage tanks. (1) Upsizing heat storage tanks Heat storage tanks were replaced with ones that had capacity large enough to store the entire heat load required in the daytime during the nighttime. 2,316,800 kcal → 5,276,800 kcal ○This allowed the shutdown of refrigerator operation and helped reduce the contract demand. (2) Change of the refrigerant system of refrigerators The refrigerant system for two refrigerators out of three were changed from the direct expansion coil system to the brine system. ○This reduced extra operation time by improving the condition of ice accretion in heat storage tanks.

Ice Storage Facilities

Facilities Flow



Change of the refrigerant system



Effects

	Electric energy for refrigeration facilities	Electric power expense for refrigeration facilities	Contract demand	Nighttime discount rate
1998	975,448 kwh	¥14,281,000	1,380 kw	¥2,013,000
1999	779,898 kwh	¥11,341,000	1,200 kw	¥2,529,000
Year-on-year decrease	195,550 kwh	¥2,940,000	¥3,268,000	¥516,000
			Total decrease	¥6,724,000

Environmental Education

From the top to rank-and-file employees

Enhancement of environmental awareness and improvement of environmental morality are required.

Environmental management, capital investment and daily energy conservation and separation and reduction of wastes

Choral speaking of the environmental policy, continuance of awareness education

To the next generation

- Have employees talk with their families (children) about the environmentally friendly behavior and its merit

  Participation in Clean Up Movement, Environmental Household Account Book

Final Goal

Clear Global Environmental Problems