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RAW MATERIALS AND ENVIRONMENT

Eurostat's recent publication (Raw Materials EC Balance Sheets 1983-1986) focuses mainly on the supply of raw materials. This paper draws attention to some implications of the raw materials balance sheets in the context of environment policy, notably, the importance of recycling as a source of raw materials and the impact of these substances on the environment and on human health.

The selection of the EC consolidated balance sheets presented here trace the main elements of availability and utilisation (taken equal by definition) for the Community in it's respective composition from 1975 to 1987. A world raw material reserves table -updated for 1988- is also included to illustrate the international interdependencies. Emphasis is given to recycling which plays an important role for two reasons, (a) reduction of wastes returned to the environment and (b) new supply of raw materials for the industrial sector, therefore graphics for the quantities recovered are seperately presented.

In this "Rapid Report" only a certain number of items can be analysed. The selection of the raw materials is based mainly on toxicity and availability of data. The grouping adopted is merely for convenience in graphical presentation. Additional information on the composition of the raw materials and the development in each Member State is contained in the publication mentioned above.

Although the consumption of raw materials has increased along with the industrial development and economic growth, this tendency has been influenced by the growing concern about the depletion of the world reserves and the environmental implications. This has led to research for substitutes, new extraction techniques and locations and reuse of recycled materials. The processes of extraction, processing, transformation and consumption are generating emissions and waste which are contaminating the air, water or soil and can be potentially hazardous to the environment and become directly or indirectly a threat to human health.

EC environmental protection legislation has been taken especially for the uses of Cadmium **(Cd)**, Lead **(Pb)** and Mercury **(Hg)**.
Cadmium **(Cd)**, Arsenic **(As)** and Beryllium **(Be)** are actually not included in the EC consolidated balance sheets. Whether Cadmium balances can be included in future in the raw materials balance sheets is being investigated.

The EC balance sheets show a still increasing consumption for Aluminium **(Al)**, Copper **(Cu)**, Chromium **(Cr)** and Nickel **(Ni)**, a constant or decreasing for Lead **(Pb)**, Zinc **(Zn)** and Vanadium **(V)** and a flactuating one for Mercury **(Hg)** and Cobalt **(Co)**. The recovery rates differ according to the material.

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KONSOLIDIERTE EG-BILANZEN
METALLINHALT

CONSOLIDATED EC BALANCE SHEETS
METAL CONTENT

BILANS CONSOLIDES CE
TENEUR EN METAL

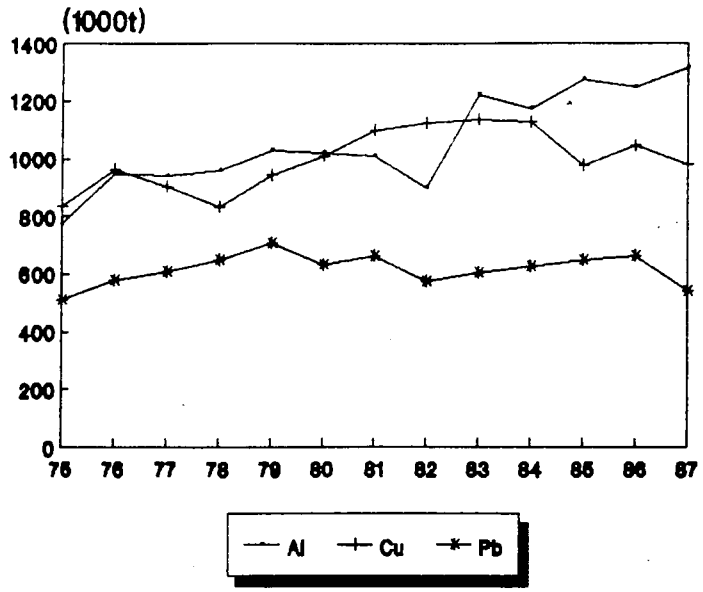
	AUFKOMMEN / AVAILABILITY / DISPONIBILITES					VERWENDUNG / UTILISATION / EMPLOIS			
	PI	PV	M	-DV	TOTAL	C	X	+DV	TOTAL
ALUMINIUM (1000t)									
1975	785	774	3578	:	5137	3764	746	627	5137
1976	661	946	3990	:	5597	4515	832	250	5597
1977	586	940	4041	:	5567	4381	858	328	5567
1978	571	959	3876	195	5601	4584	1017	:	5601
1979	567	1028	4126	165	5886	4957	929	:	5886
1980	549	1021	4450	:	6020	4873	980	167	6020
1981	1313	1011	3715	:	6039	4580	1323	136	6039
1982	1141	898	3534	:	5573	4204	1227	142	5573
1983	1031	1223	3664	274	6192	4838	1354	:	6192
1984	955	1175	4191	136	6457	4860	1597	:	6457
1985	949	1273	4267	135	6624	5083	1541	:	6624
1986	887	1248	4867	541	7543	6068	1475	:	7543
1987	1052	1314	4876	1032	8274	6432	1841	:	8274
KUPFER / COPPER / CUIVRE (1000t)									
1975	14	836	2118	:	2968	2436	390	142	2968
1976	8	962	2244	:	3214	2724	396	94	3214
1977	7	903	2305	:	3215	2678	488	49	3215
1978	6	832	2188	82	3108	2514	594	:	3108
1979	6	944	2185	100	3235	2694	541	:	3235
1980	6	1010	2336	12	3364	2807	557	:	3364
1981	7	1100	2066	120	3293	2631	662	:	3293
1982	4	1125	2163	:	3292	2611	648	33	3292
1983	4	1137	1939	85	3165	2550	615	:	3165
1984	3	1130	2252	7	3392	2680	712	:	3392
1985	2	977	2337	:	3316	2539	714	63	3316
1986	53	1048	2463	:	3564	2930	616	18	3564
1987	19	981	2328	96	3424	2811	613	:	3424
BLEI / LEAD / PLOMB (1000t)									
1975	127	511	651	:	1289	1126	136	27	1289
1976	129	579	711	5	1424	1247	177	:	1424
1977	141	606	674	9	1430	1251	179	:	1430
1978	147	650	651	:	1448	1163	211	74	1448
1979	158	708	724	:	1590	1365	207	18	1590
1980	138	635	782	:	1555	1256	228	71	1555
1981	122	663	635	30	1450	1251	199	:	1450
1982	111	574	699	66	1450	1245	205	:	1450
1983	111	603	672	15	1401	1195	206	:	1401
1984	108	625	696	15	1444	1222	222	:	1444
1985	104	648	759	21	1532	1315	217	:	1532
1986	176	664	801	18	1659	1477	182	:	1659
1987	176	540	804	36	1556	1322	234	:	1556

FUSSNOTEN SIEHE S.8

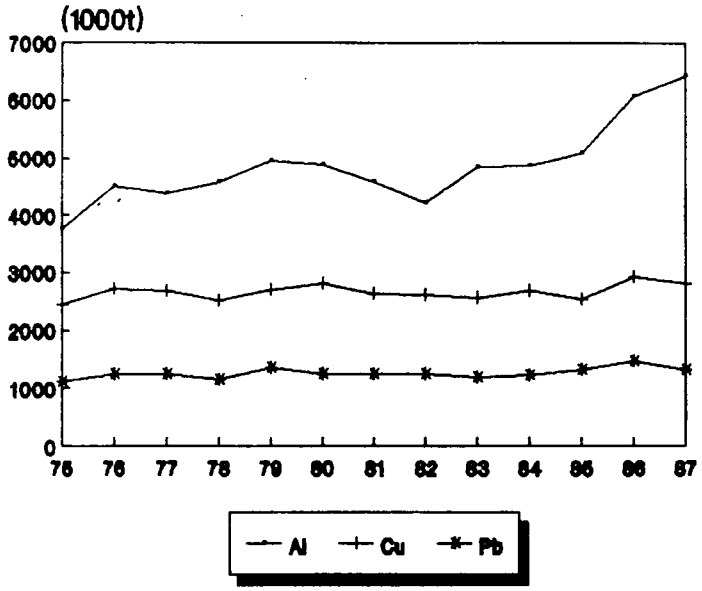
FOOTNOTES P.8

RENVOIS VOIR P.8

RÜCKGEWINNUNG RECOVERY RECUPERATION



VERBRAUCH CONSUMPTION CONSOMMATION



Al Recovery Rate, (PV/C) x 100 for 1986;EUR 12 = 21%

Cu Recovery Rate, (PV/C) x 100 for 1986;EUR 12 = 36%

Pb Recovery Rate, (PV/C) x 100 for 1986;EUR 12 = 45%

ALUMINIUM compounds are to be found everywhere in the biosphere. Toxic effects to plants and aquatic organisms have been observed.

COPPER is both essential and toxic, the threshold value depending on the kind of organism.

LEAD in the atmosphere is directly associated with alkyl lead in petrol. It is highly toxic and its continued build-up could have serious long-term consequences.

KONSOLIDIERTE EG-BILANZEN
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CONSOLIDATED EC BALANCE SHEETS
METAL CONTENT

BILANS CONSOLIDES CE
TENEUR EN METAL

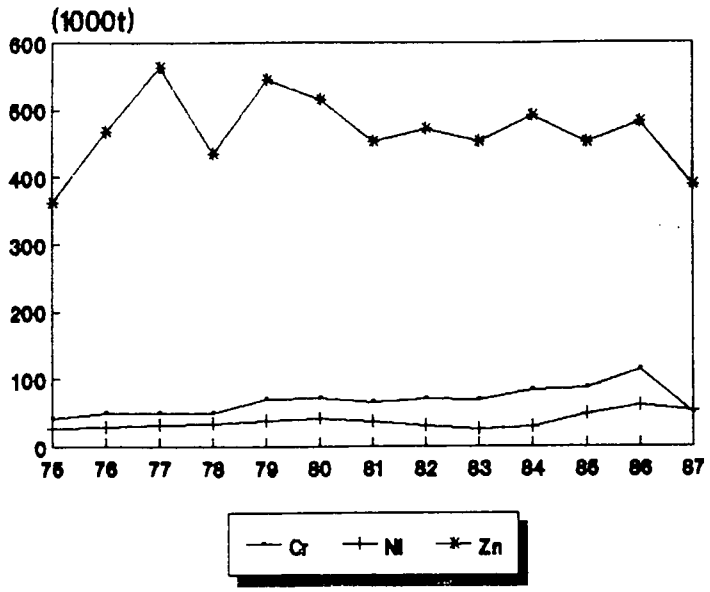
	AUFKOMMEN / AVAILABILITY / DISPONIBILITES					VERWENDUNG / UTILISATION / EMPLOIS			
	PI	PV	M	-DV	TOTAL	C	X	+DV	TOTAL
		*			CHROM / CHROMIUM / CHROME (1000t)				
1975	.	42	522	:	564	476	25	63	564
1976	.	49	597	:	646	574	37	35	646
1977	.	49	532	:	581	551	26	4	581
1978	.	50	500	:	550	511	19	20	550
1979	.	70	633	:	703	684	19	0	703
1980	.	72	600	:	672	652	17	3	672
1981	5	65	409	19	498	475	23	:	498
1982	6	71	488	:	565	534	28	3	565
1983	10	68	534	7	619	583	36	:	619
1984	23	83	586	16	708	667	41	:	708
1985	23	86	628	0	737	693	41	3	737
1986	23	114	650	:	787	739	45	3	787
1987	21	50	734	:	838	781	57	:	838
		*			NICKEL (1000t)				
1975	.	27	200	:	227	178	42	7	227
1976	.	29	197	:	226	180	37	9	226
1977	.	32	187	9	228	185	43	:	228
1978	.	33	180	10	223	183	40	:	223
1979	.	39	207	29	275	225	50	:	275
1980	.	41	211	18	270	227	43	:	270
1981	12	37	177	4	230	181	49	:	230
1982	6	31	149	0	186	151	36	:	186
1983	13	25	152	:	190	138	52	:	190
1984	14	29	185	4	232	180	52	:	232
1985	19	48	192	28	287	223	64	:	287
1986	18	60	205	24	307	237	70	:	307
1987	11	53	227	24	314	258	57	0	314
					ZINK / ZINC (1000t)				
1975	283	363	1178	:	1824	1375	216	233	1824
1976	315	468	1255	:	2038	1606	347	85	2038
1977	359	563	1111	:	2033	1576	370	87	2033
1978	414	434	1028	33	1909	1631	278	:	1909
1979	413	545	1170	33	2161	1883	278	:	2161
1980	425	515	1129	81	2150	1811	339	:	2150
1981	331	453	1084	23	1891	1491	400	:	1891
1982	375	473	1164	:	2012	1525	432	55	2012
1983	402	454	1041	133	2030	1541	489	:	2030
1984	423	491	1393	:	2307	1743	532	32	2307
1985	430	452	1421	33	2336	1763	573	:	2336
1986	609	482	1325	96	2512	1958	554	:	2512
1987	605	388	1518	60	2572	1910	662	:	2572

FUSSNOTEN SIEHE S.8

FOOTNOTES SEE P.8

RENVOIS VOIR P.8

RÜCKGEWINNUNG RECOVERY RECUPERATION



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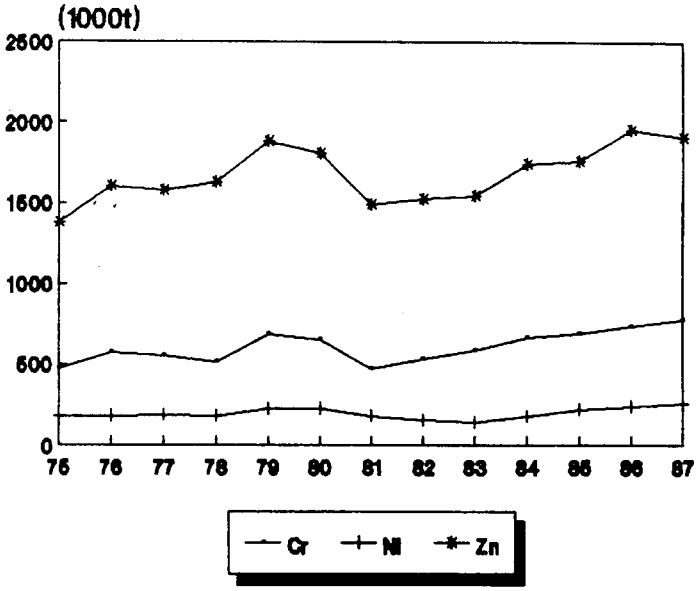

Cr Recovery Rate, (PV/C) x 100 for 1986;EUR 12 = 15%

Ni Recovery Rate, (PV/C) x 100 for 1986;EUR 12 = 25%

Zn Recovery Rate, (PV/C) x 100 for 1986;EUR 12 = 25%

CHROMIUM compounds are less toxic than methyl mercury and cadmium. Nevertheless severe toxic effects to local vegetation have been reported.

NICKEL in the atmosphere is mostly due to man's activities. Major sources of pollution result from the burning of heating fuels and automobile exhaust emissions.

ZINC defficiency in general can cause more problems than an overdose. Limits for zinc concentrations in soil used for agricultural purposes exist in several countries.

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METAL CONTENT

BILANS CONSOLIDES CE
TENEUR EN METAL

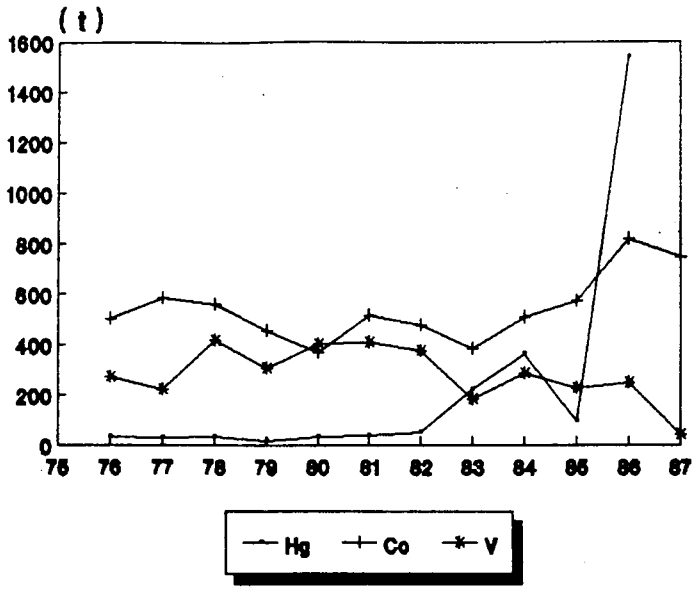
	AUFKOMMEN / AVAILABILITY / DISPONIBILITES					VERWENDUNG / UTILISATION / EMPLOIS			
	PI	PV	M	-DV	TOTAL	C	X	+DV	TOTAL
		*			QUECKSILBER / MERCURY / MERCURE (t)				
1975	.	:	:	:	:	:	:	:	:
1976	743	36	713	972	2464	1708	756	:	2464
1977	.	31	883	527	1441	1118	323	:	1441
1978	.	35	838	870	1743	1204	539	:	1743
1979	.	18	925	400	1343	1039	304	:	1343
1980	.	34	1079	200	1313	963	350	:	1313
1981	203	39	811	:	1053	818	210	25	1053
1982	128	51	747	238	1164	907	257	:	1164
1983	.	222	1372	668	2262	1592	670	:	2262
1984	.	360	1233	66	1659	1250	409	:	1659
1985	.	95	1627	264	1986	1182	804	:	1986
1986	2757	1540	769	233	5299	3144	2155	:	5299
1987	1571	:	1102	363	3036	2273	763	:	3036
		*			KOBALT / COBALT (t)				
1975	.	:	:	:	:	:	:	:	:
1976	.	503	17707	1000	19210	5907	13303	:	19210
1977	.	584	17507	2000	20091	7060	13031	:	20091
1978	.	558	21455	:	22013	7575	14438	:	22013
1979	.	456	14745	(3500)	18701	6440	12261	:	18701
1980	.	369	13449	(694)	14512	6144	8368	:	14512
1981	.	517	11362	:	11879	4140	5873	(1866)	11879
1982	.	476	6011	(3259)	9746	4491	5255	:	9746
1983	.	383	7087	2047	9517	5891	3626	:	9517
1984	.	506	5074	3020	8600	4635	3965	:	8600
1985	.	569	5374	830	6773	5075	1698	:	6773
1986	.	817	7497	769	9083	6326	2757	:	9083
1987	.	744	7375	973	9092	6604	2488	:	9092
		*			VANADIUM (t)				
1975	.	:	:	:	:	:	:	:	:
1976	.	271	6538	80	6889	4231	2658	:	6889
1977	.	223	7309	103	7635	4525	3110	:	7635
1978	.	416	9705	:	10121	5462	4650	9	10121
1979	.	305	9358	278	9941	7098	2843	:	9941
1980	.	404	11060	:	11464	10096	1334	34	11464
1981	.	408	10350	106	10864	7890	2974	:	10864
1982	.	373	10082	187	10642	8807	1835	:	10642
1983	.	184	8144	104	8432	6134	2298	:	8432
1984	.	284	13093	:	13377	7676	4272	1429	13377
1985	.	227	12601	:	12828	7580	3205	2043	12828
1986	.	247	7489	119	7855	5817	2038	:	7855
1987	.	41	7084	151	7276	5419	1857	:	7276

FUSSNOTEN SIEHE S.8

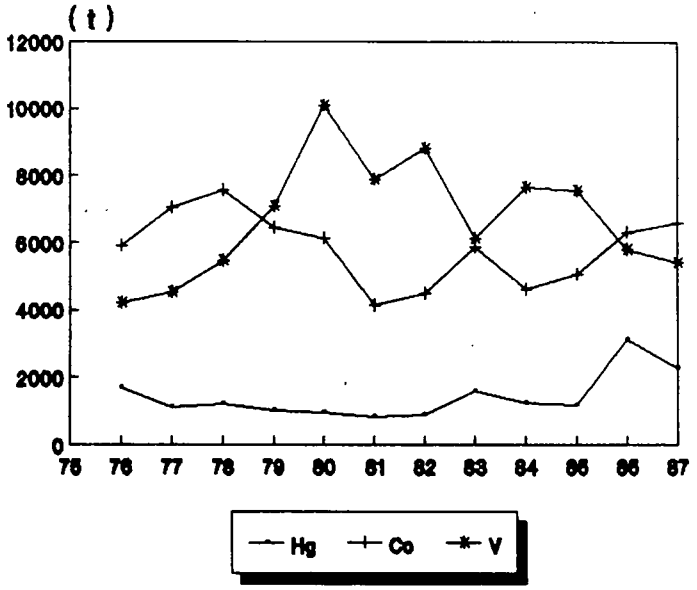
FOOTNOTES SEE P.8

RENVOIS VOIR P.8

RÜCKGEWINNUNG RECOVERY RECUPERATION



VERBRAUCH CONSUMPTION CONSOMMATION



Hg Recovery Rate, (PV/C) x 100 for 1986;EUR 12 = 49%

Co Recovery Rate, (PV/C) x 100 for 1986;EUR 12 = 13%

V Recovery Rate, (PV/C) x 100 for 1986;EUR 12 = 4%

MERCURY in the environment can result indirectly from the burning of fossil fuels. Methyl mercury poisoning arising from the contamination of the aquatic environment has resulted in serious episodes in Japan (Minamata, Niigata incidents).

COBALT levels in the environment are a function of man's industrial activity and of the extent to which soil particles are dispersed by the wind.

VANADIUM fly ash release by the use of oil combustion for power generation has been markedly reduced by the increasing use of anti-pollution control measures.

WELTROHSTOFFVORRATE | WORLD RAW MATERIAL RESERVES | RESERVES MONDIALES DE MATIERES PREMIERES

1988

	WESTEUROPA WESTERN EUROPE EUROPE DE L'OUEST	EUR 12	OSTEUROPA EASTERN EUROPE EUROPE DE L'EST	AFRIKA AFRICA AFRIQUE	NORDAMERIKA NORTH AMERICA AMERIQUE DU NORD	MITTELAMERIKA CENTRAL AMERICA AMERIQUE CENTRALE	SUDAMERIKA SOUTH AMERICA AMERIQUE DU SUD	ASIEN ASIA ASIE	OZEANIEN OCEANIAN OCEANIE	TOTAL
	%									10^6t
Al	6,3	4,5	2,8	32,7	0,2	8,6	19,9	10,2	19,3	5485
Cu	2,0	1,2	13,1	12,2	19,2	8,5	27,8	7,3	9,9	589
Pb	13,7	8,7	16,6	5,8	31,8	3,2	2,9	5,8	20,2	139
Cr	1,5	0,0	2,2	94,7	0,1	0,0	0,1	1,4	0,0	2036
Ni	3,7	2,5	8,7	9,5	15,8	24,3	5,4	11,2	21,4	101
Zn	10,8	8,8	7,0	7,3	36,3	3,0	6,0	13,3	16,3	300
Hg	58,2	41,8	12,3	2,4	8,3	5,8	0,7	12,3	.	0,15
Co	2,4	1,5	2,7	33,0	13,4	22,2	1,4	11,8	13,0	8,4
V	0,6	.	24,6	47,4	13,5	0,0	0,7	10,1	3,1	16,6

SYMBOLS AND ABBREVIATIONS

BALANCE SHEET

PI	Production
PV	Domestic recovery
M	Imports
±DV	Variations in stocks
C	Consumption (PI+PV+M-X±DV)
X	Exports

SIGNS

t	Tonne (also tonne of metal content or net tonne)
(...) *	Estimated by the EC Statistical Office
:	Figure not available
0	Negligible (generally less than half the smallest unit or decimal of the heading)
.	No figure for confidentiality reasons

SCOPE

EC, EUR	European Community : 1975-1980; EUR 9 1981-1985; EUR 10 1986-1987; EUR 12

SOURCES

Raw Materials, EC Balance Sheets 1983-1986, Eurostat
Raw Materials Questionaire 1987, Eurostat
UNEP Industry and Environment Jan / Feb / Mar, 1989
Metals in the Environment, H.A.,Waldon, 1980