

Sakai Oil Refinery

Address: 3-16 Chikko-Shinmachi, Sakai-shi, Osaka-fu
 Start of operations: October 1968
 Area: 1,254,603 m²
 Employees: 216
 Crude oil processing capacity: 80,000 barrels/day
 (as of March 2002)



Regulated Pollutants

Air Pollutants	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
	NOx (m ³ _N /hour)	Municipal notification	Areawide total pollutant load control	48.82	12.0	10.0
	SOx (m ³ _N /hour)	Municipal notification	Areawide total pollutant load control	45.6	1.0	0.5
	Particulate (boiler) (g/m ³ _N)	Prefectural ordinance	Concentration control	0.05	Below measurement threshold	

Water Pollutants	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
	COD (kg/hour)	Water Pollution Control Law	Areawide total pollutant load control	186.8	89.6	54.9
	COD (mg/L)	Prefectural ordinance	Concentration control	15 (10)	9.8	7.2
	SS (mg/L)	Prefectural ordinance	Concentration control	40 (30)	5	Below measurement threshold
	Oil content (mg/L)	Prefectural ordinance	Concentration control	2	Below measurement threshold	
	Nitrogen (mg/L)	Prefectural directive	Concentration control	35	5.0	3.0
	Phosphorus (mg/L)	Prefectural directive	Concentration control	1.5	0.557	0.128
	Phenol (mg/L)	Prefectural ordinance	Concentration control	2	Below measurement threshold	

Figures in parentheses = daily average

Environmental Performance

	Amount	Amount per unit of production
Energy	256,959 (kL-crude oil/year)	8.68 (L-crude oil/thousand kL)
CO ₂	721,314 (t-CO ₂ /year)	24.37 (kg-CO ₂ /kL)
SOx	12 (t/year)	0.4 (g/kL)
NOx	180 (t/year)	6.1 (g/kL)
COD	20.1 (t/year)	0.68 (g/kL)
Industrial wastes generated	5,036 (t/year)	
Industrial wastes recycled	1,028 (t/year)	
Industrial wastes disposed of	323 (t/year)	

PRTR Law designated chemical substance	Release/transfer
Ethyl benzene (atmospheric release)	0.2 (t/year)
Xylene (atmospheric release)	0.7 (t/year)
1,3,5-trimethylbenzene (atmospheric release)	21 (kg/year)
Toluene (atmospheric release)	1.7 (t/year)
Benzene (atmospheric release)	0.8 (t/year)
Cobalt and its compounds (transfer)	0.0 (t/year)
Nickel compounds (transfer)	1.8 (t/year)
Molybdenum and its compounds (transfer)	0.0 (t/year)

Environmental Accounting

Item	Environmental cost (million yen)	
	Investment amount	Expenditure amount
1 Business area costs	7	3,023
Pollution prevention costs	6	611
Global environmental conservation costs	1	2,354
Resource circulation costs	0	58
2 Upstream/downstream costs	22	4,370
Product environmental impact reduction costs	22	4,370
Product sulfur reduction costs	14	2,053
Gasoline	5	681
Naphtha	1	123
Jet fuel oil	1	193
Kerosene	2	311
Diesel fuel	3	539
Heavy fuel oil A	2	178
Heavy fuel oil C	0	0
LPG	0	28
Costs of substituting toxic substances in gasoline	8	2,317
Costs of aromatics reduction in petrochemical products	0	0
Green procurement costs	0	0
3 Management activity costs	0	83
4 Research and development costs	0	0
5 Social activity costs	0	88
Total	29	7,564

Item	Benefits of environmental protection	
	Reduction of environmental impacts (2000 value minus 2001 value)	Environmental impacts
	Concentrations/unit value	Environmental impacts
1 Business area benefits		
Benefits of reduction in resource input	(kL-crude oil/thousand kL) (TJ)	
Energy input	0.51 (kg/kL)	- 540 (thousand t)
Water input	19 (kg/kL)	- 130 (thousand t)
Benefits of reduction in emissions and waste generation		
Release to atmosphere	(kg-CO ₂ /kL) (thousand t-CO ₂)	
CO ₂	1.38 (g/kL)	- 40 (thousand t)
SOx	0.1 (g/kL)	0.0
NOx	0.6 (g/kL)	- 3.0
Benzene	- 0.01 (g/kL)	- 0.13
Release to water	(g/kL) (t)	
COD	0.03 (g/kL)	- 1.2 (t)
Wastes	(g/kL) (t)	
Industrial wastes generated	3 (g/kL)	- 451 (t)
Industrial wastes recycled	3 (g/kL)	- 25 (t)
Industrial wastes disposed of	8 (g/kL)	186 (t)
2 Upstream/downstream benefits		
Benefits of product environmental impact reduction		
Product sulfur reduction	(sulfur:weight %) (potential SOx emissions: t)	
Total	0.1720	10,883
Gasoline	0.0000	0
Naphtha	0.0152	16
Jet fuel oil	- 0.0055	- 51
Kerosene	- 0.0003	- 4
Diesel fuel	- 0.0011	- 86
Heavy fuel oil A	- 0.0104	133
Heavy fuel oil C	0.2241	10,875
LPG	- 0.0001	0
Benefits of substituting toxic substances in gasoline	(volume %) (t)	
CO ₂ emissions from product use	- 0.0207 (t-CO ₂ /kL)	- 255 (thousand t-CO ₂)
	0.0352 (t-CO ₂ /kL)	- 74 (thousand t-CO ₂)

Economic Benefit (671 million yen)

Savings through energy reductions (savings through cogeneration): 671
 Saving through catalyst recycling (reduction of waste management cost, etc.): 0
 Benefits from research and development (income from royalties, etc.): 0