

論 說

**Fuel-Energy Problems under the Political Administration of
M. Gorbachev.**

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Owing to the second oil shortage in 1979, world oil prices rose to their highest level in 1981. They then began a slow decline to about 30 dollars per barrel in 1984 and suddenly dropped to below 15 dollars at the end of 1985. As a result, the amount of hard currency that the Soviet Union received through foreign trade with Western countries was severely affected.

Let us consider this fact in detail. The Soviet Union received over 18 billions dollars in hard currency from oil exports to Western countries from 1982 to 1984. This amount, however, violently decreased to 13.9 billions dollars in 1985 and to 8.6 billion dollars in 1986.⁽¹⁾ In 1985 the dollar began to fall against other major currencies. Soviet terms of trade in 1986, in terms of crude oil versus West German manufactured equipment, dropped 60 percent from the 1983 level and, "As a result, the Soviet leaders faced a familiar conflict between near-term and long-term policy, but even more pressingly than eight years before..."⁽²⁾

Moreover the Soviets had to increase fuel and energy output to accelerate economic growth. They also were forced to import more farm products on account of stagnating agricultural yields in 1984 and 1985. In addition they had to generate hard currency to import technology from developed Western countries in order to be competitive internationally. They continued to export fuel and energy to keep the CMEA under the control of the Soviet Union, and they had to deal with the Chernobyl' nuclear power plant accident.

All these circumstances forced Soviet leaders to increase fuel and energy outputs as had been the trend in the past. Let us consider the following points more closely.

I Factors Influencing Fuel and Energy Output

(1) Increasing Internal Energy Consumption.

According to "Plan Econ"⁽³⁾ estimates based on Soviet government data, the energy/GNP ratio, expressed in oil equivalent, declined in the 1980s due to efforts to conserve energy (cf. Table 1.1). Western data, on the

Table. 1. 1 Energy Unit/GNP Ratio Based on Soviet Data

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
GNP (in billions of 1988 rubles)	650.6	675.3	701.3	733.2	762.5	780.0	806.0	829.5	875.0	901.0
GNP (1980=100)	100.0	103.8	107.8	112.7	117.2	119.9	123.9	127.5	134.5	138.5
RATIO OF ENERGY / GNP (1980=100)	100.0	98.3	96.7	94.0	93.2	94.7	94.2	93.6	91.1	88.3
ELASTICITY OF ENERGY/GNP	N/A	0.53	0.58	0.35	0.77	1.72	0.84	0.76	0.48	-0.06

SOURCE : Plan Econ (Mar. 7, 1990), pp. 6-7.

Table. 1. 2 Energy Unit/GNP Ratio Based on Western Data

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
GNP (in a hundred thousand of 1988 dollars)	2181.0	2197.0	2251.0	2319.0	2348.0	2368.0	2450.0	2492.0	2535.0	2510.0
GNP (1980=100)	100.0	100.7	103.2	106.3	107.7	108.6	112.3	114.3	116.2	115.1
RATIO OF ENERGY / GNP (1980=100)	100.0	101.3	101.0	99.7	101.5	104.6	103.9	104.4	105.4	106.2
ELASTICITY OF ENERGY/GNP	N/A	2.73	0.91	0.53	2.46	4.65	0.81	1.30	1.52	0.17

SOURCE : Plan Econ (Mar. 7, 1990), pp. 6-7.

other hand, shows that the energy/GNP ratio had in fact increased slightly, reflecting energy waste (cf. Table 1.2). The same tendency described above was also indicated by "Plan Econ" with respect to the same ratio calculated in coal equivalent (cf. Figure 1.1). Even if we recognized the data of the Soviet Union government as accurate, we could not conclude that the Soviet Union had succeeded remarkably in conserving energy.

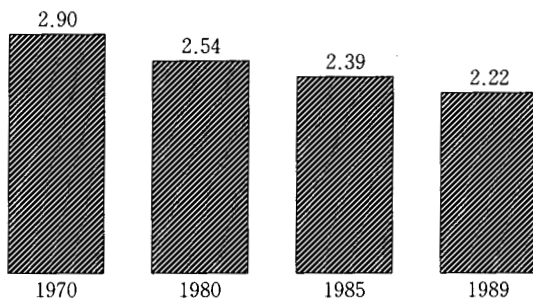
In short, the more the Soviet GNP increased, the more the absolute volume of apparent energy consumption increased throughout the 1980's, with

Table 1.3 Gross Energy Balance of the Soviet Union (thousands of barrels calculated in oil equivalent/day) (growth rate in % versus the year before)

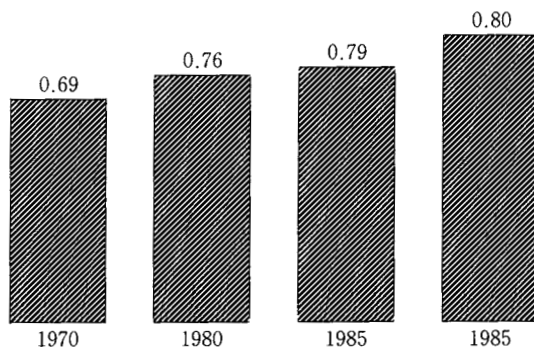
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1981	1982	1983	1984	1985	1986	1987	1988	1989
Output, Total	27546.3	28066.3	28680.8	29275.7	30110.1	30871.1	32192.9	33140.3	34010.5	33861.8	1.9	2.2	2.1	2.9	2.5	4.3	2.9	2.6	4
coal	6410.7	6204.2	6246.1	6151.9	6047.4	6120.5	6387.8	6409.5	6431.0	6128.7	-3.2	-7	-1.5	-1.7	1.2	4.4	3	3	3
natural gas	12093.4	12209.3	12384.7	12360.9	12284.7	11943.4	12338.9	12532.1	12533.3	12188.4	1.0	-6	-6	-6	-2.8	3.3	1.6	0	-2.8
primary electricity	7191.5	7654.2	8201.5	8734.6	9535.2	10390.3	11066.1	11729.0	12394.1	12813.6	6.4	7.2	6.5	9.2	9.0	6.7	5.8	5.7	3.4
the others	1178.0	1245.5	1250.2	1331.1	1577.3	1747.0	1724.2	1855.7	2038.1	2133.9	5.7	4.2	6.5	18.5	10.8	-1.3	7.6	9.8	4.7
Export, Total	627.7	753.1	698.3	697.2	661.5	669.9	655.9	614.0	614.0	604.2	12.0	-7.3	-2	-5.1	1.3	-2.1	-6.4	0	-1.6
coal	4382.4	4614.4	4841.5	5142.6	5303.5	5007.0	5640.0	5950.8	6228.4	5934.4	-7	4.9	6.2	6.2	3.1	-5.6	12.6	5.5	4.7
natural gas	371.7	315.0	314.4	334.8	367.9	400.1	461.7	480.6	530.5	508.2	-15.3	-2	6.5	9.9	8.8	15.4	4.1	10.4	-4.2
primary electricity	901.8	962.7	979.6	988.0	1102.3	3247.9	3741.3	3931.7	4120.8	3728.3	8	6.2	7.7	2	-10.0	11.8	5.1	4.8	-9.6
the others	91.3	92.4	101.3	108.6	113.1	134.0	138.1	159.0	177.5	177.7	1.2	9.6	7.2	4.1	18.5	3.1	15.1	11.6	1
Export, Socialist countries	2670.0	2857.1	2770.9	2771.4	2856.6	2871.8	3082.3	3146.3	3110.4	3051.6	-4	-3.0	0	3.1	5	7.3	2.1	1.1	-1.9
oil	267.8	258.5	261.9	265.5	277.5	292.2	307.3	297.6	303.9	286.6	-3.5	1.3	1.8	4.1	5.3	5.2	-3.2	2.1	-11.6
natural gas	2014.2	2002.3	1874.5	1847.3	1881.9	1866.8	1979.4	1986.3	1913.5	1826.6	-6	-6.4	-1.5	1.9	-1.3	6.6	4	-3.8	-4.7
electricity	512.4	518.2	555.7	577.1	611.3	614.9	687.1	729.7	739.5	806.8	1.1	7.2	3.9	5.9	6	11.7	6.2	1.3	9.1
the others	75.6	78.1	78.8	80.5	85.9	107.9	108.5	130.7	153.5	152.6	3.4	7.9	2.1	6.7	25.7	5	20.5	17.4	-6
Export, Non-Socialist countries	1712.7	1757.3	2070.5	2371.2	2446.8	2135.1	2557.7	2604.6	3117.9	2921.8	2.6	17.8	14.5	3.2	-12.7	19.8	9.7	11.2	-6.3
oil	104.0	56.5	59.5	68.3	90.5	107.9	154.4	183.0	226.6	239.5	-45.7	-7.1	30.1	32.5	19.2	43.1	18.5	23.8	5.7
natural gas	1203.4	1242.0	1571.7	1863.9	1838.2	1491.1	1761.9	1943.4	2207.3	1802.7	3.2	26.5	18.6	-1.4	-18.9	18.2	10.3	13.6	-13.8
electricity	389.5	444.6	423.9	410.9	490.9	510.1	611.7	649.9	660.1	754.5	14.1	-4.7	-3.1	19.5	3.9	19.9	6.2	1.6	14.3
the others	15.8	14.2	22.4	28.1	27.2	26.0	29.7	28.3	23.9	25.1	-10.1	57.7	25.4	-3.2	-4.4	14.2	-4.7	-15.5	5.0
Import, Total	241.8	219.2	360.1	455.6	539.4	466.2	536.0	501.3	637.3	481.9	-9.3	64.3	26.5	18.4	-9.9	10.2	-6.5	27.1	-24.4
oil	93.5	57.7	121.3	155.2	172.0	143.9	152.1	133.0	167.0	111.8	-38.3	110.2	70.9	10.8	-16.3	5.7	-12.6	25.6	-9.5
natural gas	97.8	120.5	189.2	254.3	320.4	289.3	332.4	323.6	435.7	311.8	23.2	57.0	34.4	26.0	-9.7	14.9	-2.6	34.6	-28.4
coal	47.2	37.3	41.8	41.9	42.3	44.5	44.0	39.3	30.0	14.0	-21.0	12.1	-2	1.0	5.2	-1.1	-10.7	-23.7	-53.4
electricity	3.3	3.7	7.8	4.2	4.7	8.5	7.5	5.4	4.6	5.1	12.1	110.8	-46.2	11.9	80.9	-11.8	-28.0	-14.8	10.0
Import, Socialist countries	115.2	79.8	151.8	182.4	200.6	178.0	184.4	166.0	205.8	185.8	-30.7	90.2	20.2	20.2	10.0	-11.3	3.6	-10.0	-9.7
oil	95.5	57.7	121.3	155.2	172.0	143.9	152.1	133.0	167.0	111.8	-38.3	110.2	27.9	10.8	-16.3	5.7	-12.6	25.6	-9.5
natural gas	18.2	18.2	18.2	18.2	18.7	18.3	18.7	16.6	21.5	15.6	0	-5	-6	-2.1	2.2	-11.2	29.5	-27.3	
electricity	2	2	4.6	4.8	5.2	7.3	6.1	11.0	12.7	14.0	0	2200.0	4.3	8.3	40.4	-16.4	80.3	15.5	10.0
Import, Non-Socialist countries	126.6	139.4	206.3	273.2	338.8	308.2	351.6	335.3	431.5	296.2	10.1	49.4	31.2	24.0	-9.0	14.1	-4.6	28.7	-31.4
oil	79.5	102.2	171.1	236.1	301.7	271.0	313.7	307.0	414.2	296.2	28.6	67.4	38.0	27.8	-10.2	15.8	-2.1	34.9	-28.5
natural gas	47.1	37.2	37.2	37.2	37.2	37.2	37.9	28.3	17.3	0	-21.0	0	0	0	1.9	-25.3	-38.9	-100.0	
electricity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Apparent consumption	23205.7	23671.1	24198.4	24588.7	25346.0	26350.3	27088.9	27690.8	28419.4	28370.4	2.0	2.2	1.6	3.1	2.0	2.6	2.2	2.6	-2
coal	6132.5	5946.9	6053.0	5972.3	5851.5	5864.3	6078.2	6061.9	6087.5	5771.7	3.0	1.8	1.3	-2.0	-2	3.6	3.3	1	-4.9
oil	8973.6	9085.5	9027.7	8904.0	8868.9	8884.8	8930.0	8824.0	8848.2	8765.9	1.2	-6	-1.4	-2	0	-5	-1	-8	-9
natural gas	6336.9	6728.8	7263.7	7788.5	8457.2	9309.8	9831.2	10338.8	11024.5	11265.3	6.2	7.9	7.2	8.8	9.8	5.6	5.7	6.1	2.2
primary electricity	1090.0	1156.8	1158.7	1226.7	1488.9	1621.5	1593.6	1702.1	1865.2	1961.3	6.1	0	6.1	19.7	10.4	-1.7	6.8	9.6	5.2
the others	672.7	753.1	698.3	697.2	661.5	669.9	655.9	614.0	614.0	604.2	12.0	-7.3	-2	-5.1	1.3	-2.1	-6.4	0	-1.6

SOURCE: Plan Econ (Mar. 7, 1990), pp. 6-7.

Fig. 1. 1 Energy Unit Necessary to Produce GNP
Energy Consumption in Coal equivalent (1000kg)/GNP
(billions of rubles) Based on Soviet Data



Energy Consumption in Coal equivalent (1000kg)/GNP
(billions of dollars) Based on CIA ESTIMATES



SOURCE : Plan Econ (Mar. 7. 1990) P. 9.

the exception of 1989 (cf. Table 1. 3).

In consequence, I consider that the necessity of meeting increasing internal consumption demanded strongly that the Soviet leaders increased fuel and energy output.

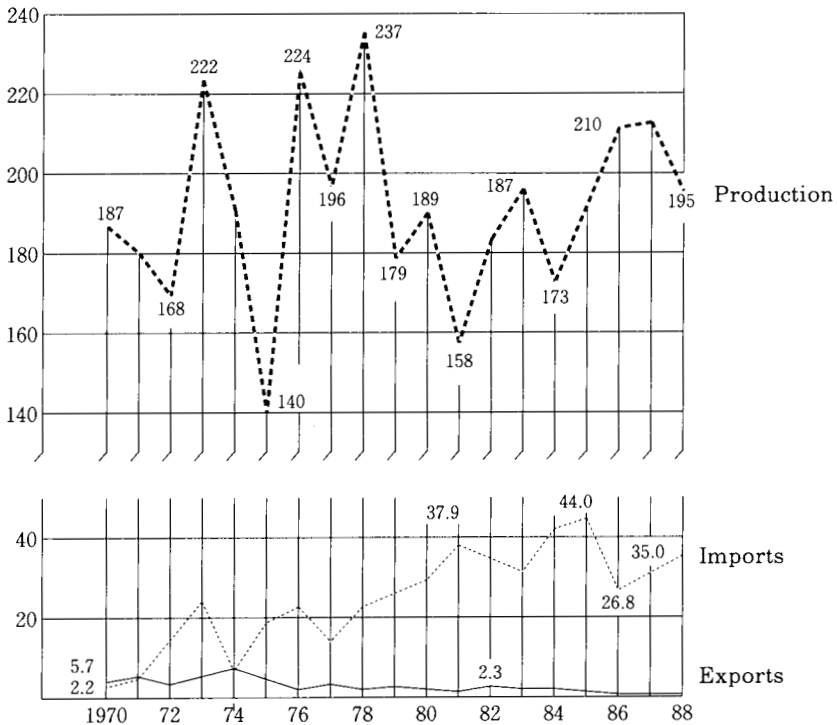
(2) The Need to Import Farm Products

One of the important feature of Soviet agriculture is that farm products yields vary greatly depending on weather. Therefore, Soviet imports

increased or decreased according to the decrease or increase of agricultural yields as they had in the 1980s (cf. Fig. 1.2 & 1.3, Table 1.4).

In 1981 grain production declined to 158 million tons while meat and meat products production increased marginally, resulting in imports valued at 14.5789 billion rubles (cf. Table 1.5). Failure to reach the target levels of the 11th 5 year plan (except in egg production) from 1981 on forced Soviet leaders to spend more than 14 billion rubles on agricultural imports

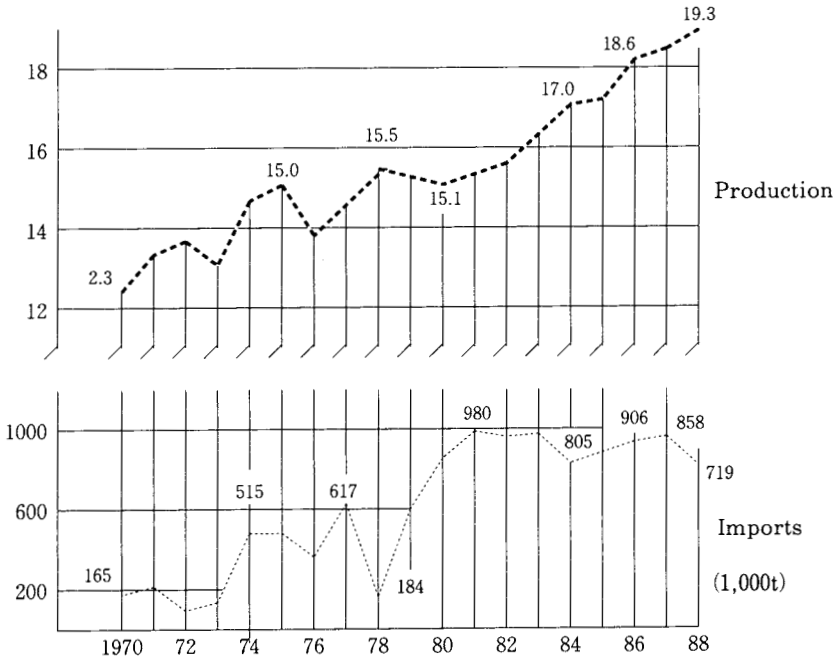
Fig. 1.2 Soviet Grain Production and Grain Imports and exports (millions of tons)



SOURCE : K. OGAWA and K. MOTOMURA ed. Soren. Tokeizai to Nippon. P.67

in 1984 and 1985 (cf. Tables 1.4 and 1.5). Although grain production increased in 1986, allowing a four billion ruble cut in agricultural imports, decreases in both the value and amount of hard currency hindered existing import efforts : the Soviets were forced to replace non-socialist trading partners with CMEA members (cf. Table 1.5).

Fig. 1.3 Soviet Meat, Meat Products Production and Imports (millions of tons)



SOURCE : The Same as Fig. 1.2

Table 1.4 Main Farm Products Production in the Soviet Union

	Grain	Raw cotton	Beet	Sun flower	Potato	Vegetables	Meat	Milk	Eggs
	millions of tons				billions				
1951-1955 (average number of years)	88.5	3.89	24.0	2.46	69.5	11.2	5.7	37.9	15.9
1956-1960 ()	121.5	4.36	45.6	3.67	88.3	15.1	7.9	57.2	23.6
1961-1965 ()	130.3	4.99	59.2	5.07	81.6	16.9	9.2	64.7	28.7
1966-1970 ()	167.6	6.10	81.1	6.35	94.8	19.5	11.6	80.5	35.8
1971-1975 ()	181.5	7.67	76.0	5.97	89.8	23.0	14.0	87.5	51.4
1976-1980 ()	205.0	8.93	88.7	5.31	82.6	26.3	14.8	92.7	63.1
1981-1985 ()	180.3	8.31	76.4	4.97	78.4	29.2	16.2	94.6	74.4
1986	210.1	8.23	79.3	5.27	87.2	29.8	18.0	102.2	80.7
1987	211.4	8.09	90.4	6.12	75.9	29.2	18.9	103.8	82.7
1988	195.0	8.69	87.9	6.16	62.7	34.5*	19.7	106.8	85.2
1989	211.1	8.6	97.5	7.0	72.0	33.5*	20.0	108.1	84.6
1986-1990 (plan, average number of years)	250-255	...	102-103	7.2-7.5	90-92	37-39	20-20.5	104-106	78-79
1990 (goal)	250-255	...	92-95	7.4-7.5	90-92	40-42	21	106-110	80-82

* /inclusive of a kind of melon
 SOURCE : Statistical Yearbook of National Economy in the Soviet Union, Pravda (1991. 1. 28) and the 12th Five Year Plan. K. Ogawa and K. Motomura, op. cit. p. 66.

Table 1.5 Imports of Farm Products, 1979-1988
(millions of rubles, number within () shows %)

	Imports of Farm Products	From Socialist Countries	From Non-Socialist Countries
1979	8,296.0(100.0)	3,988.7(48.1)	4,307.3(51.9)
1980	10,760.0(100.0)	4,398.8(40.9)	6,361.2(59.1)
1981	14,578.9(100.0)	4,760.1(32.6)	9,818.8(67.4)
1982	13,369.4(100.0)	5,793.4(43.3)	7,576.0(56.7)
1983	12,215.8(100.0)	5,526.1(45.2)	6,689.7(54.8)
1984	14,709.0(100.0)	6,657.4(45.3)	8,051.6(54.7)
1985	14,649.5(100.0)	7,606.0(51.9)	7,043.5(48.1)
1986	10,702.2(100.0)	6,987.1(65.3)	3,715.1(34.7)
1987	9,779.3(100.0)	6,781.5(69.3)	2,997.8(30.7)
1988	10,276.3(100.0)	6,506.0(63.3)	3,770.3(36.7)

SOURCE : Statistical Yearbook of Foreign Trade in the Soviet Union (Various Years)

I am fully convinced that the Soviet government must obtain hard currency, in order to have the massive imports of farm products amounting to over 14 billion rubles in 1984 and 1985, on account of stagnating agricultural yields.

(3) The Need to Obtain Hard Currency in order to Obtain Advanced Western Technology

How much did the Soviet Union depend on imports of advanced technology from Western countries? The value of these imports recorded their highest level in 1984 when the share of machinery etc. in total imports amounted to 29.5%. Since then imports of machinery etc. stabilized at a level of over 5.4 billion rubles.

Let us analyze which kind of the machinery the Soviet Union imported from Western countries (cf. Table 1.6,1.7,1.8,1.9,1.10). Since 1981 the import value of pipe increased, continuously. Imported machinery for drilling, well development and geological exploration increased remarkably from 1982 (cf. Table 1.7). In addition the Soviet Union imported most of

Table 1.6 Machinery Imports of the Soviet Union from Western Countries, 1980-1988 (millions of rubles, number within () shows %)

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Imports	15,721.3 (100.0)	18,111.7 (100.0)	18,892.4 (100.0)	18,718.8 (100.0)	19,579.1 (100.0)	19,268.2 (100.0)	15,853 (100.0)	13,812.9 (100.0)	16,320.6 (100.0)
Machinery	4,655.8 (29.6)	4,344.6 (24.0)	5,871.0 (31.1)	6,746.3 (36.0)	5,778.2 (29.5)	5,420.0 (28.1)	5,665 (35.7)	4,721.9 (34.0)	5,666.2 (34.7)

SOURCE : Statistical Yearbook of Foreign Trade in the Soviet Union (Various Years)

Table 1.7 Soviet Imports of Equipment Related to the Gas, Oil and Oil-Refining Industries, 1979-1988 (millions of rubles, number within () shows %)

	Category 127			Category 128			Category 266		
	Total	CMEA	WEST	Total	CMEA	WEST	Total	CMEA	WEST
1979	178.5	152.5	8.4	136.3 (100.0)	70.2 (51.5)	52.6 (38.6)	1,373.6 (100.0)	62.7 (4.6)	1,112.6 (81.0)
1980	188.9	154.5	11.5	249.0 (100.0)	78.1 (31.4)	132.7 (53.3)	1,238.1 (100.0)	71.9 (5.8)	964.0 (77.9)
1981	125.8	114.6	1.0	199.4 (100.0)	85.7 (43.0)	108.1 (54.2)	1,575.5 (100.0)	78.5 (5.0)	1,274.4 (80.9)
1982	54.4	48.2	5.7	659.8 (100.0)	213.7 (47.4)	401.9 (60.9)	2,174.3 (100.0)	232.8 (10.7)	1,414.4 (65.1)
1983	89.6	54.3	34.5	1,298.6 (100.0)	302.4 (23.3)	972.0 (74.8)	1,934.3 (100.0)	232.8 (12.0)	1,575.1 (81.4)
1984	71.7	52.4	6.3	1,031.2 (100.0)	267.9 (26.0)	738.1 (71.5)	1,851.4 (100.0)	233.0 (12.6)	1,556.3 (84.0)
1985	109.6	104.2	1.2	627.2 (100.0)	333.7 (53.2)	271.0 (43.2)	1,889.9 (100.0)	251.0 (13.3)	1,561.6 (82.6)
1986	126.2	97.7	2.3	692.6 (100.0)	427.3 (61.7)	221.6 (32.0)	1,999.5 (100.0)	270.1 (13.5)	1,657.9 (82.9)
1987	92.8	80.1	7.3	857.1 (100.0)	402.7 (47.0)	382.1 (44.6)	1,734.1 (100.0)	255.7 (14.7)	1,445.1 (83.3)
1988	97.9	94.1	1.2	634.1 (100.0)	454.7 (71.4)	170.2 (26.9)	1,989.2 (100.0)	238.7 (12.0)	1,138.3 (57.2)

SOURCE : T. Gustafson ; Crisis amid Plenty, pp. 197-199. and Statistical Yearbook of Foreign Trade in the Soviet Union (1988).

Noto : Category 127 is defined as "equipment for the oil-refining industry". Category 128 is "machinery, etc., for drilling, well development, and geological exploration".

Category 266 is pipe, of which about two-thirds is destined for the energy sector.

its steel rolling facilities and chemical industry related equipment, because Soviet technology in these fields was inferior to that of the West (cf. Table 1.8, 1.9).

Table 1.8 Soviet Imports of Rolling Facilities in Steel Branch, 1979-1988
(millions of rubles)

	Total	Share of Imports	WEST	Share of WEST
1979	1,161.5	2.9%	911.9	78.5%
1980	1,336.6	2.9%	1,015.1	75.9%
1981	1,278.6	2.4%	978.7	76.5%
1982	1,312.9	2.3%	893.5	68.1%
1983	1,363.0	2.3%	929.8	68.2%
1984	1,525.7	2.3%	1,055.5	69.2%
1985	1,791.7	2.6%	1,288.6	71.9%
1986	1,370.3	2.2%	747.3	54.5%
1987	1,351.9	2.2%	755.6	55.9%
1988	1,382.5	2.1%	801.1	57.9%

SOURCE : Statistical Yearbook of Foreign Trade in the Soviet Union (Various Years)

Table 1.9 Soviet Imports of Equipment Related to Chemical Industry,
1979-1988 (millions of rubles)

	Total	Share of Imports	WEST	Share of WEST
1979	1,753.6	4.6%	1,301.2	74.2%
1980	1,243.9	2.8%	779.9	62.7%
1981	852.5	1.6%	455.6	53.4%
1982	852.6	1.5%	426.7	50.0%
1983	1,042.5	1.7%	473.1	45.4%
1984	1,176.3	1.8%	590.0	50.2%
1985	1,042.5	1.5%	440.3	42.2%
1986	864.9	1.4%	258.3	29.9%
1987	701.5	1.2%	209.0	29.8%
1988	867.7	1.3%	405.6	46.7%

SOURCE : Statistical Yearbook of Foreign Trade in the Soviet Union (Various Years)

Table 1.10 Soviet Imports of Equipment for Motor Industry, 1979-1988
(millions of rubles)

	Total	Share of Imports	WEST	Share of WEST
1979	144.8	0.38%	134.0	92.5%
1980	139.8	0.31%	133.4	95.4%
1981	132.5	0.25%	127.2	96.0%
1982	164.9	0.29%	156.1	94.7%
1983	219.6	0.37%	211.9	96.5%
1984	137.4	0.21%	130.5	94.9%
1985	77.5	0.11%	69.2	89.3%
1986	70.8	0.11%	64.5	91.0%
1987	26.1	0.04%	19.5	75.0%
1988	35.8	0.05%	30.0	84.0%

SOURCE : Statistical Yearbook of Foreign Trade in the Soviet Union (Various Years)

Finally, although the share of motor industry equipment in total imports was remarkably low, the share of such imports from all the Western countries was extremely high. Although these imports have recorded low levels recently, in the 1970s they had at times amounted to 300 million rubles. This equipment subsequently contributed to passenger car and truck production (cf. Table 1.10).

Table 1.11 The Energy Gap in Eastern Europe
(1,000 barrels in oil equivalent/day, Gap shows %)

	Primary Energy Output				Primary Energy Consumption				Energy Gap			
	1960	1970	1980	1986	1960	1970	1980	1986	1960	1970	1980	1985
Bulgaria	109	151	181	227	131	391	668	715	16.8	61.3	72.9	68.3
Czechoslovakia	761	906	963	987	798	1,136	1,466	1,517	4.6	20.2	34.3	34.9
German Dem. Rep.	1,027	1,172	1,213	1,471	1,166	1,491	1,827	1,978	11.9	21.4	33.6	25.6
Hungary	207	277	278	311	270	431	602	648	23.3	35.7	53.8	52.0
Poland	1,278	1,895	2,446	2,514	1,050	1,653	2,479	2,420	-	-	(1.3)	-
Romania	487	879	1,102	1,187	376	844	1,338	1,444	-	-	(17.6)	17.8
Eastern Europe	3,870	5,280	6,180	6,700	3,790	5,950	8,380	8,720	-	11.3	26.2	23.2

SOURCE : J. M. Kramer : The Energy Gap in Eastern Europe (1990), p. 2.
The number within () is calculated by me. (H. IWATA)

(4) The Need to Maintain Export Levels to CMEA Nations

The member nations of the CMEA, especially the Eastern European countries, showed remarkably increased fuel and energy consumption in 1970s.

As these countries, however, could not meet this demand with their insufficient supplies, they had to turn to importing energy.

This is referred to as "The Negative Energy Gap", (defined as the ratio of the supply deficit to internal consumption). The size of this gap is different for each country. The table 1.11 shows various patterns regarding the gap. It increased continuously in Bulgaria and Hungary since 1960, but appeared only recently in Romania, while Poland showed an energy surplus.

Table 1.12 The Oil Energy Gap in Eastern Europe
(1,000 barrels in oil equivalent/day, Gap shows %)

	Output		Consumption		Energy Gap	
	1976	1986	1976	1986	1976	1986
Bulgaria	3	6	265	295	98.6	98.0
Czechoslovakia	3	3	353	358	99.1	99.2
German De. Rep.	1	1	315	333	99.7	99.7
Hungary	43	40	227	204	81.0	80.4
Poland	9	3	322	351	97.2	99.1
Romania	308	212	319	324	3.4	34.5
Eastern Europe	367	265	1,801	1,865	79.6	85.8

SOURCE : J. M. Kramer ; op. cit p. 3.

The energy gap for oil and natural gas, moreover, was significantly larger than the gap for primary energy (cf. Table 1.12, 1.13 and 1, 14).

Let us next examine how much of a part the Soviet Union played in covering this gap. In 1970 Bulgaria, Hungary and Czechoslovakia had to meet, respectively, 63%, 43%, and 29% of their internal consumption needs with imported energy, while Romania had to meet only 11%.

In 1970 Bulgaria, Poland and Czechoslovakia had to depend on the Soviet Union for 86%, 87% and 80%, respectively, of their total primary energy imports, while Romania was only 19% dependent (cf. Table 1.14).

Table 1.13 The Energy Gap in Natural Gas
(thousands of barrels in oil equivalent/day, Gap shows %)

	Output		Consumption		Energy Gap	
	1976	1986	1976	1986	1976	1986
Bulgaria	-	-	5.7	16.0	100	100
Czechoslovakia	2.8	2.0	14.2	32.0	80.3	93.7
German Dem. Rep.	22.7	23.0	34.0	40.0	33.2	42.5
Hungary	17.0	19.0	19.8	31.0	14.1	38.4
Poland	17.0	16.5	25.5	31.5	33.3	47.6
Romania	93.4	101.5	93.4	107.5	0	5.6
Eastern Europe	152.9	162.0	192.6	258.0	20.6	37.2

SOURCE : J. M. Kramer ; op. cit. p. 3.

In 1980, while Poland and Romania depended on the U.S.S.R. for 83,6% and 13.8%, respectively, of their total imports of primary energy, Bulgaria, Poland and Hungary depended on the Soviet Union for over 90% of their primary energy needs.

From these facts we can conclude that, on the one hand, the Eastern European countries had been included in the fuel-energy supply system of the Soviet Union and, on the other hand, the Soviet Union had to increase its output and export of fuel-energy to link up with, and subordinate these countries to Soviet leadership.

Table 1.14 The Energy Imports of Eastern Europe(1970) (%)

	Importation as Share of Consumption	Importation from Soviet Union as Share of Importation
Bulgaria	63	86
Czechoslovakia	29	80
German Dem. Rep.	26	66
Hungary	43	66
Poland	14	87
Romania	11	19

SOURCE : J. M. Kramer ; op. cit. p. 14.

(5) The Effect of the Chernobyl' Nuclear Power Plant Accident

The energy specialists of USA⁽⁵⁾ have analysed the short term effects and long term effects of this accident. If all plants at Chernobyl' stop generating electric power (29 billion Kw in 1985), the short term effects would be: (1) the Soviet Union would have to increase output and consumption of fossil fuel by 9,5 million tons; (2) energy exports to Eastern European countries (especially Hungary) would be decreased; (3) electric power deficits in Ukraine would increase; (4) closure of the RMBK type nuclear reactor, representing 49.5% of all the nuclear reactors in the USSR (as of Jan. 11, 1986), because of structural faults, would cause immeasurable economic losses to the country.

The long term effects would be: (1) a delay in implementing planned atomic power generation for at least five years; (2) the necessity to increase fossil fuel transportation from Siberia for use of traditional thermal power stations; (3) possible negative effects on the development of atomic power in Eastern and Western countries would force the Soviets to increase exports of fossil fuel, especially natural gas.

How accurate were the U. S. analysts? The short term effects have not been as severe as predicted. Nevertheless, the Soviets had to decrease exports of Electricity to Czechoslovakia and Hungary because of declining internal electric power generation.⁽⁶⁾

The long term effects have become more serious than predicted: has occurred such cases as the construction of nuclear power plants has been halted. In conclusion, the Chernobyl' Accident has seriously affected the Soviet energy policy.

II Perestroika and the Future Task of the Fuel-Energy Sector

Let us consider the energy policy of past Soviet leaders in order to clarify the Gorbachev government's policy.

First, the main points, regarding energy output, of the 11th five year plan are as follows.

(1) To increase the output of natural gas and coal to lower the use of oil fuel.

(2) To endeavor to rapidly develop atomic power generation, including a high-speed nuclear reactor.

(3) To rapidly increase the production of natural gas in Siberia as a major economic and political goal.

(4) To investigate the production of synthetic liquid fuel using the KanskAchinsk Basin coal field as a prototype.

Secondly let us turn to the Gorbachev long term energy program, established in March 1989 to run until the year 2000.

The essential points are as follows:

(1) To stress energy conservation.

(2) To stabilize crude oil output at the level of 625 million tons per annum beginning in 1990, and to increase natural gas output and promote atomic power generation.

(3) To reach peak natural gas output in the mid 1990's while increasing utilization of fissionable material coal resources by implementing open-air mining techniques and new energy sources (e.g. Solar, geothermal, wind, tidal and magnetic field energy) at the second step of the plan from the mid '90's to the year 2000.

Now, what kind of fuel-energy policy did the Soviet leaders under Gorbachev decide on? They were forced to follow in the footsteps of the

old fuel-energy policy under the pressure of external and internal events, despite the environmental destruction that accompanied the development of oil fields, the decline of investment efficiency, rising costs, and the Chernobyl' accident.

We can clearly demonstrate this by analyzing the target data of the 12th five year plan of the Gorbachev government (cf. Table 2.1). What kind of Perestroika then, was carried out in the fuel-energy sector?

First, a fully self-paying system, thought to be the most advanced system in the Soviet Union, was introduced, but only in the Ministry of the Gas Industry and the Ministry of the Petroleum Industry, in 1988. This system was also widely introduced in other government sectors, enterprises and combined enterprises outside the fuel-energy sector.

In other words, they introduced the fully self-paying system into only two of the ministries related to the fuel-energy sector while continuing old energy policies and reshuffling the Cabinet, as in the case of V. A.

Table 2.1 Soviet Fuel-Energy Production Targets in 1990

	Unit	1985 actual	1990 Goal of the 12th five year plan		Volume of growth	
			basic aim	final law	1981- 1985	1986- 1990
generation of electric power	billions of KWh	1,544	1,840-1,880	1,860	251	315
items : atomic power generation	—	167	390	390	94	223
hydro power generation	—	215	—	245	30	31
thermal power generation	—	1,162	—	1,225	127	61
crude oil (inclusive of gas condensate)	millions of tons	595	625-640	635	-8	40
natural gas	billions of m ³	643	835-850	850	208	207
coal	millions of tons	726	780-800	795	10	69

SOURCE : K. Ogawa ; Economics of Perestroika, p. 118.

Dinkov.⁽⁹⁾ In spite of the limited application of a self-paying system, the energy conservation expected by M. Gorbachev has not been reached.

The reasons for this are as follows:

(1) Industry has shown little interest in energy conservation in face of the remarkably low cost of energy compared to the prime cost of manufactured goods. There is little economic inducement to encourage energy conservation.

(2) There is a shortage of energy saving machinery.

(3) An inadequate system exists for monitoring and calculating fuel-energy consumption.

(4) The present system of inspecting the technical performance levels of energy related equipment is also inadequate.

III The Soviet Investment Policy Problem

Finally, I would like to mention the investment policy of the Soviet leaders and its weak points. The new investment policy of the Soviets is to distribute investment into renovation of existing enterprises (technology upgrades and equipment reconstruction), rather than into new construction and new equipment as has been the case to date⁽¹¹⁾.

How did, and will, the position of Siberia change in industrialization process of the first half of the 1980s as well as in the future?

A. G. Granberg has demonstrated that the position of Siberia has deteriorated in the process of industrialisation as indicated in Tables 3.1, 3.2, and 3.3.⁽¹²⁾

Primarily, the extractive industry has developed rapidly since the end of 1960s while the manufacturing industry had developed at a slower rate than the average rate of the country as a whole in the 1980s (cf. Table 3.1).

Table 3.1 Annual Average Growth Rate of Extractive Industry & Manufacturing Industry in the Soviet Union and Siberia %

	1968-1970	1971-1975	1976-1980	1981-1982
Extractive industry				
Soviet Union	5.2	4.6	1.9	1.0
Siberia	7.8	8.1	5.8	4.4
Manufacturing industry				
Soviet Union	8.4	7.7	4.6	3.4
Siberia	9.4	8.3	4.4	2.9

SOURCE: A. G. Granberg; Structural Change and Intensiveness of Siberia Industry, "EKO" No. 6,

Table 3.2 The Share of Manufacturing Industry in Industrial Output in the Soviet Union and Siberia

	1970	1975	1980	1983
In Current Price				
Soviet Union	8.9	8.1	7.3	9.0
Siberia	16.7	17.1	17.3	28.0*
In 1st Jul. 1967 price				
Soviet Union	9.4	8.9	8.0	7.5
Siberia	18.8	18.7	19.9	21.0

SOURCE: A. G. Granberg; *op. cit.*

NOTE: Despite the figure 28.0 for 1983 in Siberia is extraordinary, I'll quote sic((L)).

Secondly, even if we trace the development of the manufacturing industry through a macro index, only such subsectors as machine making, metal manufacturing, chemical, petrochemical and the other manufacturing industries showed an above average growth rate. Almost all other subsectors, aside from the above-mentioned, showed a growth rate below the average rate (cf. Table 3.2 & 3.3).

What will be the results of a change in investment policy?⁽¹³⁾ If the Soviet leaders carry forward Siberian development from the view point of preferential development of Central Western part of the Soviet Union as before, and continue to transport greater amounts of materials, energy and

Table 3.3 Sectorial Structure of Total Production of Industry in Siberia (1975 price), Share of Siberia in the Soviet Union

	1970	1980	1983
Electrical power energy	5.4	5.2	5.0
Fuel	12.6	17.0	18.5
Steel	5.0	3.8	3.6
Chemistry and Petrochemistry	6.6	7.3	7.7
Machine making and metal manufacturing	19.8	23.4	24.2
Wood, wood precessing, cellalose and paper	9.3	6.9	6.8
Construction materials	4.4	3.7	3.4
Light industry	10.8	10.7	9.9
Food processing	17.4	11.9	10.3
Other	8.7	10.1	10.6

SOURCE: A. G. Granberg ; op. cit.

goods from Siberia to western USSR instead of reconsidering the development of Siberia from the point of view of the long range global development of Siberia, the deterioration of extraction efficiency and investment one in fuel-energy sector will continue permanently into the future. (9. December 1991. At Institute of Economics, Hungarian Academy of Sciences)

Note

- (1) Kazuo Ogawa ; "Seibu Siberia no Seki-Yu Kagaku Kichi Kensetsu to Soren no Kagakuhin Boeki" in *Kagaku Keizai* (1989, No. 4) pp. 2-10.
- (2) T. Gustafson ; *Crisis amid Plenty*. (1989), pp. 47-49.
- (3) *Plan Econ.*, Mar 7. 1990.
- (4) (Nippon Enerugi Keizai Kenkyusho ed. ;) *Soren Toshokoku ni Okeru Enerugi Shigen-Jukyu no Genjo to Shorai-*, p. 202.
- (5) M. J. Sagers & M. B. Green ; *The Transportation of Soviet Energy Resources* (1989) pp. 145-153.
- (6) *CMEA Statistical Yearbook* (1989).
- (7) *Zai Sorenpo Nippon Koku Taishikan, Sorenkeizai Kenkyukai ; Soren Keizai Q & A*, pp. 145-146.

- (8) Takashi Murakami; "Gorbachev Seikenka no Enerugi Seisaku to Nishigawa Kyoroku" in Kagaku Keizai (No. 9, 1988) p. 10.
- (9) Tatsuru Kanbara; "Soren To no Enerugi Josei" in Kokusai Mondai (No. 9, 1990) p. 74.
- (10) Takashi Murakami; op. cit.
- (11) Kuboniwa & others; "Seisan Shihon-Toshi" in (Nippon Kokusai Mondai Kenkyu Sho ed.) Soren Keizai no Chu-Choki Bunseki, pp. 69-72.
- (12) cf. А. Г. ГРАНБЕРГ, СТРУКТУРНЫЕ СДВИГИ И ИНТЕНСИФИКАЦИЯ ПРОМЫШЛЕННОСТИ СИБИРИ, (A.G. Granberg; "Structural Change and Intensiveness of Siberia Industry", ЕКО, No. 6, 1985.
- (13) cf. T. Shabad; 12 The Gorbachev Economic Policy: Is the USSR turning away from Siberian Development, in (B. Wood & R. A. French ed.) The Development of Siberia (1989), pp. 256-260.