国際協力事業団
ブルガリア共和国産業省

ブルガリア共和国
鉄鋼産業再構築及び
近代化計画調査報告書

(付　録)

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Appendix 2-1 Share of Net Material Products (NMP) and Gross Domestic Products (GDP) in Each Sector

(Unit: %)

	50	60	70	80	85	88	89	90	91	92
Agriculture, Forest	31.5	32.3	18.0	19.0	13.3	11.5	10.9	17.8	15.3	9.6
Mining, Industry	33.8	47.3	55.0	51.0	59.9	53.2	51.5	44.3	43.4	39.3
Construction	6.8	7.0	9.0	9.0	9.9	7.9	7.8	7.0	4.5	3.9
Commerce	21.4	9.0	9.0	10.0	6.9	6.8	7.6	8.1	7.7	6.9
Transport, Telecommunication	3.1	4.2	7.0	8.0	7.6	7.6	8.6	7.5	8.1	6.9
Other, Services	3.4	0.2	2.0	3.0	2.4	13.0	13.6	15.3	21.0	33.4

Note: From 1989, NMP are replaced by GDP

Source: Statistical Year Book of Member Countries of CMEA, Bulgaria N.S.I.

Appendix 2-2 Evolution of Major Economic Indexes

(Unit: %, growth over the previous year)

	76-80	81-85	86	87	88	89	90	91	92	93
GDP	(8.2)	(3.7)	(4.0)	(5.7)	(6.1)	(6.2)	(-)	(-)	(-)	(-)
(NMP)	6.1	3.7	5.3	5.4	2.4	-3.3	-9.1	-11.7	-5.7	-4.0
Gross Products	(-)	(5.1)	(4.5)	(4.9)	(5.0)	(5.0)	(-)	(-)	(-)	(-)
of Industry	6.0	4.3	4.0	4.2	5.2	1.0	-12.5	-18.6	-7.0	-4.5
Gross Products	(3.7)	(3.4)	(7.4)	(N.A)	(5.5)	(8.9)	(-)	(-)	(-)	(-)
of Agriculture	0.9	-0.6	11.7	-5.1	-0.1	-5.0	-3.7	-9.8	-7.7	-5.0

Note: Figures in parentheses indicate planned figures; from 1989, NMP are relaced by GDP.

Source: Government, National Bank of Bulgaria

Appendix 2-3 Evolution of Total Investment

(Unit: %)

	61-70	71-75	76-80	81-85	86	87	88	89	90	91	92
Total Investment	(-)	(6.4)	(7.5)	(1.9)	(5.8)	(8.9)	(4.1)	(-)	(-)	(-)	(-)
	10.2	8.7	4.0	4.5	7.8	7.3	2.4	0.4	-25.1	-15.6	-10.0

Note: Figures in parentheses indicate planned figures; after 1989, there have been no planned figures.

Source: Statistical Year Book of Member Countries of CMEA, Government statistics.

Appendix 2-4 Investment in Each Sector

(Unit: %)

	80	85	88	89	90	91	92
Productive Sector	71.4	72.3	74.1	76.1	77.7	80.9	81.7
Agriculture, Forestry	12.4	8.1	8.5	8.4	9.8	7.4	2.9
Mining, Industry	41.9	46.7	49.9	49.8	48.4	56.1	48.7
Construction	2.5	3.8	3.6	4.8	4.5	2.6	17.1
Transport, Telecommunication	11.1	9.8	7.4	5.9	8.0	2.6	6.3
Commerce	3.0	3.3	2.7	4.3	3.8	4.8	3.8
Others	0.5	0.6	2.1	2.9	3.2	7.4	2.9
Non Productive Sector	28.6	27.7	25.9	23.9	22.3	19.1	18.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Statistical Year Book of Member Countries of CMEA, Government statistics.

Appendix 2-5 Revenue of National Budget

(Unit: Million Leva)

	88	89	90	91	92	93*	94*
Total Revenue	22,064	22,912	23,972	54,782	77,014	126,746	99,887
Tax Revenue, including:	18,462	19,809	19,476	51,042	69,682	115,801	80,154
Profit Tax	8,110	9,185	8,126	22,401	16,769	23,455	9,920
Income and Consumer Tax	4,443	4,450	4,082	9,686	12,337	23,388	39,677
Social Security	3,628	3,906	4,364	11,302	21,514	36,185	N.A
Others	2,281	2,368	2,804	7,653	19,061	32,774	N.A
Non-Tax Revenue**	3,602	3,103	4,496	3,740	7,333	10,945	19,733

Appendix 2-6 Percentage of Revenue in GDP

(Unit: %)

	88	89	90	91	92	93*
Total Revenue	57.7	58.0	53.3	41.8	36.7	36.7
Tax Revenue, including:	48.3	50.2	43.3	38.9	33.2	33.6
Profit Tax	21.2	23.2	17.9	17.1	8.0	6.8
Income and Consumer Tax	11.6	11.2	9.0	7.4	5.9	6.8
Social Security	9.5	9.9	9.6	8.6	10.2	10.5
Others	6.1	6.1	6.6	5.8	9.1	9.5
Non-Tax Revenue**	9.4	7.8	9.9	2.9	3.5	3.2

Note * : Budget Plan

** : Non Tax Revenue includes tax revenue for the previous year, revenues from fees for service revenue by National Bank.

Source: Ministry of Finance, Government statistics

Appendix 2-7 Expenditure of National Budget

(Unit: Million Lava)

	88	89	90	91	92	93*	94*
Current Expenditure	22,393	23,137	28,124	75,091	107,237	154,330	133,567
Wages & Salaries	1,778	1,850	2,496	6,544	12,203	19,129	9,875
Maintenance & Operation	5,167	5,748	5,517	12,195	16,685	28,578	21,379
Defense & Security	1,929	1,944	2,190	5,333	8,375	12,795	18,859
Subsidies	6,767	6,119	6,753	5,471	3,653	6,550	6,550
Interest	795	1,208	4,296	24,261	32,020	32,838	42,735
Social Security	3,895	4,104	5,465	18,629	28,666	47,806	3,454
Capital Expenditure	2,062	2,164	1,407	2,658	5,634	6,633	3,896

Appendix 2-8 Percentage of Current Expenditure in GDP

(Unit: %)

	88	89	90	91	92	93*
Current Expenditure	63.7	61.4	64.3	57.4	51.1	44.7
Wages & Salaries	4.6	4.7	5.5	5.0	5.8	5.5
Maintenance & Operation	13.5	14.5	12.2	9.3	7.9	8.3
Defense & Security	5.0	4.9	4.8	4.1	4.0	3.7
Subsidies	17.6	15.5	14.9	4.2	1.7	1.9
Interest	2.1	3.1	9.5	18.5	15.2	9.5
Social Security	10.2	10.4	12.0	14.2	13.7	13.9
Capital Expenditure	5.4	5.5	3.1	2.0	2.7	1.9

* Budget Plan

Source: Ministry of Finance, Government statistics

Appendix 2-9 Balance of Payments (in Hard Currency)

(Unit: Billion $)

	70	75	80	85	86	87	88	89
Current Balance	-	-0.7	0.9	-0.1	-0.7	-0.8	-0.8	-1.3
Trade Balance	-0.1	-0.6	0.8	-0.4	-0.8	-1.0	-1.0	-1.2
(Export)	0.4	1.0	3.3	3.3	2.7	3.2	3.5	3.1
(Import)	0.5	1.6	2.5	3.7	3.5	4.2	4.5	4.3
Services	-	-0.1	0.0	0.2	0.0	0.1	0.1	-0.2
Unrequited Transfer	-	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Foreign Reserve	N.A	N.A	N.A	2.1	1.5	1.2	1.8	1.4

(Unit: Million $)

	90	91	92	93
Current Balance	-860	-96.0	-520.5	-900.4
Trade Balance	-757	-32.0	-484.5	-695.1
(Export)	2,615	3,737.0	4,608.5	3,635.3
(Import)	3,372	3,769.0	5,093.0	4,330.4
Services,net	-211	-114.0	-75.8	-242.2
Transport	51	-13.8	-31.7	-83.9
Tourism	78	-84.2	31.9	69.5
Interest	-396	-28.1	-76.0	-192.3
Private transfer,net	108	50.0	39.8	36.9
Capital Balance	-135	115.0	-31.5	148.4
Errors & Omissions	127	45.2	225.9	263.2
Overall Balance	-868	64.2	-326.1	- 488.8

Source: Bulgaria N.S.I.

Appendix 2-10 Regional Share of Foreign Trade by Bulgaria

(Unit: %)

		85	86	87	88	89	90	91	92	93
Former CMEA	Ex.	75.7	81.6	81.4	82.4	83.8	80.2	57.7	39.2	35.4
	Im.	75.4	75.7	78.8	75.1	73.4	75.9	48.5	36.3	42.9
Western Industrial Countries										
	EX.	9.6	7.2	6.9	6.5	8.2	9.0	26.3	42.2	43.1
	IM.	15.3	15.5	15.4	15.6	17.3	15.0	32.8	43.8	42.6
Developing Countries										
	Ex.	14.7	11.2	11.7	11.1	8.0	6.1	8.3	8.6	7.0
	Im.	9.3	8.8	5.8	9.3	9.3	4.3	4.5	8.6	4.9
Total	Ex.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
with Other	Im.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Foreign Trade Annual Statistics of Bulgaria
Bulgaria N.S.I.

Appendix 2-11 Share of Major Trading Partner

(Unit: %)

	Export					Import				
	85	89	90	91	92	85	89	90	91	92
Former USSR	56.6	65.2	64.0	49.8	25.2	56.1	52.9	56.5	43.2	28.6
Former East Germany	5.1	5.5	2.9	-	-	5.1	5.8	6.7	-	-
West Germany*	1.4	1.3	1.3	4.8	10.0	3.9	4.9	3.7	7.0	12.8
Czekoslovakia	4.6	4.3	4.4	0.9	0.7	4.1	4.9	4.6	1.2	1.9
Poland	3.5	3.8	2.6	2.1	2.3	4.6	4.8	5.0	1.1	0.8
Libya	4.3	1.3	4.0	2.1	0.5	2.9	1.4	1.7	2.5	0.4
Iraq	3.1	1.0	0.2	0.0	0.1	0.6	2.9	2.0	0.0	0.0
USA	0.2	0.6	1.7	3.4	1.7	1.2	1.5	0.6	2.9	3.0
Japan	0.2	0.2	0.3	0.7	0.4	0.6	1.3	1.0	0.5	2.3
Total with others	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note *: from 1991, West Germany includes East Germany
Source: Foreign Trade Annual Statistics of Bulgaria

Appendix 2-12 Composition of Export Commodities

(Unit: %)

	60	70	80	85	88	89	90	91	92
Machine, Equipment, Transport equipment	12.3	29.0	44.4	53.5	60.5	59.4	59.1	30.6	15.6
Energy, Metal, Mineral resources	9.2	8.1	15.0	10.0	7.0	7.7	7.7	10.5	19.9
Foods & Beverages, Raw materials for foods	56.4	43.4	24.4	18.4	15.8	15.7	14.7	20.8	22.3
General consumables Fuels	17.9	14.7	8.8	9.7	10.7	11.1	10.3	22.3	8.3
Chemicals, Rubber, Construction materials	3.6	4.8	7.4	8.4	6.0	5.5	7.4	15.1	28.0
Others	0	0	0	0	0.7	0.6	0.9	0.6	5.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Appendix 2-13 Composition of Import Commodities

(Unit: %)

	60	70	80	85	88	89	90	91	92
Machine, Equipment, Transport equipment	43.9	40.6	35.4	33.2	41.6	42.7	46.2	15.8	23.0
Energy, Metal, Mineral resources	24.3	29.1	42.9	46.9	36.7	35.1	33.6	58.7	42.0
Foods & Beverages, Raw materials for foods	16.7	15.9	9.7	9.5	9.6	10.6	3.4	7.9	6.9
General consumables Fuels	7.6	5.7	4.4	3.8	5.1	5.2	6.4	4.4	5.4
Chemicals, Rubber, Construction materials	7.5	8.7	7.6	6.6	6.2	5.8	9.6	13.0	18.2
Others	-	-	-	-	0.8	0.6	0.8	0.2	4.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Statiscal Year Book of Member Countries of CMEA, Bulgaria N.S.I.

Appendix 2-14 Evolution of Rank of Trade Partner

No	Export				Import			
	1980	(share %)	1991	(share %)	1980	(share %)	1991	(share %)
1	USSR	(49.9)	USSR	(49.8)	USSR	(57.3)	USSR	(43.2)
2	East Germany	(5.5)	Germany	(4.8)	East Germany	(6.6)	Germany	(7.0)
3	Poland	(3.9)	USA	(3.4)	West Germany	(4.8)	Austria	(4.7)
4	Greece	(3.8)	Italy	(2.7)	Poland	(4.0)	Italy	(4.2)
5	Libya	(3.6)	Greece	(2.2)	Czech Rep	(3.7)	Poland	(3.7)
6	West Germany	(2.5)	Libya	(2.1)	Rumania	(1.9)	U.K.	(3.6)
7	Switzerland	(2.2)	Poland	(2.1)	Hungary	(1.9)	USA	(2.9)
8	Rumania	(2.2)	U.K.	(1.9)	France	(1.8)	Libya	(2.5)
9	Czech Rep	(2.0)	Rumania	(1.8)	Switzerland	(1.8)	France	(2.1)
	Hungary	(1.9)	Switzerland	(1.2)	Austria	(1.7)	Switzerland	(2.1)
Rank of Japan	31	(0.2)	26	(0.2)	21	(0.5)	21	(0.2)

Source: Foreign Trade Annual Statistics of Bulgaria.

Appendix 2-15 Composition of Labour by Sector

(Unit: %)

	50	60	70	80	85	88	89	90	91	92	93
Productive Sector	95.0	90.8	86.9	83.1	82.3	81.7	81.5	80.4	78.6	78.1	77.5
Mining Industry, Construction	11.4	27.1	38.8	43.2	45.6	46.7	46.3	44.8	42.3	38.9	36.9
Agriculture & Forestry	79.5	55.5	35.8	24.6	21.1	19.2	19.3	18.5	19.0	21.2	23.0
Transport, Telecommunication	1.8	4.1	6.0	6.8	6.7	6.6	6.7	7.0	7.5	7.2	7.2
Commerce	2.3	4.0	6.2	8.1	8.5	8.8	8.8	9.1	8.9	10.0	9.6
Others	-	0.1	0.1	0.4	0.4	0.4	0.4	1.0	0.9	0.8	0.8
Non Productive Sector	5.0	9.2	13.1	16.9	17.7	18.3	18.5	19.6	21.4	21.9	22.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total (number, thousand)								4,097	3,564	3,274	3,076

Source: Statistical Year Book of Member Countries of CMEA, Bulgaria N.S.I.

Appendix 2-16 Unemployment Number and Ratio Estimation

	end of 1991	1992	1993	May of 1993
Number (thousand)	72	430	577	592
Ratio (%)	-	11.5	15.6	16.0

NB: Unemployment number and ratio were not published by N.S.I., these figures are estimated ones.

Appendix 5-1 Forecast of Steel Consumption by Demand Categories and Product Type (Optimistic Case)

(Optimistic case) (1000MT)

Usage of each product (1995)

	Gen.	Mine	Non fe	Mach	Elec	Chem	Food	Cons	Agr	Trans	Other	Total
Ingots & semis	1	1	1	32	2	1	1	81	1	1	10	132
Railway	0	0	0	0	0	0	0	1	0	2	0	3
Sections	0	0	1	6	0	1	0	7	0	0	3	17
Bars	1	1	1	26	2	1	0	66	1	1	8	107
Wire rods	0	0	0	71	0	0	0	27	0	0	3	101
Special steel	0	17	1	33	3	1	0	1	0	0	2	57
Hot 3mm more	1	1	1	42	2	2	0	6	0	0	2	57
Hot 3mm less	0	0	0	19	6	2	0	3	1	0	3	33
Cold rolled s.s.	0	0	0	49	15	6	0	7	2	0	9	87
Electrical s.s.	0	0	0	0	11	0	0	0	0	0	0	11
Stainless steel	0	0	0	4	0	1	0	0	0	0	2	7
Steel for tool	0	0	0	4	0	0	0	0	0	0	2	6
Tinplate	0	0	0	24	8	3	4	0	0	0	2	42
Galvanized s.s.	0	0	0	8	0	0	0	6	0	0	1	15
Cold tapes	0	0	0	3	2	0	0	0	0	0	1	7
Sections	0	1	0	2	0	0	0	1	0	0	1	5
Balls	0	0	0	5	0	0	0	0	0	0	0	5
Seamless tubes	3	1	1	22	2	3	1	10	1	0	5	49
Welded tubes	1	0	0	33	0	0	0	12	0	0	4	50
Drawn wires	0	1	0	21	8	3	0	9	0	4	6	51
Total	6	24	6	493	61	23	7	236	5	7	83	949
	0.7%	2.8%	0.7%	48.0%	7.3%	2.7%	0.8%	28.1%	0.6%	0.9%	7.5%	

Long	478	56.9
Flat	264	31.4
Tube	99	11.7

Usage of each product (1999)

	Gen.	Mine	Non fe	Mach	Elec	Chem	Food	Cons	Agr	Trans	Other	Total
Ingots & semis	1	2	1	36	3	1	1	105	1	1	12	164
Railway	0	0	0	0	0	0	0	1	0	2	0	4
Sections	0	0	1	6	0	1	0	9	0	0	3	21
Bars	1	1	1	29	2	1	1	85	1	1	10	133
Wire rods	0	0	0	81	0	0	0	34	0	0	4	120
Special steel	0	20	2	37	3	1	0	1	0	0	2	66
Hot 3mm more	1	1	1	49	3	2	0	7	0	0	2	66
Hot 3mm less	0	0	0	21	6	3	0	3	1	0	4	39
Cold rolled s.s.	0	0	0	55	17	7	0	9	2	0	10	101
Electrical s.s.	0	0	0	0	12	0	0	0	0	0	0	12
Stainless steel	0	0	0	5	0	1	0	0	0	0	2	8
Steel for tool	0	0	0	5	0	0	0	0	0	0	2	7
Tinplate	0	0	0	28	9	3	6	0	0	0	2	48
Galvanized s.s.	0	0	0	9	0	0	0	7	0	0	2	18
Cold tapes	0	0	0	4	2	0	0	0	0	0	1	7
Sections	0	1	0	2	0	0	0	1	0	0	1	6
Balls	0	0	0	5	0	0	0	0	0	0	0	5
Seamless tubes	4	1	1	26	2	4	1	13	1	0	6	59
Welded tubes	1	0	1	37	0	0	0	16	0	0	4	59
Drawn wires	0	1	0	24	9	3	0	12	0	4	7	60
Total	8	27	8	461	68	27	9	305	6	8	75	1002
	0.8%	2.7%	0.8%	46.0%	6.8%	2.7%	0.9%	30.4%	0.6%	0.8%	7.5%	

Long	578	57.7
Flat	306	30.5
Tube	118	11.8

Usage of each product (2004)

	Gen.	Mine	Non fe	Mach	Elec	Chem	Food	Cons	Agr	Trans	Other	Total
Ingots & semis	1	2	1	46	4	2	1	117	2	1	15	192
Railway	0	0	0	0	0	0	0	2	0	3	0	5
Sections	0	0	1	8	0	1	0	10	0	0	4	25
Bars	1	2	1	38	3	1	1	95	1	1	12	156
Wire rods	0	0	0	104	0	0	0	38	0	0	5	148
Special steel	0	23	2	48	4	1	0	1	0	0	3	82
Hot 3mm more	1	1	2	62	4	2	0	8	0	0	3	84
Hot 3mm less	0	0	0	27	9	3	0	4	1	0	5	49
Cold rolled s.s.	0	0	0	71	24	8	0	10	3	0	13	129
Electrical s.s.	0	0	0	0	17	0	0	0	0	0	0	17
Stainless steel	0	0	0	6	0	1	0	0	0	0	3	10
Steel for tool	0	0	0	6	0	0	0	0	0	0	3	8
Tinplate	0	0	0	36	13	4	0	0	0	0	3	63
Galvanized s.s.	0	0	0	12	0	0	0	8	0	0	2	22
Cold tapes	0	0	0	5	3	0	0	0	0	0	1	10
Sections	0	1	0	3	0	0	0	1	0	0	2	7
Balls	0	0	0	7	0	0	0	0	0	0	0	7
Seamless tubes	4	1	2	33	2	5	2	14	1	0	8	72
Welded tubes	1	0	1	48	0	0	0	17	0	0	5	72
Drawn wires	0	1	0	31	13	4	0	13	0	5	9	75
Total	7	31	10	591	98	33	12	341	7	10	92	1231
	0.6%	2.5%	0.8%	48.0%	7.8%	2.7%	1.0%	27.7%	0.6%	0.8%	7.5%	

Long	695	56.5
Flat	392	31.8
Tube	144	11.7

Sources: National statistical institute & Ministry of Industry of Bulgaria
(Forecast : JICA Consultant)

Appendix 5-2 Forecast of Steel Consumption by Demand Categories and Product Type (Pessimistic Case)

(Pessimistic case) (1000MT)

Usage of each product (1995)

	Gen	Mine	Non fe	Mach	Elec	Chem	Food	Cons	Agr	Trans	Other	Total
Ingots & semis	1	1	1	39	2	1	1	81	1	1	10	129
Railway	0	0	0	0	0	0	0	1	0	2	0	3
Sections	0	0	1	5	0	1	0	7	0	0	3	16
Bars	1	1	1	24	2	1	0	66	1	1	8	105
Wire rods	0	0	0	67	0	0	0	26	0	0	3	97
Special steel	0	17	1	31	3	1	0	1	0	0	2	54
Hot 3mm more	1	1	1	40	2	2	0	6	0	0	2	54
Hot 3mm less	0	0	0	18	6	2	0	3	1	0	3	32
Cold rolled s.s.	0	0	0	46	14	5	0	7	2	0	8	83
Electrical s.s.	0	0	0	0	10	0	0	0	0	0	0	11
Stainless steel	0	0	0	4	0	1	0	0	0	0	2	6
Steel for tool	0	0	0	4	0	0	0	0	0	0	2	5
Tinplate	0	0	0	23	8	3	4	0	0	0	2	39
Galvanized s.s.	0	0	0	7	0	0	0	6	0	0	1	14
Cold tapes	0	0	0	3	2	0	0	0	0	0	1	6
Sections	0	1	0	2	0	0	0	1	0	0	1	5
Balls	0	0	0	4	0	0	0	0	0	0	0	4
Seamless tubes	3	1	1	21	1	3	1	10	1	0	5	47
Welded tubes	1	0	0	31	0	0	0	12	0	0	4	47
Drawn wires	0	1	0	28	0	3	0	0	0	3	5	49
Total	6	23	6	379	59	22	6	235	5	6	81	837
	0.7%	2.8%	0.7%	47.0%	7.3%	2.7%	0.3%	29.1%	0.6%	0.8%	7.5%	

Long	462	57.2%
Flat	251	31.1%
Tube	94	11.7%

Usage of each product (1999)

	Gen	Mine	Non fe	Mach	Elec	Chem	Food	Cons	Agr	Trans	Other	Total
Ingots & semis	1	1	1	32	2	1	1	97	1	1	11	148
Railway	0	0	0	0	0	0	0	1	0	2	0	4
Sections	0	0	1	6	0	1	0	9	0	0	3	19
Bars	1	1	1	26	2	1	1	79	1	1	9	121
Wire rods	0	0	0	71	0	0	0	32	0	0	3	106
Special steel	0	18	2	33	3	1	0	1	0	0	2	59
Hot 3mm more	1	1	1	42	2	2	0	7	0	0	2	59
Hot 3mm less	0	0	0	19	6	2	0	3	1	0	4	34
Cold rolled s.s.	0	0	0	48	15	6	0	8	2	0	9	89
Electrical s.s.	0	0	0	0	11	0	0	0	0	0	0	11
Stainless steel	0	0	0	4	0	1	0	0	0	0	2	7
Steel for tool	0	0	0	4	0	0	0	0	0	0	2	6
Tinplate	0	0	0	24	8	3	5	0	0	0	2	43
Galvanized s.s.	0	0	0	8	0	0	0	7	0	0	1	16
Cold tapes	0	0	0	3	2	0	0	0	0	0	1	7
Sections	0	1	0	2	0	0	0	1	0	0	1	5
Balls	0	0	0	5	0	0	0	0	0	0	0	5
Seamless tubes	4	1	1	22	2	4	1	12	1	0	6	53
Welded tubes	1	0	0	33	0	0	0	13	0	0	4	52
Drawn wires	0	1	0	21	0	3	0	11	0	4	6	53
Total	7	24	7	423	61	24	8	281	5	7	67	935
	0.8%	2.7%	0.8%	45.0%	6.8%	2.7%	0.9%	31.4%	0.6%	0.8%	7.5%	

Long	519	58.0%
Flat	271	30.3%
Tube	105	11.7%

Usage of each product (2004)

	Gen	Mine	Non fe	Mach	Elec	Chem	Food	Cons	Agr	Trans	Other	Total
Ingots & semis	1	2	1	40	3	1	1	105	1	1	13	169
Railway	0	0	0	0	0	0	0	1	0	2	0	4
Sections	0	0	1	7	0	1	0	9	0	0	3	22
Bars	1	1	1	33	3	1	1	85	1	1	10	137
Wire rods	0	0	0	99	0	0	0	34	0	0	4	129
Special steel	0	28	2	42	4	1	0	1	0	0	2	71
Hot 3mm more	1	1	1	54	3	2	0	7	0	0	2	73
Hot 3mm less	0	0	0	24	8	3	0	3	1	0	4	43
Cold rolled s.s.	0	0	0	82	21	7	0	9	2	0	11	112
Electrical s.s.	0	0	0	0	15	0	0	0	0	0	0	15
Stainless steel	0	0	0	5	0	1	0	0	0	0	2	9
Steel for tool	0	0	0	5	0	0	0	0	0	0	2	7
Tinplate	0	0	0	31	12	3	7	0	0	0	2	55
Galvanized s.s.	0	0	0	10	0	0	0	7	0	0	2	19
Cold tapes	0	0	0	4	3	0	0	0	0	0	1	9
Sections	0	1	0	3	0	0	0	1	0	0	1	6
Balls	0	0	0	6	0	0	0	0	0	0	0	6
Seamless tubes	3	1	1	28	2	4	2	13	1	0	7	63
Welded tubes	1	0	1	41	0	0	0	16	0	0	5	63
Drawn wires	0	1	0	27	11	3	0	12	0	5	7	68
Total	6	27	9	512	84	29	11	304	6	9	81	1073
	0.6%	2.5%	0.8%	47.5%	7.8%	2.7%	1.0%	28.2%	0.5%	0.8%	7.5%	

Long	611	56.7%
Flat	342	31.7%
Tube	126	11.7%

Sources: National statistical Institute & Ministry of Industry of Bulgaria

(Forecast : JICA Consultant)

Appendix 6-1 World-wide Crude Steel Production and Iron Ore Output/Trade Volume for Period 1984-1993

(Unit: One Million MT)

Item \ Jan.-Dec.	1984	1985	1986	1987	1988
Crude steel production	711	719	714	737	780
Pig iron production	491	499	496	509	538
Iron ore production	882	910	921	946	964
Breakdown: Free countries	493	511	508	522	541
Breakdown: Former U.S.S.R.	247	248	250	251	250
Breakdown: China	142	151	163	168	173
Internationally traded iron ore	372	376	370	368	401
Seaborne iron ore trade	306	321	311	319	348

Item \ Jan.-Dec.	1989	1990	1991	1992	1993:(P)
Crude steel production	786	710	737	723	726
Pig iron production	545	532	509	500	503
Iron ore production	991	980	951	921	935
Breakdown: Free countries	569	558	562	537	547
Breakdown: Former U.S.S.R.	241	236	199	175	153
Breakdown: China	181	186	175	196	225
Internationally traded iron ore	424	397	399	367	398
Seaborne iron ore trade	362	347	358	334	352

(P) Provisional

Source: TEX Report

Appendix 6-2 Iron Ore Exported by Each Country for Period 1990–1993

(Unit : One Million WMT)

Country \ Jan.-Dec.	1990	1991	1992	1993:P
Sweden	16.4	15.5	15.5	16.4
France	3.3	3.1	2.9	2.8
Spain	1.7	2.2	1.9	1.4
Norway	2.1	2.1	2.3	2.5
Others	0.1	---	0	0.2
Western Europe Total	23.6	22.9	22.6	23.3
Former U.S.S.R.	38.6	27.4	27.0	29.3
South Africa	17.0	15.5	14.9	19.6
Mauritania	11.4	10.5	8.1	9.7
Liberia	3.9	1.1	1.5	0.3
Angola	—	—	—	—
Sierra Leone	—	—	—	—
Algeria	—	—	—	—
Others	0.1	0.1	0.1	0.1
Africa Total	32.4	27.2	24.6	29.7
Canada	27.0	29.7	25.1	26.1
U.S.A.	3.2	4.0	5.1	5.1
Northern America Total	30.2	33.7	30.2	31.2
Brazil	114.3	114.7	106.0	111.9
Venezuela	14.8	13.4	10.2	10.4
Chile	6.5	7.4	6.0	6.3
Peru	3.5	2.7	3.2	5.0
South America Total	139.1	138.2	125.4	133.6
India	31.6	31.5	28.5	31.5
North Korea	0.8	0.8	0.8	0.8
Others	—	0.1	0.2	0.3
Asia Total	32.4	32.4	29.5	32.6
Australia	100.0	115.9	106.6	116.5
New Zealand	1.0	1.2	1.4	1.3
Oceania Total	101.0	117.1	108.0	117.8
World Trading	397.3	398.9	367.3	397.5

Source: TEX Report

Appendix 6-3 Iron Ore Price in Europe (Main Brands) for Period 1992–1994

FOB US¢/Fe 1% - DMT

① Lumpy ore	1992	1993	1994	Remarks
ISCOR (S. Africa)	¢32.29 (-7%)	¢29.38 (-9%)	¢28.00 (-4.7%)	
Mt. Newman (Aus) Hamersley (Aus)	¢48.28 (-3.9%)	¢42.06 (-12.9%)	¢40.28 (-4.2%)	(CIF Rotterdam)
Carajas (Brazil)	¢37.10 (-11.16%)	¢33.09 (-10.8%)	¢30.47 (-7.92%)	

② Pellets	1992	1993	1994	Remarks
LKAB (Sweden)	¢53.475 (-7.5%)	¢45.70 (-14.5%)	¢45.60 (-0.22%)	
QCM (Canada) Carol Lake (Canada)	¢49.35 (-6.9%)	¢44.25 (-10.3%)	¢44.00 (-0.56%)	
CVRD (Brazil)	¢48.47 (-7.05%)	¢43.64 (-9.96%)	¢43.64 (---)	

③ Powdery	1992	1993	1994	Remarks
LKAB (Sweden)	¢37.00 (-1.6%)	¢31.00 (-2.3%)	¢29.10 (-6.1%)	
Mt. Newman (Aus) Hamersley (Aus)	¢41.40 (-1.2%)	¢35.18 (-15.0%)	¢32.80 (-6.77%)	(CIF Rotterdam)
Carajas (Brazil)	¢33.10 (-4.8%)	¢29.09 (-12.1%)	¢26.47 (-9%)	

Source: TEX Report

Appendix 6-4 Production of Coke Oven Coke (Mt)

	1984	1985	1986	1987	1988	1989	1990	1991	1992 *
Australia	3.6	3.6	3.8	3.6	4.1	4.4	4.5	4.2	4.4
Austria	1.8	1.8	1.7	1.7	1.7	1.8	1.7	1.5	1.5
Belgium	5.9	6.0	5.1	5.2	5.6	5.5	5.4	4.9	4.6
Canada	4.9	4.7	4.5	4.6	4.7	4.4	3.7	3.6	3.7
Denmark	—	—	—	—	—	—	—	—	—
Finland	—	—	—	0.1	0.5	0.4	0.5	0.5	0.5
France	9.0	8.7	8.3	7.5	7.4	7.3	7.2	6.9	6.8
Germany	28.4	30.2	30.0	26.7	25.5	25.2	21.9	16.5	n.a.
Greece	—	—	—	—	—	—	—	—	—
Iceland	—	—	—	—	—	—	—	—	—
Ireland	—	—	—	—	—	—	—	—	—
Italy	6.9	7.4	7.2	6.8	6.7	6.7	6.4	6.1	5.4
Japan	48.2	48.6	45.1	43.7	47.7	46.9	45.9	45.5	43.7
Luxembourg	—	—	—	—	—	—	—	—	—
Netherlands	2.7	3.0	2.9	2.8	2.9	2.9	2.7	2.9	2.9
New Zealand	—	—	—	—	—	—	—	—	—
Norway	0.3	0.3	0.3	0.3	0.2	—	—	—	—
Portugal	—	—	—	—	—	—	—	—	—
Spain	3.3	3.4	3.1	2.9	3.0	3.1	3.2	3.2	3.0
Sweden	1.2	1.2	1.2	1.1	0.9	1.0	1.1	1.1	1.1
Switzerland	—	—	—	—	—	—	—	—	—
Turkey	2.6	2.7	3.0	3.2	3.4	2.8	3.2	3.3	3.2
United Kingdom	7.0	9.3	8.9	8.7	8.6	8.4	8.4	7.8	6.5
United States	27.7	26.0	23.2	25.4	29.4	30.0	25.1	21.8	n.a.
OECD Total	153.7	156.8	148.3	144.3	152.3	150.9	140.8	129.9	124.3

Note : The solid product obtained from the carbonization of coal, principally coking coal, that is used mainly in the iron and steel industry; also includes coke and semi-coke made from lignite.

* : Estimated

Source: IEA/OECD Energy Balances and IEA Country Submissions (1992)

Appendix 6-5 Consumption of Coke Oven Coke (Mt)

	1984	1985	1986	1987	1988	1989	1990	1991	1992 *
Australia	3.5	3.5	3.3	3.2	3.1	3.2	4.2	4.2	3.7
Austria	2.9	3.0	2.6	2.6	2.6	2.6	2.5	2.5	2.2
Belgium	5.9	5.8	5.1	5.0	5.4	5.3	5.3	5.0	4.3
Canada	5.3	5.2	4.9	4.9	5.1	4.9	3.8	4.1	3.9
Denmark	0.1	0.1	0.1	—	0.1	—	—	—	—
Finland	1.2	1.2	1.1	1.1	1.2	1.3	1.3	1.2	1.2
France	10.3	10.4	9.1	8.4	8.4	8.5	7.7	7.2	6.9
Germany	28.6	29.7	26.4	24.7	25.8	25.7	21.1	16.3	n.a.
Greece	0.1	0.1	—	—	—	—	—	—	—
Iceland	—	—	—	—	—	—	—	—	—
Ireland	—	—	—	—	—	—	—	—	—
Italy	6.9	7.3	7.0	6.9	6.4	6.7	6.4	6.4	5.2
Japan	46.0	46.6	42.2	41.1	44.8	44.3	43.8	42.9	42.2
Luxembourg	1.9	1.8	1.7	1.3	1.4	1.5	1.5	1.3	1.2
Netherlands	2.5	2.5	2.4	2.2	2.5	2.5	2.3	2.2	2.1
New Zealand	—	—	—	—	—	—	—	—	—
Norway	0.8	0.9	0.7	0.7	0.7	0.6	0.5	0.5	0.5
Portugal	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.3
Spain	3.7	3.8	3.2	3.0	3.0	3.2	3.4	3.2	3.0
Sweden	1.4	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.4
Switzerland	0.1	0.1	0.1	0.1	—	—	—	—	—
Turkey	2.7	2.8	3.0	3.5	3.4	2.8	3.3	3.5	3.3
United Kingdom	8.5	9.2	8.1	8.8	9.1	8.5	8.2	7.8	6.8
United States	27.1	26.6	22.2	26.7	30.8	30.8	25.2	22.0	n.a.
OECD Total	159.9	162.4	145.2	146.0	155.9	154.1	142.3	131.8	125.2

Note : The solid product obtained from the carbonization of coal, principally coking coal, that is used mainly in the iron and steel industry; also includes coke and semi-coke made from lignite.

* : Estimated

Source: IEA/OECD Energy Balances and IEA Country Submissions (1992)

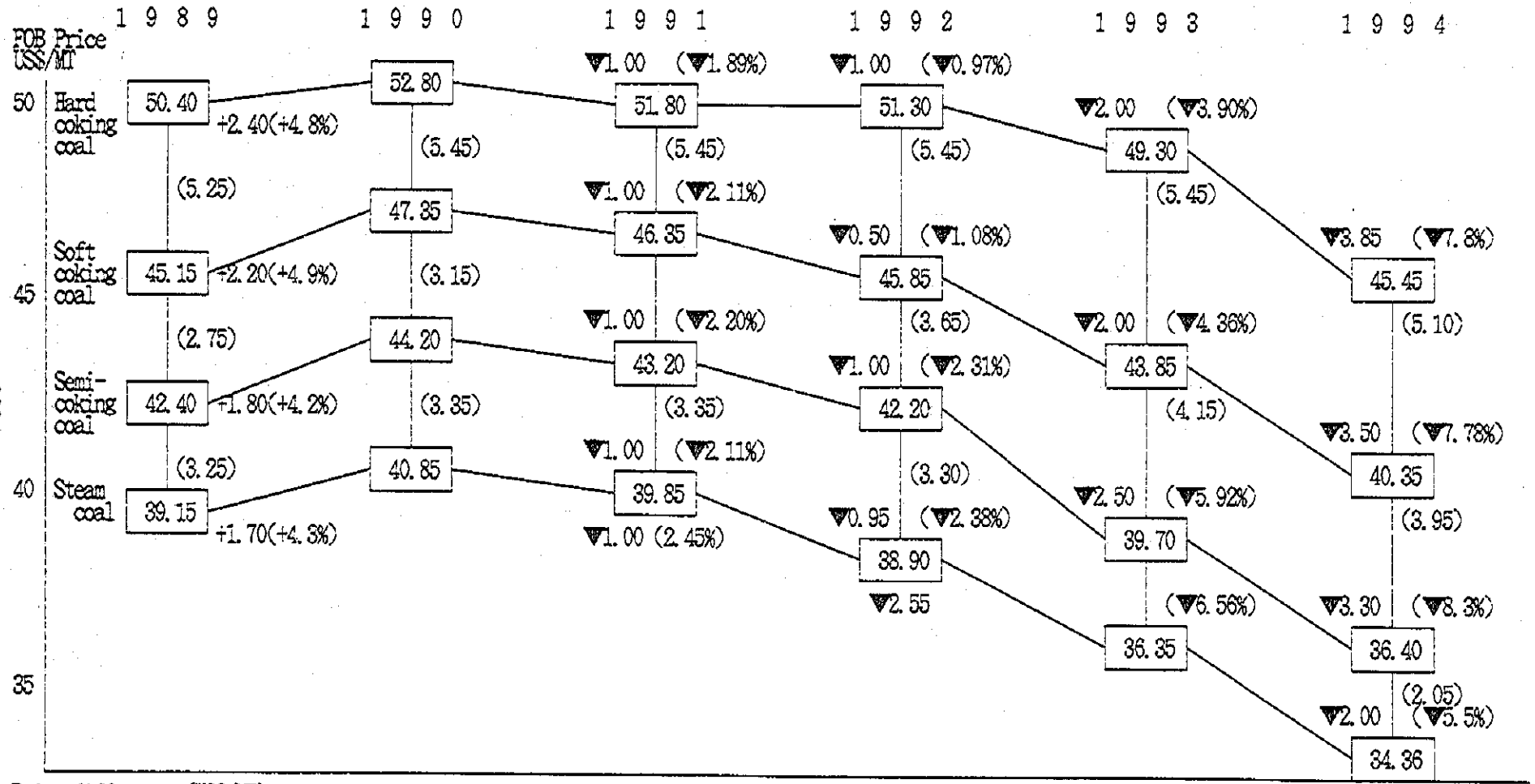
Appendix 6-6 Average CIF Prices for Coking Coal Imported into European Community from Non-EC Countries

	Average of all contracts	
	$/t	$/tce
1977	62.13	58.50
1978	61.90	58.40
1979	65.30	61.50
1980	69.20	65.10
1981	81.70	76.90
1982	81.40	76.60
1983	69.60	65.50
1984	65.00	61.20
1985	62.40	58.80
1986	58.50	55.10
1987	54.00	50.85
1988	56.45	53.15
1989	60.04	56.53
1990	59.95	56.69
1991	59.55	56.07
1992	57.92	54.54
Q189	58.25	54.85
Q289	60.15	56.64
Q389	60.65	57.11
Q489	61.10	57.53
Q190	61.45	58.97
Q290	59.00	55.55
Q390	59.40	55.93
Q490	59.80	56.31
Q191	60.40	56.87
Q291	59.70	56.22
Q391	58.90	55.46
Q491	59.20	55.74
Q192	58.90	55.46
Q292	58.00	54.60
Q392	57.50	54.14
Q492	57.30	53.95
Q193	57.50	54.14

Note : Coking coal refers to coal standardized to the following characteristics: ash 6.0%, sulphur 1.0%, volatile matter 24.0% (all measured on a dry sample basis), moisture 5%, screen size 0 ~30mm.

Source: Commission of the European Communities, Community Imports of Hard Coal from Non-Member Countries for use in Coking Plants (various years).

Appendix 6-7 Prices List of Coking Coal and Steam Coal in Period 1989-1994



Price difference (US$/MT)

Hard/semi-soft	8.00	8.60	8.60	9.10	9.60	9.05
Hard/steam	11.25	11.95	11.95	12.40	12.95	11.10

Source: Coal News. April 4. 1994 (No. 2025)

Appendix 8.1～8.7

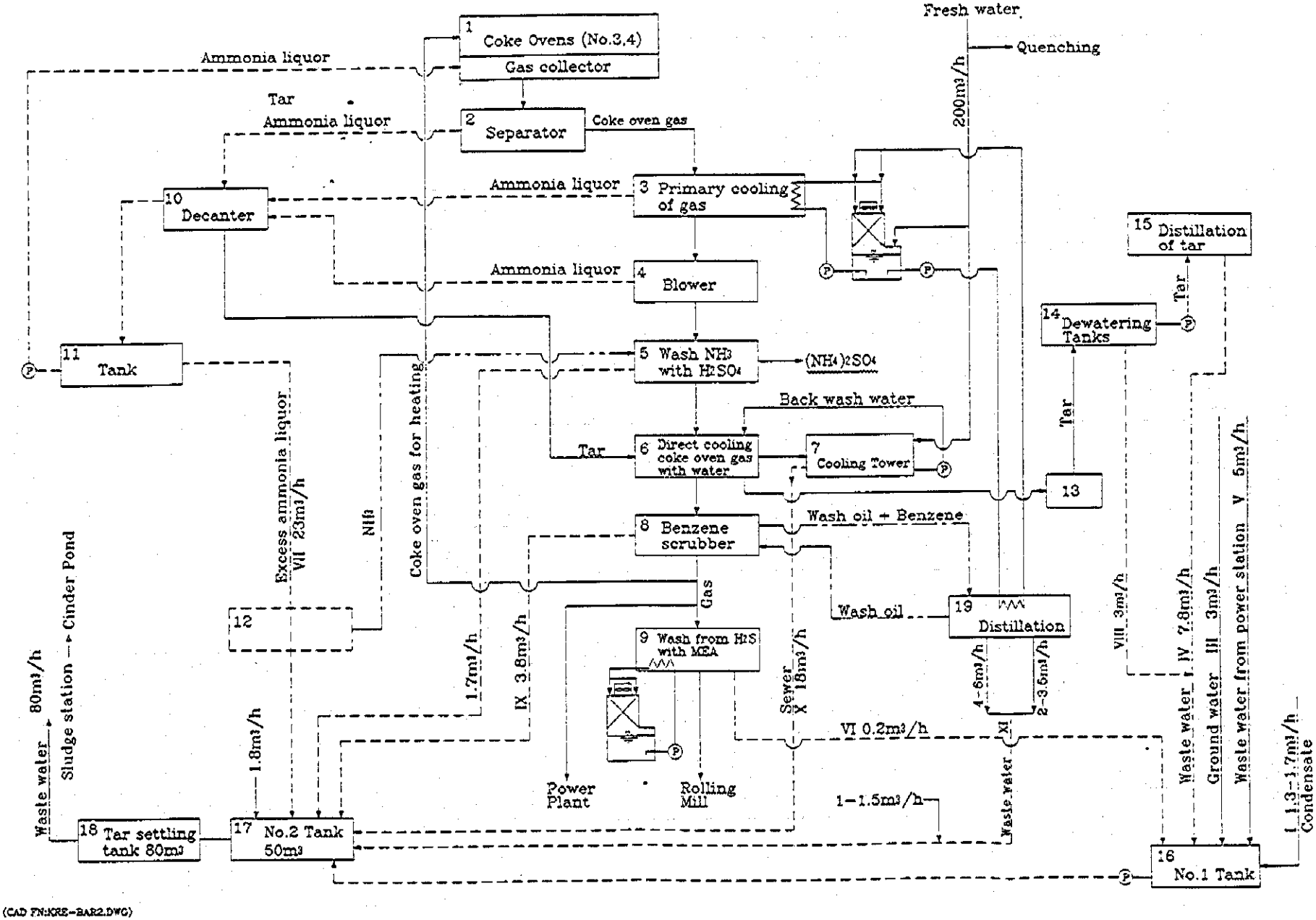
Environmental Pollution Prevention (Water)

Appendix 8-1 Water Balance at Kremikovtzi Steelworks unit(m3/h)

No.	Plant name	Supply water (Tailing Pond / Botunetze Lake / Pancharevo Lake)		Recycled water: Waste water	Recycled water: Clean water	Treatment water: WT	Treatment water: CP	Treatment water: TP
1	Refractory plant	80				40	30	
2	Coke oven	360			3,400	250	100	
3	Ore preparation plant	1,200+A		1,800	800	50		1,600
4	Sintering plant	300	900		950	200		1,000
5	Blast furnace	500		2,520	6,000	350	150	
6	Ferro-alloy plant	200			200	150	50	
7	Converter	200		910	610	100	70	
8	Electric arc furnace	100		720	1,400	50	30	
9	Hot rolling mill	1,200		8,800	5,260	1,200		
10	Cold rolling mill	400			4,570	200	200	
11	Pipe plant	300		380		150	50	
12	Power plant	1,000	-A		28,025	300		
13	Deminelizer etc.	900					300	
14	Oxygen plant	150			6,370	150		
15	Mechanical shop	200				200		
16	Compress shop				2,210			
		(A:400)						
		5,890	2,100	15,130	59,795	3,590	980	2,600
		7,990		74,925		7,170		

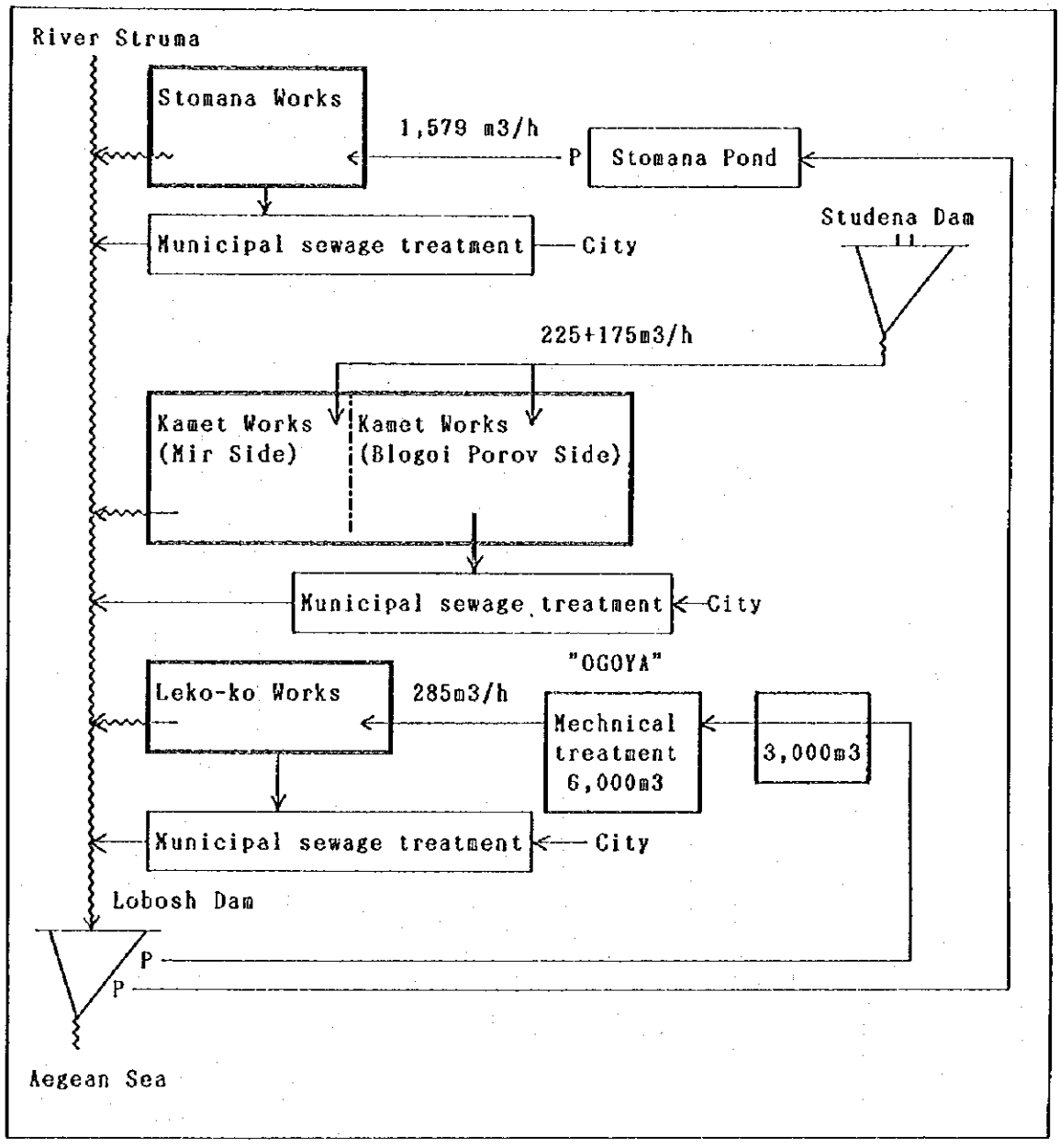
Note:WT(Wastewater Treatment Plant) CP(Cinder Pond) TP(Tailing Pond)

Appendix 8-2 Wastewater Flow Sheet (Coke Plant at Kremikovtzi)

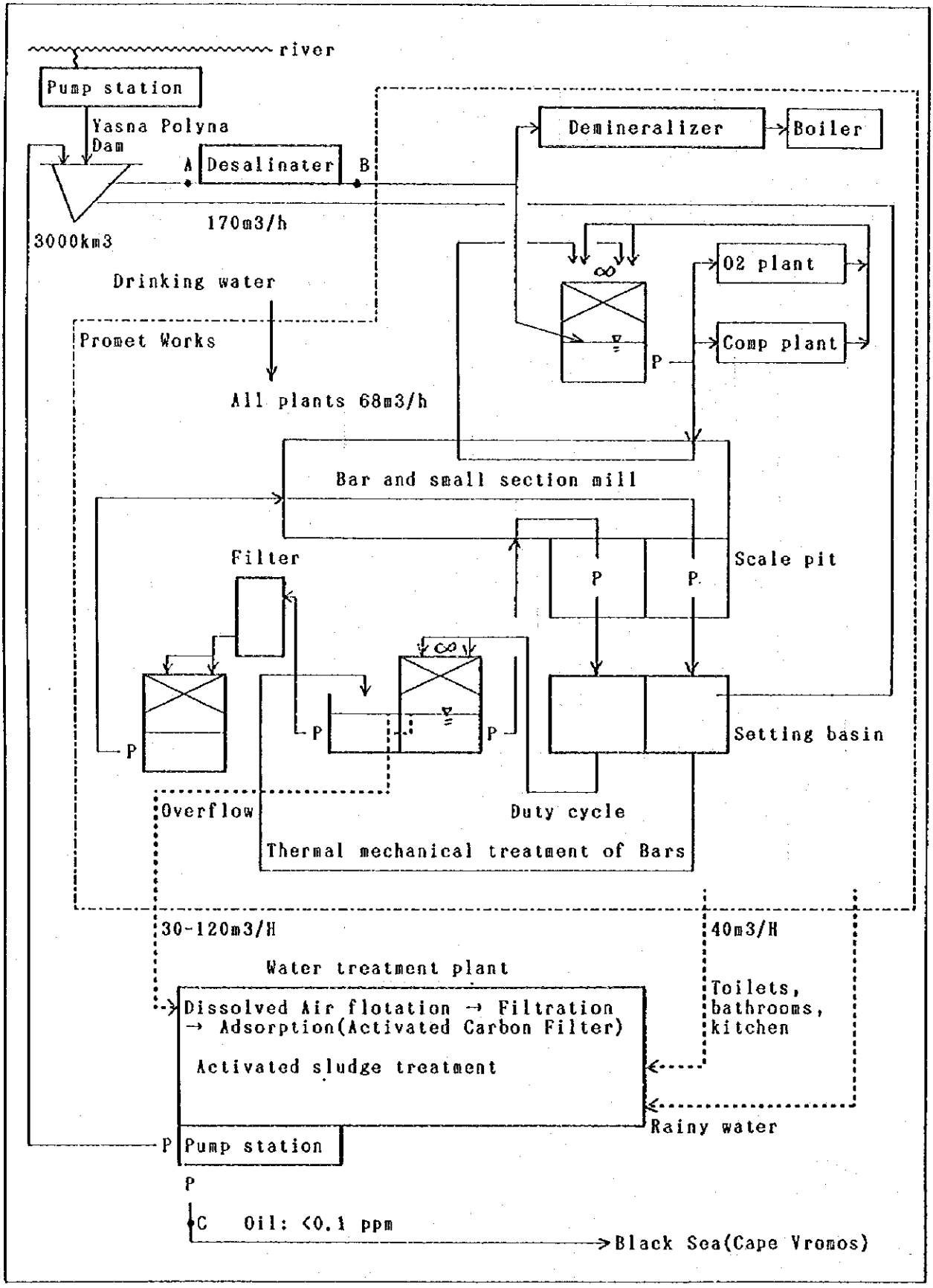


(CAD FN:KRE-BAR2.DWG)

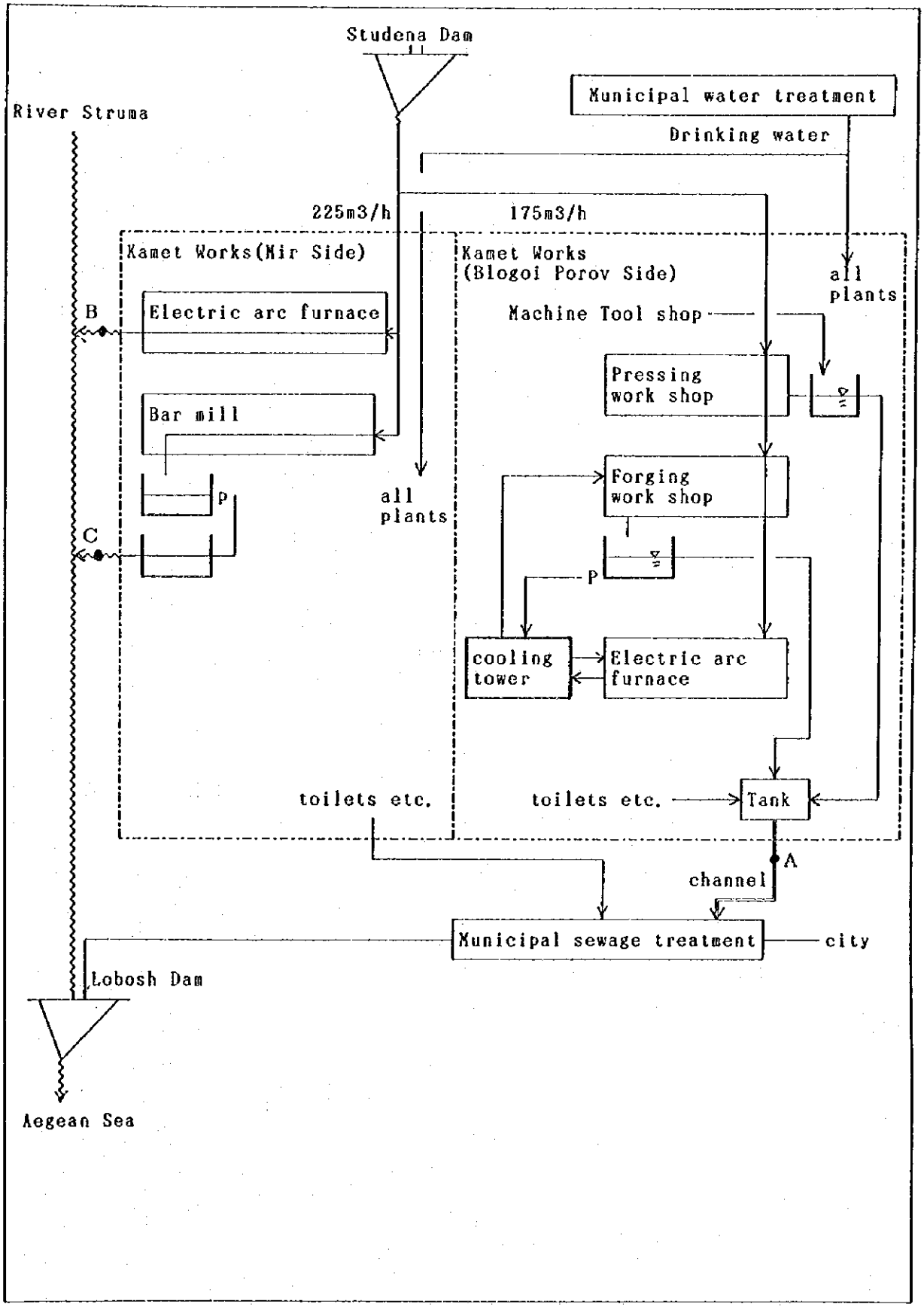
Appendix 8-3 Water Balance at Stomana, Kamet and Leko ko Steelworks



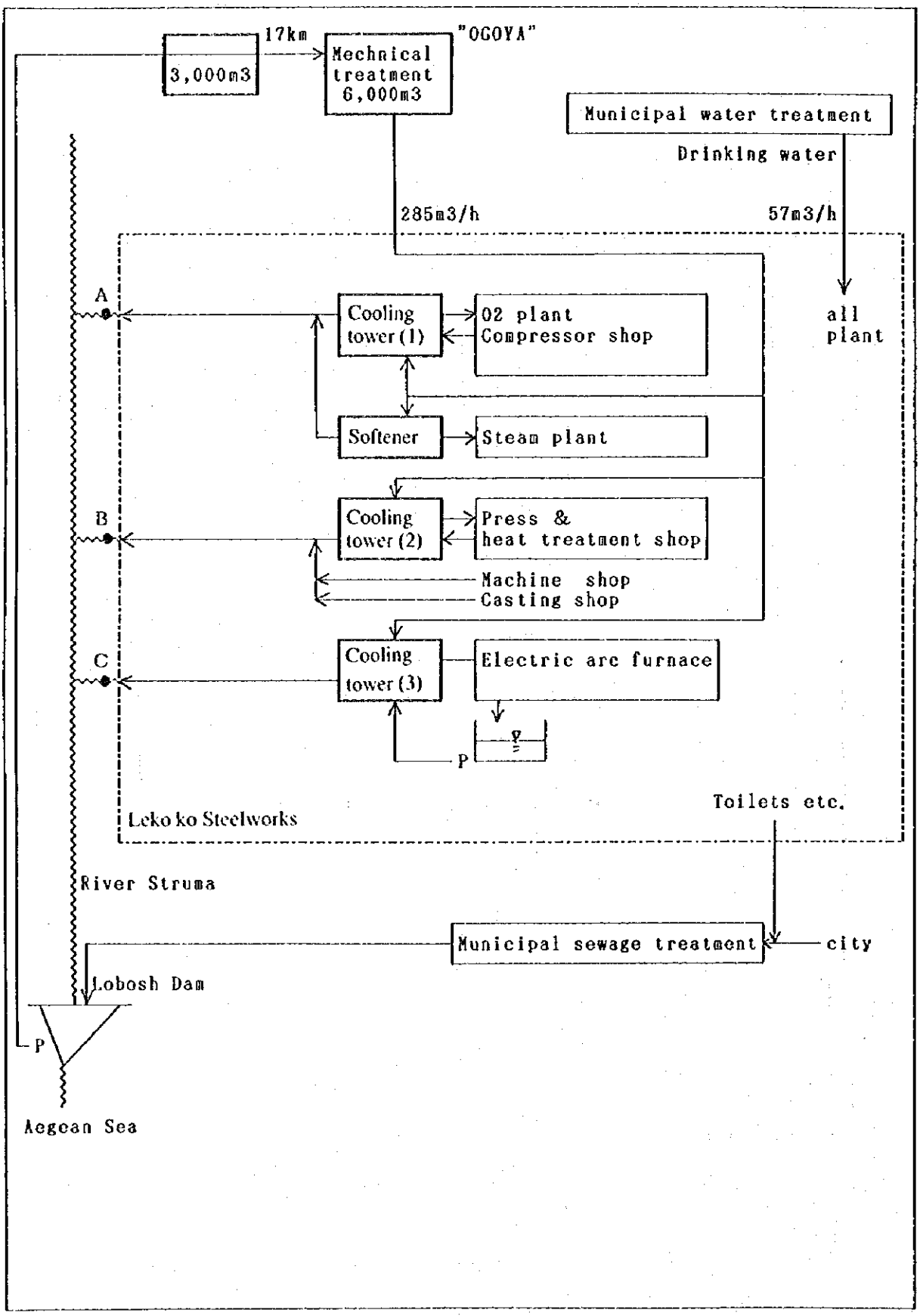
Appendix 8-4 Water Balance at Promet Steelworks



Appendix 8-5 Water Balance at Kamet Steelworks



Appendix 8-6 Water Balance at Leko ko Steelworks



Appendix 8-7 Recommendations of Wastewater Facility

法規上の水質基準は満足しているが、水処理設備として改善を要する項目を列記する。

1) Kremikovtzi 製鉄所

a) 工業用水回収率

工業用水の回収率を上げると、藻の発生、スケールの析出、腐食の進行が起こり易くなる。

工業用水中の硬度成分が高いので、高炉、加熱炉等の熱負荷の高い間接冷却の箇所についてはスケールの発生・成長による熱交換不良に対する注意が必要である。
また、転炉、高炉の集塵水ラインでは、スケール析出による送水配管の閉塞に注意が必要である。

腐食状況をチェックする為には、主要な工場の循環水系統のMDD（腐食速度）と水質（PH、全硬度、塩素イオン、硫酸イオン等）の測定を定期的に行うべきである。冷却水中の塩素イオンによる腐食については150ppm位から著しくなる。この場合、間接冷却水系統に防錆剤等の薬品の注入が必要になる。

問題が生じれば、下記の対策を行う。
・Wastewater Treatmentの処理水のBotunetze湖への送水量を減らす。
・間接冷却水には、水質に合った最適な防錆剤を使う。

b) Cinder Pond運転

Cinder Pondは中和処理設備の廃水・排泥、純水装置樹脂の再生廃液、コークス炉ガス液、高炉・転炉・電気炉のスラリー等を受け入れ処理している。輸送ラインはパイプで、途中から解放型のU字溝になっている。これらの廃液は濃度が高い為、製鉄所からCinder Pondまでの輸送が難しく、次の問題点がある。
・酸性廃液の中和が不十分な為、輸送ラインの配管が腐食して漏れが発生する。
（その為、配管は内面コーテイング配管と交換中であった。）
・中和スラッジの送泥ラインの管径（流速）が適切ではなく、配管が詰まりやすい。
・高炉、転炉等のスラッジで輸送配管が磨耗して、漏れが発生する。
また、Cinder Pondのスラリーが乾燥して飛散する問題があり、薬品で対処している。

将来的には、スラリーのリサイクル等を行い、このpondを閉鎖し、送泥ポンプの電力費、輸送ラインの補修費、公害対策費等を無くすべきである。

c) Tailing Pond運転状況

Talling Pondも乾燥による粉塵の飛散が問題となっており、定期的に散水をしている。

将来的には、製鉄所内のシックナーで処理をしてスラリーのリサイクルを行い、送水ポンプの電力費、pondの維持費等の削減を図るべきである。

d) 製鉄所内水処理設備

油分

各工場の循環水系統への油の流入量が（日本に比べて）多い。また、ほとんどの間接冷却水で、油分が数ppm混入している。今後、詳細に調査を行い、対策する必要がある。

高炉集塵水ライン

3基のシックナーで集塵排水を処理している。凝集剤を注入していない為、処理水のＳＳ（懸濁物質）は37ppmである。高炉集塵機への送水配管がスケールで詰まる為、送水ラインが2系列になっており定期的に配管を交換している。分散剤注入による送水配管閉塞防止テストを行い、配管交換費用と分散剤費用を比較検討すべきである。

Cinder Pondに送泥するスラリーポンプのサクションがスケールで詰まる為、除去作業（エアー吹かし）をしている。高炉、転炉とも集塵水の戻りラインに、ダストコンベア等の粗粒分離装置を設置して、集塵排水中の粗粒を回収する（転炉ではスクラップ使用増加による亜鉛の増加がない事を確認して）と共に、スケール除去作業の削減を図るべきである。

転炉集塵水ライン

2基のシックナーで集塵排水を処理している。転炉集塵水の送水ラインで配管内にスケールが成長し、配管内径が小さくなり、送水量が低下する問題が発生していた。（PH 11.3 ,全硬度802ppm）

対策として、高分子凝集剤の注入を始めており、処理水のＳＳは約10ppmとなっている。完全な対策を打つためには、送水ラインに最適な分散剤を注入する必要がある。（その後、注入テストを開始）

熱延工場水処理設備

直接系の水処理設備は2カ所（圧延ラインの排水とホットランテーブルの排水）に分かれている。タイプは横流沈澱地である。一部の水槽で凝集剤を注入しているが、大半は凝集剤を注入していない為、処理水の水質はＳＳ30-34ppm、Oil 7-14ppmである。今後、ＳＳの低い冷却水が要求された時、凝集剤の注入、または、ろ過器の設置が必要になる。

沈澱池表面に、油膜または油が層状に浮かんでいる。油は回収され、発電所で燃料の一部に使われてはいるが、工場から循環水への油の混入は出来るだけ少なくすべきである。

デスケーリングポンプの水はポンプが腐食すると言う理由で、間接冷却水を使用している。水質の改善またはポンプの材質変更を行い、直接冷却水を使用して、工業用水を削減すべきである。

中和廃水処理設備

日本における塩酸酸洗廃液の一般的な処理方法は、酸洗ラインの廃酸は塩酸回収装置で塩酸を回収し、酸化鉄（Fe_2O_3）を製造する。そして、どうしても漏れる薄酸（鋼板洗浄水等）については中和処理設備で処理する。

この製鉄所では、廃酸を含んだ酸性廃液を中和処理工場（地下３階、地上２階ですべて建屋の中に装置がある）で処理している。

まず、消石灰の品質を改善する必要がある。ザラザラの消石灰である。消石灰の品質確認はしていないが、品質は相当低いと思われる。

中和処理工場のＰＨ計は１本であった。少なくとも、中和（制御）用、処理水用の２本のＰＨ計が必要である。

将来、塩酸の酸洗廃酸の処理については、塩酸回収装置を設置して、塩酸の回収による塩酸購入費の削減及び酸化鉄（Fe_2O_3）の製造・販売を行うべきである。これによりCinder Pondへの輸送ラインの補修費用も削減する。

2) Stomana 製鉄所

・ＣＣへの直接冷却水の水質（水処理設備での処理水の水質）がＳＳ34ppmと高い。日本の製鉄所では、通常5ppm以下である。ＳＳを含んだ冷却水を使用していると腐食を引き起こしたり、ノズルの閉塞が発生しやすくなり、トラブルの原因となる為である。凝集剤の使用、ろ過器の増設等を提案する。

・現在、間接冷却水のブロー水をそのまま放流している所がある。工業用水の回収率を高める為、間接冷却水のブロー水を直接冷却水の補給水として利用し、直接冷却水への工業用水の補給をやめるべきである。

・ＣＣのモールド冷却水に関しては、補給水ラインにろ過器を設置し、循環水のＳＳを下げる事を提案する。また、循環水を軟水にすると（出来れば、クローズ化すれば）モールドの寿命が延びるので、投資効果を含めて検討すべきである。

3) Promet 製鉄所

・棒鋼工場からの排水（直接系循環水）中には、油が非常に多く沈澱槽に層状に浮かんでいる。水質汚濁防止対策の概要に示す油対策のステップ１、２を行う必要がある。

・最終排水処理設備のろ過器出口のＳＳが15ppmと高い為、活性炭槽に負荷がかかっている。ろ過器の点検、再生条件の見直し等の改善が必要である。

4) Leko-ko 製鉄所

・工業用水は製鉄所に給水される前にろ過されているが、ろ過後の水質がＳＳ38 ppm と高い。ろ過器の点検・整備の強化を図り、ＳＳは少なくとも10ppm以下にすべきである。ＳＳの高い冷却水を使用していると腐食を引き起こしたり、スライムが発生しやすくなり、トラブルの原因となる為である。

Appendix 9-1

Sources of Raw Materials and Energy

1　原材料源（鉄鉱石，石炭及びスクラップ）計画

各シナリオのための原材料の供給について検討した結果、各シナリオに対する原材料供給に問題はない。

1.1 原材料の使用量

1) 鉄鉱石のシナリオ別使用量を下記 Table 1 に示す。各シナリオとも使用量がそれほど多くなく供給上の支障はない。

Table 1　Iron Ore Consumption for Restructuring the Bulgarian Steel Industry

Kremikovtzi Steelworks　(Unit : 1,000MT/Y)

Items		Number of Scenario					
		A	A-2	B-1	B-2	C	C-2
Total ore	100%	1,615	2,120	1,433	1,433	1,615	2,120
Sinter feeds	90%	1,454	1,906	1,289	1,289	1,454	1,906
Pellet	5%	80.5	107	72	72	80.5	107
Lumpy ore	5%	80.5	107	72	72	80.5	107

2) 石炭のシナリオ別使用量を下記 Table 2 に示す。各シナリオとも使用量がそれほど多くなく供給上の支障はない。

Table 2　Coal Consumption for Restructuring the Bulgarian Steel Industry

Kremikovtzi Steelworks　(Unit : 1,000MT/Y)

Item	Number of Scenario					
	A	A-2	B-1	B-2	C	C-2
Coking coal	658	873	587	587	658	871

3) スクラップの各製鉄所のシナリオ別使用量を下記 Table 3 に示す。シナリオA-2とC-2において、クレミコフチの溶銑の生産量を増加させ、輸入スクラップの使用をゼロにする計画である。

Table 3 Scrap Consumption for Restructuring of Bulgarian Steel Industry

(Unit: 1,000MT/Y)

Items	Number of Scenario								
	A	A-2	B-1	B-2	C	C-2	D-1	D-2	D-3
① Kremikovtzi & Stomana									
Total scrap	1,194	859	1,274	1,274	1,167	834	2,157	2,141	2,141
Domestic scrap	600	600	600	600	600	600	600	600	600
Import scrap	335	0	443	443	333	0	1,295	1,295	1,295
Cast iron	0	0	0	0	0	0	15	15	15
Return scrap	259	259	231	231	234	234	245	231	231
② Leko ko									
Total scrap	85	85	85	85	85	85	85	85	85
Domestic scrap	56	56	56	56	56	56	56	56	56
Return scrap	29	29	29	29	29	29	29	29	29
③ Total steel mills (①+②)									
Total scrap	1,279	944	1,359	1,359	1,252	919	2,242	2,226	2,226
Domestic scrap	656	656	656	656	656	656	656	656	656
Import scrap	335	0	443	443	334	0	1,296	1,296	1,296
Cast iron	0	0	0	0	0	0	15	15	15
Return scrap	288	288	260	260	263	263	274	260	260

1.2 供給の見通し

1) 鉄鉱石、石炭

クレミコフチ製鉄所はすでに世界市場から購入している。鉄鉱石はBulgas port又はLom portから、石炭はBulgas portから鉄道でクレミコフチ製鉄所へ輸送されている。将来の鉄鉱石及び石炭の購入に対して問題はない。

2) スクラップ

将来共スクラップの国内発生量は697,800t/年であるため、クレミコフチ製鉄所及びストマーナ製鉄所へ600,000t/年、レココ製鉄所へ58,000t/年供給するものとして製鉄所の近代化を計画する。不足分は輸入スクラップを使用する。

1.3 原料単価の推定

鉄鉱石及び石炭の単価を下記Table 4に、またスクラップの単価を下記Table 5に示す。鉄鉱石及び原料炭価格を先進国の価格に近付け設定した。

Table 4 Iron Ore and Coking Coal Price (Unit : US$/t)

Powdery ore	30.00
Coking coal	60.00

シナリオA-2及びC-2に於けるスクラップの平均価格は他のシナリオに較べ、輸入スクラップが無いため低い。ベスト案と推定される。

Table 5 Steel Scrap Price

(Unit:US$/t)

Items	Number of Scenario								
	A	A-2	B-1	B-2	C	C-2	D-1	D-2	D-3
① Kremikovtzi									
Domestic scrap	95	95	95	95	95	95	95	95	95
Import scrap	145	145	145	145	145	145	145	145	145
Ave. Do. & Imp.	113	95	116	116	113	95	129	129	129
Cast iron	170	170	170	170	170	170	170	170	170
Return scrap	57	57	57	57	57	57	57	57	57
Ave. of scrap	98	73	80	80	98	73	120	121	121
② Stomana									
Domestic scrap	95	95	95	95	95	95	95	95	95
Import scrap	145	145	145	145	145	145	145	145	145
Ave. Do. & Imp.	113	95	116	116	113	95	129	129	129
Return scrap	57	57	57	57	57	57	57	57	57
Ave. of scrap	104	89	110	110	106	90	122	123	123
③ Leko ko									
Domestic scrap	95	95	95	95	95	95	95	95	95
Return scrap	57	57	57	57	57	57	57	57	57
Ave. of scrap	82	82	82	82	82	82	82	82	82

2. エネルギー源計画

各シナリオに対するエネルギー供給を検討した結果、供給に問題がない。シナリオ選択がエネルギー供給面から制約を受けない事を確認するため、シナリオ毎の製鉄所年間エネルギー（天然ガス、電力）購入量を想定する。予想購入量は、どのシナリオが選択されても現状供給能力で充分対応できる事を示しており、シナリオ選択の制約とはならない。

1) 使用量

選択されたシナリオをエネルギー需給に影響を与える条件（生産量と設備構成）で分類すると、下記のTable 6に示す如く4グループとなる。

Table 6 Crude Steel Production and Plant Composition at Each Scenario

Scenarios	Kremikovtzi				Stomana	
	Crude steel Production (Kt/y)	Composition			Crude steel Production (Kt/y)	Composition
		BF	COV	EF		EF
A	1,474	2	3	1	546	2
C	1,474	2	3	1	521	2
B - 1	993	2	3	(1)	1,002	2
B - 2	993	2	3	(1)	1,002	2
D - 1	979	-	-	2	1,027	2
D - 2, 3	993	-	-	2	1,002	2
A - 2	1,474	2	3	-	546	2
C - 2	1,474	2	3	-	521	2

グループ分けされた各シナリオ毎の天然ガス、電力の年間予想購入量をTable 7に示す。
購入量の予想は、各シナリオの改善原単位と生産量をもとに行っている。

Table 7 Annual Natural Gas and Electric Power Purchased in Each Group

Steelworks	Scenario A, C		Scenario A-2, C-2		Scenario B-1, B-2		Scenario D-1, D-2, D-3	
	Electric power (10^6Kwh)	N.Gas (10^6Nm^3)	Electric power (10^6Kwh)	N.Gas (10^6Nm^3)	Electric power (10^6Kwh)	N.Gas (10^6Nm^3)	Electric power (10^6Kwh)	N.Gas (10^6Nm^3)
Kremikovtzi	730.2	233.8	646.1	169	478.2	223.6	731.5	373.2
Stomana	510.7	91.1	510.7	91.1	835.1	95.8	854.7	97.2
Promet	(51.4)	(12.6)	(51.4)	(12.6)	78	19.8	78	19.8

（ ）は、C又はC-2シナリオの使用量を示す。

2) 供給先, 供給品質及び供給能力

Table 8, Table 9 に天然ガスと電力の供給能力と選択されたシナリオの内最も多い購入量との比較を示す。このTable からどのシナリオが採択されても供給能力に問題はないと言える。

(1) 天然ガス

供給先　　；　ブルガルガス　会社

供給品質　；　単位発熱量　7,920　～　8,000　Kcal/Nm^3

組成

CH_4 98.54%, C_2H_4 0.32%, C_3H_8 0.09%, C_4H_{10}- C_5H_{12}0.04%,

CO_2 0.03%, N_2 0.98%

供給能力, 購入量　；　下記　Table 8 参照

Table8　Comparison of Natural Gas Supply Capacity and Consumption Amount at Kremikovtzi, Stomana and Promet

Steelworks	Estimated supply capacity	Average consumption per hour
Kremikovtzi	$85 \times 10^3 Nm^3/h$	$43 \times 10^3 Nm^3/h$
Stomana	$35 \times 10^3 Nm^3/h$	$11 \times 10^3 Nm^3/h$
Promet	$15 \times 10^3 Nm^3/h$	$2.3 \times 10^3 Nm^3/h$

(2) 電力

供給先　　；　National Electric Company

供給能力, 購入量　；　下記　Table 9 参照

Table 9　Comparison of Electric Power Supply Capacity and Purchase at Kremikovtzi, Stomana and Promet

Steelworks	Estimated supply capacity	Average consumption per hour
Kremikovtzi	860 MVA	98 MVA
Stomana	630 MVA	115 MVA
Promet	120 MVA	10 MVA

3) 輸送ルート

天然ガス、電力とも既設の供給ラインで供給される。天然ガス、Pipe line、電力は架空線である。

4) 単価（FOB、フレート、国内輸送）

7.4.1、7.4.2 で既に示したように天然ガスは、0.12 US$/Nm^3 (0.015 US$/Mcal) 電力の平均単価は 0.05 US$/Kwh と想定する。電力の時間帯別単価は、1993年をベースに考えると夜間時間0.024 US$/Kwh、昼間時間 0.048 US$/Kwh、ピーク時間 0.088 US$/Kwh と推定される。

この場合クレミコフチ製鉄所の自家用発電所は天然ガスを燃料として、ピーク時間帯に運転する事によりメリットが発生する。(天然ガスが 0.015 US$/Mcal の場合、電力単価が 0.069 US$/Kwh 以上になると発電メリットがでる。)

Appendix 10-1 Products and Quality of Coil and Sheet

Products	Sizes	Steel Grade
1.Hot rolled Sheet	(2.0-2.8)T * (770-1,050)W * (2-3m)L (3.0-3.8)T * (770-1,250)W * (2-6m)L (4.0-12)T * (770-1,500)W * (2-6m)L	Carbon Steel DIN17100/80--St33,St37, DIN1614/86 part1--St22,St23 DIN17210/86--C10,C15 DIN17200/87--C22,C25,C30, C35,C40,C45,C50
Strip	(3-6)T*(120-600)W*OD(1.1-1.9m)*ID (740)	Alloyed Steel
Coil	OD(1,100-1,900) * ID(850)	DIN17102/83--TStE355 DIN17200/87--15Mn3,30Mn4
Checker plate	(4.0-8.0)T * (770-1,250)W * (2-6m)L	DIN17155/83--H1,H11 DIN17405--RFE120,RFE100
2.Cold rolled Sheet	(0.5-0.65)T * (720-1,000)W * 2mL (0.7-1.2)T * (720-1,250)W * (2-2.5m)L (1.2-2.0)T * (720-1,250)W * (2-4m)L	DIN1623/83part1--St12,St13,St14 DIN1623/86part2--FeP01～04 DIN1623/87part3--EK2,EK4
Coil	(0.24-2.5)T * (720-1,250)W * ID (300, 600)	DIN1616/84--T50,52,57,61,65
Strip	(0.28-2.0)T * (10-500)W * ID(300,600)	DIN1623/83part1--St12,St13,St14
Plate	(0.24-0.5)T * (512/712)	DIN1623/86part2--FeP01～04 DIN1623/83part1--St12,St13,St14
Sheet with organic coating	(0.55-0.63)T * (750-1,000)W * (2-5m)L (0.7-0.8)T * (750-1,100)W * (2-5m)L (1.0-1.5)T * (720-1,250)W * (2-5m)L	DIN17100/80 DIN1623/83
CGL Sheet	(0.5-0.63)T * (710-1,000)W * 2mL (0.7-0.8)T * (710-1,100)W * 2mL (1.0-1.5)T * (710-1,250)W * (2-2.5m)L	DIN 17162/77part1--St01Z,St02Z
Coil	ID(600,420)	
CAL-ETL Sheet Coil	(0,24-0,36)	

Appendix 10-2 Products and Quality of Welded Pipes and Cold Bent Sections

Products	Sizes	Steel grade
1.Welded pipe		
General purpose pipe	ϕ 57 * (3, 3.5, 4.0)^{T} * (4-8m)^{L}	DIN17100/80--St33,St37-2
	ϕ 63.5 * (3, 3.5, 4.0)^{T} * (4-8m)^{L}	DIN1626/87--St37.0,St44.0
	ϕ 76 * (3.5, 4.0)^{T} * (4-8m)^{L}	
	ϕ 89 * (3, 3.5, 4.0)^{T} * (4-8m)^{L}	
Tubular scaffold	ϕ 48 * 3.5^{T}	
Water/Gas pipe	ID(10-80) * OD(17.2-89) * (2.6-5.4)^{T}	
Square pipe	□(50-90) * (3.6, 4)^{T} * (4-10m)^{L}	DIN17100/80--St37-2
2.Cold bent	Channel(100-220)^{W} * (40-160)^{H} * (4-6)^{T},	DIN17100/80--St33,St37-2
	Trough like section 223 * 72 * (2.5-3.0)	DIN17200/87--C22
	Road side fence section 270 * 77 * 4	DIN17210/86--C10

Appendix 10-3 Products and Quality of Rods, Seamless Pipes and Billets

Production	Sizes	Quality
1.Rod	ϕ 5 - ϕ 16 Coil weight 1.3 ton	DIN17100/80--St37-2
		DIN17100/87--C35,40,45,50,55,60
		DIN17145/80--USD-7,10MnSi5
		Air patented processed
2.Seamless pipe	ϕ (50-57) * (4-10)^{T} * (4-12m)^{L}	DIN17200/87--41Cr4
	ϕ 63.5 * (4-12)^{T} * (4-12m)^{L}	DIN1629/84 --St37.0,St44.0
	ϕ (70-159) * (4-12)^{T} * (4-12m)^{L}	
Cold drawn pipe	OD(42-75)* (3-6)^{T} * (4-11m)^{L}	
3.Billet	ϕ (100,120,140) * (6-12m)^{L}	DIN17100/80--St33,St37-2
	□(80,100,115,120) * (4-12m)^{L}	DIN17200/87--C10,22,25,35,45,60
		DIN17102/83--TStE355

Appendix 10-4 Products and Quality of Plates and Shapes & Bars No. 1

Production	Sizes	Quality
1.Plate	(8-25)T * (1,400-2,000)W * (3-8m)L	DIN17100--St33,37-2,37-3,44-2, 44-3,50-2,52-3 DIN17200--Ck10,15,C22,25,30,40, C45,28Cr4,34Cr4,41Cr4 Lloyd-Germany , DIN17155 H
2.Shapes	L 50×50 - 100×100 [60×30 - 80×40	DIN17100--St37-2,44-2,50-2
	□(80 - 120) * (3-8m)L	DIN17100--St37-2,44-2,50-2
	Flat bar (25-60)T * (100-140)W * (2-8m)L	DIN17200--C25,35,45,28Cr4,34Cr4 ,41Cr4
	Bell shaped , Trough shaped, Chute shaped,Railway connections, Plough share , U- shaped	
3.Bars	ϕ 10- ϕ 100	DIN488--BSt420,500
4.Ball	ϕ 40- ϕ 120	

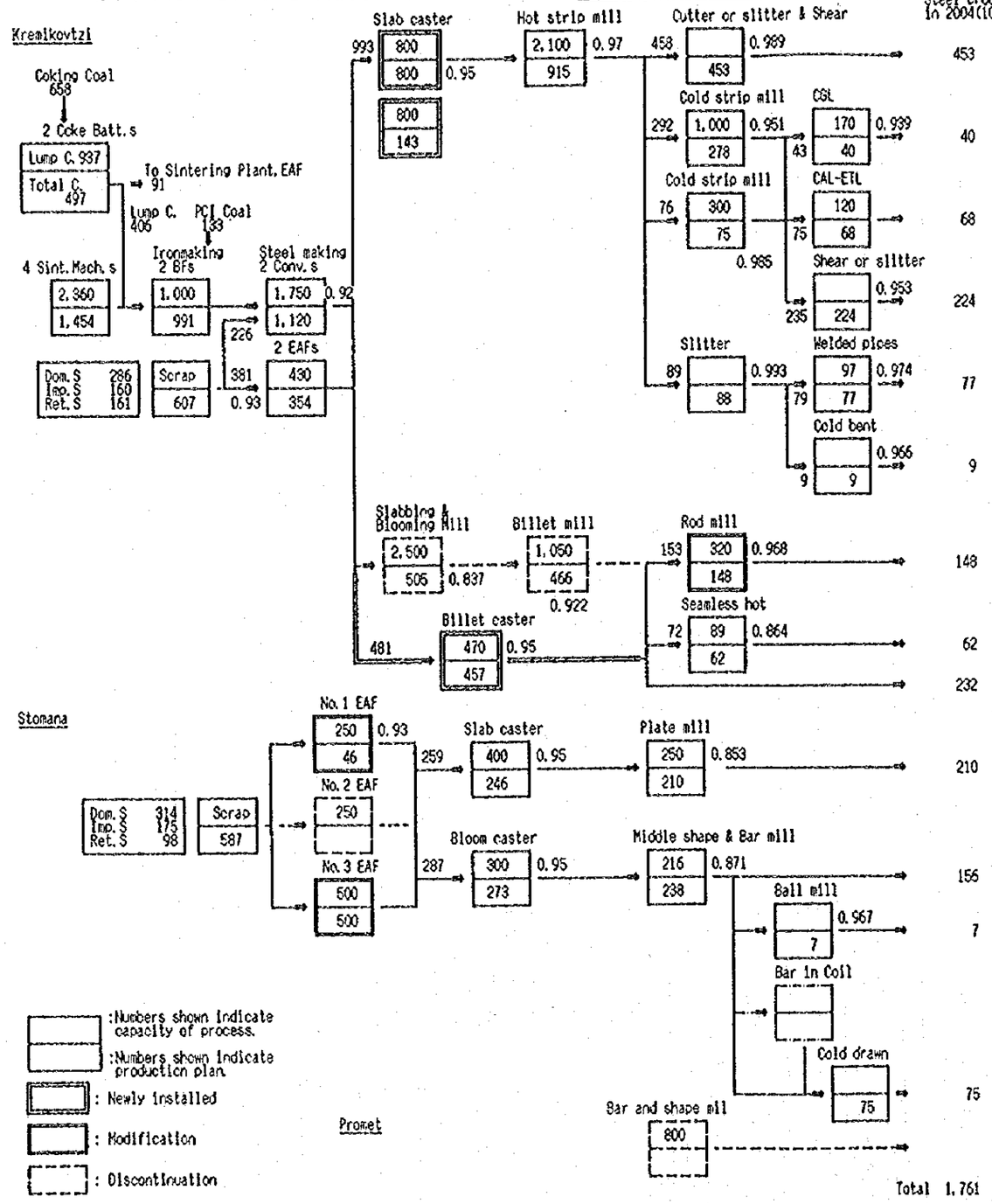
Appendix 10-5 Products and Quality of Plates and Shapes & Bars No. 2

Production	Sizes	Quality
1.Plate	(8-25)T * (1,400-2,000)W * (3-8m)L	DIN17100--St33,37-2,37-3,44-2, 44-3,50-2,52-3 DIN17200--Ck10,15,C22,25,30,40, C45,28Cr4,34Cr4,41Cr4 Lloyd-Germany , DIN17155 H
2.Shapes	L 50×50 - 100×100 [60×30 - 80×40	DIN17100--St37-2,44-2,50-2
3.Bars	ϕ 10- ϕ 100	DIN488--BSt420,500
4.Ball	ϕ 40- ϕ 120	

Appendix 10-6

Material Balance

A1160021 # Appendix 10-6-1 Material Balance No. A (4) Scenario for Restructuring



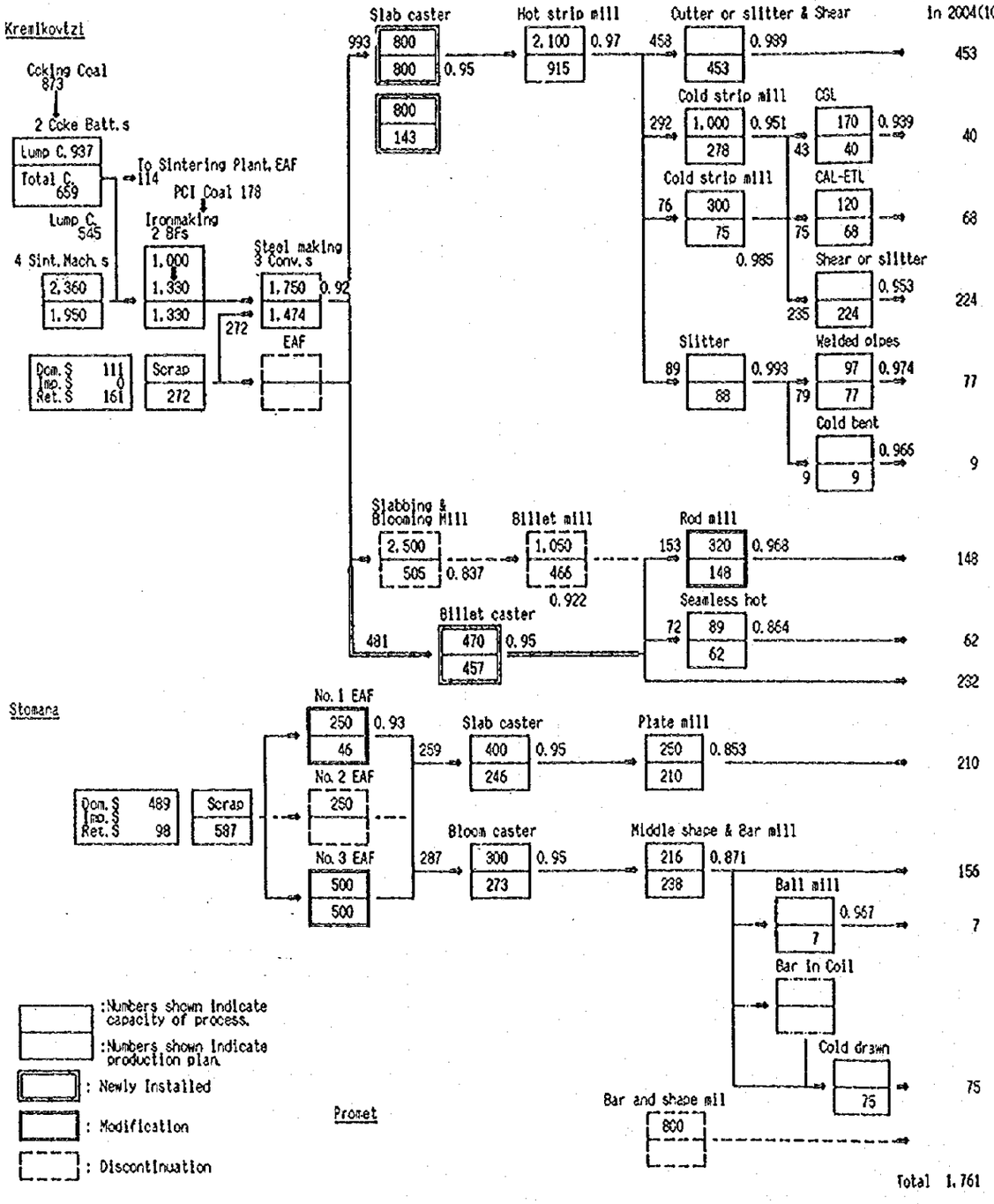
Products and production after restructuring

Size of products

Present and after restructuring

Steel production in 2004(10^3t/y)	Number of steel products classification	After restructuring	Present
453	6, 7	Sheet (3.0 -2.8)^T*(770-1,650)^W*(2-3m)^L (3.0 -3.8)^T*(770-1,250)^W*(2-6m)^L (4.0 -12)^T*(770-1,500)^W*(2-6m)^L Strip (3-6)^t*(120-600)^W*00(1200-1,900)*ID(740) Coil 00(1,100-1,900)*ID(850) Checkered plate (4.0-8.0)^T*(770-1,250)^W*(2-6m)^L	
40	10	Sheet (0.5-0.63)^T*(710-1,000)^W*2m^L (0.7-0.8)^T*(710-1,100)^W*2m^L (1.0-1.5)^T*(710-1,250)^W*(2, 2.5m)^L Coil ID(600, 420) ※⇒ Sheet (0.24, 0.26, 0.28, 0.30, 0.32, 0.36)^T Coil	
68	9	※	
224	8, 11	Sheet (0.5-0.65)^T*(720-1,000)^W*2m^L (0.7-1.2)^T*(720-1,250)^W*(2-2.5m)^L (1.2-2.0)^T *(720-1,250)^W*(2-4m)^L Strip (0.28-2.0)^T*(10-500)^W*ID(300, 600) Plate (0.24-0.5)^T*(512/712) Coil (0.24-2.5)^T*(720-1,250)^W*ID(300 or 600)	
77		Sheet with organic coating (0.55-0.63)^T*(750-1,000)^W*(2-5m)^L (0.7-0.8)^T*(750-1,100)^W*(2-5m)^L (1.0-1.5)^T *(720-1,250)^W*(2-5m)^L	Wide-strip galvanized steel sections with organic coating
9	15	General purpose pipes Φ57*(3, 3.5, 4.0)^T*(4-8m)^L Φ83.5*(3, 3.5, 4.0)^T*(4-8m)^L Φ76*(3.5, 4.0)^T*(4-8m)^L Φ89*(3, 3.5, 4.0)^T*(4-8m)^L Tubular scaffold 0.948 Φ48*3.5mm	Water/gas pipes ID(10-80)* 00(17.2-89) *(2.6-5.4, 2.9-5.4)^T
148	12	Equilateral section [(100-220)*(40-90)*(4-6), 114*160 *7 Trough-like section 223*72*(2.5-3.0) Road side fence section 270*77*4 After restructuring (Wire rod and rebar) Φ5.5 - 16	
62	4		
232	14	Seamless hot-rolled pipe Φ(50- 57)*(4-10)^T*(4-12m)^L Φ63.5 *(4-12)^T*(4-12m)^L Φ(70-159)*(4-12)^T*(4-12m)^L	Cold drawn pipes 00(42-75)*(3-6)^T*(4-11m)^L
	1	Round billets Φ(100, 120, 140)*(6-12m)^L Square billets (80/80, 100/100, 115/115, 117/117)*(6-12m)^L	
210	6	(8 -25)^T × (1400-2000)^W × (3 -8m)^L	(8 -25)^T × (1400-2000)^W × (3 -8m)^L
155	3	Bars Φ(12 -20), 010-020 Shapes Φ(50 - 100)*(3-7m)^L L (60 ×60 - 100×100)*(6-9m)^L L (18, 10, 12)*(4-9m)^L □(80*80-120*120)*(3-8m)^L FB(25-60)^T*(100-140)^W*(2-8m)^L Bell-shaped, Trough-shaped, Chute-shaced, Railway connections, Ploughshare, U-shaped	Φ(12 -20), 010-020 Φ(50 - 100)*(3-7m)^L L (60 ×60 - 100×100)*(6-9m)^L L (18, 10, 12)*(4-9m)^L □(80*80-120*120)*(3-8m)^L FB(25-60)^T*(100-140)^W*(2-8m)^L Bell-shaced, Trough-shaped, Chute-shaced, Railway connections, Ploughshare, U-shaped
7	13	Balls Φ(40-120)	Balls Φ(40-120)
75	16	Round calibrated steel Φ(13-65)*(3-6m)^L	Round calibrated steel Φ(13-65)*(3-6m)^L
			Φ10 -Φ90 Straight L 50×50 - 100×100 L 60×30 - 80× 40

Appendix 10-6-2 Material Balance No. A-2 Scenario for Restructuring



Products and production after restructuring

Size of products

In 2004(10^3t/y)	steel products classification	Size of products
453	6, 7	Sheet (2.0 -2.8)^T*(770-1,050)^W*(2-3m)^L; (3.0 -3.8)^T*(770-1,250)^W*(2-6m)^L; (4.0 -12)^T*(770-1,500)^W*(2-6m)^L Strip (3-6)^t*(120-500)^W*00(1200-1,900)*ID(740) Coil 00(1,100-1,900)*ID(850) Checkered plate (4.0-8.0)^t*(770-1,250)^W*(2-6m)^L
40	10	Sheet (0.5-0.63)^T*(710-1,000)^W*2m^L; (0.7-0.8)^T*(710-1,100)^W*2m^L; (1.0-1.5)^T*(710-1,250)^W*(2, 2.5m)^L Coil ID(600, 420) ※ Sheet (0.24, 0.26, 0.28, 0.30, 0.32, 0.36)^T; Coil
68	9	※
224	8, 11	Sheet (0.5-0.65)^T*(720-1,000)^W*2m^L; (0.7-1.2)^T*(720-1,250)^W*(2-2.5m)^L; (1.2-2.0)^T*(720-1,250)^W*(2-4m)^L Strip (0.28-2.0)^T*(10-500)^W*ID(300, 600) Plate (0.24-0.5)^T*(512/712) Coil (0.24-2.5)^T*(720-1,250)^W*ID(300 or 600)
77		Sheet with organic coating (0.55-0.63)^T*(750-1,000)^W*(2-5m)^L; (0.7-0.8)^T*(750-1,100)^W*(2-5m)^L; (1.0-1.5)^T*(720-1,250)^W*(2-5m)^L Wide-strip galvanized steel sections with organic coating
9	15	General purpose pipes Φ57*(3, 3.5, 4.0)^T*(4-8m)^L; Φ63.5*(3, 3.5, 4.0)^T*(4-8m)^L; Φ76*(3.5, 4.0)^T*(4-8m)^L; Φ89*(3, 3.5, 4.0)^T*(4-8m)^L Tubular scaffold 0.948 Φ48*3.5mm Water/gas pipes ID(10-80)*00(17.2-89) *(2.6-5.4, 2.9-5.4)^T
148	12	Equilateral section [(100-220)*(40-90)*(4-6), 114*160 *7 Trough-like section 223*72*(2.5-3.0) Road side fence section 270*77*4 After restructuring (Wire rod and rebar) Φ5.5 - 16
62	4	
232	14	Seamless hot-rolled pipe Φ(50-57)*(4-10)^t*(4-12m)^L; Φ63.5*(4-12)^t*(4-12m)^L; Φ(70-159)*(4-12)^t*(4-12m)^L Cold drawn pipes 00(42-75)*(3-5)^T*(4-11m)^L
210	1	Round billets Φ(100, 120, 140)*(6-12m)^L Square billets (80/80, 100/100, 115/115, 117/117)*(6-12m)^L
156	6	After restructuring: (8 -25)^T × (1400-2000)^W × (3 -8m)^L Present: (8 -25)^T × (1400-2000)^W × (3 -8m)^L
7	3	Bars Φ(12 -20), D10-D20; Φ(50 - 100)*(3-7m)^L Shapes [(60 ×60 - 100×100)*(6-9m)^L; L (18, 10, 12)*(4-9m)^L; □(80*80-120*120)*(3-8m)^L; I8(25-60)^t*(100-140)^W*(2-8m)^L Bell-shaped, Trough-shaped, Chute-shaped, Railway connections, Ploughshare, U-shaped Balls Φ(40-120)
75	13	
16		Round calibrated steel Φ(13-65)*(3-6m)^L Round calibrated steel Φ(13-65)*(3-6m)^L Φ10 -Φ90 Straight [50×50 - 100×100 [60×30 - 80× 40

Total 1,761

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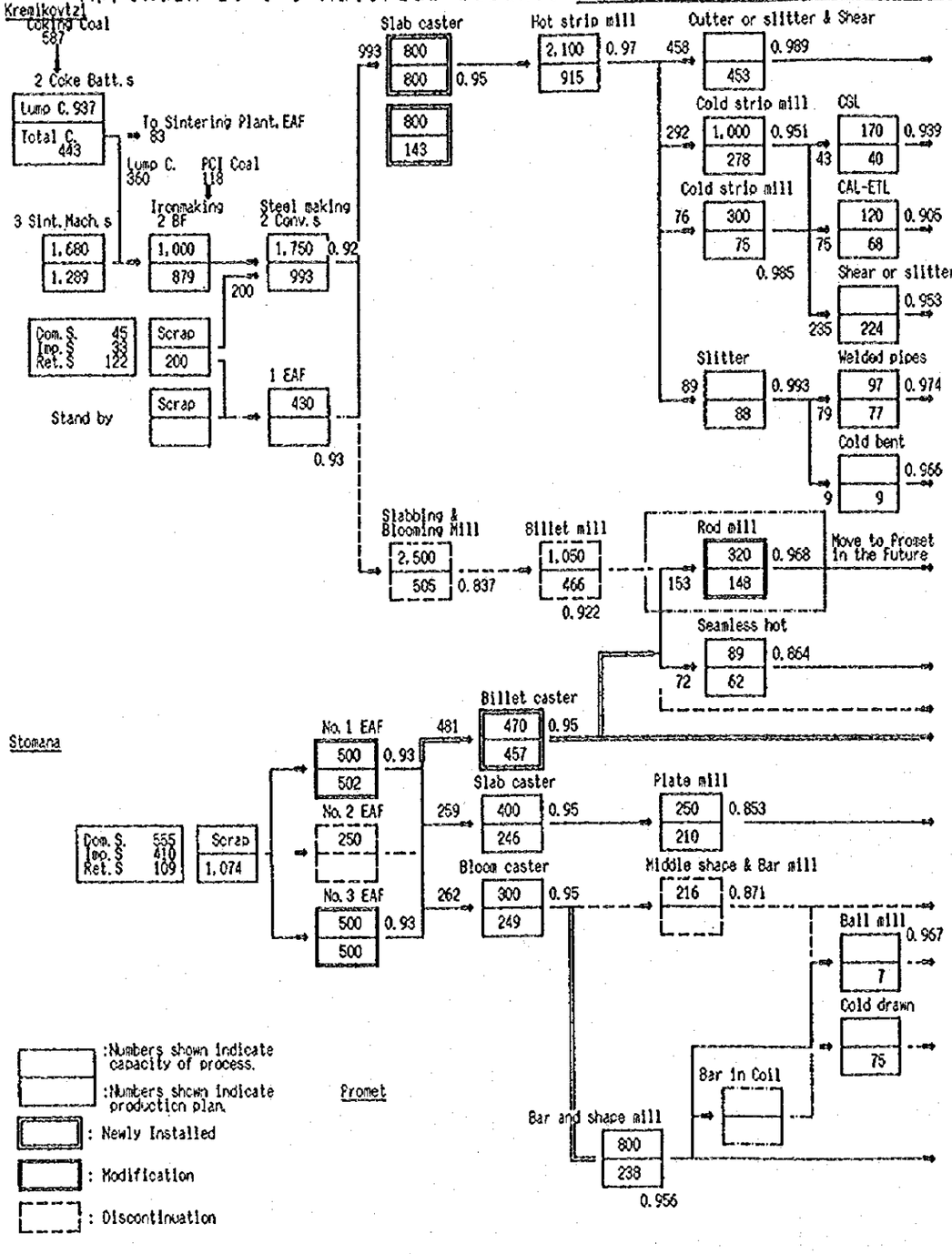
Appendix 10-6-3 Material Balance No. B-1 (3a) Scenario for Restructuring



Products and production after restructuring

	Steel production in 2004 (10^4t/y)
	453
	40
	68
	224
	77
	9
	143
	62
	(232)
	232
	210
	(156)
	7
	75
	155

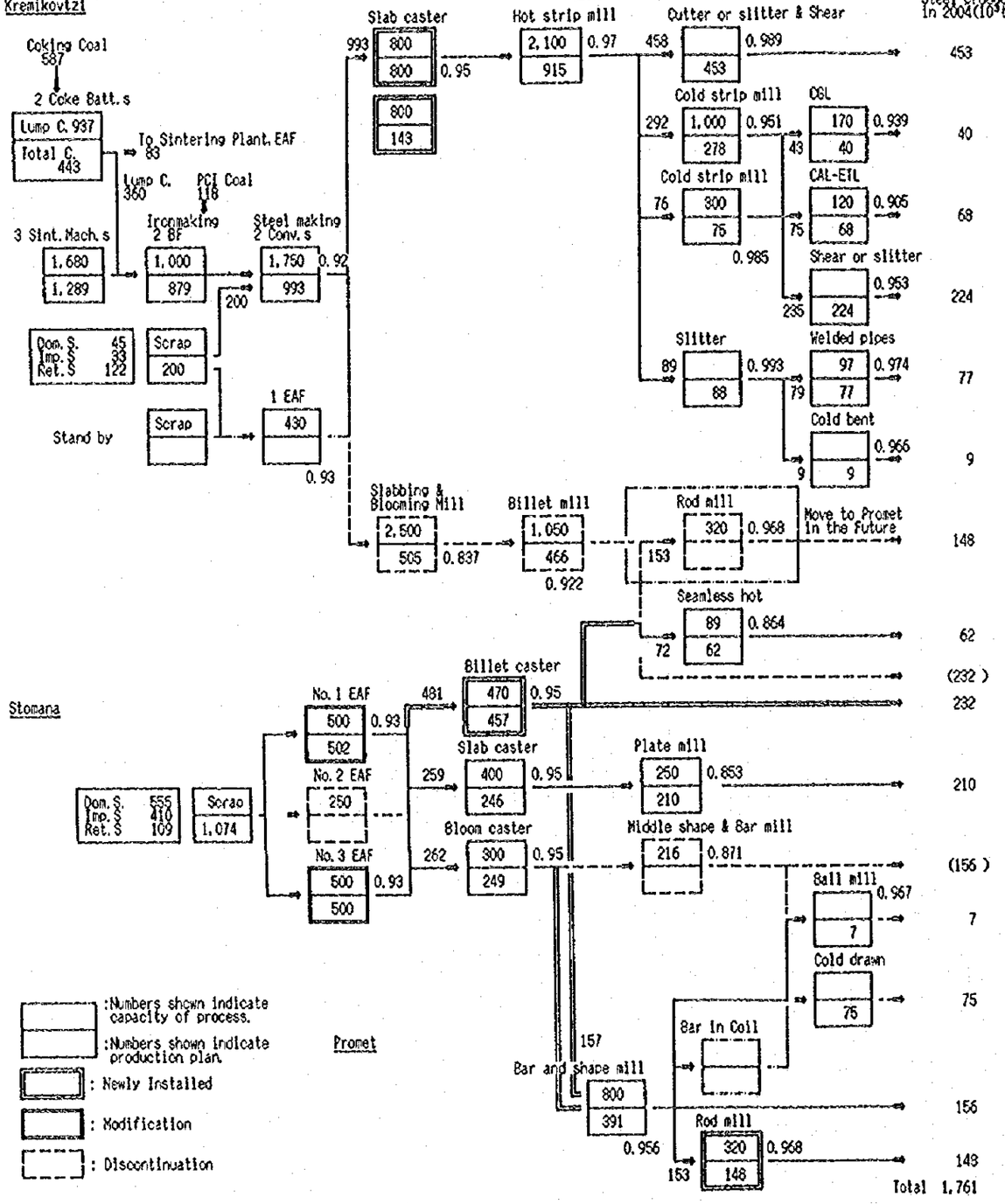
Size of products

Present and after restructuring

Number of steel products classification	
6, 7	Sheet (2.0 -2.8)^T*(770-1,050)^W*(2-3m)^L (3.0 -3.8)^T*(770-1,250)^W*(3-6m)^L (4.0 -12)^T*(770-1,500)^W*(2-6m)^L Strip (3-6)^t*(120-600)^W*ID(1200-1,900)*ID(740) Coil OD(1,100-1,900)*ID(850) Checkered plate (4.0-8.0)^T*(770-1,250)^W*(2-6m)^L
10	Sheet (0.5-0.63)^T*(710-1,000)^W*2m^L (0.7-0.8)^T*(710-1,100)^W*2m^L (1.0-1.5)^T*(710-1,250)^W*(2, 2.5m)^L Coil ID(600, 420) ※ ⇒ Sheet (0.24, 0.26, 0.28, 0.30, 0.32, 0.36)^T Coil
9	※
8, 11	Sheet (0.5-0.65)^T*(720-1,000)^W*2m^L (0.7-1.2)^T*(720-1,250)^W*(2-2.5m)^L (1.2-2.0)^T *(720-1,250)^W*(2-4m)^L Strip (0.28-2.0)^T*(10-500)^W*ID(300, 600) Plate (0.24-0.5)^T*(512/712) Coil (0.24-2.5)^T*(720-1,250)^W*ID(300 or 600)
	Sheet with organic coating (0.55-0.63)^T*(750-1,000)^W*(2-5m)^L (0.7-0.8)^T*(750-1,100)^W*(2-5m)^L (1.0-1.5)^T *(720-1,250)^W*(2-5m)^L Wide-strip galvanized steel sections with organic coating
15	General purpose pipes Φ57*(3, 3.5, 4.0)^T*(4-8m)^L Φ63.5*(3, 3.5, 4.0)^T*(4-8m)^L Φ76*(3.5, 4.0)^T*(4-8m)^L Φ89*(3, 3.5, 4.0)^T*(4-8m)^L Tubular scaffold 0.948 Φ48*3.5mm Water/gas pipes ID(10-80)*OD(17.2-89) *(2.6-5.4, 2.9-5.4)^T
12	Equilateral section L (100-220)*(40-90)*(4-6), 114*160 *7 Trough-like section 223*72*(2.5-3.0) Road side fence section 270*77*4	
4	(Wire rod and rebar) Φ5.5 - 16	
14	Seamless hot-rolled pipe Φ(50-51)*(4-10)^T*(4-12m)^L Φ63.5*(4-12)^T*(4-12m)^L Φ(70-159)*(4-12)^T*(4-12m)^L Cold drawn pipes OD(42-76)*(3-5)^T*(4-11m)^L
(1)		
1	Round billets Φ(100, 120, 140)*(6-12m)^L Square billets (80/80, 100/100, 115/115, 117/117)*(6-12m)^L	
6	After restructuring (8 -25)^T × (1400-2000)^W × (3 -8m)^L	Present (8 -25)^T × (1400-2000)^W × (3 -8m)^L
(3)		Φ(12 -20), D10-D20 Φ(50 - 100)*(3-7m)^L L (60 ×60 - 100×100)*(5-9m)^L I (88, 10, 12)*(4-9m)^L □(80*80-120*120)*(3-8m)^L FB(25-60)^T*(100-140)^W*(2-8m)^L Rail-shaped, Trough-shaped, Chute-shaped, Railway connections, Ploughshare, U-shaped
(13)		Balls Φ(40-120)
(16)		Round calibrated steel Φ(13-65)*(3-6m)^L
3	Φ10 -Φ90- Φ100 Straight L 50×50 - 100×100 L 60×30 - 80× 40	Φ10 -Φ90 Straight L 50×50 - 100×100 L 60×30 - 80× 40

A1160025 # Appendix 10-6-4 Material Balance No. B-2 (3a) Scenario for Restructuring

Kremikovtzi



	Steel production in 2004(10^3t/y)
	453
	40
	68
	224
	77
	9
	148
	62
	(232)
	232
	210
	(156)
	7
	75
	156
	148
Total	1,761

Products and production after restructuring Size of products

Present and after restructuring

Number of steel products classification	
6, 7	Sheet (2.0 -2.8)^T*(770-1,050)^W*(2-3m)^L; (3.0 -3.8)^T*(770-1,250)^W*(2-6m)^L; (4.0 -12)^T*(770-1,500)^W*(2-6m)^L. Strip (3-6)^T*(120-600)^W*00(1200-1,900)*ID(740). Coil 00(1,100-1,900)*ID(850). Checkered plate (4.0-8.0)^T*(770-1,250)^W*(2-6m)^L
10	Sheet (0.5-0.63)^T*(710-1,000)^W*2m^L; (0.7-0.8)^T*(710-1,100)^W*2m^L; (1.0-1.5)^T*(710-1,250)^W*(2, 2.5m)^L. Coil ID(600, 420). ※ Sheet (0.24, 0.26, 0.28, 0.30, 0.32, 0.36)^T. Coil
9	※
8, 11	Sheet (0.5-0.65)^T*(720-1,000)^W*2m^L; (0.7-1.2)^T*(720-1,250)^W*(2-2.5m)^L; (1.2-2.0)^T*(720-1,250)^W*(2-4m)^L. Strip (0.28-2.0)^T*(10-500)^W*ID(300, 600). Plate (0.24-0.5)^T*(512/712). Coil (0.24-2.5)^T*(720-1,250)^W*ID(300 or 600)
	Sheet with organic coating (0.55-0.63)^T*(750-1,000)^W*(2-5m)^L; (0.7-0.8)^T*(750-1,100)^W*(2-5m)^L; (1.0-1.5)^T*(720-1,250)^W*(2-5m)^L. Wide-strip galvanized steel sections with organic coating
15	General purpose pipes Φ57*(3, 3.5, 4.0)^T*(4-8m)^L; Φ63.5*(3, 3.5, 4.0)^T*(4-8m)^L; Φ76*(3.5, 4.0)^T*(4-8m)^L; Φ89*(3, 3.5, 4.0)^T*(4-8m)^L. Tubular scaffold 0.948 Φ48*3.5mm. Water/gas pipes ID(10-80)*00(17.2-89) *(2.6-5.4, 2.9-5.4)^T
12	Equilateral section (100-220)*(40-90)*(4-6), 114*160 *7. Trough-like section 223*72*(2.5-3.0). Road side fence section 270*77*4
4	(Wire rod and rebar Φ5.5 - 16)
14	Seamless hot-rolled pice Φ(50-57)*(4-10)^T*(4-12m)^L; Φ63.5*(4-12)^T*(4-12m)^L; Φ(70-159)*(4-12)^T*(4-12m)^L. Cold drawn pices 00(42-75)*(3-6)^T*(4-11m)^L
(1)	
1	Round billets Φ(100, 120, 140)*(6-12m)^L. Square billets (80/80, 100/100, 115/115, 117/117)*(6-12m)^L
6	After restructuring (8 -25)^T*(1400-2000)^W*(3 -8m)^L. Present (8 -25)^T*(1400-2000)^W*(3 -8m)^L: Φ(12 -20), 010-020; Φ(50 - 100)*(3-7m)^L; L (60×60 - 100×100)*(6-9m)^L; L (65 10 12)*(4-9m)^L; □(80*80-120*120)*(3-8m)^L; FB(25-60)*(100-140)^W*(2-8m)^L; Bell-shaped, Trough-shaped, Chute-shaped, Railway connections, Ploughshare, U-shaped; Balls Φ(40-120); Round calibrated steel Φ(13-65)*(3-6m)^L
(3)	
(13)	
(16)	
3	Φ10 -Φ90- Φ100 Straight; L 50×50 - 100×100; L 60×30 - 80×40. Φ10 -Φ90 Straight; L 50×50 - 100×100; L 60×30 - 80×40
4	(Wire rod and rebar Φ5.5 - 16)

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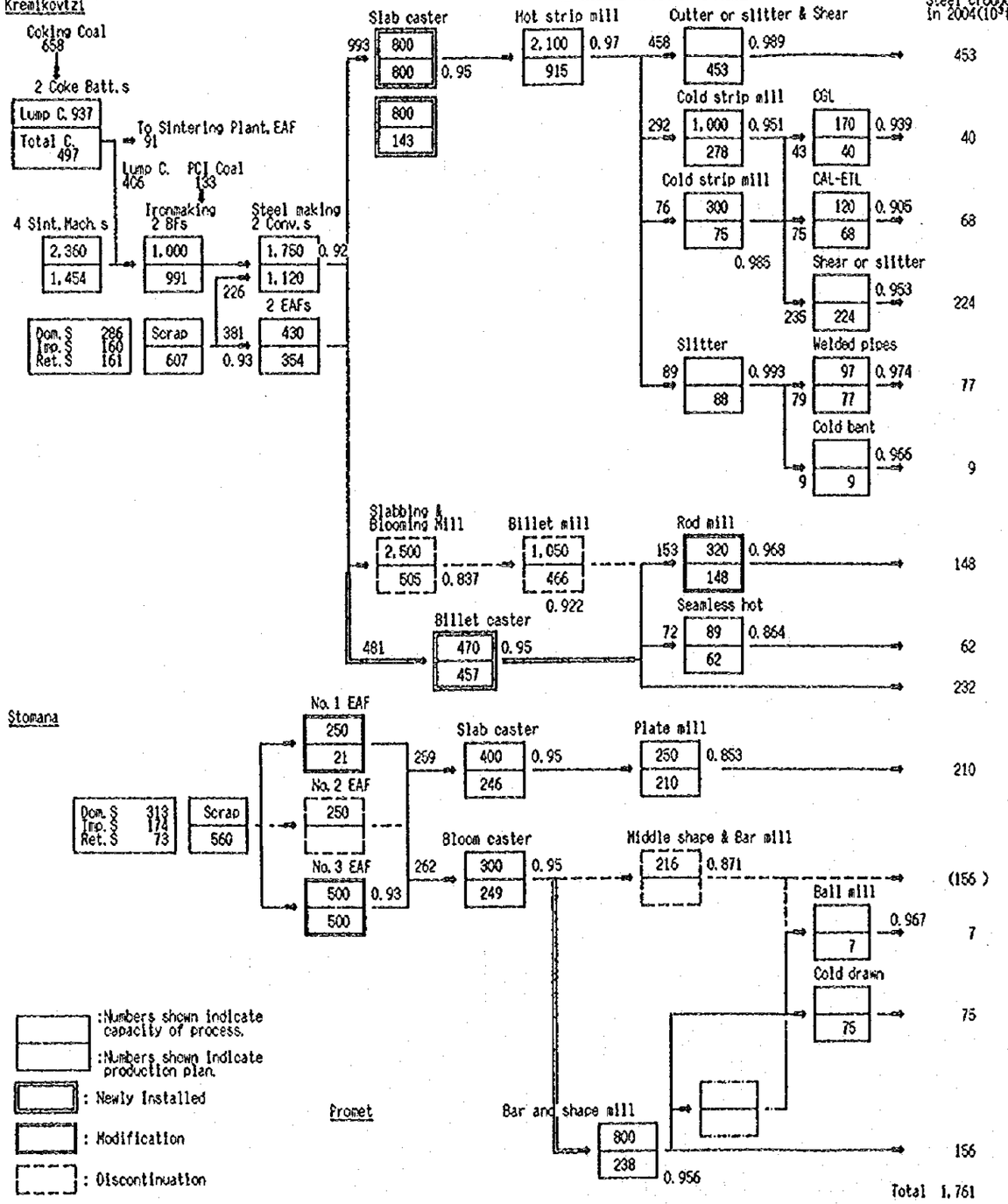
Appendix 10-6-5 Material Balance No. C (4C) Scenario for Restructuring



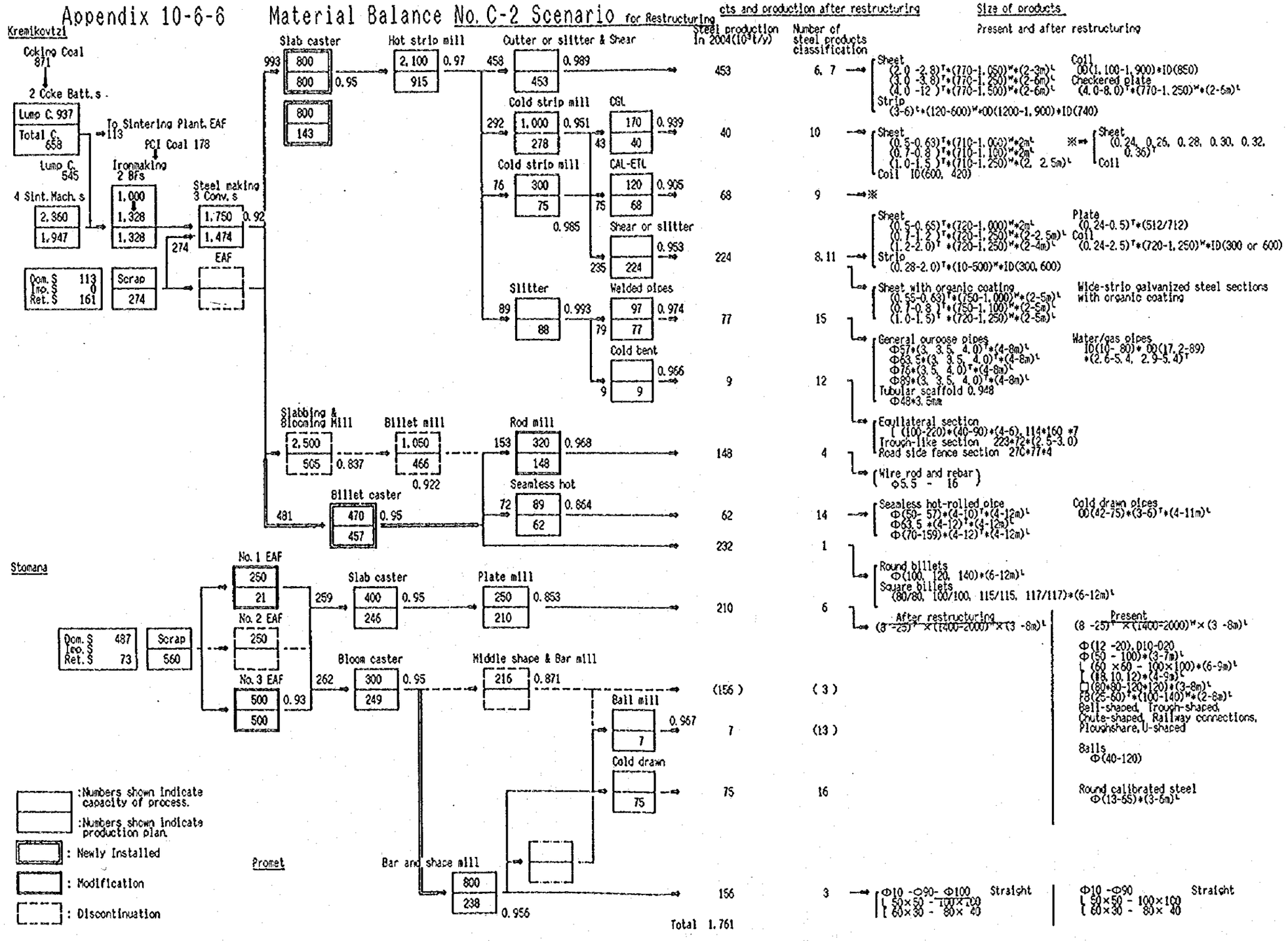
Products and production after restructuring

Size of products

Present and after restructuring

Steel production in 2004(10^6t/y)	Number of steel products classification	Products and production after restructuring
453	6, 7	Sheet (2.0 -2.8)^T*(770-1,650)^W*(2-3m)^L (3.0 -3.8)^T*(770-1,250)^W*(2-6m)^L (4.0 -12)^T*(770-1,500)^W*(2-6m)^L Strip (3-5)^t*(120-600)^W*ID(1200-1,900)*ID(740) — Coil ID(1,100-1,900)*ID(650); Checkered plate (4.0-8.0)^T*(770-1,250)^W*(2-6m)^L
40	10	Sheet (0.5-0.63)^T*(710-1,000)^W*2m^L (0.7-0.8)^T*(710-1,100)^W*2m^L (1.0-1.5)^T*(710-1,250)^W*(2, 2.5m)^L Coil ID(600, 420) ※ Sheet (0.24, 0.26, 0.28, 0.30, 0.32, 0.36)^T Coil
68	9	※
224	8, 11	Sheet (0.5-0.65)^T*(720-1,000)^W*2m^L (0.7-1.2)^T*(720-1,250)^W*(2-2.5m)^L (1.2-2.0)^T *(720-1,250)^W*(2-4m)^L Strip (0.28-2.0)^T*(10-500)^W*ID(300, 600) — Plate (0.24-0.5)^T*(512/712); Coil (0.24-2.5)^T*(720-1,250)^W*ID(300 or 600)
77	15	Sheet with organic coating (0.55-0.63)^T*(750-1,000)^W*(2-5m)^L (0.7-0.8)^T*(750-1,100)^W*(2-5m)^L (1.0-1.5)^T *(720-1,250)^W*(2-5m)^L — Wide-strip galvanized steel sections with organic coating
9	12	General purpose pipes Φ57*(3, 3.5, 4.0)^T*(4-8m)^L Φ83.5*(3, 3.5, 4.0)^T*(4-8m)^L Φ76*(3.5, 4.0)^T*(4-8m)^L Φ89*(3, 3.5, 4.0)^T*(4-8m)^L Tubular scaffold 0.948 Φ48*3.5mm — Water/gas pipes ID(10-80)* 00(17.2-89) *(2.6-5.4, 2.9-5.4)^T
148	4	Equilateral section [(100-220)*(40-90)*(4-6), 114*160 *7 Trough-like section 223*72*(2.5-3.0) Road side fence section 270*77*4
		(Wire rod and rebar Φ5.5 - 15)
62	14	Seamless hot-rolled pipe Φ(50- 57)*(4-10)^T*(4-12m)^L Φ63.5 *(4-12)^T*(4-12m)^L Φ(70-159)*(4-12)^T*(4-12m)^L — Cold drawn pipes 00(42-75)*(3-6)^T*(4-11m)^L
232	1	Round billets Φ(100, 120, 140)*(6-12m)^L Square billets (80/80, 100/100, 115/115, 117/117)*(6-12m)^L
210	6	After restructuring (8 -25)^T ×(1400-2000)^W×(3 -8m)^L — Present (3 -25)^T ×(1400=2000)^W× (3 -8m)^L
(156)	(3)	Φ(12 -20), 010-020 Φ(50 - 100)*(3-7m)^L L (60 ×60 - 100×100)*(6-9m)^L L (18, 10, 12)*(4-9m)^L □(80×80-120×120)*(3-8m)^L FB(25-60)^T*(100-140)^W*(2-8m)^L Bell-shaped, Trough-shaped, Chute-shaped, Railway connections, Ploughshare, U-shaped
7	(13)	Balls Φ(40-120)
75	16	Round calibrated steel Φ(13-65)*(3-6m)^L
156	3	Φ10 -Φ90- Φ100 Straight L 50×50 - 100×100 L 60×30 - 80× 40 — Φ10 -Φ90 Straight L 50×50 - 100×100 L 60×30 - 80× 40
Total 1,761		

Appendix 10-6-6 Material Balance No. C-2 Scenario for Restructuring



cts and production after restructuring

Steel production in 2004(10^3t/y)

Number of steel products classification

Size of products

Present and after restructuring

6, 7 →
- Sheet
  - (2.0 -2.8)^T*(770-1,050)^W*(2-3m)^L
  - (3.0 -3.8)^T*(770-1,250)^W*(2-6m)^L
  - (4.0 -12)^T*(770-1,500)^W*(2-6m)^L
- Strip
  - (3-6)^T*(120-600)^W*00(1200-1,900)*ID(740)
- Coil
  - 00(1,100-1,900)*ID(850)
- Checkered plate
  - (4.0-8.0)^T*(770-1,250)^W*(2-6m)^L

10 →
- Sheet
  - (0.5-0.63)^T*(710-1,060)^W*2m^L
  - (0.7-0.8)^T*(710-1,160)^W*2m^L
  - (1.0-1.5)^T*(710-1,250)^W*(2, 2.5m)^L
- Coil ID(600, 420)

※ →
- Sheet
  - (0.24, 0.26, 0.28, 0.30, 0.32, 0.36)^T
- Coil

9 → ※

8, 11 →
- Sheet
  - (0.5-0.65)^T*(720-1,000)^W*2m^L
  - (0.7-1.2)^T*(720-1,250)^W*(2-2.5m)^L
  - (1.2-2.0)^T *(720-1,250)^W*(2-4m)^L
- Strip
  - (0.28-2.0)^T*(10-500)^W*ID(300, 600)
- Plate
  - (0.24-0.5)^T*(512/712)
- Coil
  - (0.24-2.5)^T*(720-1,250)^W*ID(300 or 600)

15 →
- Sheet with organic coating
  - (0.55-0.63)^T*(750-1,000)^W*(2-5m)^L
  - (0.7-0.8)^T*(750-1,100)^W*(2-5m)^L
  - (1.0-1.5)^T *(720-1,250)^W*(2-5m)^L

Wide-strip galvanized steel sections with organic coating

12 →
- General purpose pipes
  - Φ57*(3, 3.5, 4.0)^T*(4-8m)^L
  - Φ63.5*(3, 3.5, 4.0)^T*(4-8m)^L
  - Φ76*(3.5, 4.0)^T*(4-8m)^L
  - Φ89*(3, 3.5, 4.0)^T*(4-8m)^L
- Tubular scaffold 0.948
  - Φ48*3.5mm

Water/gas pipes
ID(10-80)*00(17.2-89)*(2.6-5.4, 2.9-5.4)^T

4 →
- Equilateral section
  - L (100-220)*(40-90)*(4-6), 114*160 *7
- Trough-like section 223*72*(2.5-3.0)
- Road side fence section 270*77*4

(Wire rod and rebar Φ5.5 - 16)

14 →
- Seamless hot-rolled pipe
  - Φ(50- 57)*(4-10)^T*(4-12m)^L
  - Φ63.5 *(4-12)^T*(4-12m)^L
  - Φ(70-159)*(4-12)^T*(4-12m)^L

Cold drawn pipes
00(42-75)*(3-6)^T*(4-11m)^L

1 →
- Round billets
  - Φ(100, 120, 140)*(6-12m)^L
- Square billets
  - (80/80, 100/100, 115/115, 117/117)*(6-12m)^L

6 → After restructuring (8 -25)^T ×(1400-2000)^W×(3 -8m)^L

Present (8 -25)^T ×(1400-2000)^W×(3 -8m)^L

- Φ(12 -20), D10-D20
- Φ(50 - 100)*(3-7m)^L
- L (60 ×60 - 100×100)*(6-9m)^L
- L (13, 10, 12)*(4-9m)^L
- □(60*60-120*120)*(3-8m)^L
- FB(25-60)*(100-140)^W*(2-8m)^L
- Bell-shaped, Trough-shaped, Chute-shaped, Railway connections, Ploughshare, U-shaped

Balls
- Φ(40-120)

Round calibrated steel
- Φ(13-55)*(3-6m)^L

3 → Straight
- Φ10 -Φ90- Φ100
- L 50×50 - 100×100
- L 60×30 - 80× 40

Straight
- Φ10 -Φ90
- L 50×50 - 100×100
- L 60×30 - 80× 40

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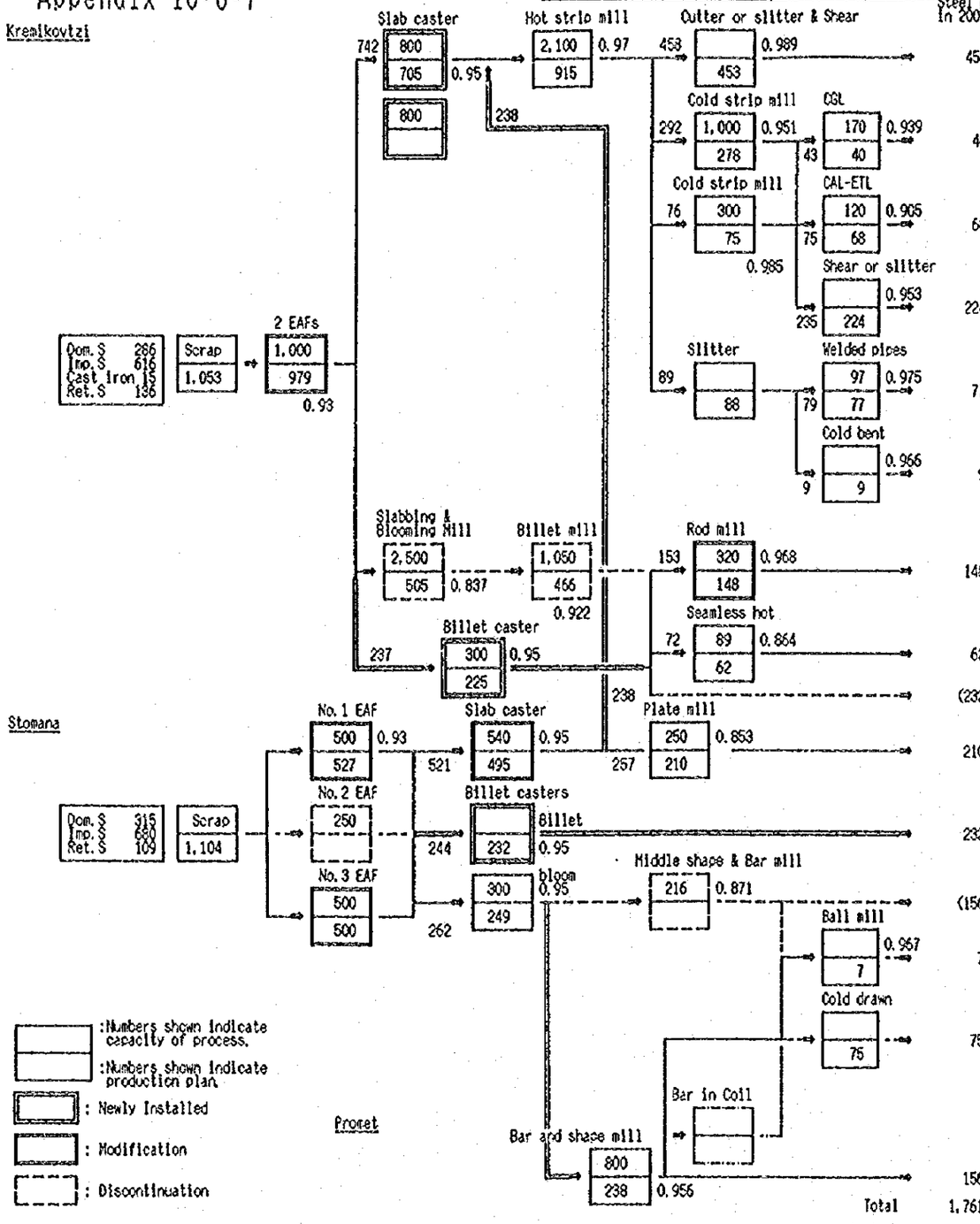
Appendix 10-6-7 Material Balance No. D-1 (3d) Scenario for Restructuring



Products and production after restructuring

Size of products

Present and after restructuring

Number of steel products classification

6, 7 → Sheet
(2.0 -2.8)ᵀ*(770-1,050)ᵂ*(2-3m)ᴸ
(3.0 -3.8)ᵀ*(770-1,250)ᵂ*(2-6m)ᴸ
(4.0 -12)ᵀ*(770-1,500)ᵂ*(2-6m)ᴸ
Coil
OD(1,100-1,900)*ID(850)
Checkered plate
(4.0-8.0)ᵀ*(770-1,250)ᵂ*(2-6m)ᴸ
Strip
(3-6)ᵗ*(120-600)ᵂ*OD(1200-1,900)*ID(740)

10 → Sheet
(0.5-0.63)ᵀ*(710-1,000)ᵂ*2mᴸ
(0.7-0.8)ᵀ*(710-1,100)ᵂ*2mᴸ
(1.0-1.5)ᵀ*(710-1,250)ᵂ*(2, 2.5m)ᴸ
Coil ID(600, 420)
※→ Sheet
(0.24, 0.26, 0.28, 0.30, 0.32, 0.36)ᵀ
Coil

9 → ※

8, 11 → Sheet
(0.5-0.65)ᵀ*(720-1,000)ᵂ*2mᴸ
(0.7-1.2)ᵀ*(720-1,250)ᵂ*(2-2.5m)ᴸ
(1.2-2.0)ᵀ *(720-1,250)ᵂ*(2-4m)ᴸ
Plate
(0.24-0.5)ᵀ*(512/712)
Coil
(0.24-2.5)ᵀ*(720-1,250)ᵂ*ID(300 or 600)
Strip
(0.28-2.0)ᵀ*(10-500)ᵂ*ID(300, 600)

→ Sheet with organic coating
(0.55-0.63)ᵀ*(750-1,000)ᵂ*(2-5m)ᴸ
(0.7-0.8)ᵀ*(750-1,100)ᵂ*(2-5m)ᴸ
(1.0-1.5)ᵀ *(720-1,250)ᵂ*(2-5m)ᴸ
Wide-strip galvanized steel sections with organic coating

15 → General purpose pipes
Φ57*(3, 3.5, 4.0)ᵀ*(4-8m)ᴸ
Φ63.5*(3, 3.5, 4.0)ᵀ*(4-8m)ᴸ
Φ76*(3.5, 4.0)ᵀ*(4-8m)ᴸ
Φ89*(3, 3.5, 4.0)ᵀ*(4-8m)ᴸ
Water/gas pipes
ID(10-80)* OD(17.2-89)
*(2.6-5.4, 2.9-5.4)ᵀ

12 → Tubular scaffold 0.948
Φ48*3.5mm

→ Equilateral section
(100-220)*(60-90)*(4-6), 114*160 *7
Trough-like section 223*72*(2.5-3.0)
Road side fence section 270*77*4

4 → (Wire rod and rebar)
Φ5.5 - 16

14 → Seamless hot-rolled pipe
Φ(50- 57)*(4-10)ᵀ*(4-12m)ᴸ
Φ63.5 *(4-12)ᵀ*(4-12m)ᴸ
Φ(70-159)*(4-12)ᵀ*(4-12m)ᴸ
Cold drawn pipes
OD(42-75)*(3-5)ᵀ*(4-11m)ᴸ

(1)

After restructuring

6 → (8 -25)ᵀ ×(1400-2000)ᵂ×(3 -8m)ᴸ

Present

(8 -25)ᵀ ×(1400-2000)ᵂ×(3 -8m)ᴸ

1 → Round billets
Φ(100, 120, 140)*(6-12m)ᴸ
Square billets
(80/80, 100/100, 115/115, 117/117)*(6-12m)ᴸ

(3)

Φ(12 -20), D10-020
Φ(50 - 100)*(3-7m)ᴸ
L (60 ×60 - 100×100)*(6-9m)ᴸ
L (10, 10, 12)*(4-9m)ᴸ
□(80*80-120*120)*(3-8m)ᴸ
FB(25-60)ᵀ*(100-140)ᵂ*(2-8m)ᴸ
Bell-shaped, Trough-shaped, Chute-shaped, Railway connections, Ploughshare, U-shaped

16

Balls
Φ(40-120)

Round calibrated steel
Φ(13-65)*(3-6m)ᴸ

3 → Φ10 -Φ90- Φ100 Straight
L 50×50 - 100×100
L 60×30 - 80× 40

Φ10 -Φ90 Straight
L 50×50 - 100×100
L 60×30 - 80× 40

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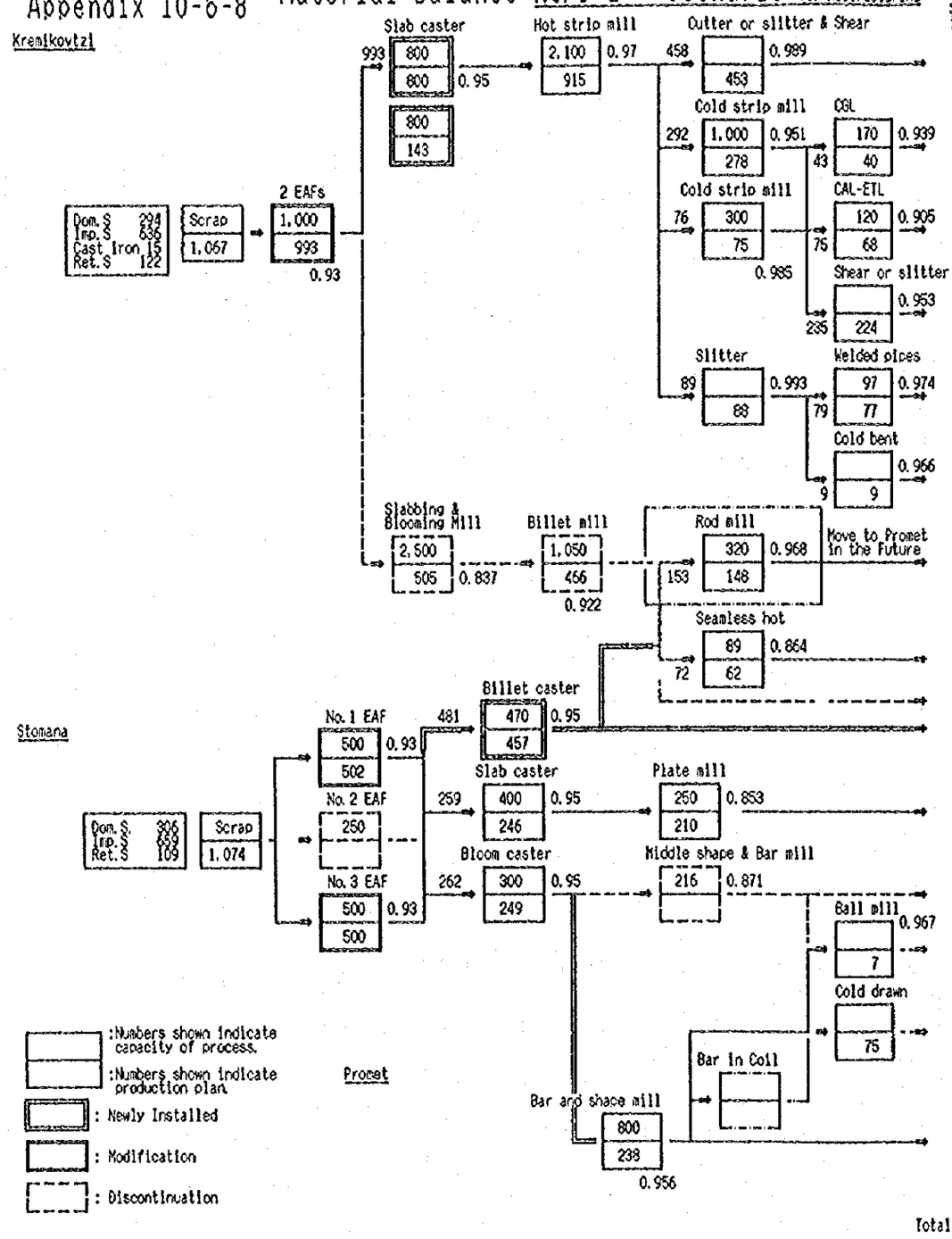
Appendix 10-6-8 Material Balance No. D-2 Scenario for Restructuring



Products and production after restructuring

Size of products

Present and after restructuring

Steel production in 2004(10^3t/y)	Number of steel products classification	Present and after restructuring
453	6, 7	Sheet (2.0 -2.8)^T*(770-1,050)^W*(2-9m)^L (3.0 -3.8)^T*(770-1,250)^W*(2-6m)^L (4.0 -12)^T*(770-1,500)^W*(2-6m)^L Strip (3-6)^T*(120-600)^W*OD(1200-1,900)*ID(740) — Coil OD(1,100-1,900)*ID(850); Checkered plate (4.0-8.0)^T*(770-1,250)^W*(2-6m)^L
40	10	Sheet (0.5-0.63)^T*(710-1,000)^W*2m^L (0.7-0.8)^T*(710-1,100)^W*2m^L (1.0-1.5)^T*(710-1,250)^W*(2, 2.5m)^L Coil ID(600, 420) ※ Sheet (0.24, 0.26, 0.28, 0.30, 0.32, 0.35)^T Coil
68	9	※
224	8, 11	Sheet (0.5-0.65)^T*(720-1,000)^W*2m^L (0.7-1.2)^T*(720-1,250)^W*(2-2.5m)^L (1.2-2.0)^T *(720-1,250)^W*(2-4m)^L Strip (0.28-2.0)^T*(10-500)^W*ID(300, 600) — Plate (0.24-0.5)^T*(512/712); Coil (0.24-2.5)^T*(720-1,250)^W*ID(300 or 600)
		Sheet with organic coating (0.55-0.63)^T*(750-1,000)^W*(2-5m)^L (0.7-0.8)^T*(750-1,100)^W*(2-5m)^L (1.0-1.5)^T *(720-1,250)^W*(2-5m)^L — Wide-strip galvanized steel sections with organic coating
77	15	General purpose pipes Φ57*(3, 3.5, 4.0)^T*(4-8m)^L Φ63.5*(3, 3.5, 4.0)^T*(4-8m)^L Φ76*(3.5, 4.0)^T*(4-8m)^L Φ89*(3, 3.5, 4.0)^T*(4-8m)^L Tubular scaffold 0.948 Φ48*3.5mm — Water/gas pipes ID(10-80)*OD(17.2-89) *(2.6-5.4, 2.9-5.4)^T
9	12	Equilateral section ∟(100-220)*(40-90)*(4-6), 114*160 *7 Trough-like section 223*72*(2.5-3.0) Road side fence section 270*77*4
148	4	(Wire rod and rebar) Φ5.5 - 16
62	14	Seamless hot-rolled pice Φ(50- 57)*(4-10)^T*(4-12m)^L Φ63.5*(4-12)^T*(4-12m)^L Φ(70-159)*(4-12)^T*(4-12m)^L — Cold drawn pices OD(42-75)*(3-6)^T*(4-11m)^L
(232)	(1)	
232	1	Round billets Φ(100, 120, 140)*(6-12m)^L Square billets (80/80, 100/100, 115/115, 117/117)*(6-12m)^L
210	6	After restructuring (8-25)^T×(1400-2000)^W×(3-8m)^L — Present (8-25)^T×(1400-2000)^W×(3-8m)^L
(156)	(3)	Φ(12-20), D10-D20 Φ(50 - 100)*(3-7m)^L ∟(60×60 - 100×100)*(6-9m)^L ∟(18, 10, 12)*(4-9m)^L □(80*60-120*120)*(3-8m)^L [8(25-60)^T*(100-140)^W*(2-8m)^L Bell-shaped, Trough-shaped, Chute-shaped, Railway connections, Ploughshare, U-shaped
7	(13)	Balls Φ(40-120)
75	(16)	Round calibrated steel Φ(13-65)*(3-8m)^L
156	3	Φ10 -Φ90- Φ100 Straight ∟50×50 - 100×100 ∟60×30 - 80× 40 — Φ10 -Φ90 Straight ∟50×50 - 100×100 ∟60×30 - 80× 40

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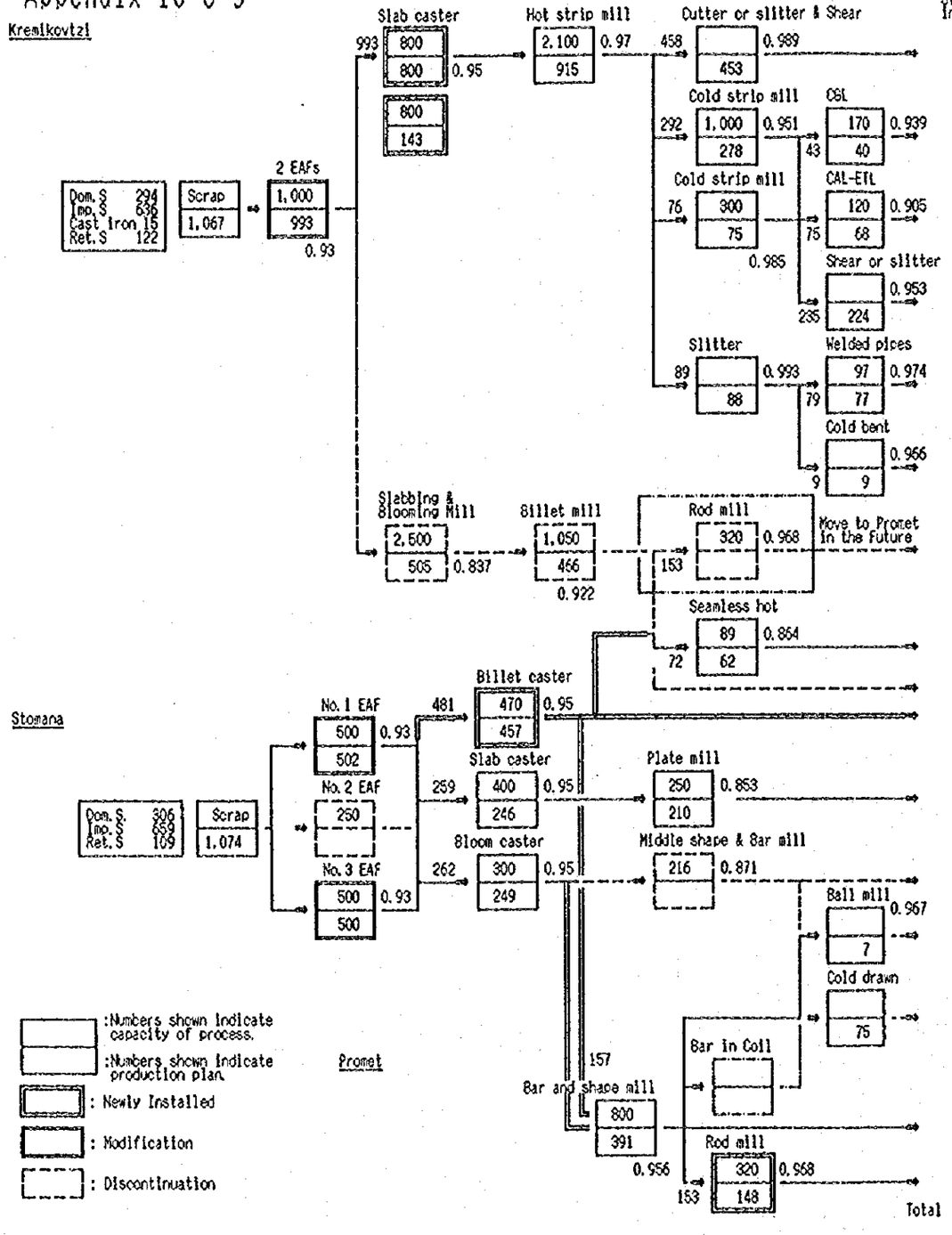
Appendix 10-6-9 Material Balance No. D-3 Scenario for Restructuring



Products and production after restructuring

Steel production in 2004 (10^4t/y)	Number of steel products classification	Products and production after restructuring
453	6, 7	Sheet (2.0 -2.8)^T*(770-1,050)^W*(2-3m)^L; (3.0 -3.8)^T*(770-1,250)^W*(2-6m)^L; (4.0 -12)^T*(770-1,500)^W*(2-6m)^L Strip (3-6)^t*(120-600)^W*ID(1200-1,900)*ID(740)
40	10	Sheet (0.5-0.63)^T*(710-1,000)^W*2m^L; (0.7-0.8)^T*(710-1,100)^W*2m^L; (1.0-1.5)^T*(710-1,250)^W*(2, 2.5m)^L Coil ID(600, 420) ※⇒ Sheet (0.24, 0.26, 0.28, 0.30, 0.32, 0.36)^T Coil
68	9	※
224	8, 11	Sheet (0.5-0.65)^T*(720-1,000)^W*2m^L; (0.7-1.2)^T*(720-1,250)^W*(2-2.5m)^L; (1.2-2.0)^T *(720-1,250)^W*(2-4m)^L Strip (0.28-2.0)^T*(10-500)^W*ID(300, 600) Plate (0.24-0.5)^T*(512/712) Coil (0.24-2.5)^T*(720-1,250)^W*ID(300 or 600)
77	15	Sheet with organic coating (0.55-0.63)^T*(750-1,000)^W*(2-5m)^L; (0.7-0.8)^T*(750-1,100)^W*(2-5m)^L; (1.0-1.5)^T *(720-1,250)^W*(2-5m)^L Wide-strip galvanized steel sections with organic coating
9	12	General purpose pipes Φ5*(3, 3.5, 4.0)^T*(4-8m)^L; Φ63.5*(3, 3.5, 4.0)^T*(4-8m)^L; Φ76*(3.5, 4.0)^T*(4-8m)^L; Φ89*(3, 3.5, 4.0)^T*(4-8m)^L Tubular scaffold 0.948 Φ48*3.5mm Water/gas pipes ID(10-80)* OD(17.2-89) *(2.6-5.4, 2.9-5.4)^T
148	4	Equilateral section [(100-220)*(40-90)*(4-6), 114*160 *7 Trough-like section 223*12*(2.5-3.0) Road side fence section 270*77*4
		(Wire rod and rebar Φ5.5 - 16)
62	14	Seamless hot-rolled pipe Φ(50- 57)*(4-10)^T*(4-12m)^L; Φ63.5*(4-12)^T*(4-12m)^L; Φ(70-159)*(4-12)^T*(4-12m)^L Cold drawn pipes OD(42-75)*(3-6)^T*(4-11m)^L
(232)	(1)	
232	1	Round billets Φ(100, 120, 140)*(6-12m)^L Square billets (80/80, 100/100, 115/115, 117/117)*(6-12m)^L
210	6	After restructuring (8 -25)^T ×(1400-2000)^W×(3 -8m)^L Present (8 -25)^T ×(1400-2000)^W×(3 -8m)^L
(156)	(3)	Φ(12 -20), D10-D20 Φ(50 - 100)*(3-7m)^L; L (60 ×60 - 100×100)*(6-9m)^L; L (8, 10, 12)*(4-9m)^L; □(60×80-120×120)*(3-8m)^L; T8(25-60)^T*(100-140)^W*(2-8m)^L Bell-shaped, Trough-shaped, Chute-shaped, Railway connections, Ploughshare, U-shaped Balls Φ(40-120) Round calibrated steel Φ(13-65)*(3-8m)^L
7	(13)	
75	(16)	
156	3	Φ10 -Φ90- Φ100 Straight; L 50×50 - 100×100; L 60×30 - 80× 40 Φ10 -Φ90 Straight; L 50×50 - 100×100; L 60×30 - 80× 40
148	4	(Wire rod and rebar Φ5.5 - 16)
Total 1,761		

Size of products

Present and after restructuring

Appendix 10-7

Operating Conditions after Improvement

Appendix 10-7-1 Operating Conditions after Improvement

Kremikovizi Steelworks – 1

Area	Facilities	Amount of investment and major specifications after improvement	Unit	Number of scenarios								
				A	A-2	B-1	B-2	C	C-2	D-1	D-2	D-3
Iron making	Coke plant	a) Fuel consumption	Mcal/t	600	600	600	600	600	600	0	0	0
		Reduction of fuel consumption from 713 to 600 Mcal/t										
		b) Power consumption	kwh/t	45	45	45	45	45	45	0	0	0
		Increase of consumption from 22.3 to 45.0 kwh/t because of environmental pollution prevention from coke plant, and operation gas liquor treatment plant										
		c) Steam for ammonium stripping	T/H	0.5	0.5	0.5	0.5	0.5	0.5	0	0	0
	Sintering plant	a) Coke and coal consumption	kg/t	55	55	55	55	55	55	0	0	0
		Reduction of consumption from 75 to 55 kg/t										
		b) N gas consumption	Mcal/t	15	15	15	15	15	15	0	0	0
		Reduction of gas consumption from 80 to 15 kg/t										
		c) Power consumption	kwh/t	55	55	55	55	55	55	0	0	0
		Reduction of electric power consumption from 86.3 to 55.0 kwh/t in spite of installation of enviromental pollution prevention facilities										
	Blast furnaces	a) Coke ratio	kg/t	530	530	530	530	530	530	0	0	0
		Reduction of coke ratio from 765 to 530 kg/t										
		b) Ore ratio 100%	kg/t	1630	1630	1630	1630	1630	1630	0	0	0
		Reduction of ore ratio from 1,850 to 1,630 kg/t										
		-Sintered ore consumption 90%	kg/t	1466	1466	1466	1466	1466	1466	0	0	0
		-Pellet consumption 5%	kg/t	82	82	82	82	82	82	0	0	0
		-Lump ore consumption 5%	kg/t	82	82	82	82	82	82	0	0	0
		c) Fuel for hot stove	Mcal/t	600	600	600	600	600	600	0	0	0
		Reduction of fuel consumption from 1,010 to 600 Mcal/t										
		d) Power consumption	kwh/t	35	35	35	35	35	35	0	0	0
		Increase of power from 6.9 to 35 kwh/t because of environmental pollution prevention										

Appendix 10-7-2 Operating Conditions after Improvement

Kremikovizi Steelworks – 2

Area	Facilities	Amount of investment and major specifications after improvement	Unit	Number of scenarios								
				A	A-2	B-1	B-2	C	C-2	D-1	D-2	D-3
Iron making	Blast furnaces	e) Coal consumption										
		Reduction of coking coal consumption by PCI system from 530 to 410 kg/t	kg/t	410	410	410	410	410	410	0	0	0
		Increase of non-coking coal consumption to 134 kg/t		134	134	134	134	134	134	0	0	0
Steel making	LD converters	a) Yield: Increase of yield from 89.44% to 92.0%	%	92	92	92	92	0	92	0	0	0
		b) O_2 consumption	Nm^3/t	60	60	60	60	0	60	0	0	0
		Reduction of consumption from 77.4 to 60.0 Nm^3/t										
		c) N gas consumption	Nm^3/t	4.7	4.7	4.7	4.7	0	4.7	0	0	0
		Reduction of consumption from 9.3 to 4.7 Nm^3/t										
	EAF	a) Yield	%	93	93	93	93	93	93	93	93	93
		b) O_2 consumption	Nm^3	30	30	30	30	30	30	30	30	30
		Increase of consumption from 18.4 to 30.0 Nm^3/t										
		c) Power consumption	kwh/t	505	505	505	505	505	505	505	505	505
		Reduction of consumption from 664 to 505 kwh/t for EAF, LF dust catchers,water supply pumps, etc.										
		d) Coke breeze consumption	kg/t	12	12	12	12	12	12	12	12	12
		Injection of coke breeze at ratio of 12 kg/t into hot metal (new)										
		e) Carbon electrode consumption	kg/t	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
		Reduction of consumption from 4.0 to 3.0 kg/t for LF										
		f) N gas consumption	Nm^3	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
		Reduction of consumption from 5.3 to 3.6 Nm^3/t										
		g) Refractory consumption	kg/t	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
		Reduction of consumption from 10.69 to 8.0 kg/t										

Appendix 10-7-3 Operating Conditions after Improvement

Kremikovtzi Steelworks－3

Area	Facilities	Amount of investment and major specifications after improvement	Unit	Number of scenarios								
				A	A-2	B-1	B-2	C	C-2	D-1	D-2	D-3
Steel making	EAF	h) Power consumption Increase of consumption because of waste water	kwh/t	0	0	0	0	0	0	0	0	0
	Slab and billet casters	<Slab caster>										
		a) Yield: Increase of yield from 83.36 to 95.0% by replacing slabbing and blooming mills with slab caster	%	95	95	95	95	95	95	95	95	95
		b) Power consumption Increase of consumption to 32 kwh/t including 7 kwh/t of power consumption for water supply pump because of operation of casters	kwh/t	32	32	32	32	32	32	32	32	32
		c) Fuel consumption Increase of consumption to 50 Mcal/t because of caster operation	Mcal/t	50	50	50	50	50	50	50	50	50
		b) Water consumption Increase of consumption to 10 m³/t because of operation of casters	m³/t	10	10	10	10	10	10	10	10	10
		e) Refractory consumption Increase of consumption to 2 kg/t because of operation of casters	kg/t	2	2	2	2	2	2	2	2	2
		f) Power consumption Increase of consumption because of increase of waste water volume	kwh/t	7	7	7	7	7	7	7	7	7
		<Billet caster>										
		g) Yield : Increase of yield from 77.1 to 95.0% by replacing slabbing and blooming mills with billet caster	%	95	95	0	0	95	95	95	0	0
		h) Power consumption Increase of consumption to ratio of 25 kwh/t	kwh/t	25	25	0	0	25	25	25	0	0
		i) Fuel consumption Increase of consumption to 50 Mcal/t by operation of casters	Mcal/t	50	50	0	0	50	50	50	0	0

Appendix 10-7-4 Operating Conditions after Improvement

Kremikovtzi Seelworks – 4

Area	Facilities	Amount of investment and major specifications after improvement	Unit	Number of scenarios								
				A	A-2	B-1	B-2	C	C-2	D-1	D-2	D-3
Steel making	Slab and billet casters	j) Refractory consumption Increase of consumption to 2 kg/t by operation of casters	kg/t	2	2	0	0	2	2	2	0	0
		<Discontinuation of ingot making >										
		k) Mold,plate and siphon saving at ratio 15 kg/t	kg/t	0	0	0	0	0	0	0	0	0
		l) Refractory (for EAF) saving at ratio 5 kg/t	kg/t	0	0	0	0	0	0	0	0	0
		<Discontinuation of slabbing and blooming mills >										
		m)Power saving at raito of 47.1 kwh/t	kwh/t	0	0	0	0	0	0	0	0	0
		n) Fuel saving at ratio of 258.1 Mcal/t	Mcal/t	0	0	0	0	0	0	0	0	0
		<Discontinuation of billet mill >										
		o) Power consumption Saving of 28.3 kwh/t of power consumption because of billet mill discontinuation	kwh/t	0	0	0	0	0	0	0	0	0
	Limestone treatment	a) Power consumption Increase of consumption because of strengthening of bag filters for kiln	kwh/t	0.8	0.8	1.2	1.2	0.8	0.8	1.2	1.2	1.2
Hot rolling	Hot strip mills	a) Yield : Increase of yield from 96.2 to 97.0%	%	97	97	97	97	97	97	97	97	97
		b) Fuel consumption Reduction of consumption from 724 to 450 Mcal/t	Mcal/t	450	450	450	450	450	450	450	450	450
		c) Better quality										
Cold strip mills	Pickling lines	a)Yield Increase of total yield of HCL and H_2SO_4 lines from 95.9 to 97.0%	%	97	97	97	97	97	97	97	97	97

Appendix 10-7-5 Operating Conditions after Improvement

Kremikovtzi Steelworks – 5

Area	Facilities	Amount of investment and major specifications after improvement	Unit	Number of scenarios								
				A	A-1	B-1	B-2	C	C-2	D-1	D-2	D-3
Cold strip mills	Pickling lines	b)Power consumption for HCL line Reduction of consumption from 117.1 to 12.3 kwh/t c)Better quality	kwh/t	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
	Cold strip mills	a) Power consumption Reduction of consumption from 130.3 to 105.0 kwh/t for 1200 mill	kwh/t	105	105	105	105	105	105	105	105	105
		Reduction of consumption from 91.1 to 86.0 kwh/t for 1700 mill	kw/t	86	86	86	86	86	86	86	86	86
		b) Better quality										
		c) Power consumption Increase of consumption because of increase of waste water volume	kwh/t	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Coating	CAL	a) Power consumption Reduction of consumption from 189 to 40 kwh/t	kwh/t	40	40	40	40	40	40	40	40	40
		b) Fuel consumption Reduction of consumption from 340 to 200 Mcal/t	Mcal/t	200	200	200	200	200	200	200	200	200
Welded pipe		a) Yield : Increase of yield from 96.9 to 97.4%	%	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4
		b) Strengthening of guarantee quality for export by non destructive examination system										
		<Zinc coating>										
		b) Yield : Increase of yield from 94.8 to 95.3%	%	95.3	95.3	95.3	95.3	95.3	95.3	95.3	95.3	95.3
		c) Power consumption Reduction of consumption from 118 to 78 kwh/t	kwh/t	78	78	78	78	78	78	78	78	78
		d) Fuel consumption Reduction of consumption from 992 to 692 kwh/t	kwh/t	692	692	692	692	692	692	692	692	692

Appendix 10-7-6 Operating Conditions after Improvement

Kremikovtzi Steelworks – 6

Area	Facilities	Amount of investment and major specifications after improvement	Unit	Number of scenarios								
				A	A-1	B-1	B-2	C	C-2	D-1	D-2	D-3
Welded pipe		f) Zinc consumption Reduction of zinc consumption from 77.1 to 67.1 kwh/t	kwh/t	67.1	67.1	67.1	67.1	67.1	67.1	67.1	67.1	67.1
Rod and shapes	Rod mill	a) Yield : Increase of yield from 92.0 to 96.8% by replacement of rod mill	%	96.8	96.8	0	0	96.8	96.8	96.8	0	0
		b) Fuel consumption Reduction of consumption from 473 to 426 Mcal/t by replacement of rod mill	Mcal/t	426	426	0	0	426	426	426	0	0
		c) Power consumption Increase of consumption from 83 to 166 by replacement of rod mill	kwh/t	166	166	0	0	166	166	166	0	0
Waste water treatment		a) Power consumption Modification for waste water treatment	kwh/t	150	150	150	150	150	150	150	150	150
		b) Active carbon adsorption	US $ /day	2000	2000	2000	2000	2000	2000	2000	2000	2000

Appendix 10-7-7 Operating Conditions after Improvement

Stomana Steelworks – 1

Area	Facilities	Amount of investment and major specifications after improvement	Unit	Number of scenarios								
				A	A-2	B-1	B-2	C	C-2	D-1	D-2	D-3
Steel making	EAF,LF	a) Yield : Increase of yield from 91.5 to 93.0%	%	93	93	93	93	93	93	93	93	93
		b) O_2 consumption Increase of consumption from 24.8 to 30.0 Nm³/t	Nm³/t	30	30	30	30	30	30	30	30	30
		c) Power consumption Reduction of consumption from 824 to 500 kwh/t	kwh/t	500	500	500	500	500	500	500	500	500
		b) Coke breeze consumption Injection of coke breeze at ratio of 12 kg/t into fumace	kg/t	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
		e) Carbon electrode Reduction of electrode consumption from 5.9 to 3.0 kg/t	kg/t	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
		f) N gas consumption Reduction of consumption from 112.0 to 56.0 Mcal/t	Mcal/t	56.0	56.0	56.0	56.0	56.0	56.0	56.0	56.0	56.0
		g) Refractory consumption Reduction of consumption from 23.5 to 10.0 kg/t	kg/t	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
		h) Active carbon adsorption	US $ / day	500	500	500	500	500	500	500	500	500
	Slab, bloom and billet casters	<Slab caster>										
		a) Yield: Increase of yield from 90.25 to 95.0%	%	95	95	95	95	95	95	95	95	95
		b) Power consumption Increase of consumption by 7 kwh/t because of increase of water consumption	kwh/t	7	7	7	7	7	7	7	7	7
		c) N gas consumption Increase of consumption from 40.8 to 44.0%	Mcal/t	44	44	44	44	44	44	44	44	44
		d) Refractory consumption Reduction of consumption from 6.0 to 3.0 kg/t	kg/t	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Appendix 10-7-8 Operating Conditions after Improvement

Stomana Steelworks – 2

Area	Facilities	Amount of investment and major specifications after improvement	Unit	Number of scenarios								
				A	A-2	B-1	B-2	C	C-2	D-1	D-2	D-3
Steel making	Slab and billet casters	<Bloom caster>										
		e) Yield: Increase of yield from 90.3 to 95.0%	%	95	95	95	95	95	95	95	95	95
		f) N gas consumption	Mcal/t	44	44	44	44	44	44	44	44	44
		Reduction of consumption from 124 to 44 Mcal/t										
		g) Reduction of refractory consumption from 6.0 to 3.0 kg/t	kg/t	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
		<Billet caster>										
		h) Yield: Yield of billet caster installed will be 95%.	%	95	95	95	95	95	95	95	95	95
		i) Power consumption	kwh/t	0	0	7	7	0	0	7	7	7
		Increase of consumption by 7 kwh/t because of increase of water consumption										
		j) N gas consumption	Mcal/t	0	0	44	44	0	0	44	44	44
		Consumption is 44 Mcal/t.										
		k) Refractory consumption	kg/t	0	0	3.0	3.0	0	0	3.0	3.0	3.0
		Consumption is 3.0 kg/t.										
Hot rolling	Plate mill	a) Yield : Increase of yield from 81.71 to 85.30%	%	85.3	85.3	85.3	85.3	85.3	85.3	85.3	85.3	85.3
		b) Fuel consumption	Mcal/t	1,024	1,024	1,024	1,024	1,024	1,024	1,024	1,024	1,024
		Consumption is 1,024 Mcal/t.										
	Medium section and bar mills	a) Yield : Increase of yield from 82.1 to 87.1%	%	87.1	87.1	0	0	0	0	0	0	0
		b) Fuel consumption	Mcal/t	745	745	0	0	0	0	0	0	0
		Reduction of consumption from 876 to 745 Mcal/t										

Appendix 10-7-9 Operating conditions after Improvement

Stomana Steelworks – 3

Area	Facilities	Amount of investment and major specifications after improvement	Unit	Number of scenarios								
				A	A-2	B-1	B-2	C	C-2	D-1	D-2	D-3
Hot rolling	Ball mill	a) Fuel consumption Reduction of N gas consumption from 1,528 to 1,299 Mcal/t	Mcal/t	1,299	1,299	1,299	1,299	1,299	1,299	1,299	1,299	1,299
	Bar mill at Promet	a) Yield : 95.6% b) Fuel consumption: 377 Mcal/t c) Power consumption: 174 kwh/t	% Mcal/t kwh/t	0 0 0	95.6 377 174	95.6 377 174	95.6 377 174	95.6 377 174	95.6 377 174	95.6 377 174	95.6 377 174	95.6 377 174
	Rod mill at Promet / Kremikovtzi	a) Yield : Increase of yield from 92.0 to 96.8% by replacement of rod mill b) Fuel consumption Reduction of consumption from 473 to 426 Mcal/t by replacement of rod mill c) Power consumption Increase of yield from 83 to 166 kwh/t by replacement of rod mill	% Mcal/t kwh/t	0 0 0	0 0 0	96.8 426 166	96.8 377 166	0 0 0	0 0 0	0 0 0	96.8 426 166	96.8 377 166