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A SUGGESTED STRATEGIC PLAN FOR COAL MINING COMPANIES IN JAPAN

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Golden, Colorado

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ABSTRACT

Unprofitability of the coal industry in Japan makes the continued existence of Japanese coal mining companies questionable. On the other hand, market conditions, such as increasing demand for coal, appear to be beneficial.

This study analyzes the basic mission of the companies, managerial values, and external and internal factors, and suggests eight criteria for appropriate strategic planning for the long-term survival of these companies.

The suggested strategy is development of coal mines in South Africa, China, and Colombia. This strategy satisfies all eight criteria.

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Chapter 1

INTRODUCTION

1-1. Status of the Japanese Coal Mining Industry

Demand for coal appears to be reviving all over the world. The so-called oil price shocks (especially the second) had an extremely strong impact on the structure of world energy demand and supply. Both the oil price, which kept rising after the oil price shock, and the growing uncertainty of oil supply forced many countries to reduce total quantity of oil consumption and to develop new energy sources. Since it takes a long lead time and considerable cost to develop new energy sources, coal received primary attention as the most important energy substitute.

This situation also happened in Japan. Demand for coal increased rapidly after the second oil price shock. The coal mining industry in Japan, however, appears to be in deep trouble, in spite of good market conditions. Production of domestic coal decreases every year. Between 1970 and 1983, domestic coal production declined at a 6.2% annual compound rate. The growth rate of number of employees was -8.4% during the same period. Every coal mine has suffered losses. For example, before taking the government subsidy into account, the total loss in 1983 was estimated to be 30 million yen. As a result of such losses and changes in market conditions, Japanese coal mining, once the most important industry in Japan, is beginning to question its very existence.

A coal mining company is defined as a company which produces coal. A coal company is defined as a company which sells coal. However, in the case of Japan, the coal mining company is a subsidiary company of the coal company. All shares are owned and whole coal is sold by the coal company. Therefore, this study will recognize both companies as one organization.

It is an objective of this thesis to develop an appropriate strategic plan for long-run survival of coal companies in Japan. Before doing so, the elements of strategic planning must be defined.

1-2. Elements of Strategic Planning

Strategic planning is defined as "the process of determining the major objective of an organization and the policies and strategies that will govern the acquisition, use, and disposition of resources to achieve those objectives." (Steiner, 1969: 34) A strategic plan provides an organization with long-range direction and growth from four elements: (a) analysis of the basic mission of the organization, (b) analysis of managerial values of the organization, (c) analysis of external factors, (d) analysis of internal factors.

The first element determines and clarifies the reasons for the existence of the organization. In other words, what is the main purpose of the organization? This mission tends to be defined in terms of market definition because products may change but markets remain. In this sense, the basic mission of Japanese coal companies can be defined as meeting the energy needs of industrial residential use. Historically, domestic coal played an important role in supplying primary energy, but it is obvious that this mission is not satisfied in the current situation. The proportion of domestic coal in the primary energy supply was only 3.6% in 1982 (see Figure 1).

The second element of a strategic plan helps determine the manner in which management will treat its customers and employees, who will in turn affect strategic planning. The managerial value elements consist of two portions: one is values which the top manager brings to the workplace; the other is values which are accumulated by the history of the organization. Both values are interdependent and make up managerial values of the organization. In the case of Japanese coal companies, the personalities of top managers are different in each company; but the second set of values, called corporate culture by some, are very similar. For

Figure 1

Proportion of Domestic and Coal in Primary Energy Supply

Source: <u>Energy Statistics</u>, 1982, Agency of Natural Resources and Energy, Tokyo.

<u>Coal Note</u>, 1984, Agency of Natural Resources and Energy, Tokyo.

many years the industry was closely related to and controlled by the government; the companies reacted similarly to government control. We would conclude that this corporate culture has been conservative, considering these facts: (a) very little input was allowed from the industry and (b) the industry itself also depended upon government support and did not have an aggressive strategy.

The third element is assessment of threats and opportunities in the context of external environments such as economics, politics, and technology. The most important tool in evaluating the external environments is forecasting, an attempt to predict outcomes that will happen in the future (Schermerhorn, Jr., 1984: 122). This element will be discussed in Chapters 2 and 3.

The fourth element is assessment of the strengths and weaknesses of the organization itself. Human and material resources are generally considered as internal factors of the organization. This element helps establish a realistic basis for strategic planning by showing actual capabilities of the organization. This element will be discussed in Chapter 4.

Chapter 2

OUTLOOK OF EXTERNAL FACTORS TO 2000

In this chapter, the influence of external factors, such as economics, politics, and technology in the coal market in Japan will be discussed. Special emphasis is focused on external influences on Japanese coal companies.

2-1. Economics

Since coal is a factor of production, demand for coal is derived demand and depends upon demand for goods whose production depends on coal. There are two uses of coal, thermal and metallurgical. Thermal coal is in direct competition with other fuels and requires a price differential to beat other fuels on an economic basis. In contract, coking (metallurgical) coal can only be partially substituted, making this coal more expensive (James, 1982: 54).

In 1983 the electric power generation and cement industries consumed 85.1% of the thermal coal, and the steel industry consumed 92.2% of coking coal. These three industries consumed 88.9% of all coal (See Table 1). However, thermal coal comprised only 31.9% of the total Japanese coal market at that time.

2-1-1. The Electric Power Generation Industry

The electric power generation industry is the largest

Table 1

Coal Use in Japan, 1983

(Ten Thousand Metric Tons)

Thermal	
Electricity	1,771 (56.9%)
Cement	876 (28.2%)
Others	464 (14.9%)
Subtotal	3,111 (100%)
Coking	
Steel	6,011 (92.2%)
Others	617 (7.8%)
Subtotal	6,628 (100%)
Total	9,739

Source: Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

consumer of thermal coal in Japan. Since this industry operates under a government license, it is very likely to be influenced by government policy, even though it may not be economical to do so. The Japanese government currently expects that nuclear energy will be the main energy source of electric power generation. Table 2 shows two important points relative to the changing structure of the Japanese energy sector. One is the value of elasticity of electricity growth rate to GNP growth rate; this value measures proportional change of electricity use to GNP growth. The second point is a remarkable increase in the use of nuclear energy.

From 1968 to 1973, demand for electricity grew 11.5%, and GNP, 8.1% (the value of the elasticity was 1.42). From 1973 to 1979, demand for electricity increased 4.3%, and GNP, 4.0% (the value of the elasticity was still above 1.0). But from 1979 to 1983, even though GNP grew 3.7%, demand for electricity grew only 1.6% (the value of the elasticity now fell to 0.43). The reasons for this imbalance are due to structural changes in the economy and energy conservation.

The sharp rise in the price of energy has reduced the demand for industrial products in general and of energy-intensive products in particular (IEA, 1982: 70). Every

Table 2

Electric Power Generation By Fuel Type and Relation between Electricity Growth and GNP Growth in Japan (Million kwh)

	1968	1973	1979	1983
Coal, Oil, Gas	166,078	330,185	373,703	360,984
Hydro.	68,583	66,005	78,577	81,387
Nuclear	1,037	9,705	69,344	113,122
Total	235,698	405,894	521,624	555,493

	(68/73)	(73/79)	(79/83)
Electricity Growth	11.5%	4.3%	1.6%
GNP Growth	8.1%	4.0%	3.7%
Elasticity	1.42	1.08	0.43

Note: Growth Rate is compounded annually.

Source: Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

mass energy consuming industry has been forced to change to a less energy consuming method of production. In many cases, companies have moved into entirely different markets. It is a change from a heavy-thick-long-large industry such as the steel industry to a light-thin-short-small industry such as the high-tech industry.

Figure 2 also shows the history of energy intensity which is measured in units of energy consumption per unit of GNP. Energy intensity has decreased almost every year since 1973. This trend occurred because of the sudden rise in energy costs. It would appear that, for the time being, this trend seems to be fixed in the economy. Therefore it is reasonable to assume that energy intensity will flatten out or decrease until the end of this century.

The sharp rise in the price of energy also provided incentives to improve technology in order to reduce energy costs. The steel industry of Japan is one of the successful industries in this endeavor. Since the steel industry is a mass energy consuming industry, it experienced a rapid increase in energy costs after 1973. To offset this, the steel industry improved both machinery and production processes which were concerned with quality control. Basically, quality control proposes to check products to ensure that they meet certain standards, and if successful,

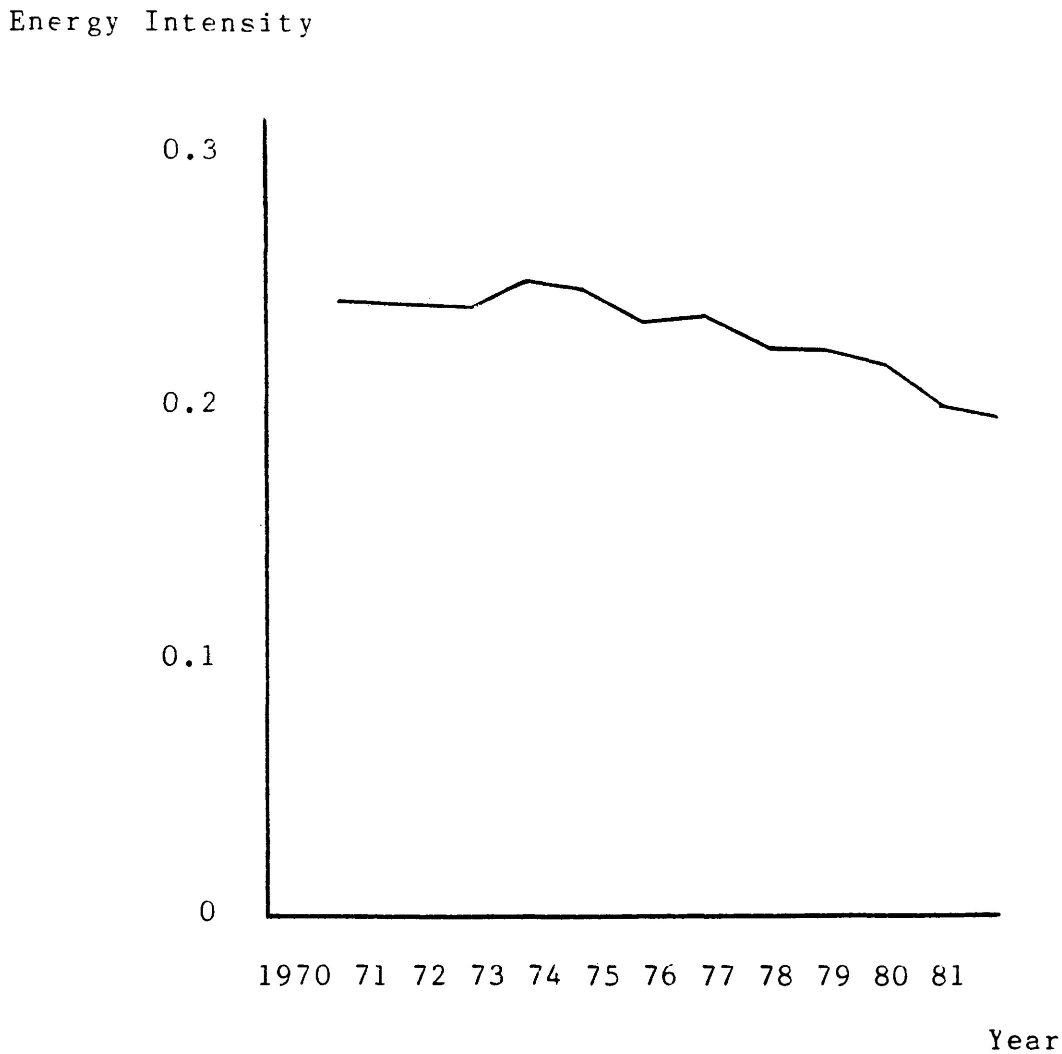

Figure 2

History of Energy Intensity in Japan

(10^{10} kcal/100 Million Yen)

Source: Energy Statistics, 1982, Agency of Natural Resources and Energy, Tokyo it also improves productivity by reducing waste on the input side (Schermerhorn, Jr., 1984: 534). By both of those methods the steel industry accomplished about a 15% reduction in total energy consumption between 1973 and 1983 as shown in Figure 3. Had there been no effort in this area, the steel industry would have had to consume 54198 x 10^{10} instead of 46121 x 10^{10} kcal. Again, according to the trend of the price of energy, this kind of effort will continue.

It would appear difficult for the value of the elasticity of electricity growth rate to GNP growth rate to exceed 1.0 as it did before the second oil price shock. The Japanese government estimates that this value will be about 0.8 through the end of this century. This estimate took into account the very rapid changes in this value between 1979 and 1983. In this case, since GNP growth rate is estimated to remain at about 4% until 2000, the electricity growth rate will be 3.2%, which means demand for electricity in 2000 will be about 824,439 million kwh.

The other important point in Table 2 is the remarkable increase in nuclear power plants (27.8% increase from 1973 to 1983). The reason for this increase is closely related to government policy which will be explained in detail later. Practically, however, it is getting difficult to

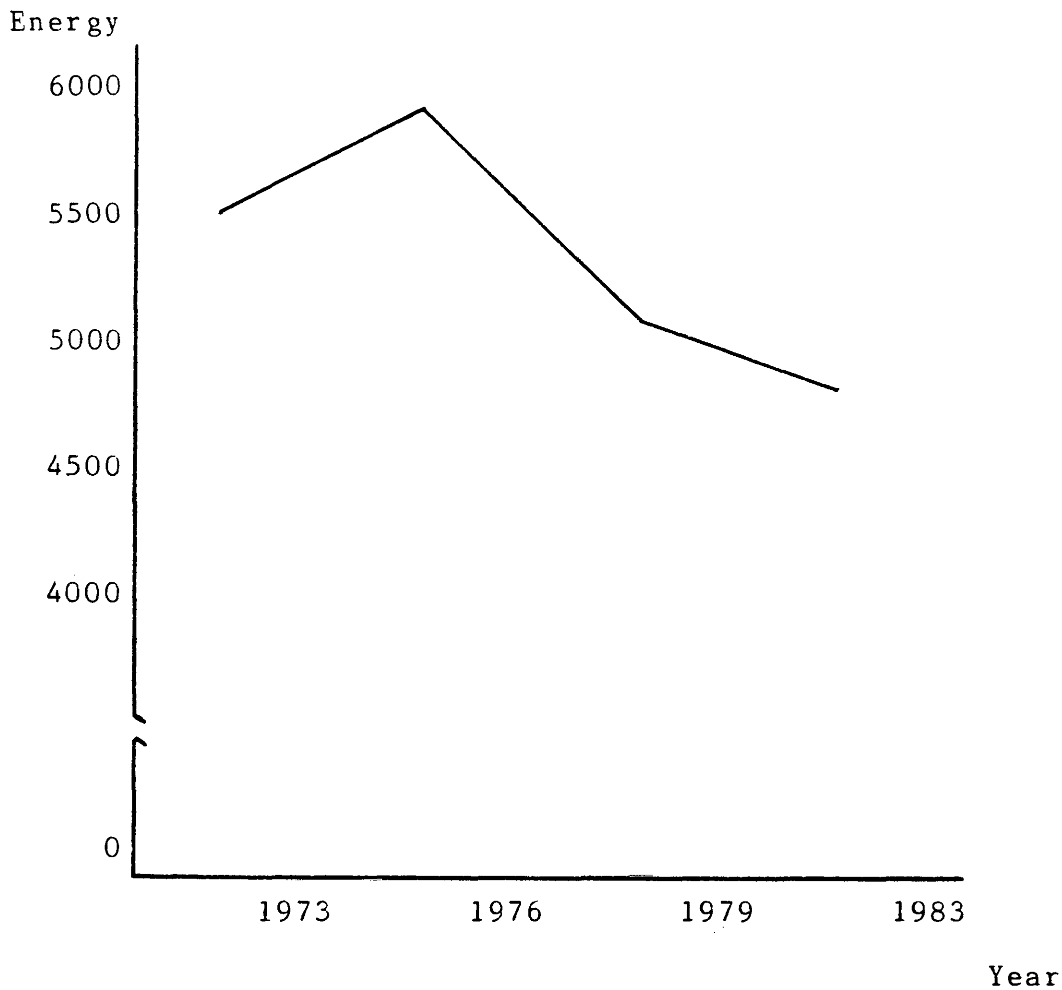

Figure 3

Conservation of Energy in the Japanese Steel Industry

10^3 kcal/t of raw steel)

Source: <u>Coal Note</u>, 1984, Agency of Natural Resources and Energy, Tokyo.

construct new nuclear power plants because of widespread public opposition. Unless concerns about safety and waste management are resolved, this opposition will continue. In this sense, the future of nuclear power plants is very uncertain.

2-1-2. The Cement Industry

The cement industry is now the second largest consumer of thermal coal. In 1983, 28% of total thermal coal was used in the cement industry. Thermal coal consumption increased about 17 million metric tons from 1979 to 1983. The cement industry used 41% of this increase (ANRE, 1984). This industry recently converted from oil to coal very rapidly as shown in Table 3. Between 1968 and 1973, consumption of coal decreased because of the energy revolution. Between 1973 and 1979 consumption of coal increased somewhat, but from 1979 to 1981 consumption of coal increased rapidly at the same time consumption of oil rapidly decreased. Since the second oil price shock brought a sharp rise in the price of oil, energy conservation in the cement industry advanced rapidly after 1979. The reason for this conversion can be explained as follows.

1) The cement industry is a typical mass-energy-consuming industry; that is, more than 50% of total production cost is energy cost. Therefore this

Table 3

Coal and Oil Consumption in the

Cement Industry in Japan

	Coal (1000 Metric Tons)	Oil (1000 kl)	Energy (1000 kl)	Cement (1000 Metric Tons)
1963	2,019	2,425	NA	29,582
1973	277	8,137	NA	78,250
1979	1,556	6,955	7888	87,940
1980	6,236	3,385	7126	85,882
1981	10,118	631	6702	83,605
1982	9,663	304	5838	80,056
1983	8,790	280	5536	79,402

Source: Coal Manual, 1985, Tex Report, Inc., Tokyo industry is very sensitive to sharp rises in the price of oil.

2) The production process of clinker itself contains a function which can prevent the creation of SO_x and ash, which means that it costs less to use coal in the cement industry than in other industries.

Since conversion from oil to coal was completed in 1981, demand for thermal coal in the cement industry now depends upon demand for cement. However, this industry may not have a bright future. Demand for cement is closely related to government expenditure, but the Japanese government is currently using a tight finance policy in order to reconstruct past deficit financing; the government expenditure cannot be expected to increase at least until 1990. Considering an expected moderate economic growth rate through the end of this century and the structural changes in the economy as mentioned earlier, the private sector cannot be expected to increase its demand for cement either. It seems reasonable to assume that demand for cement cannot be expected to increase.

Another factor which will affect demand for coal in the cement industry is progress in production technology. Table 3 also shows a comparison of efficiency of production between 1979 and 1983. In 1979, 0.0897 kl of energy was

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required to produce one metric ton of cement, but in 1983, only 0.0697 kl of energy was required to produce the same quantity. This means a 22% energy saving. In other words, the cement industry saved 1,586 thousand kl of energy in 1983. It can be concluded that demand for thermal coal cannot be expected to increase in the cement industry.

2-1-3. The Steel Industry

The steel industry contributed to a high rate of post-war economic growth as a basic industry. Simultaneously, the increase in demand for steel, brought about by economic growth, supported the growth of the steel industry. As shown in Table 4, however, after the first oil price shock, production of raw steel began a downward trend for the following reasons:

1) Low economic growth rate
2) Structural changes in the economy
3) Competition with the steel industry in developing countries

What supported the growth of the steel industry in the past was increasing domestic demand for steel, brought about by high economic growth and exports. However, the oil price shock forced the entire economy to grow very moderately, and the domestic steel market became sluggish. Structural changes in the economy also decreased demand for steel.

Table 4

History of Raw Steel Production and
GNP Growth Rate in Japan
(Thousand Metric Tons)

	1970	1973	1979	1983
Raw Steel Production	92,406	120,017	113,010	100,200

	(70/73)	(73/79)	(79/83)
Production Growth	+9.1%	-0.1%	-3.0%
Economic Growth	+6.8%	+4.0%	+3.2%

Note: Growth Rate is compounded annually.

Source: Coal Manual, 1984, Tex Report Inc., Tokyo

Demand for steel as intermediate goods was replaced by demand for lighter materials. Figure 4 shows steel intensity, a measure of relative dominance of steel in the economy. Obviously the steel intensity declined after the first oil price shock. Moreover, the international steel market is being invaded by developing countries, such as Brazil and Korea, which have a very cheap labor force. This threat is common in industrialized countries. For example, between 1976 and 1983, production of steel in the United States decreased at a 5.7% annual compound rate; in the European community, at 3%; and in Japan, at 1.4%. At the same time, production of steel in Korea increased at a 19.1% annual compound rate, and in Brazil, 6.9% (Tex, 1984: 88). Therefore, assuming current conditions will continue through 2000, demand for steel cannot be expected to increase.

2-2. Government Policies

Current government energy policy can be summarized as (a) security of energy supply, and (b) reduction in the cost of energy. There are two serious problems in the energy supply structure in Japan.

1) Although Japan is the second largest energy consuming country among the western countries, dependence upon imported energy sources is remarkably high.

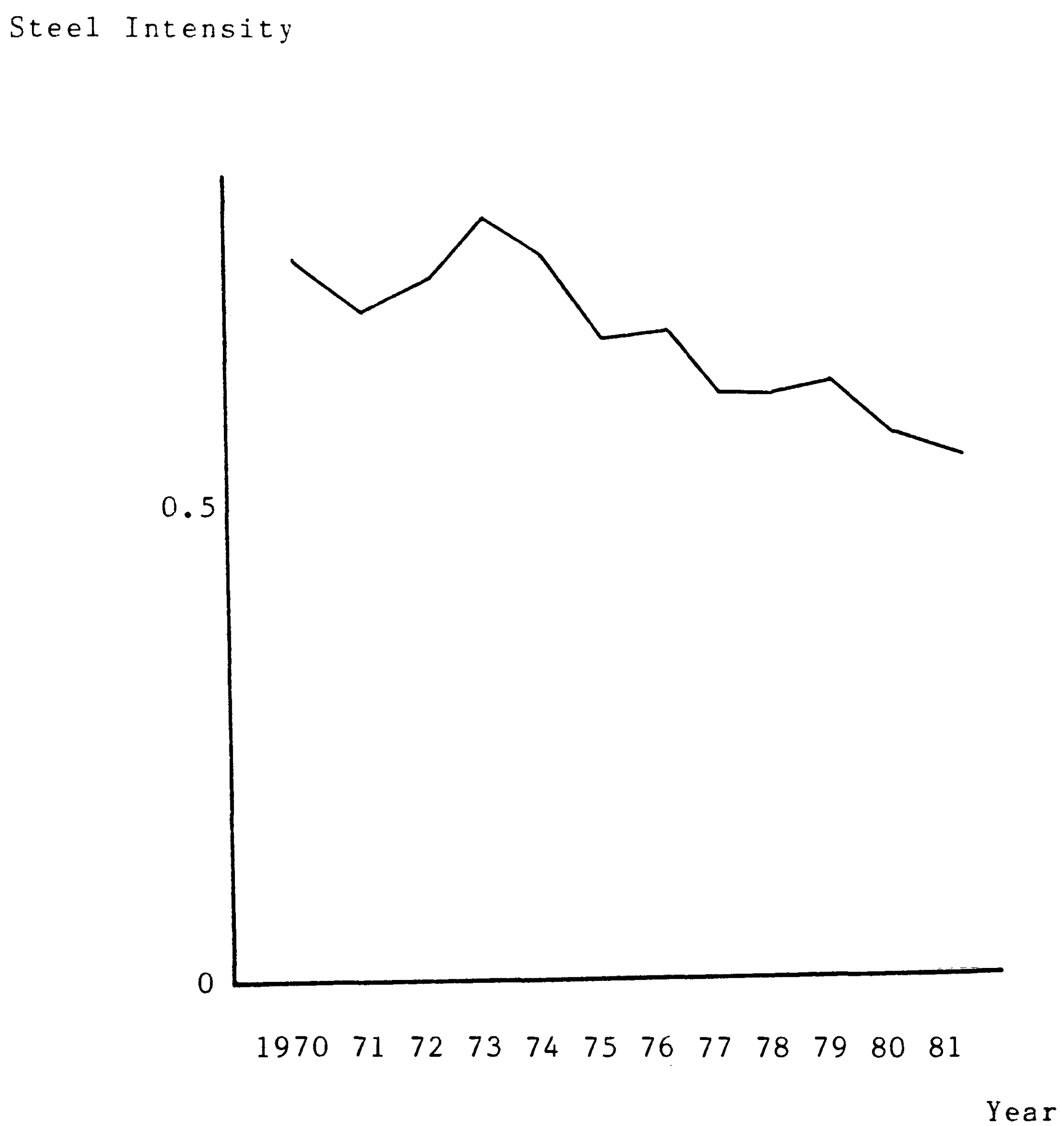

Figure 4

History of Steel Intensity in Japan

(Thousand Metric Tons/Billion Yen)

Source: <u>Energy Statistics</u>, 1982, Agency of Natural Resources and Energy, Tokyo

2) Japanese primary energy sources depend heavily upon oil, especially from the Middle East (56.9% in 1978).

Since there is frequently religious, racial, and boundary conflict in the Middle East, the Japanese energy supply is very fragile. The government is trying to reduce dependence upon oil as one way to solve this problem; development of new substitute energy sources for oil, such as coal, nuclear, geothermal, and hydro are encouraged. Although the government wants to put a priority on domestic energy sources, domestic sources of traditional energy fuels are small. Therefore, at this time, the government expects that nuclear energy will be a main source of energy in the future. This view is held because once development of a recycle process is completed, nuclear energy will become a semi-domestic energy, partly because fuel costs of nuclear energy are very competitive. The government aims for about a 40% supply of total electric power generated by nuclear power plants and guides the electric power generation industry to do so, but as mentioned before, it is uncertain whether this target will be attained.

Domestic coal is a pure domestic energy source though the quantity is limited. To protect domestic coal, the government currently sets the base price of domestic coal and import quotas. In general, this policy should be effective as shown in Figure 5. Suppose P1 is the prevailing world price, D-D is the domestic market demand, and S-S is the domestic market supply. Without government intervention, domestic supply will be Q1 and Q4-Q1 will be imported. Now if the price is set at P2 or the quantity which can be imported is limited to Q3-Q2, the domestic supply will increase to Q2 because of the higher price; that is, this policy assures an increase in both price and domestic production.

In the Japanese coal market, however, there is another problem. Since many mines were closed during the energy revolution, and most existing mines are currently operating at great depths, the domestic supply of coal is inelastic. Suppose the government sets price to P2 (see Figure 6). The main objective of the government is to secure domestic coal production at the Q2 level. Since Japan needs overseas coal to reduce dependence upon oil, consumers of coal are allowed to import Q4-Q2 for a price of P1. Import quotas are actually not working. The price difference between domestic coal and overseas coal forces the price of domestic coal to decrease; since existing mines are operating at greater depth, the domestic supply curve will shift to the left because of higher cost. As a result, in spite of the

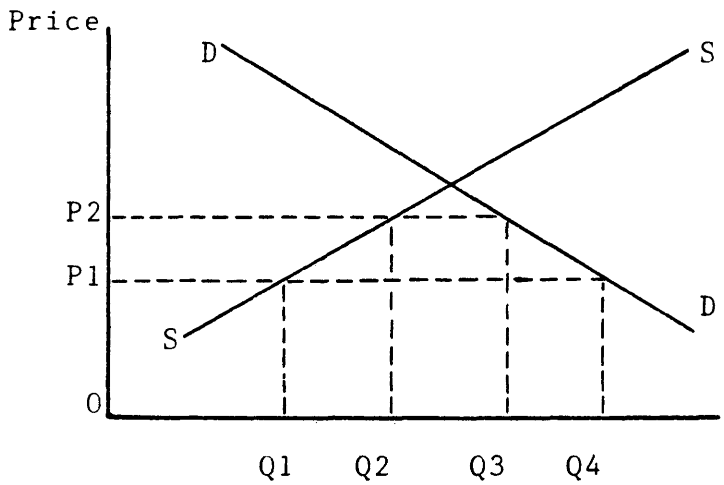

Figure 5

Base Case of Effect of Import Quotas

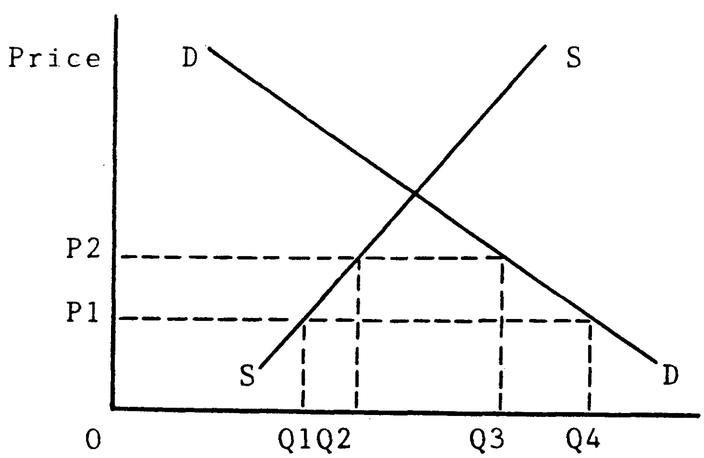

Figure 6

Japanese Case of Effect of Import Quotas government policy, domestic coal production is declining (see Table 5). We would conclude that so long as the current policy continues, domestic coal production will keep on declining.

2-3. Technology

There are two basic types of technology in use for coal: coal-using and coal-mining. Because coal-mining technologies, including those used in exploration, are related to a coal mining company itself, they will be discussed in Chapter 4. This section will concentrate on coal-using technologies. It should be noted that progress in technology does not necessarily make a positive impact on demand for coal. For example, progress in production technology decreased demand for coal in the steel and cement industries, as mentioned before. Progress in technology which will develop a new use of coal or improve a conventional use of coal will increase demand for coal. In this section, a brief explanation of this kind of technology will be made.

2-3-1. Coal Combustion Technology

Coal combustion technology intends to increase the efficiency and flexibility of coal combustion as a source of heat and steam in industry and for electric power

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Table 5

History of Japanese Coal Mines

(Thousand Metric Tons)

	Number of Operational Mines	Domestic Coal Production
1970	74	38,329
1975	35	18,597
1979	26	17,760
1980	25	18,095
1981	30	17,472
1982	28	17,408
1983	30	16,694
1984	30	16,830

Source: <u>Coal Note</u>, 1984, Agency of Natural Resources and Energy, Tokyo generation. The most important of these developing technologies are fluidized-bed combustion and the production of stabilized coal-in-oil suspensions and their use in furnaces designed for oil, and magnetohydrodynamic (MHD) technology (Wilson, 1980: 185). Fluidization technology intends to improve efficiency by improvement of combustors. Coal-oil mixture intends to eliminate disadvantages of handling difficulties by transformation of coal from solid to liquid. MHD technology intends to improve efficiency by improvement of the electricity producing process. These technologies, extensions of conventional use of coal, are trying to increase the competitive power of thermal coal by increasing the efficiency of coal combustion. The first two of these technologies is expected to be in commercial use in a few more years, while the last one needs more time.

2-3-2. Coal Conversion Technology

The main purpose of coal conversion technology is to eliminate disadvantages of coal, such as solidity and pollutants, by gasification and liquefaction of coal. The coal-oil mixture mentioned above has the same purpose. Conversion technologies, instead of a simple mixture of coal and oil, transform coal by chemical reaction. Many methods of coal gasification and liquefaction are currently under study, but most of them are not expected to be in commercial use before the 1990s. It requires long lead times to construct power plants which use newly developed technology. Therefore even if these technologies are completed during the 1990s, it is very unlikely that these technologies would contribute to an increase in demand for coal until 2000.

2-4. Forecast of Domestic Demand for Coal in 2000

Table 6 shows the forecast of demand for coal in 2000, based on discussions above. Basic data of this forecast were supplied by the Japanese government, except demand for thermal coal used in industries other than electric power generation which are based on Chase Manhattan Bank's 1985 forecast. The Japanese government data are considered quite reliable, and form the basis for government policy analysis. It was, therefore, decided to use government data when possible in this thesis. The Chase Manhattan data were used in the one sector because no such data are available from the Japanese government; Chase's forecast is considered to be the most reliable. Reasons for this judgment will be mentioned in Chapter 3. Basic assumptions of the demand forecast are as follows:

1) GNP growth rate in Japan is a 4% annual compound rate.

Table 6

Forecast of Total Demand for Coal in Japan in 2000

(Thousand Metric Tons)

	1983*	2000	1983/2000
Thermal Coal			
Electricity	17,310	63,698	+8.0%
Others	13,800	17,479	+1.4%
Subtotal	31,110	81,177	+5.8%
Coking Coal	66,280	70,934	+0.4
Total	97,390	152,111	+2.7%

*Source: Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

2) Progress in coal-using technologies will not have significant impact on domestic demand for coal.

3) The price of oil will increase modestly toward 2000.

4) Other factors are kept constant unless specified.

2-4-1. Demand for Thermal Coal in the Electric Power Generation Industry

Table 7 shows the forecast of domestic demand for electricity and coal in the electric power generation industry. As mentioned before, the value of the elasticity of electric growth to GNP growth is estimated as 0.8. The Japanese government aims to produce 16% of total electricity by the year 2000 from coal-fired plants. That share in 1980 was 4.4%. Since this industry is under strong government control, this goal is likely to be attained. Thus, a significant increase in demand for thermal coal in this industry can be expected.

2-4-2. Demand for Thermal Coal in Other Industries

Table 8 shows the result of the forecast. Chase Manhattan Bank forecasts 1.4% annually compounded growth in this sector. This rather modest growth rate is predicted for the following reasons:

1) Demand for thermal coal in the cement industry, which is the largest consumer with the exception of

Table 7

Forecast of Demand for Electricity and Coal in the Electric Power Generation Industry in Japan

(Electricity-Billion kwh)

(Coal-Thousand Metric Tons)

	1980*	2000	1980/2000
Electricity	514	921	+3.0%
Coal	9,776	63,698	+9.8%

Assumptions

1. GNP Growth rate is 4%
2. The value of the elasticity of electricity growth rate to GNP growth rate is 0.8
3. Share of coal-fired plants in 2000 is 16%
4. Other factors are kept constant

*Source: Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

Table 8

Forecast of Demand for Thermal Coal in Industrial and Residential Sectors in Japan in 2000

(Thousand Metric Tons)

	1983*	2000	1983/2000
Industrial and Residential Use	13,800	17,479	+1.4%

Assumptions

1. GNP Growth Rate is 4%
2. The price of oil increases modestly

*Source: Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

the electric power generation industry, is not expected to increase.

2) There still exist a number of mid-size and small-size boilers which have not been converted, although they could be. These boilers, both industrial and residential, are expensive to convert because of their size and because the price of oil has not been low enough to justify conversion. Since the price of oil is assumed to increase modestly, this conversion is not expected to advance rapidly.

If the price of oil increases rapidly, demand for coal will be much greater than this forecast predicts.

2-4-3. Demand for Coal in the Steel Industry

Table 9 shows the forecast of domestic demand for coking coal in the steel industry. The Japanese government estimates that the growth rate of demand for coking coal will be at a 0.4% annual compound rate. The reasons for this small increase were mentioned before.

2-5. Forecast of Domestic Supply of Coal in 2000

Production of domestic coal cannot be discussed on only an economic basis; it must also be considered on a political basis. Total revenue of domestic coal mines did not cover

Table 9

Forecast of Demand for Coking Coal in Japan in 2000

(Thousand Metric Tons)

	1983*	2000	1983/2000
Demand for Coking Coal	66,289	70,934	+0.4%

Assumptions: Growth rate of demand for coking coal is 0.4% annual compound rate.

*Source: Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

even their production costs in 1979 (see Table 10). The government wants to raise the base price at least to the level of breakeven. However, because of the comparison of the price of overseas coal, the government has not been able to do so (see Table 11). As mentioned in Section 2-2, until the government strictly regulates the quantity of import coal, the price of domestic coal is forced to decline. Moreover, every mine is operating at greater depth. As a result, although the government aims for 20 million metric tons coal production, actual output is decreasing as already shown in Table 5. After 1973, output decreased constantly at 2.2% annual compound rate. As long as current policy is maintained and current technologies remain in use, this trend will continue.

Putting it all together, Table 12 shows the balance of domestic demand and supply of coal in 2000, which indicates there will be about a 136 million metric ton shortage of coal in 2000. Japan has to depend upon overseas coal to compensate for this imbalance. In the following chapter, environments of overseas coal will be discussed.

Table 10

Total Profit and Loss of Coal Companies in Japan in 1979

(Quantity-Thousand Metric Tons)

(Million Yen)

Quantity of Coal Sale	16,070
Total Coal Sale	249,763
Production Costs	280,535
Gross Margin	- 30,772
Government Subsidy	22,348
Non Operating Loss	- 3,147
Ordinary Loss	- 11,571

Source: Sumitomo Bank, 1979

Table 11

Comparison of Price of Coal between Domestic and Import

(Yen/Metric Ton)

	Coking		Thermal	
	Domestic	Import	Domestic	Import
1970	6,228	5,317	5,357	-
1975	14,930	12,610	11,380	10,700
1980	21,290	12,280	17,850	12,100
1981	22,260	14,970	19,075	15,190
1982	23,730	16,720	20,115	16,010
1983	23,680	13,080	20,115	12,520

Note: The price of imported coal is the average CIF price

Source: Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

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Table 12

Balance of Domestic Demand and Supply of Coal in 2000

(Thousand Metric Tons)

	1983*	2000
Demand	97,390	152,111
(Thermal)	(31,110)	(81,177)
(Coking)	(66,280)	(70,934)
Supply	18,660	12,784
(Thermal)	(14,460)	(9,907)
(Coking)	(4,200)	(2,877)
Balance	-78,730	-139,327
(Thermal)	(-16,650)	(-71,270)
(Coking)	(-62,080)	(-68,057)

Assumption: Supply of domestic coal will decrease at a 2.2% annual compound rate

*Source: Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

Chapter 3

ENVIRONMENTAL FACTORS OF OVERSEAS COAL

This study has discussed the increasing demand for coal which Japan will experience as the year 2000 approaches, and has reviewed necessary incremental dependence upon overseas coal. In this chapter, environmental factors of overseas coal will be analyzed.

3-1. World Coal Demand

World Coal Study (WOCOL) in 1980 made an optimistic forecast of demand for coal (Wilson, 1980: 87-117). Basic assumptions of this forecast are as follows.

1) In OECD countries toward 2000: (a) electricity growth rate will be 3%-3.9%; (b) steel production growth rate will be about 1.2%-1.8%; (c) thermal coal use in other sectors will increase at about 4.1%-6.7% annually compounded; all of which will bring a 3.1%-5% annually compounded growth rate in demand for coal.
2) Growth rate of demand for coal in developing countries will be a little higher than that of industrialized countries.

Based on the assumptions above, WOCOL made the forecast that demand for coal will be 6-7 billion metric tons in

2000, which represents an annual growth rate of 4%-4.5%. After careful analysis of each variable, this author believes that this forecast is now too optimistic. The biggest disadvantages of this forecast are that it was based on conditions existing in 1977, and did not take into account factors which appeared after the second oil price shock, such as worldwide recession and the rather stable price of oil after 1982. For example:

1) The WOCOL forecast assumed that in OECD countries, conversion from oil to coal in the electric power generation industry would advance rapidly because of limitation of supply of oil. Therefore the expected growth rate of demand for coal between 1977 and 1985, which was predicted at 3.7%-4.9%, was somewhat higher than the actual growth rate between 1980 and 1983 which was 2.5%.
2) The WOCOL forecast overestimated increase in demand for coal in the steel industry. Although this forecast estimated that demand for coal in the steel industry would increase at about 1.2%-1.8% compounded annually to 2000, the actual growth rate between 1979 and 1983 in industrialized countries was -6.4%, and in the world, -2.3%.

Therefore WOCOL made the forecast that total demand for coal would increase 2.8%-4.1% compounded annually between 1977 and 1985, while actual growth rate between 1979 and 1983 was 1.9%.

The most recent forecast was made by Chase Manhattan Bank in 1985. According to this forecast, total demand for coal in the world will increase at about 2.1% compounded annually through the end of this century (see Table 13), while WOCOL expected 4%-4.5%. This increase will be led mainly by the electric power generation industry and total demand for coal will amount to about 5.5 billion metric tons (Colarco, 1985: 81-101). Basic assumptions of this forecast are

1) GNP growth rate will be about 3% compounded annually to the year 2000.
2) The value of the elasticity of electricity growth to GNP growth will be about 1; that is, electricity growth will be proportional to GNP growth.
3) Growth rate of raw steel production will be about 0.7% compounded annually to 2000.
4) Growth rate of demand for thermal coal in sectors other than electric power generation industry will be about 1.5% compounded annually to 2000.

Table 14 shows the comparison of several forecasts. The later the forecasts are, the smaller the growth rates

Table 13

Forecast of World Coal Consumption

(Million Metric Tons)

	1983	2000	1983/2000
Electricity	2315.7	3631.1	+2.7%
Industrial & Other	1070.0	1379.1	+1.5%
Sub Total	3385.7	5010.4	+2.3%
Coking Coal	503.9	525.5	+0.02%
Other	28.5	39.1	+1.9%
Total	3918.1	5575.0	+2.1%

Source: World Coal Outlook to 2000, 1985, Chase Manhattan Bank N.A.

Table 14

Comparison of Several Forecasts

	Annual Compounded Growth Rate	Note
WOCOL(1980)	4%-4.5%(1980/2000)	OECD Countries
IEA(1982)	3.1%-3.9%(1980/2000)	OECD Countries
TEXACO(1984)	3.4%(1985/2000)	Western Countries
CHASE(1985)	2.1%(1985/2000)	World
	2.3%(1985/2000)	Western Countries

Sources: Coal-Bridge to the Future, 1980, WOCOL

World Energy Outlook, 1982, IEA

World Energy Prospects to 2000, 1984, Texaco

World Coal Outlook to 2000, 1985, Chase Manhattan Bank are, because they took into account worldwide recession and rather stable price of oil after 1982. Therefore we would conclude that Chase Manhattan Bank's forecast seems reasonable under today's conditions.

3-2. World Coal Supply

Coal is recognized as the most important substitute energy for oil because the supply of coal seems reliable. World coal reserves which are technically and economically recoverable are estimated at about 663 billion metric tons (see Table 15). Since total expected recovery of oil is estimated at from 216 to 318 billion metric tons (IEA, 1982: 211), coal reserves equivalently are equal to about more than double the oil reserves. Moreover, coal reserves are mostly distributed in advanced countries. There is very little possibility that those countries will experience major political changes or nationalization of mineral resources. The potential availability of coal is large enough to satisfy increasing demand for coal in the world.

Nonetheless, development of a new coal mine also has several disadvantages. The first is that it is very difficult for the mine to adjust its production level once it is completed. If demand for coal decreases after the mine is completed, the mine will have no choice but to hold excess inventory. A second disadvantage is that development

Table 15

World Coal Reserves

(Million Tons Coal Equivalent)

	Technically and Economically Recoverable Reserves
United States	166,950
Soviet Union	109,900
People's Republic of China	98,883
Poland	59,600
United Kingdom	45,000
Republic of South Africa	43,000
Australia	32,800
Others	106,799
Total	662,932

Source: Coal-Bridge to the Future, 1980, WOCOL of a new mine requires a long lead time for planning and development of both the mine and required infrastructure as well as a substantial investment. Finally, the level of investment required to get a mine into production can be prohibitive. Without assured or firm expectations of substantial growth in coal demand, the necessary investments may not be made (IEA, 1982: 315). Therefore development of new coal mines should be made in a carefully programmed manner.

It was pointed out earlier that Japanese dependence upon imported coal would increase toward 2000. In the following section, environments of several foreign countries from which Japan might import coal will be discussed.

3-3. Environments of Selected Countries

Australia currently exports the largest quantity of coal to Japan. Other important suppliers are the United States, Canada, South Africa, and the People's Republic of China (see Figure 7). Considering reserves and environmental factors such as distance to Japan, it is probable that these five countries will dominate coal export to Japan toward the end of this century. In this section, coal supply environments of these five countries will be studied. The governments of these five countries are adopting positive policies to introduce foreign capital to

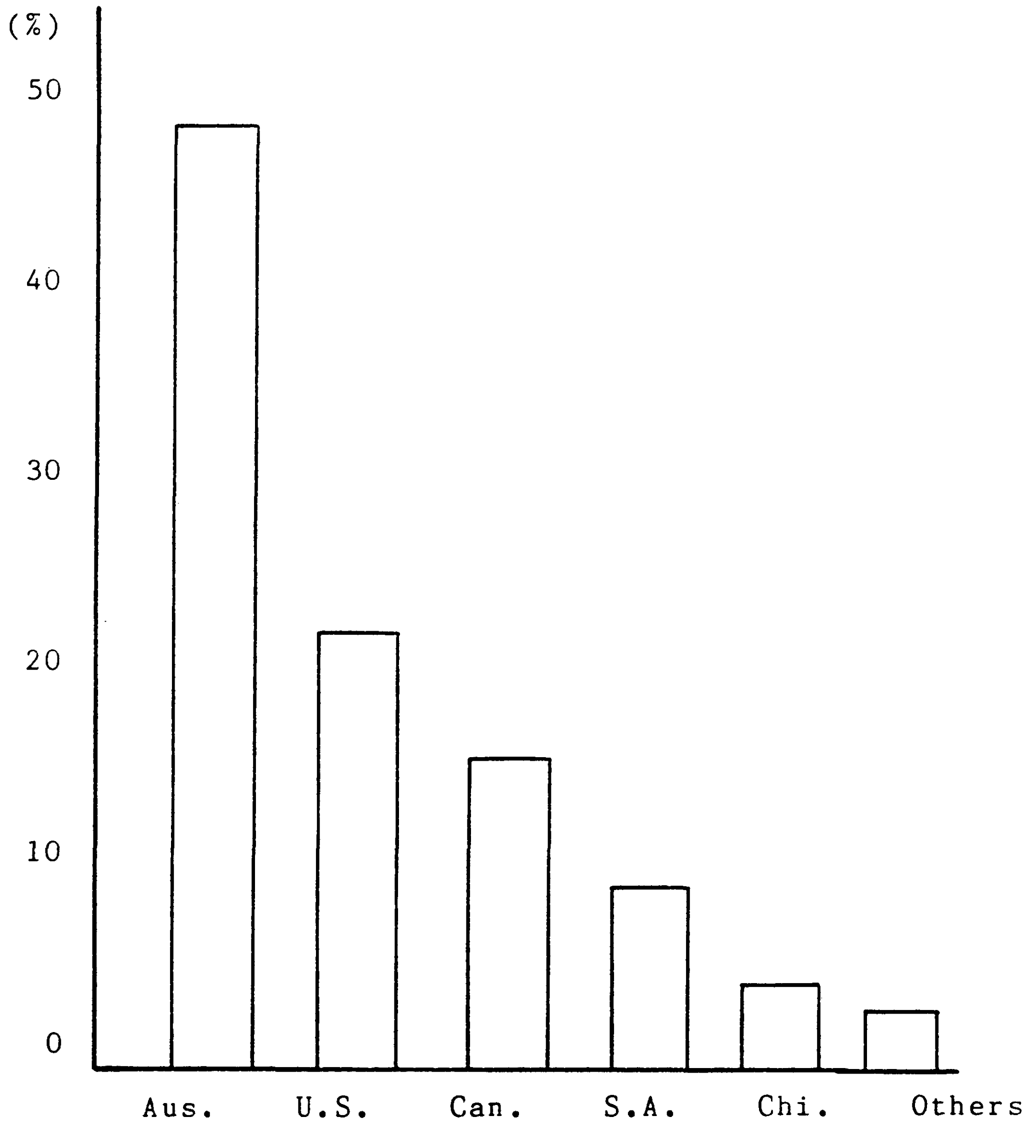

Figure 7

Import Share of Selected Countries

Source: Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

develop a coal mine, and the Japanese government does not have a preference from which country Japan should import. Therefore, cost is the main variable for the coal importers of Japan to consider in deciding from which country to import. Table 16 shows the breakdown of cost and price of each coal in 1983. IEA surveyed the proportion of each cost in 1981, and this table is based on the assumption that the proportion of cost did not change between 1981 and 1983. It should be noted that total cost is associated with three elements: capital cost, operating cost, and foreign exchange rate.

3-3-1. Australia

Australia is the largest exporter of coal to Japan. Low ocean freight, due mainly to the close proximity of Australia to Japan, is the main factor which gives a competitive edge to Australian coal. One surprising fact is that the price of Australian coal is higher than that of South African coal. Originally Australian coal mines were located near the port, but now mines are located inland. The cost of production facilities and infrastructure is growing. As a result of the rapidly rising cost of infrastructure, it has become more profitable to exploit coal deposits by underground mining in the built-up areas of New South Wales, than to develop open-cut mines in some of the

Table 16

Competitiveness of Selected Overseas Coal to Japan in 1983

(U.S. Dollars)

	U.S.	Australia	Canada	South Africa
FOB Mine	29-32	29-35	25-34	24-30
Inland Tran.	12-14	10-12	10-18	5-7
Loading	2	2	1	1
Ocean	17	8	15	15
Unloading	1	1	1	1
Delivered Price	63	54	58	50
Distance(km)	17,610	6,200-8,000	7,000-8,000	14,360

Note: This model is based on the price of thermal coal.

Source: World Energy Outlook, 1984, IEA

more remote areas of the country. In New South Wales, the development of an underground mine designed to produce one million tons of coal per annum can be expected to cost $25-$100 million. By the same token, to develop an open-cut mine producing three million tonnes of coal per year in Central Queensland will normally cost about $400 million, but could cost much more (Banks, 1983: 152). Looking at the price of coal by FOB-port, there is a $10 difference between Australian coal and South African coal. On the other hand, to expand export of coal, Australia has to depend upon this inland coal. Therefore future expansion of coal exports will mainly depend upon how improvement of infrastructure is programmed and upon how costs are expected to increase.

3-3-2. The United States

This model is based on eastern underground coal. Expensive inland transporation cost and ocean freight resulted in the highest price among these four countries. The United States also has a large deposit of coal in the western part of the country, with a low sulfur content which is developed by open-cut mining. But so far, this coal does not attract Japanese coal consumers because of its extremely high inland transportation cost. Since operating cost and ocean freight will become more competitive, there is a good possibility that this high quality coal from western part of

North America will become more attractive to Japanese coal importers, once improvements to inland transportation and port facilities have been completed (IEA, 1982: 292). Based on the current condition, import of thermal coal from the United States cannot be expected unless the price of coal from other countries increases.

3-3-3. Canada

Japan is currently importing mostly metallurgical coal from Canada. One interesting thing concerning Australia, the United States, and Canada, is that the FOB-port delivered price is exactly the same at $43. This means that although there are differences between each mine in each country, such as quantity of reserves, distribution of reserves, thickness of coal seam, and location, operating costs and inland transporation costs are very similar. In other words, the competitive power of each coal depends heavily upon maritime transportation costs. This is the reason why Australian coal has a competitive edge over American and Canadian coal at this time. As mentioned before, demand for thermal coal is expected to increase but demand for coking coal is not. To expand Canadian export of thermal coal, reduction of inland and maritime transportation costs will be required. Japanese participation in development of coal in these three countries--Australia, the

United States, and Canada--are currently dominated by the Japanese trading company as will mentioned later.

3-3-4. South Africa

South Africa is using coal as a primary energy source and is concentrating on development of thermal coal. Japan began to import thermal coal after the first oil price shock. South African mines are located relatively near the main port, Richard Bay. Further South Africa has not yet reached the capacity of the coal-loading equipment installed at Richard Bay. The resulting low inland transportation cost makes South African coal competitive. Also the mine-mouth cost of coal in South Africa is uniformly one of the lowest in the world. There is one thing that should be noted about the price of South African coal, the foreign exchange rate. The South African rand decreased its value relative to the U.S. dollar in 1983. In 1982, R1 = $0.95, while R1 = $0.82 in 1983. At the time this writing (mid-October 1985), South African coal was even more competitive as the South African rand had declined to R1 = $0.38. The CIF price of South African coal in 1982 was about $61. The actual received amount of the South African rand was about R64. The CIF price of South African coal in 1983 was only about $50, an 18% decrease. However, the actual received amount was about R61, a 5% decrease. Evidently the change in foreign exchange rate gave another competitive edge to South African coal in 1983. Considering that South Africa has larger amounts of coal reserves than Australia, and that infrastructure, such as inland transportation and loading facilities, was already well arranged in South Africa, South African coal is expected to be competitive to other major importing coal.

3-3-5. People's Republic of China

There are no data available about mining and transportation costs of Chinese coal. Although China has the third largest technically and economically recoverable reserves, China cannot afford to export large quantities of coal at this time because about 70% of its primary energy supply depends upon coal. China requires enough capital and technologies to develop new coal mines. Development of a new coal mine in cooperation with Japanese coal companies may be attractive to both countries, and some negotiations are currently proceeding. Since China definitely has the potential capability to export large amounts of coal (the third largest reserves in the world), and has the advantage of near location of coal mines to the port and also has the advantage of proximity to Japan (2000 km), Chinese coal will be competitive if infrastructure is improved.

3-3-6. Other Areas

India and Colombia are other potential coal exporters to Japan. India is the second largest coal producing country in Asia (ANRE 1984: 115). However, most of India's coal is consumed in the domestic market. In order for India to export coal, production facilities and infrastructure must be improved. Although a very small amount of coal is currently imported by the Japanese electric generation industry, competition from India is not expected until after the turn of the century (Montalvo 1984: 76).

In Colombia, Exxon Corporation and the Colombian government are developing El Cerrejon thermal coal, of which there are estimated total reserves of 3 billion tonnes (Montalvo, 1984: 2-7). Although Japanese coal importers currently are not interested in Colombian coal because of the distance from Colombia to Japan, one study suggested that competitiveness of Colombian coal is very similar to that of South African coal because of low inland transportation costs (Montalvo, 1984: 37-38). This author also believes that it is likely that Colombian coal will attract the attention of Japanese coal importers because (a) it is important to diversify sources of supply; (b) although South Africa is located far from Japan, South African coal is currently the most competitive because of other factors such as inland transportation costs and foreign exchange rates; (c) Colombian coal is of good quality (Montalvo, 1984: 11); (d) to capitalize technologies effectively, it is better to develop a coal mine in developing countries than in industrialized countries with established technologies. In three countries, South Africa, China and Colombia, which are potential exporters of coal to Japan, the domination of the Japanese trading company is not established yet (Tex, 1984).

3-4. Advance of Japan into Overseas Coal

There are currently eighteen operating overseas coal mines in which Japan is participating (see Table 17). The current Japanese advance overseas is dominated mainly by a trading company. The trading company plays a role as go-between for coal exporters and coal importers. The basic process is as follows:

1) The trading company collects information about a new coal mine project and evaluates its feasibility based on a report which is made by the developer.
2) If the trading company considers that the project is feasible, the trading company will search out Japanese coal consumers.
3) After finding consumers, the trading company will coordinate a contract between the exporter and the importer; if necessary, the trading company will

Table 17

Operating Overseas Projects in Which Japan Participates

	Coking	Thermal	Both	Total
Australia	6	3	4	13
Canada	3	0	2	5
Total	9	3	6	18

Source: Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

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also invest.

3) When production begins, the right to import coal belongs to the trading company and the trading company will receive a handling commission as an agent of the importers. This is the main revenue of the trading company.

Most coal from Australia, the United States, and Canada is imported by the trading company.

Japanese coal mining companies are not playing any significant role in coal importing. Their role is no more than that of other consumers; that is, they purchase coal from the trading company and sell it to other consumers. There is no doubt that the trading company is playing an important role, such as collection of information and supplying capital. However, as in the case of China, technological cooperation will be a more important factor in a Japanese advance overseas, especially in the case of developing countries. From the coal mining company's point of view, there is no room left for the coal mining company to get involved in the projects in industrialized countries because of the domination by the trading company. Since coal in three countries, South Africa, China, and Colombia, is expected to be competitive and is not dominated by the trading company, there is a good possibility for Japanese coal mining companies to develop coal mines in these countries. In Chapter 4, internal factors of Japanese coal mining companies will be discussed.

Chapter 4
INTERNAL FACTORS AFFECTING JAPANESE COAL MINING COMPANIES

The major purpose of this chapter is to examine the strengths and weaknesses of the coal mining companies; that is, to consider the internal factors which affect the strategic plan. The plan will then build upon the forecast of external environments that this study discussed so far:

1) Demand for coal, especially thermal coal, will increase both in Japan and in the world.
2) Since domestic coal production is not expected to increase, Japan has to increase its dependence upon overseas coal.
3) There is good potential for Japanese coal companies to make use of their technologies.

According to Hodgetts (1982, 72), strategic plans should be built on a company's strengths and minimize its weaknesses. Material and human resources of Japanese coal companies will be studied in this chapter to identify the internal factors that will become elements of the strategic plan.

4-1. Material Resources

Material resources consist of three factors:

production capacity, financial strengths and technologies. Each will be examined, with the expectation of finding aspects that can be exploited by the plan.

4-1-1. Production Capacity

As mentioned before, domestic coal production cannot be expected to increase because of the poor distribution of resources. Japanese coal is distributed deep underground, requiring an operation with long, deep, and steep tunnels. Average depth of operation was about 640 meters in 1983, while Australian underground coal is 150 meters to 300 meters deep (Japan Economic and Industry News, 1984). In deep and steep tunnels, the extraction is unavoidably labor intensive, which decreases the overall productivity of the mine. As a result, productivity of Japanese coal mines does not compare well with the productivity of mines in foreign countries (see Table 18). This low productivity causes extremely high production costs and brings great losses to Japanese coal companies. It was shown earlier that revenue does not cover even production costs. Therefore, development of domestic coal cannot be considered economically sound. Without government subsidy, Japanese coal mining companies will not be able to keep producing coal. Because the basic mission of coal mining companies is to supply energy needs of industrial and residential use, coal mining

Table 18

Comparison of Productivity in Selected Countries in 1983

(Thousand Metric Tons)

(%)

(Metric Tons/Person/Day)

	Underground	Surface	Total
U.S.	247,850	460,293	708,142
	(35.0)	(65.0)	(100.0)
	10.25	27.89	16.55
Australia	53,227	67,108	120,335
	(44.2)	(55.8)	(100.0)
	7.84	18.97	11.66
Japan	15,155	1,539	16,694
	(90.8)	(9.2)	(100.0)
	NA	NA	2.97

Sources: National Coal Association, 1984

Coal Note, 1984, Agency of Natural Resources and Energy, Tokyo

Coal Manual, 1985, Tex Report Inc., Tokyo companies should not concentrate on domestic coal but on overseas coal.

4-1-2. Financial Strength

Japanese coal mining companies are weak financially because of the losses they have experienced over time. The debt to equity ratio, which measures the contribution of financing by owners with financing provided by creditors, is one indicator. The debt to equity ratio of the Mitsui Mining Co., the largest coal mining company in Japan with three operating mines, amounted to 1,362.8% in 1984. For purposes of comparison, the average debt to equity ratio for manufacturers in Japan is estimated at about 400% (Sumitomo Bank, 1979). To get a profit from amalgamation is one way to improve this ratio. But this author believes that coal companies do not have to do so because this ratio basically should be improved by operating profits. If current operations are going well, it is not appropriate to be too concerned with this ratio. Another problem is the fragile base of business. Coal companies closed unproductive coal mines and concentrated on relatively profitable mines during the 1960s when the so-called energy revolution--replacing coal with oil--advanced. Each coal mining company currently operates one to three coal mines upon which it depends. If a serious accident, such as cave-ins and gas explosions were to happen, the effect would be devastating. One coal company went bankrupt because of the gas explosion which killed 93 miners in 1981. To counter this weakness, coal companies sought diversification into other product areas. For example, Mitsui Mining Co. is selling not only domestic coal but also raw materials, such as coke, cement, and oil (see Table 19). However, this diversification did not occur to any significant degree, and did not significantly improve their financial strength. The kind of diversification which Japanese coal companies are currently seeking is wrong. To sell raw materials other than coal is clearly in contradiction to the external factors, structural changes in the economy, mentioned in Chapter 2. Under current conditions, the main concern should be how to get added value by capitalizing technologies. In this sense, Japanese coal companies should pay attention to development of overseas coal mines that will satisfy both the basic mission and external factors, and which will counter the financial weakness by diversification of sources of revenue.

4-1-3. Technologies

Although the productivity of Japanese coal mines cannot compare favorably with that of foreign open-pit coal mines, it is indisputable that Japanese underground coal mining technology is at a high level despite severe mining

Table 19

Example of Diversification

(% of Total Sales)

	Mitsui Mining Co.	Sumitomo Mining Co.	Mitsui Matsushima Co.
Coal	39.0	54.5	44.5
Coke	20.1	-	-
Oil	15.8	-	-
Building Material	13.6	26.3	38.6
Super Market	-	13.0	5.2
Others	11.5	6.3	11.7

Source: Annual Report of each Company

conditions (Yamaguchi, 1984: 848-851). In Chapter 3, this study viewed environments of seven countries from which Japan is expected to import coal. In South Africa, large amounts of coal are produced by underground mining. Australian coal, which is located near the port, is developed by underground mining. China wants to develop a coal mine in cooperation with Japanese coal companies. It appears that there is a good possibility for Japanese coal companies to capitalize on their well-developed underground mining technologies. Such a strategy could strengthen Japan's bargaining power in dealing with potential coal exporters.

4-2. Human Resources

The biggest problem concerning human resources of Japanese coal mining companies is the composition of the work force. The average age of a coal miner was 42 years in 1983, compared with 31 years in the United States in 1978. As already mentioned, the biggest strength of Japanese coal companies is in their well-developed technologies. It should be noted that technologies belong to personnel, and in this sense human resources should be recognized as the most important resource in coal companies. To keep this strength in the company, it is indispensable to have young people in the company and to train them. If Japanese coal mining companies are to remain viable and active in mining

Japanese coal, they need to implement policies to encourage young people to become coal miners. Because of adverse underground conditions, some special incentives may be required. Motivation theory can be applicable to this problem. Maslow has represented the needs in hierarchical form, with those at the lower levels requiring basic satisfaction before the individual can move on to the upper level (Hodgetts, 1982: 314). See Figure 8. Physiological needs are those necessary to sustain life and include food, water, clothing, and shelter. Safety needs are protection from physical danger, such as an accident. Friendship and affection are examples of social needs. Esteem needs affect one's sense of personal respect and competence. Self-actualization needs are an attempt to realize full personal potential. When physiological needs and safety needs are basically satisfied, social needs become important (Hodgetts, 1982: 316). Currently, only physiological needs appear to be satisfied. The average salary of a coal miner is slightly higher than that of other manufacturers (Tanaka, 1985: 79). However, between 1973 and 1983, accidents such as cave-ins and gas explosions killed 505 and injured 21,983 miners (ANRE, 1984: 403). This number is too large to satisfy safety needs. It was pointed out that a considerable number of accidents could have been prevented if safety

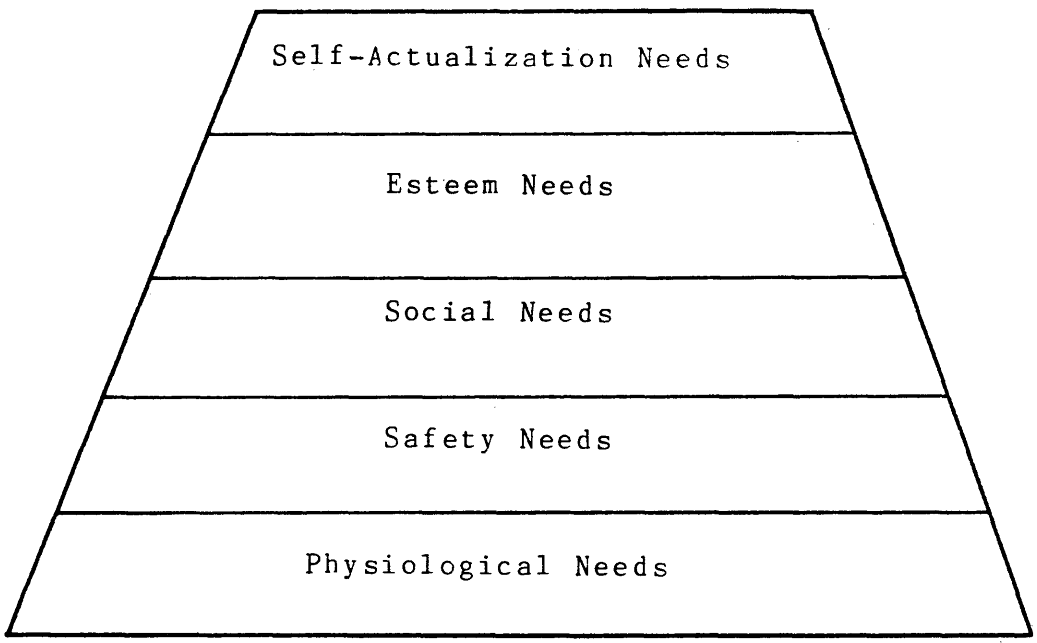

Figure 8

Maslow's Hierarchy of Needs

facilities had been completed (Hirasawa, 1981: 62). To counter human resource weakness, coal companies must improve safety facilities and enhance their images. After that, participation in overseas projects will give young people another incentive to enter the coal industry; increases in esteem and self-actualization will come from overseas work.

Chapter 5

CONCLUSIONS

This study has investigated elements of strategic planning for long run survival of coal companies in Japan. Considering the results, the strategic plan should satisfy the following criteria:

(1) It should be associated with energy supply to meet the basic mission.

(2) It should not be risky, or it will be in contradiction to corporate culture.

(3) It should meet incremental domestic demand for coal, a political and economic expectation.

(4) It should compensate for the decreasing supply of domestic coal.

(5) It should aid Japanese coal companies in playing a more important role in the development of overseas coal mines, especially in developing countries.

(6) It should counter financial weakness.

(7) It should compensate for insufficiencies in the work force.

(8) It should capitalize on the well-developed underground mining technologies, the major strength of Japanese coal companies.

Based on discussion in earlier chapters, this author believes that positive participation in overseas coal projects in developing countries, especially South Africa, China, and Colombia, is the best strategic plan for Japanese coal mining companies at this time. This strategy is clearly consistent with the basic mission of the coal mining company. Overseas coal projects may look risky. Generally speaking, major risks of overseas projects are physical risk, such as unexpected quantity and unexpected quality; market risk, such as decreasing demand; and country risk, such as nationalization of resources. Since by analysis of external factors, market risk and country risk can be neglected, physical risk is of current concern, and can be considerably controlled by the coal mining company itself. Planning is not intended to eliminate risk, but rather to select the risk to be taken (Quick and Buck, 1983: 7). In this sense, it is preferable to select the controllable risk of developing foreign coal sources than the unfamiliar risk of getting into other business to diversify sources of income. A similar example of diversification into unfamiliar businesses would be the relatively recent examples of Grupo Visa and Grupo Alfa in Mexico in the early 1980s. These companies are presently selling off their purchases and moving to their areas of earlier expertise. The suggested plan compensates for decreasing supply of domestic coal to satisfy increasing domestic demand for coal. This strategy gives an important role to Japanese coal mining companies, which is only played by them, in overseas coal projects. This strategy will counter financial weakness. Multiple coal projects will diversify sources of income. Moreover, participation in overseas coal projects implies sales of Japanese technologies; in other words, sales of added value, which is expected to increase profits. This strategy will also counter perceived weaknesses in human resources. Cooperation with foreign miners will satisfy social needs. Japanese miners are expected to work as supervisors in overseas projects, jobs that will satisfy esteem needs. Moreover, development of overseas coal mines is a kind of challenge which will satisfy self-actualization needs. As a result, this strategy will be attractive to younger and less conservative management. Finally, as mentioned in Section 3-3-6, technologies can be capitalized upon more effectively in developing countries than in industrialized countries. Therefore this strategy satisfies all criteria.

Another possible alternative is diversification in other raw materials or products as some Japanese coal companies are currently doing. But this strategy is not only contradictory to the basic mission of the coal mining companies but is also risky because it tends to get the companies into unfamiliar business, as mentioned earlier. Moreover, this strategy abandons the strength of the company, which is coal mining technologies. Most of the criteria are not satisfied. Therefore we would conclude that it is participation in overseas coal projects in developing countries that is the appropriate strategic plan for coal companies in Japan.

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