

### 3. Fuji Photo Film Co., Ltd.

#### **1. Company profile**

Established in 1934 as a Japanese manufacturer of photographic film, Fujifilm in 2004 celebrates the seventieth anniversary of its founding. Today, it has grown into a comprehensive imaging and information solutions company providing a wide range of products and services. Based on the company's ideal of advancing the state of imaging and information culture by assuming the challenge of advanced technologies, Fujifilm comprises production and software development companies, sales companies, procurement companies, and financial companies, with offices in twenty countries around the world — all working to realize a more precise and beautiful world of imaging and information based on leading-edge technologies, in response to the ever-growing visual needs of an increasingly sophisticated information-technology society. As a global company, Fujifilm is currently pursuing business activities in the following three fields:

##### **Imaging Solutions:**

Color film, cameras, digital cameras, photo finishing equipment, color printing paper/chemicals/services, etc.

##### **Information Solutions:**

Various system components for printing, medical diagnosis, and information systems; materials for liquid-crystal displays; recording media, etc.

##### **Document Solutions:**

Office copiers and combination copier/printers, printers, products related to production services, paper, supplies, office services, etc. (These business operations are handled by consolidated subsidiary Fuji Xerox Co., Ltd.)

FY 2003 sales were 2,560.3 billion yen, with an operating income of 180.4 billion yen. Fujifilm currently employs 73,164 (all figures from consolidated data).

#### **2. Environmental activities**

Fujifilm has established the Fujifilm Group Green Policy, a medium-term environmental policy covering group companies. Its goal is to achieve shareholder satisfaction and to further sustainable development by achieving high levels of environmental quality in products, services, and corporate activities — not just by protecting the environment in business activities, but by implementing a range of environmental measures, including the promotion of design that takes into account the environment and strengthened control of chemical substances.

To read the entire Green Policy, please go to the following web page:

<http://home.fujifilm.com/info/environment/policy.html>.

### **3. Objectives**

Six categories of environmental impacts (CO<sub>2</sub> emissions, input of natural resources, VOCs emissions, consumption of packaging material, waste generated and water use) were chosen and our goal is to double their eco-efficiency rates of the fiscal year 2010 in comparison with those of 2000. Eco-efficiency is calculated as “Revenue / Environmental Impact.” To make a deeper analyze of eco-efficiency possible, we have introduced and examined the effectiveness of JEPIX which is one of the tools of Japanese LCIA. In addition to the eco-efficiency rates which are segmented according to the category of environmental impacts, we have decided to use the comprehensively calculated eco-efficiency rates as a basis of business evaluation.

### **4. Scope**

#### **▼ System boundary**

The system consists of site-balance, core-balance and a part of sub-balance. As for the assessment of the sub-balance, material consumption is partly included (see Figure 3.1). In deciding the system boundary, we tried to include as many categories of material and chemical substance as possible. An unnecessarily large scope could lead to deterioration of information quality, but our priority was to get the overview of a large scope (in practice there were some figures which we have decided not to include in the scope because it could deteriorate the quality of information).

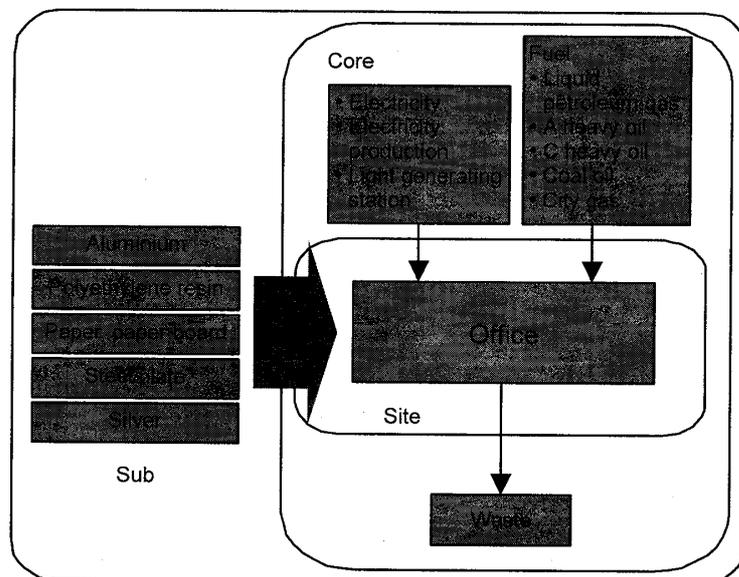


Figure 3.1: System boundary

### **5. Conditions**

#### **▼ Input data**

- Energy
- Waste (landfill and incineration are proportionally divided: 2:1)

- Material (the categories of material which are published in our sustainable report 2003 and have more than 5% of total material weight.)

Water consumption and PET are excluded although they are included in LCI of BUWAL and LCA Forum. Because these two categories have large environmental impacts, we have conducted a separate factor analysis for them. (For the input data, see Table 3.1)

- Source of the data: our sustainable report 2003 and the company internal data of three years (2000-2002)
- Priority of LCI method: Japan LCA Forum → NIRE → BUWAL (For the precise information, see Table 3.1)
- Method of LCIA: JEPIX

The input data is shown in Table 3.1.

Table 3.1: Input LCI data

Type	Measurement point	LCI source	2000	2001	2002	Unit
Energy	Combustion of liquid petroleum gas (Higher calorific power (En,Rf))	NIRE	9,516,325	11,419,590	8,809,398	MJ
Energy	A heavy oil (LCA Forum)	LCA Forum	163,000	178,000	176,000	m <sup>3</sup>
Energy	Low sulfur C heavy oil (LCA Forum)	LCA Forum	82,000	75,000	79,000	m <sup>3</sup>
Energy	Coal oil (LCA Forum)	LCA Forum	2,000	2,000	2,000	m <sup>3</sup>
Energy	City gas 13A (natural gas production - combustion) (LCA Forum)	LCA Forum	1,996,797	1,017,975	212,795,903	MJ
Energy	Electricity from light generating station (500 kWp)	BUWAL	68,400	72,000	68,400	MJ
Energy	Electricity production (LCA Forum)	LCA Forum	910,800,000	889,200,000	1,011,600,000	MJ
Input raw material	High density polyethylene (Pd,CMC)	NIRE	17,680,000	18,160,000	20,820,000	kg
Input raw material	Aluminium board (LCA Forum)	LCA Forum	47,500,000	48,500,000	48,300,000	kg
Input raw material	Paper (LCA Forum)	LCA Forum	6,790,000	6,430,000	5,120,000	kg
Input raw material	Paper board (LCA Forum)	LCA Forum	9,490,000	9,090,000	9,380,000	kg
Input raw material	Manufacture of hot rolled steel sheet (LCA Forum)	LCA Forum	3,600,000	3,400,000	2,400,000	kg
Input raw material	Silver (Pd,Rf)	NIRE	1,100,000	1,000,000	870,000	kg
Waste	Landfill (Ds,Rf)	NIRE	3,000,000	392,000	0	kg
Waste	Wastes treated by incinerator, average CH, 2000	BUWAL	1,500,000	196,000	0	kg

### ▼ Items of environmental categories

The materials are classified in some environmental categories, so that effect of each material will be clear. The classified materials are assessed by JEPIX (see Table 3.2).

In the category of waste, only the amount of landfill is assessed because it is the only impact of waste according to JEPIX. The material emissions accompanied by landfill and incineration are included in other categories.

As for the chemical substances which should be controlled with care, we have chosen from the PRTR data categories of materials which weigh more than 1% of total “emission in the air.” Methyl Ethyl Ketone was excluded because JEPIX does not have weighting factor for it.

Table 3.2: Breakdown of environmental category

Environmental category	Subcategory	Substance (assessment unit)
<b>Impact on air</b>		
	Ozone depleting substance	Alternatives for chlorofluorocarbon
	SOx, NOx	Sox
		NOx
	VOC	VOC
<b>Water resources and water quality</b>		
	Impact on water	BOD
		COD
		N (nitrogen)
		P (phosphorous)
<b>Chemical substance management</b>		
	PRTR substances and managed substance	Toluene
		Acetone
		Ethyl acetate
		Dichloromethane
		Methanol
		Propanol
<b>Resources recycling and waste</b>		
	Waste	Amount of landfill
<b>Global warming and energy conservation</b>		
	Global warming	Electricity CO <sub>2</sub>
		Fuel CO <sub>2</sub>
		Waste CO <sub>2</sub>
		CH <sub>4</sub>
		N <sub>2</sub> O

## 6. Results

### ▼ Eco-efficiency analysis

We have plotted the change of eco-efficiency rate (revenue / environmental impact) in Figure 3.2. From the year 2000 to 2001, the rate improved and from the year 2001 to 2002, it stayed approximately in the same level.

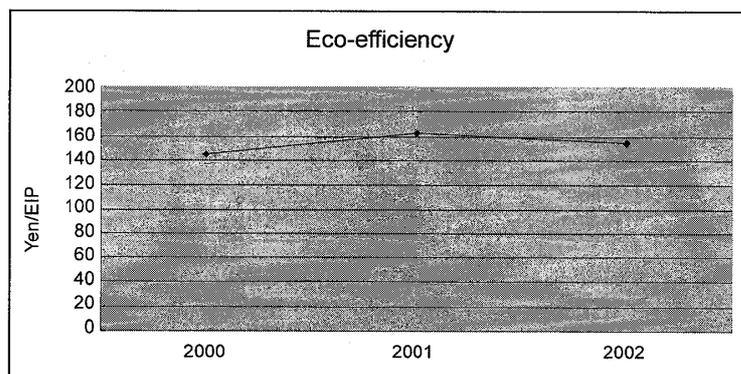


Figure 3.2: Transition of eco-efficiency

To find the cause of the eco-efficiency change, quantities of environmental impact assessed by JEPIX and revenue are plotted in Figure 3.3 which are numerator and denominator of eco-efficiency rate. From the year 2000 to 2001, the revenue increased slightly, but the eco-efficiency has improved due to the large decrease in environmental impact. Also from the year of 2001 to 2002 the environmental impact decreased, but due to the decrease in the revenue, eco-efficiency rate as a whole also slightly decreased.

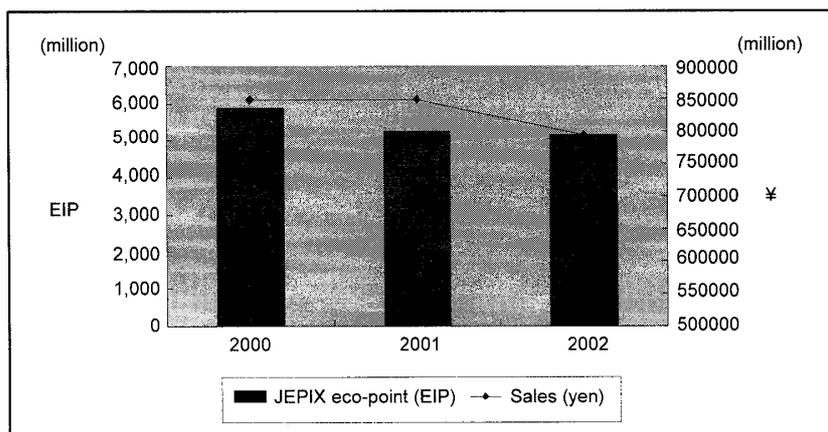


Figure 3.3: Transition of eco-point and sales

▼ **Category analysis of eco-efficiency**

Basing on the eco-efficiency analysis for the whole company, we also conducted a category analysis of eco-efficiency to see proportions of the impacts in each environmental category. The change of the proportions from the year 2000 to 2002 is shown in Figure 3.4.

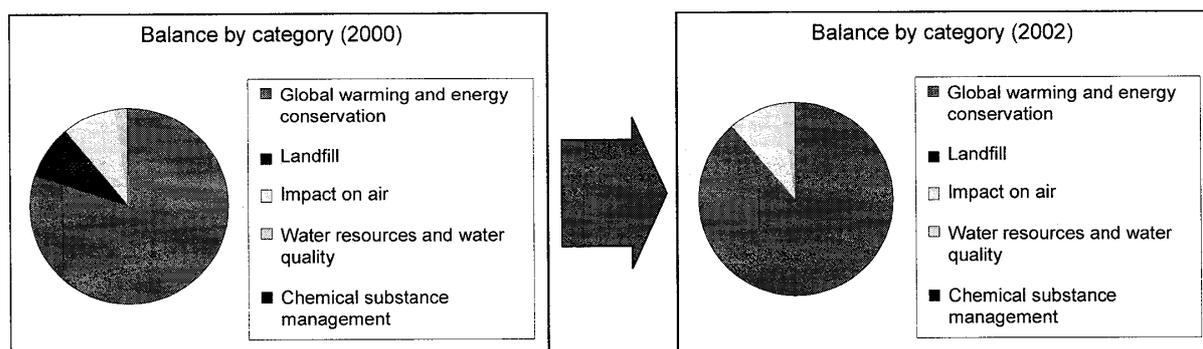


Figure 3.4: Transition of category balance in 2000 & 2002

From Figure 3.4 it is possible to conclude that the reduction of waste by zero emission activity has contributed to the decrease of the environmental impact. The changes in absolute quantity of each environmental impact category in these three years are shown in Figure 3.5 Here it is possible to see the reduction of waste more clearly. On the other hand, we can see an increase of impact categorized in “global warming and energy saving” from the year 2001 to 2002.

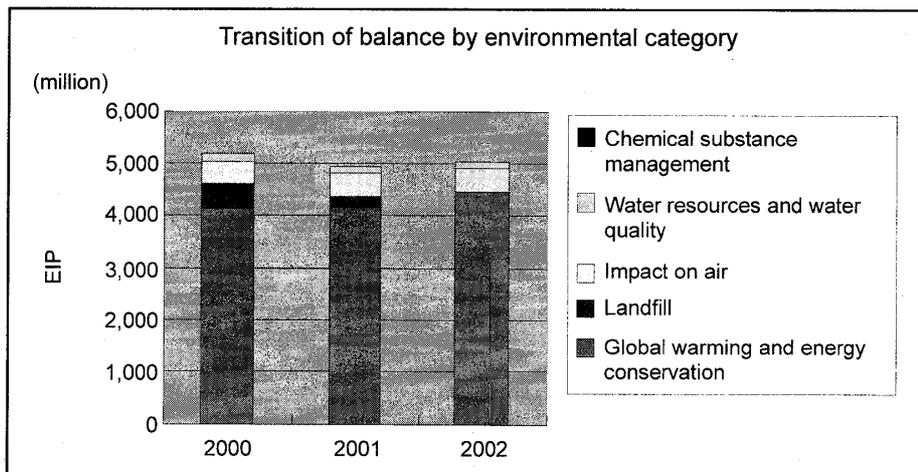


Figure 3.5: Transition of category balance from 2000 to 2002

The materials which are not listed in Table 3.1 are not included in Figure 3.4 and 3.5. Therefore, the total values of environmental impact in eco-balance and that in Figure 3.4 and Figure 3.5 are not the same.

### ▼ Analysis of the category “global warming and energy saving”

Here the category of “global warming and energy saving” will be further analyzed because it has the largest proportion in the total environmental impact. The result of the year 2002 is Figure 3.6. It is possible to see that CO<sub>2</sub> from material, electricity and fuel covers the most part of the total. It became clear in figure 3.7 that the cause of nitrogen oxide and carbon oxide lies in the production of electricity.

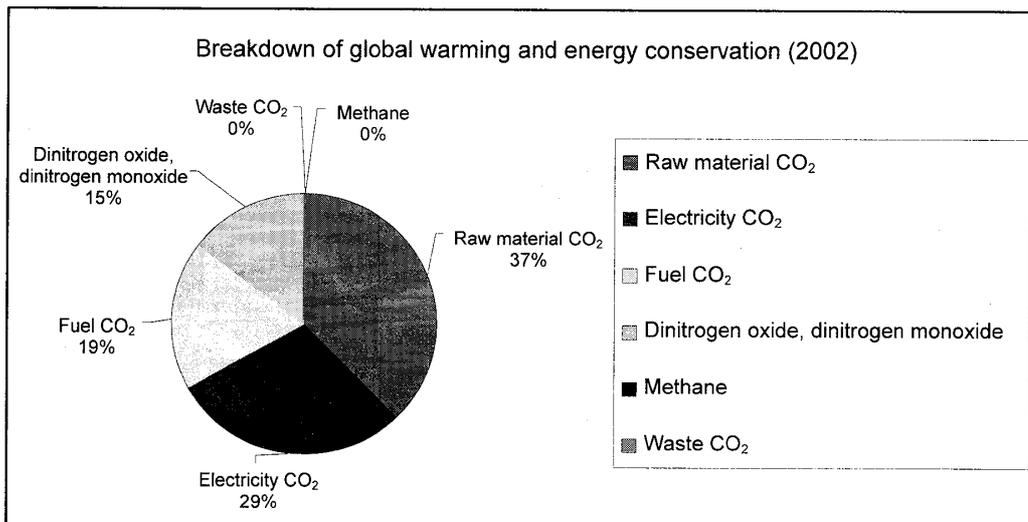


Figure 3.6: Breakdown of global warming and energy conservation

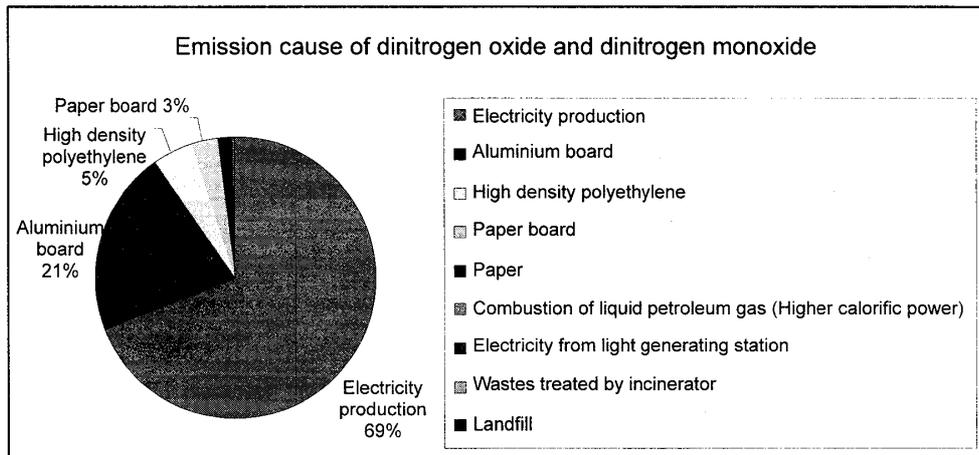


Figure 3.7: Emission cause of dinitrogen oxide and dinitrogen monoxide

**▼ Proportion and change of environmental impact in each environmental category**

To analyze which material leads to the increase of the total environmental impact, the impact amounts of each environmental category are shown in Figure 3.8. The materials which are less than 1% of the total points are omitted from this graph.

From the year 2000 to 2001 it is possible to see a reduction in waste and chemical substances. In 2002 carbon dioxide covers 75 % of the whole environmental impact and its amount is still slightly growing.

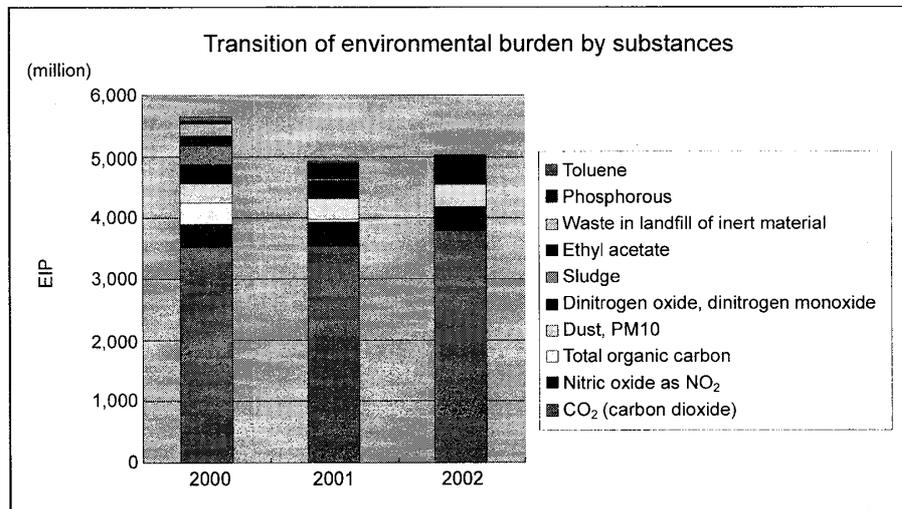


Figure 3.8: Transition of environmental burden by substances

**▼ Cause of CO<sub>2</sub> emission**

The reason for the CO<sub>2</sub> emission which causes 75% of the total environmental impact is analyzed here. Its change between the year 2000 and 2002 and its detailed information are shown in Figure 3.9. In Figure 3.9 it is possible to see that the total of electricity production, aluminum mill and A heavy oil together cause about 75% of the total environmental impact.

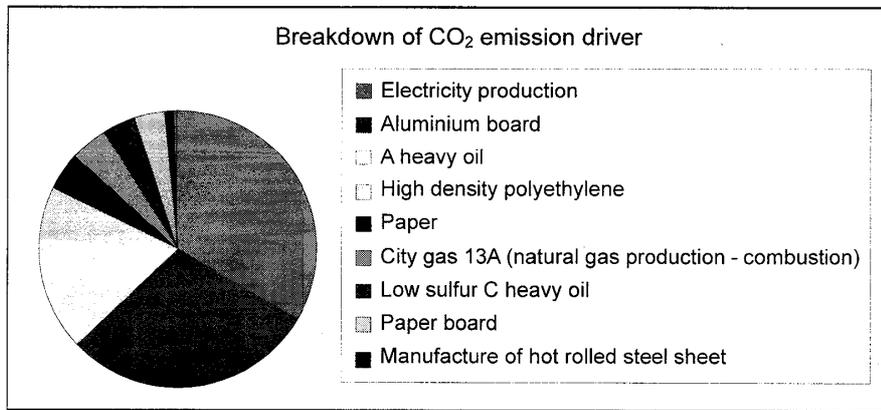
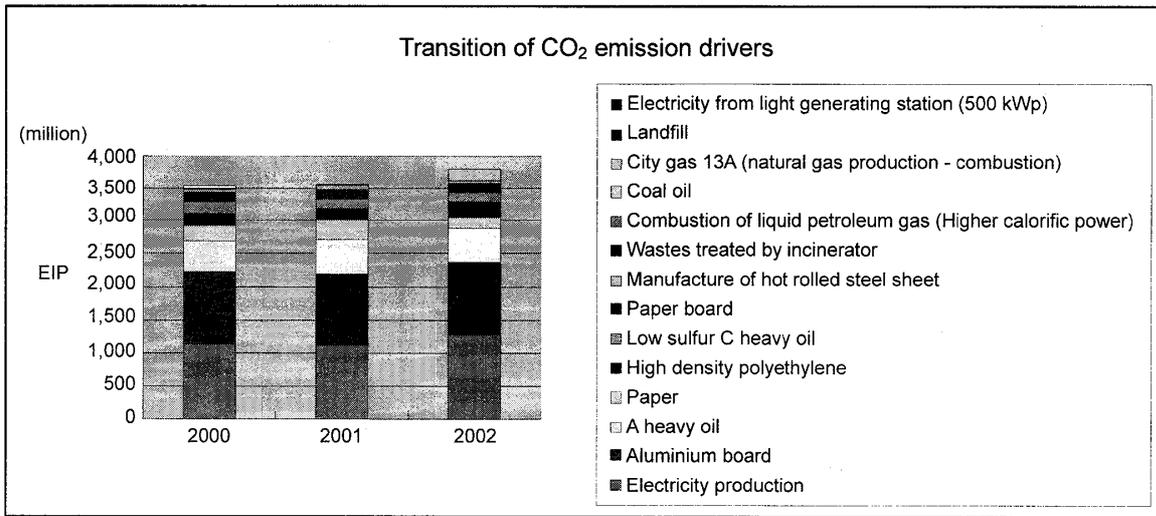
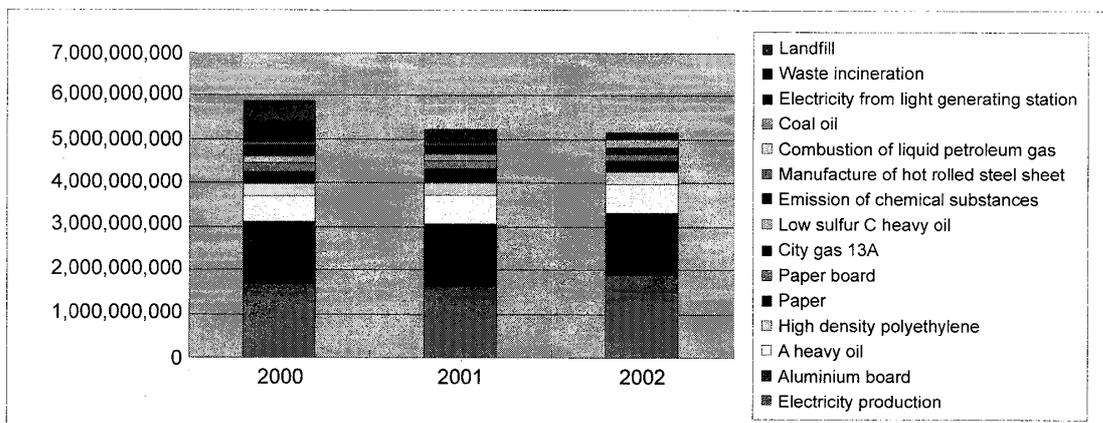


Figure 3.9: Transition of CO<sub>2</sub> emission drivers (above: 2000-2002, down: 2002)

**▼ Proportion and change of environmental impact in each measure point**

Too see which measure point has the largest environmental impact, the proportion and change of the environmental impact in each measure point is shown in Figure 3.10. It is clear here that the proportion of electricity production, aluminum production and A heavy oil is quite large.



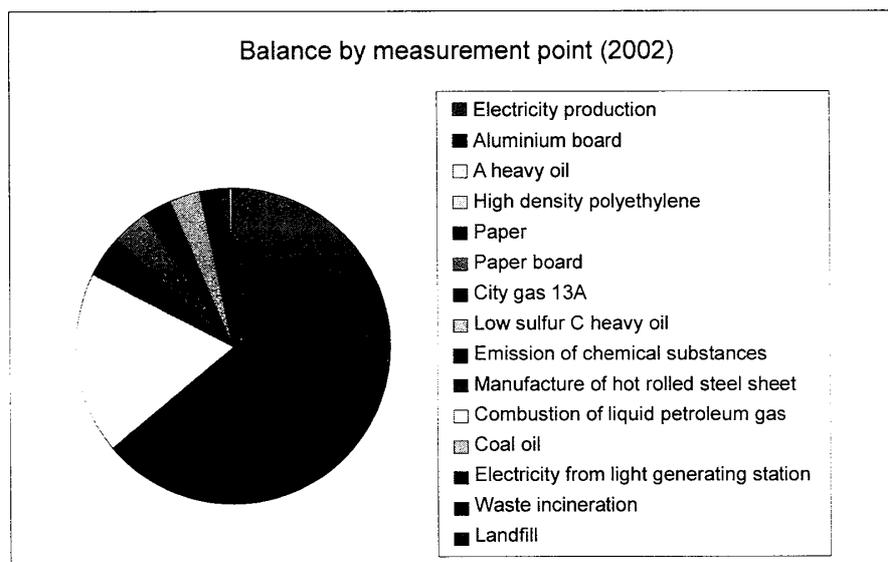


Figure 3.10: Transition of balance by measurement point (above: 2000-2002, down: 2002)

### ▼ Proportion and change of environmental impact in core-balance divided into each measure point

Figure 3.11 shows the proportion and the change of environmental impact in core-balance divided into each measure point. It is possible to see the positive effect of our zero emission activity. Because of the slight increase in electricity and gas consumption, the total environmental impact has increased to some degree.

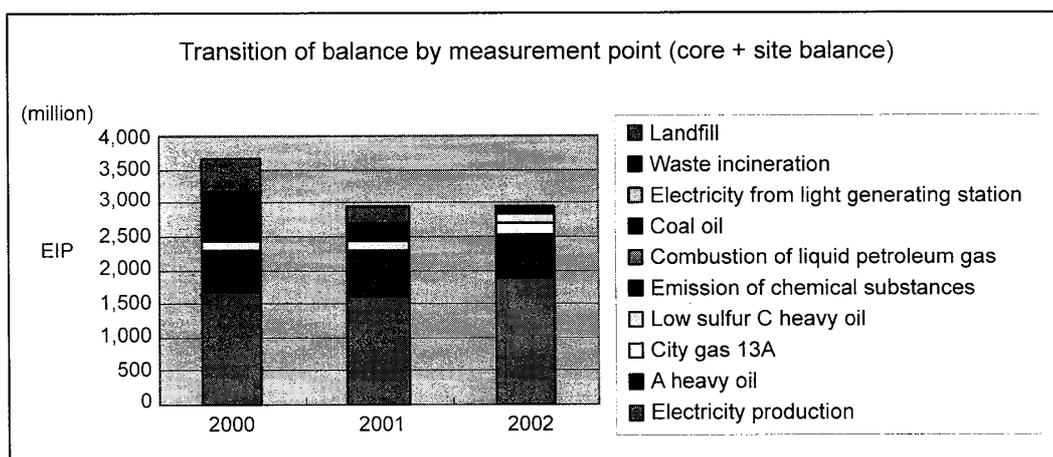


Figure 3.11: Transition of core balance by measurement point

## 7. Summary

### ▼ Analysis based on the categories of environmental impact

- Environmental impact caused by the category “global warming and energy saving” is quite large.
- It is possible to see the positive effect of “waste reduction” by the zero emission activity.

- In the category of “global warming and energy saving,” “CO<sub>2</sub> caused by fuel” is the third largest cause of environmental impact after “CO<sub>2</sub> caused by material” and “CO<sub>2</sub> caused by electricity.” Remarkable reduction of environmental impact is, therefore, expected from the replacement of A heavy oil.

▼ **Analysis based on the categories of materials**

- Environmental impact of CO<sub>2</sub> is 75% of the whole.
- Positive effect of zero emission activity and VOC reduction are clear.
- A heavy metal has a quite large effect to the emission of CO<sub>2</sub> (the third place). Remarkable reduction of environmental impact is, therefore, expected from the replacement of A heavy oil.

▼ **Analysis of core-balance and site-balance**

- Reduction of waste (landfill and incineration) can be seen.
- Reduction of chemical substances is clear.
- Environmental impact caused by A heavy oil and low sulfur C heavy oil is quite large and from replacing these kinds of oil, therefore, sharp reduction of total environmental is expected.

It was possible to see that eco-efficiency rate is an appropriate index for management, and the positive effects of our zero emission activity and chemical substance reduction have become visible by using the concept of eco-efficiency. We, therefore, think that our original goal is already achieved.

It was really a great opportunity for us to take part in this benchmark project because it has provided us a chance to analyze and research the comprehensive index for environmental impact. We would like to continue this project and are planning to apply the result to our environmental management and external disclosure.