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International material resource dependency in an input-output framework

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Abstract

Besides sustainability concerns, strategic resource interests coupled with increasing resource depletion have contributed to a rising concern with resource security. Governments issue reports to identify strategic material resources and actively design strategies to ensure the supply of natural resources and re-use of materials already in the economy. We assess natural resource use, trade linkages and dependence among the 43 countries present in the EXIOPOL database. Material resource requirements along the international supply chain are quantified using an environmentally extended international input-output model, which allows considering direct and indirect, domestic and international resource use. We focus specifically on fossil fuel carriers, metals and mineral resource use. Dependency on foreign resource suppliers is examined by looking at the natural resources required directly and indirectly in satisfying final demand by country. Key is the extent to which these resources are imported and whether the majority of the imports is sourced from a small or large set of trade partners. Three measures of resource dependency are analyzed. Resource dependency is measured as total material requirements (direct and indirect) per unit output. International material dependency is defined as the percentage of the material requirements that is sourced abroad. Finally, the concentration of international material dependency is measured by the Herfindahl index calculated over the international resource multipliers. When resources are mainly imported from one or a few trade partners, countries may want to reconsider whether strategic interests should be factored into their procurement strategies.

Keywords: international input-output, environmental accounting, material resources, dependency

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1. Introduction

Over the past decade environmentally extended input output tables (EE IOT) have received much attention due to their usefulness as data source for environmental accounting. Input-output tables and the related models allow for calculating the direct and indirect effects of an increase in final demand on total output. Extending input-output tables with environmental information results in a framework that is very suitable for analyzing the relationship between economic activities and the pressure on the environment caused by these activities. The incorporated environmental information can consist of, for example, pollution generated or material resources used.

The combination of environmentally extended input-output tables and international trade flows offers the opportunity to undertake environmental accounting in a complete economic transaction system. Including international trade linkages enables the analysis of international integration and the dependency of production. It also makes it possible to track where products consumed in a country are produced and which resources are used in the production process. For example, it can be established whether the Japanese cars contain more or less material resources than cars produced in the United States. In addition, it can be investigated which countries actually mine these resources. One of the debates this type of information has fuelled is whether a country is responsible for the extraction of natural resources or the countries to which the products are exported to.

Unlike capital that can be accumulated or population that can increase, natural resources cannot be produced. In case a country is not endowed with natural resources, it will need to obtain the resources needed for production through international trade. This can be done by either importing the natural resources directly from another country or by importing intermediate inputs in which these resources are embodied. Unstable economic trade relations with a country that is a primary supplier of the natural resources needed to fulfill a country's final demand may be harmful to the economy. Fully depending on other countries for the supply of natural resources has been viewed as undesirable, especially after the two main oil crises of the 20th century and the increasing scarcity of fossil energy carriers. A strategy of diversifying imports over the countries which have natural resource endowments may decreases risks associated with natural resource dependency.

In this paper we investigate the issue of the dependency of countries on imported material resources from abroad. The focus of the present analysis is on four types of metals, chemical/fertilizer minerals and fossil energy carriers. For the metals, we included: iron ores, aluminum/bauxite ores, copper ores and precious metals ores. The latter three are already scarce, and the first has a large chance to become scarce in the near future. In particular, we will first address for which countries and sectors an increase in final demand generates the most additional extraction of the three types of resources. This indicates the dependency of a sector on material resources. Second, we investigate the extent to which this additional demand is generated in other countries, which shows how dependent a country is on foreign suppliers of the material resources. Next, the concentration of the international dependency is analyzed as an important aspect of the factual dependency. A correlation analysis is undertaken to see to what extent these three measures are related for individual sectors.

In the next sections the methods used are discussed followed by a description of the data available from the EXIOPOL database. Then, the results on environmental resource dependency are presented, followed by a brief conclusion.

2. Methods

The derivation of an input-output model from supply and use tables (SUT) requires an explicit assumption regarding the production technology of secondary and/or by-products of industries, whereas this assumption is hidden in input-output tables. Different assumptions can be made and there is no definite answer to the question which of these is conceptually and practically the best. For the results calculated here the industry technology assumption has been used to create an industry by industry IOT.

$$\mathbf{A}_{ixi,\ ind\ tech} = \mathbf{V}\left(\hat{\mathbf{q}}\right)^{-1}\mathbf{U}\left(\hat{\mathbf{x}}\right)^{-1} \qquad \mathbf{1}$$

Where **V** is the transposed supply table, **q** is the total supply of products, **U** is the use matrix and **x** is the total output of domestic industries. The hat over the variables indicates a diagonalized matrix.

An input-output model describes how supply **x** follows demand with the following identity: $\mathbf{x} = \mathbf{Ax} + \mathbf{f}$. Where **x** is total output, **A** the matrix of direct input coefficients and **f** the vector of final demand. Solving the model for output gives $\mathbf{x} = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{f}$, where $(\mathbf{I} - \mathbf{A})^{-1}$ is the Leontief multiplier matrix of direct and indirect industry output requirements per unit of final demand. In the Leontief quantity model, from which the backward multipliers are derived, the assumption is made that prices are fixed in the short term. Another assumption in IO modeling is that input coefficients do not change regardless of output, final demand, or other relevant changes. The structure of the economy is taken to be constant, at least in the short term.

The environmental extensions are given as a matrix of direct impact coefficients $\mathbf{D} = [d_{kj}]$, of which each element represents the amount (in physical units per dollar's worth of output) of the environmental factor *k* used in the production of sector *j*.

These environmental extensions can be emissions, pollution, raw material, land use, water use, etc. The total requirement of environmental factors $\mathbf{x}^E$ can be calculated as:

$$\mathbf{x}^E = \mathbf{Dx} = \mathbf{D}(\mathbf{I} - \mathbf{A})^{-1}\mathbf{f} \qquad \mathbf{2}$$

For an international input-output table the same equation 2 holds, where **x** is now a vector of all individual country sub vectors $\mathbf{x}_R$, for all countries *R*. The matrix $\mathbf{D} = [d_{kj}^R]$ is the concatenated matrix of all individual country matrices $\mathbf{D}_R$. The matrix $\mathbf{A} = [a_{ij}^{RS}]$ is the input coefficient matrix of all domestic $\mathbf{A}^{RR}$ matrices and all bilateral matrices $\mathbf{A}^{RS}$, where *R* and *S* are the country indices and *i* and *j* are sector indices. The vector **f** is the stacked vecotr of all individual country final demand vectors $\mathbf{f}_R$.

The total requirement of environmental factors $\mathbf{x}^E$ signifies the dependency of a sector on material resource inputs. The requirements may be partially sourced domestically, but especially for the countries that do are not endowed with material resources, these requirements will be imported. The extent of dependency on foreign suppliers for material resources is measured by the requirement of imported environmental factors over the total requirement.

In addition, the Herfindahl index will be used to look at the concentration of the environmental requirements over the countries from which a sector imports. This highlights an important aspect of dependency; importing from multiple sources will make a country less dependent on one particular supplier. The index can be represented as given by equation 3, where *k* is the index representing the different resources.

$$H_{kj}^S = \sum_{R \neq S} \left(\frac{\sum_i d_{ki}^R l_{ij}^{RS}}{\sum_{i, R \neq S} d_{ki}^R l_{ij}^{RS}} \right)^2 \qquad \mathbf{3}$$

Each country has potentially 42 trading partners. For 42 observations, the value of the Herfindahl index would equal to 1/42 ≈ 0.0238 in case each of the environmental multipliers is exactly the same for each trade partner. This corresponds to full diversification over countries from which a particular country demands its imports and embodied resources. When a country only imports the embodied resources from one trade partner the value of the Herfindahl index will be equal to 1. The higher the value of the Herfindahl index the more dependent a country is on one, or a few countries, to fulfill its demand for embodied materials.

3. Data

A multi-regional EE IOT database for the year 2000 is constructed in the EXIOPOL project.[1] The project has been set up to provide a new environmental accounting framework for policy analysis, using externality data and input-output tools. The objective of the project is to enable the estimation of environmental impacts and external costs of industry activities and consumption activities of countries in the European Union. These environmental impacts include greenhouse gases emitted, pollutants discarded, and resources used as inputs to production. Within the project methodologies are developed, valuation of externalities is undertaken, and an environmentally extended (EE) input-output (IO) framework is set up that the European Union can use for environmental policy analysis (Tukker et al., 2009). The EXIOPOL database, which has as core an environmentally extended IO framework, contains satellite accounts for 186 environmental factors. The focus on the environment also called for more detail in the sectors that are mostly involved in generating or using these environmental factors. Agriculture, food products, mining and energy have been disaggregated into multiple subsectors. By covering around 80 per cent of world GDP, adding sectoral detail and the incorporation of bilateral trade, the EXIOPOL database caters directly for the need of harmonized and improved data for EE IOT analysis.

The full EXIOPOL database consists of the supply and use tables (SUT) of 43 countries[2] and an aggregated 'rest of the world'. The supply and use tables maintained by Eurostat (referred to as the ESA-95 tables) are used as basis for the supply and use tables of the European Union countries. These tables have been disaggregated in industry and commodity classification to 129 industries and products, still in a squared set-up of the SUT. See for a more detailed description of the construction methods Tukker (ed.) 2011 (forthcoming).

The tables are linked to each other via bilateral trade flows using a methodology that combines information on origin and destination of trade flows from trade statistics with the aggregated trade data in the SUT. In the process of regaining consistency after combining these two data sources, the data are also revalued from cost-insurance-freight prices of the purchasing country to basic prices of the producing country. (For a full description of the methodology see (Bouwmeester & Oosterhaven, 2008). It has to be noted that although several information sources are combined to construct a full international SUT, these tables

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[1] EXIOPOL is the acronym for: a new environmental accounting framework using externality data and input-output tools for policy analysis. The project website is http://www.feem-project.net/exiopol/, last accessed 27-04-2010.

[2] See the appendix tables for a full list of the countries included.

do not represent full information. The database also contains input-output tables that have resulted from input-output modeling of the supply and use tables. See chapter 5 of Miller & Blair (1984), for an explanation of the assumptions that need to be made in IO modeling.

All supply and use tables are extended with satellite accounts of social and environmental variables. The environmental extensions focused on in this study are the materials that are known as scarce or will become scare in the future[3]. We report results for 1) domestic extraction of iron ores, 2) domestic extraction of aluminum and bauxite ores, 3) copper ores, 4) precious metal ores, 5) chemical and fertilizer minerals, and as aggregate category 6) fossil energy carriers[4, 5]. For more information on the environmental extensions data construction, see Tukker (ed.) 2011 (forthcoming).

4. Results and discussion

In this section an analysis is presented of the dependency of countries on trade partners to fulfill their demand for embodied materials. First, we will have a closer look at the countries that supply resources. Next, to focus the discussion of the results, we selected the industries that on a world scale demand the most additional resources per € of output. For this purpose we have created a simple world supply and use table and a vector with the total material use per 'world' sector[6]. For these selected industries we computed the share of the international environmental multiplier in the total environmental multiplier as a measure of dependency on trade partners to fulfill the demand for embodied resources. Next, we also look at the Herfindahl index of the international multipliers to determine the concentration of dependency. Finally, a correlation analysis is undertaken to see whether higher international dependence of countries is related to a higher concentration of international dependence. This would indicate that the sector may be very vulnerable to the effects of increasing scarcity of material resources.

Not all countries are suppliers of material resources. It may be that the materials are not present at all within a country's territory as a natural resource. Alternatively, it may be that there are material resources, but only in a limited amount or hard to retrieve, making it economically uninteresting to mine the materials. For fossil fuels, the following countries do

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[3] The level of detail of the extensions prevents us from studying very rare and scarce materials

[4] Which consist of: hard coal, lignite/brown coal, crude oil, natural gas, natural gas liquids, and peat for energy use.

[5] Unused domestic extraction related to these materials is not included in the analysis.

[6] To make a real world table, first the 'rest of the world' countries would also need to be included and second, all international trade flows would have to become part of the transactions matrices.

not mine coal or extract oil or gas; Belgium, Cyprus, Estonia, Luxembourg, Malta, Portugal and Switzerland. Metals are not mined in the countries: Belgium, Denmark, Estonia, Germany, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Slovenia, Switzerland, Taiwan and United Kingdom. For minerals only Poland has no reported output for the mineral sector, however, the environmental extensions do report a large amount of minerals extracted, so this may be a flaw in the supply and use tables.[7] Summarizing; 37 countries extract fossil fuels, metal ores are mined in 30 countries and 42 countries report output for their mineral sector.

In Table 1, the top three of countries with the most domestic extraction used, as well as the top three of countries with the most material use per million € output are represented.[8] For fossil fuel carriers, chemical/fertilizer minerals, copper and precious metals the United States is the largest extractor of materials, however its ranking in terms of the use of materials per euro output of the related mining industry is for fossil energy carriers 22nd, for chemical/fertilizer minerals 4th, for copper ores 2nd and for precious metals ores 9th. China ranks first total domestic extraction of iron ores, and third on the quantity of iron ores used to produce the output of the mining industry of iron ore. China uses much iron ore and its mining industry is apparently also not very efficient. The same holds for chemical/fertilizer materials and copper ores in the United States. The values for the domestic extraction used per € output seem disproportionally large for India in case of aluminum/bauxite ores and for Brazil concerning copper ores. This has to be further investigated.

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[7] In case an environmental extension is recorded while the SUT record no output by the specific industry, the value of the environmental extension is disregarded in the analysis presented here.

[8] See Appendix 2, Table 1 for the table of resource use in kilogram per € output for all countries

Table 1: Domestic extraction used

	fossil fuel carriers	mln tonnes		*fossil fuel carriers*	kg / € output
1	United States	1692	1	Hungary	153
2	China	1361	2	Greece	134
3	Russian Federation	958	3	Bulgaria	119
	chemical/fertilizer minerals			*chemical/fertilizer minerals*	
1	United States	51	1	Romania	71
2	China	34	2	Russian Federation	41
3	Russian Federation	18	3	Finland	16
	iron ores			*iron ores*	
1	China	224	1	Indonesia	182
2	Brazil	210	2	India	158
3	Australia	172	3	China	157
	aluminum/bauxite ores			*aluminum/bauxite ores*	
1	Australia	121	1	India	238
2	Brazil	14	2	France	81
3	India	8	3	Hungary	46
	copper ores			*copper ores*	
1	United States	380	1	Brazil	609
2	Indonesia	119	2	United States	359
3	Australia	98	3	Bulgaria	325
	precious metal ores			*precious metal ores*	
1	United States	89	1	Bulgaria	95
2	Australia	74	2	France	64
3	South_Africa	67	3	South Korea	51

Due to the large amount of sectors; 129 sectors in each of the 43 countries included in the dataset, we have chosen to focus our analysis to the sectors that on average (as 'world' total) have the highest resource use per € of demand for that sectors' output. See Table 2 for the ranking of the industries and the related value of the environmental multiplier for each of the material groups considered. For each material group the sector which mines or extracts that resource is associated to the largest environmental multiplier (i.e. the industry that ranks first in Table 2 for each material). Fossil fuel carriers are extracted by sector i10, sector i11.a, sector i11.b and sector i11.c. More interesting are the sectors in the table that are not directly related to the mining of the material resources. As can be expected, the second largest users of domestic resources per unit of final demand are the directly downstream sectors that produce products of the materials. For example, for copper ores, the second largest user is i27.44 – copper products. The quantity of material resources used per unit of final demand for the downstream sectors quickly decreases; other inputs gain in importance. In Appendix 2 – Table 2 the detailed breakdown of the environmental multipliers per country can be found.

Table 2: Largest environmental multipliers per material for the 'world'

Kilogram of additional domestic extraction per additional € demand

rank	*fossil energy carriers*		*chemical/fertilizer minerals*		*iron ores*	
1	i10	38.2	i14.3	4.9	i13.1	38.1
2	i23.1	16.5	i26.e	0.3	i27.a	1.6
3	i40.11.a	13.5	i26.d	0.1	i27.5	0.4
4	i11.b	8.3	i27.5	0.04	i13.20.13	0.3
5	i11.a	6.3	i26.b	0.03	i28	0.2

rank	*aluminum/bauxite*		*copper ores*		*precious metals*	
1	i13.20.13	6.2	i13.20.11	103.0	i13.20.14	19.0
2	i27.42	0.9	i27.44	9.7	i27.41	2.6
3	i27.5	0.4	i27.41	0.8	i13.20.12	0.6
4	i23.3	0.1	i27.45	0.4	i27.43	0.2
5	i13.20.12	0.04	i37.1	0.4	i26.b	0.1

Note: See Appendix 1 for the sector classification codes and labels.

There is a large variation in the individual country multipliers as shown in Appendix 2 – Table 2. For fossil energy carriers this can be due to the composition of the energy carriers. The net calorific value of the different types of fossil energy carriers varies from as low as 10 MJ/kg to as high as 45 MJ/kg. Specifically for the different types of coal used by sector i10 – coal and lignite; peat, the range of net calorific value can be rather large.

For chemical/fertilizer minerals, Finland, Greece, Lithuania, Romania, the Russian Federation, and the United States have high multipliers for the related mining sector i14.3. Only Lithuania and Romania have comparatively large multipliers for sector i26.e – other non-metallic mineral products. Greece and Romania and Lithuania still use more than a kilogram per € final demand in sector i26.d – cement, lime and plaster.

For iron ores, Norway, the Russian Federation and South Africa have rather small multipliers[9] compared to the world average. China, India, Indonesia and the Slovak Republic all require more than 100 kg metals per euro of extra final demand for sector i13.1; iron ores. About four times as much as the world average. For sector i27.a all multipliers are due to embodied metals in the inputs bought by the sector. Large values are found for China, India and Brazil. Basic manufacturing of iron and steel in these countries requires more metals per euro of final demand. For the other metal ores the picture is rather similar in terms of variation, with the exception of India for aluminum ores and Brazil for copper ores – which both seem to be extreme outliers.

The multipliers per country-sector can be broken into a domestic environmental multiplier and an international environmental multiplier. The international environmental

[9] This disregards some countries with very low multipliers

multiplier as percentage of the total multiplier is a measure of the dependence of a country on foreign suppliers. It shows the share of additional demand for materials that has to be satisfied from suppliers abroad. The higher this percentage the more dependent a country is on foreign suppliers. In Appendix 2 – Table 3 to Table 8 the international multiplier percentage is given per material for each country for the five sectors that required, on a world scale, the most additional material resources when demand for its products increase. These tables also show the Herfindahl index (HI) calculated based on the international multipliers.

A combination of a high international environmental multiplier combined with a high value for the Herfindahl index can indicate a vulnerable supplier relationship for a specific material resource and the sector that requires the material in its production process. Table 3 below shows the results for the sectors that are the runner up to the mining sector in terms of quantity used per € of final demand.

From Table 3 it can be seen that especially most small European countries have a high international multiplier percentage, which is consistent with the European open market. However, the Herfindahl index for the East-European countries is in general higher than the Herfindahl index for the West-European countries. The concentration of supplier relations is especially high for fossil energy carriers, even though 37 of the countries included in the dataset extract fossil fuel carriers domestically. This would suggest that especially for Bulgaria, Estonia, Finland, Latvia, Lithuania, and the Slovak Republic, it might be wise to diversify their supplier relations more. Only a few countries extract aluminum/bauxite ores, so most countries are fully reliant on imports of these ores. In addition, the concentration of suppliers is rather high – especially given the reliance on imports, for China, Indonesia, Norway and South Africa. For copper ores the picture is far more mixed. Regarding precious metals, France, Indonesia and South Africa might want to investigate their supplier relations.

In Table 4 the coefficients of determination are presented. These values show for the five 'heavy use' sectors for each of the three material groups how much of the variation in the one variable can be explained by the variation of the other. In other words, a high coefficient of determination shows whether the total material multipliers (tm), the extent of international dependency (id), measured as percentage international material multiplier in the total material multiplier and the Herfindahl index (hi) of the international multipliers correlate over the countries.

Most relations between the total resource multiplier and international dependency enter with a negative sign. Countries that use much material resources per unit of final demand apparently use domestically extracted resources. This may be a matter of specialization; the availability of domestic resources may stimulate the development large specialized sectors that focus on mining or making products of the ores that are abundantly available. Also, if a resource is abundantly available it may result in inefficiency in using the resource, especially if the natural supply seems unlimited. The most interesting coefficient of determination, the one between the international dependency measure and the Herfindahl index of the international multipliers, does not show very strong results. Sector i11.b – natural gas and services related for fossil fuel carriers, sector i14.3 – chemical and fertilizer minerals the related mineral ores, and sector i13.1 – iron ores and sector i13.20.13 – aluminum ores for iron ores, score higher than other sectors. For these sectors, the suppliers on the world market may be very limited, which would explain the higher correlation between the international dependency and the concentration of international supplies. In the other extreme, aluminum/bauxite ores have reasonable to high coefficient of determination for four of the reported sectors, but each of them enters with a negative sign; i.e. the higher the international dependency the lower the concentration of the suppliers.

5. Conclusion and outlook

These first results indicate that international dependency on material resource suppliers differs much from sector to sector. Especially for sectors that are of strategic importance to the functioning of the economy at large, it is important to investigate the extent of dependency and the concentration of dependency. A start of the analysis of dependency has been made in this paper, but the matter is definitely in need of further investigation.

The EXIOPOL database offers a wealth of information. However, no direct information about the scarcity of natural resources is included, while this directly influences the topics discussed in this paper. The environmental multipliers vary widely. In highly aggregated international IO tables this can be expected due to the fact that very different sectors can be lumped together. However, in the EXIOPOL project much effort has been put in detailing the sectors that are important from an environmental and natural resource perspective. To still find such varying multipliers definitely warrants further investigation about the characteristics of the database and the quality of the data.

Generalizing in term of dependency and concentration appears to offer rather weak results. Although general claim cannot be made, for some counties and sectors the dependency on specific countries to supply the resources is rather large. Countries should be aware of these vulnerabilities and identify bottlenecks in order to avoid future problems with their productive system. Especially fossil energy carriers are, at least in the foreseeable future, the oil of the economy. Apart from environmental concerns in terms of emissions, the resource itself is also becoming scarcer. Changing to another energy system may be a solution, but this switch may heavily strain the material resource base (Kleijn & van der Voet, 2010).

Table 3: Selected sectors, % international multiplier of total multiplier and Herfindahl index

	fossil energy carriers **i23.1**		*chem/fert minerals* **i26.e**		*iron ores* **i27.a**	
	inter %	HI	inter %	HI	inter %	HI
Australia	0	0.15	15	0.21	8	0.38
Austria	**98**	0.44	**100**	0.18	**100**	0.20
Belgium	**100**	0.15	**98**	0.12	**100**	0.20
Brazil	40	0.23	46	0.48	0	0.14
Bulgaria	**59**	**0.90**	15	0.23	16	0.47
Canada	38	0.34	22	0.20	41	**0.67**
China	0	0.18	7	0.22	4	0.30
Cyprus	**-**	**-**	**100**	0.42	**-**	**-**
Czech Republic	4	0.47	**99**	0.22	**100**	**0.90**
Denmark	**69**	0.38	**100**	0.20	**100**	0.17
Estonia	**100**	**0.90**	**100**	**0.85**	**100**	**0.50**
Finland	**100**	**0.51**	9	0.16	**100**	0.48
France	**90**	0.22	**82**	0.15	**100**	0.31
Germany	37	0.22	**62**	0.10	**100**	0.25
Greece	47	**0.52**	1	0.25	24	0.22
Hungary	**93**	0.36	**100**	0.48	**100**	**0.82**
India	1	0.24	**60**	0.13	1	0.22
Indonesia	**-**	**-**	**84**	0.18	**98**	0.26
Ireland	**-**	**-**	**100**	0.11	**100**	0.17
Italy	**100**	0.19	**99**	0.12	**100**	0.37
Japan	**100**	0.35	35	0.19	**100**	0.38
Latvia	**100**	**0.68**	**100**	**0.62**	**100**	**0.52**
Lithuania	**100**	**0.85**	**100**	**0.98**	**100**	**0.50**
Luxembourg	**-**	**-**	**100**	**0.53**	**100**	0.24
Malta	**-**	**-**	**100**	0.38	**100**	0.17
Mexico	**96**	0.33	42	0.34	36	**0.58**
Netherlands	**95**	0.26	**84**	0.16	**100**	0.27
Norway	**78**	0.26	**100**	0.48	**61**	0.39
Poland	1	0.40	**100**	0.28	**100**	**0.63**
Portugal	**100**	0.26	**87**	0.29	**99**	0.38
Romania	9	**0.72**	13	0.39	**95**	0.40
Russian Federation	0	0.11	17	0.18	1	0.19
Slovak Republic	**100**	**0.67**	**100**	0.37	**88**	**0.96**
Slovenia	29	0.35	**100**	0.41	**100**	0.22
South Africa	1	0.31	**96**	0.27	**91**	0.21
South Korea	**98**	0.25	**68**	0.41	**100**	0.37
Spain	18	0.30	**80**	0.13	**96**	**0.83**
Sweden	**100**	0.22	**83**	0.16	37	0.20
Switzerland	**100**	0.17	**100**	0.15	**100**	0.23
Taiwan	**100**	0.24	**85**	0.26	**100**	0.31
Turkey	32	**0.53**	38	0.22	**77**	0.22
United Kingdom	42	**0.62**	**100**	0.38	**100**	0.28
United States	6	0.29	6	0.13	28	0.35

Table 3: Selected sectors, % international multiplier of total multiplier and Herfindahl index

	aluminum/bauxite **i27.42**		*copper ores* **i27.44**		*precious metals* **i27.41**	
	inter %	HI	inter %	HI	inter %	HI
Australia	0	0.20	1	0.22	0	0.33
Austria	-	-	**100**	0.21	-	-
Belgium	-	-	**100**	0.36	-	-
Brazil	18	**0.56**	5	0.18	1	0.48
Bulgaria	-	-	0	0.23	1	**0.97**
Canada	**100**	**0.53**	0	**0.74**	**97**	0.31
China	50	**0.91**	**99**	0.16	27	0.24
Cyprus	-	-	**99**	0.20	-	-
Czech Republic	-	-	-	-	-	-
Denmark	-	-	-	-	-	-
Estonia	-	-	-	-	-	-
Finland	-	-	**100**	0.29	**100**	0.26
France	**98**	0.32	20	0.16	**99**	**0.90**
Germany	**100**	0.33	**100**	0.30	-	-
Greece	38	**0.88**	-	-	**77**	0.23
Hungary	9	0.23	**100**	0.18	-	-
India	9	**0.94**	**69**	0.24	14	**0.76**
Indonesia	**62**	**0.97**	**63**	**0.56**	**100**	**0.80**
Ireland	-	-	-	-	31	0.28
Italy	**100**	0.27	**100**	0.15	**98**	0.22
Japan	**100**	0.40	**100**	0.25	**98**	0.48
Latvia	-	-	-	-	-	-
Lithuania	**100**	0.19	**100**	0.21	**100**	0.48
Luxembourg	**100**	0.29	**100**	0.29	**100**	0.23
Malta	**100**	0.35	**100**	0.14	**100**	0.17
Mexico	**100**	0.38	47	**0.99**	41	**0.76**
Netherlands	**100**	0.32	-	-	-	-
Norway	**100**	**0.80**	**100**	0.41	-	-
Poland	**100**	**0.60**	3	0.22	**97**	0.27
Portugal	-	-	-	-	**100**	0.49
Romania	**100**	0.43	21	**0.81**	0	0.21
Russian Federation	**52**	0.37	1	0.18	21	**1.00**
Slovak Republic	**100**	0.23	-	-	16	0.33
Slovenia	**100**	0.23	-	-	-	-
South Africa	**100**	**0.98**	**94**	0.49	**98**	**0.98**
South Korea	-	-	**100**	**0.63**	-	-
Spain	**100**	0.42	**72**	**0.74**	14	**0.90**
Sweden	**100**	0.50	5	0.30	39	**0.92**
Switzerland	**100**	0.27	-	-	-	-
Taiwan	-	-	**100**	**0.53**	**100**	0.47
Turkey	20	0.31	**72**	**0.55**	1	0.26
United Kingdom	**100**	0.28	**100**	**0.65**	-	-
United States	**96**	0.36	12	0.37	18	0.37

Table 4: Coefficients of determination as percentage (R^2 – % of variation explained)

fossil enery carriers

		id	hi
i10	tm	(-) 10.5	3.2
43	id		0.2
i23.1	tm	(-) 6.5	(-) 2.2
43	id		1.9
i40.11.a	tm	(-) 28.5	6.7
43	id		1.1
i11.b	tm	(-) 2.4	(-) 3.3
43	id		15.2
i11.a	tm	(-) 3.0	(-) 0.7
43	id		0.4

chem/fert minerals

		id	hi
i14.3	tm	(-) 7.1	0.2
43	id		17.6
i26.e	tm	0.1	40.9
43	id		8.6
i26.d	tm	(-) 12.6	12.1
43	id		5.6
i27.5	tm	(-) 0.2	82.5
43	id		2.1
i26.b	tm	(-) 4.4	(-) 0.2
43	id		0.2

iron ores

		id	hi
i13.1	tm	(-) 10.6	(-) 1.1
23	id		17.8
i27.a	tm	(-) 39.3	0.2
42	id		2.4
i27.5	tm	(-) 43.4	(-) 0.0
29	id		5.6
i13.20.13	tm	0.0	(-) 0.0
15	id		22.5
i28	tm	(-) 44.0	0.0
43	id		5.3

aluminum/bauxite

		id	hi
i13.20.13	tm	(-) 9.3	17.6
15	id		(-) 12.6
i27.42	tm	(-) 28.4	1.2
30	id		(-) 4.5
i27.5	tm	0.6	26.3
29	id		(-) 6.3
i23.3	tm	1.1	0.0
16	id		(-) 33.1
i13.20.12	tm	(-) 1.9	10.4
15	id		0.2

copper ores

		id	hi
i13.20.11	tm	(-) 10.3	(-) 2.2
25	id		3.6
i27.44	tm	(-) 27.1	4.6
32	id		(-) 0.3
i27.41	tm	(-) 21.5	(-) 0.7
28	id		0.0
i27.45	tm	(-) 36.9	6.3
31	id		(-) 3.0
i37.1	tm	(-) 51.1	(-) 1.0
31	id		(-) 0.7

precious metals

		id	hi
i13.20.14	tm	(-) 3.4	17.3
29	id		(-) 0.7
i27.41	tm	(-) 17.1	6.7
28	id		(-) 1.5
i13.20.12	tm	(-) 18.7	0.1
15	id		2.4
i27.43	tm	(-) 34.8	1.1
38	id		(-) 4.7
i26.b	tm	(-) 22.7	2.5
43	id		(-) 0.1

Note: the numbers in italics beneath the sector code indicate the number of countries that have a total multiplier recorded and that have been included in the calculation of the coefficients of determination.

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Appendix 1: sector classification

i01.a	Cultivation of paddy rice
i01.b	Cultivation of wheat
i01.c	Cultivation of cereal grains nec
i01.d	Cultivation of vegetables, fruit, nuts
i01.e	Cultivation of oil seeds
i01.f	Cultivation of sugar cane, sugar beet
i01.g	Cultivation of plant-based fibers
i01.h	Cultivation of crops nec
i01.i	Cattle farming
i01.j	Pigs farming
i01.k	Poultry farming
i01.l	Meat animals nec
i01.m	Animal products nec
i01.n	Raw milk
i01.o	Wool, silk-worm cocoons
i02	Forestry, logging and related service activities (02)
i05	Fishing, operating of fish hatcheries and fish farms; service activities incidental to fishing (05)
i10	Mining of coal and lignite; extraction of peat (10)
i11.a	Extraction of crude petroleum and services related to crude oil extraction, excluding surveying
i11.b	Extraction of natural gas and services related to natural gas extraction, excluding surveying
i11.c	Extraction, liquefaction, and regasification of other petroleum and gaseous materials
i12	Mining of uranium and thorium ores (12)
i13.1	Mining of iron ores
i13.20.11	Mining of copper ores and concentrates
i13.20.12	Mining of nickel ores and concentrates
i13.20.13	Mining of aluminium ores and concentrates
i13.20.14	Mining of precious metal ores and concentrates
i13.20.15	Mining of lead, zinc and tin ores and concentrates
i13.20.16	Mining of other non-ferrous metal ores and concentrates
i14.1	Quarrying of stone
i14.2	Quarrying of sand and clay
i14.3	Mining of chemical and fertilizer minerals, production of salt, other mining and quarrying n.e.c.
i15.a	Processing of meat cattle
i15.b	Processing of meat pigs
i15.c	Processing of meat poultry
i15.d	Production of meat products nec
i15.e	Processing vegetable oils and fats
i15.f	Processing of dairy products
i15.g	Processed rice
i15.h	Sugar refining
i15.i	Processing of Food products nec
i15.j	Manufacture of beverages
i15.k	Manufacture of fish products
i16	Manufacture of tobacco products (16)
i17	Manufacture of textiles (17)
i18	Manufacture of wearing apparel; dressing and dyeing of fur (18)
i19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear (19)
i20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (20)
i21	Manufacture of pulp, paper and paper products (21)
i22	Publishing, printing and reproduction of recorded media (22)
i23.1	Manufacture of coke oven products
i23.20.a	Manufacture of motor spirit (gasoline)
i23.20.b	Manufacture of kerosene, including kerosene type jet fuel
i23.20.c	Manufacture of gas oils
i23.20.d	Manufacture of fuel oils n.e.c.
i23.20.e	Manufacture of petroleum gases and other gaseous hydrocarbons, except natural gas
i23.20.f	Manufacture of other petroleum products
i23.3	Processing of nuclear fuel
i24	Manufacture of chemicals and chemical products (24)
i25	Manufacture of rubber and plastic products (25)
i26.a	Manufacture of glass and glass products
i26.b	Manufacture of ceramic goods
i26.c	Manufacture of bricks, tiles and construction products, in baked clay
i26.d	Manufacture of cement, lime and plaster
i26.e	Manufacture of other non-metallic mineral products n.e.c.

sector classification – continued

i27.a	Manufacture of basic iron and steel and of ferro-alloys and first products thereof
i27.41	Precious metals production
i27.42	Aluminium production
i27.43	Lead, zinc and tin production
i27.44	Copper production
i27.45	Other non-ferrous metal production
i27.5	Casting of metals
i28	Manufacture of fabricated metal products, except machinery and equipment (28)
i29	Manufacture of machinery and equipment n.e.c. (29)
i30	Manufacture of office machinery and computers (30)
i31	Manufacture of electrical machinery and apparatus n.e.c. (31)
i32	Manufacture of radio, television and communication equipment and apparatus (32)
i33	Manufacture of medical, precision and optical instruments, watches and clocks (33)
i34	Manufacture of motor vehicles, trailers and semi-trailers (34)
i35	Manufacture of other transport equipment (35)
i36	Manufacture of furniture; manufacturing n.e.c. (36)
i37.1	Recycling of metal waste and scrap
i37.2	Recycling of non-metal waste and scrap
i40.11.a	Production of electricity by coal
i40.11.b	Production of electricity by gas
i40.11.c	Production of electricity by nuclear
i40.11.d	Production of electricity by hydro
i40.11.e	Production of electricity by wind
i40.11.f	Production of electricity nec, including biomass and waste
i40.12	Transmission of electricity
i40.13	Distribution and trade of electricity
i40.2	Manufacture of gas; distribution of gaseous fuels through mains
i40.3	Steam and hot water supply
i41	Collection, purification and distribution of water (41)
i45	Construction (45)
i50.a	Sale, maintenance, repair of motor vehicles, motor vehicles parts, motorcycles, motor cycles parts and accessoiries
i50.b	Retail sale of automotive fuel
i51	Wholesale trade and commission trade, except of motor vehicles and motorcycles (51)
i52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods (52)
i55	Hotels and restaurants (55)
i60.1	Transport via railways
i60.2	Other land transport
i60.3	Transport via pipelines
i61.1	Sea and coastal water transport
i61.2	Inland water transport
i62	Air transport (62)
i63	Supporting and auxiliary transport activities; activities of travel agencies (63)
i64	Post and telecommunications (64)
i65	Financial intermediation, except insurance and pension funding (65)
i66	Insurance and pension funding, except compulsory social security (66)
i67	Activities auxiliary to financial intermediation (67)
i70	Real estate activities (70)
i71	Renting of machinery and equipment without operator and of personal and household goods (71)
i72	Computer and related activities (72)
i73	Research and development (73)
i74	Other business activities (74)
i75	Public administration and defence; compulsory social security (75)
i80	Education (80)
i85	Health and social work (85)
i90.01	Collection and treatment of sewage
i90.02.a	Collection of waste
i90.02.b	Incineration of waste
i90.02.c	Landfill of waste
i90.03	Sanitation, remediation and similar activities
i91	Activities of membership organisation n.e.c. (91)
i92	Recreational, cultural and sporting activities (92)
i93	Other service activities (93)
i95	Private households with employed persons (95)
i99	Extra-territorial organizations and bodies

Appendix 2: additional result tables

Table 1: Domestic extraction used – kilogram per € output by country, ordered

	fossil energy carriers			*chem/fer. minerals*			*iron ores*	
1	Hungary	153.1	1	Romania	71.3	1	Indonesia	181.8
2	Greece	134.0	2	Russian_Federation	40.5	2	India	157.6
3	Bulgaria	119.0	3	Finland	16.3	3	China	156.9
4	Estonia	106.3	4	United_States	15.6	4	Slovak_Republic	121.0
5	South_Africa	64.0	5	Greece	14.4	5	Sweden	96.9
6	Czech_Republic	46.7	6	Lithuania	14.2	6	Brazil	80.9
7	India	36.7	7	Mexico	8.8	7	Australia	59.7
8	Poland	35.6	8	Canada	8.3	8	Greece	59.4
9	Russian_Federation	32.7	9	Bulgaria	8.3	9	South_Korea	42.9
10	Slovenia	31.9	10	Slovak_Republic	6.4	10	Mexico	41.4
11	Romania	31.6	11	France	4.7	11	United_States	34.5
12	Turkey	30.9	12	South_Korea	4.3	12	Canada	30.9
13	Germany	29.0	13	Belgium	4.3	13	Bulgaria	28.5
14	Finland	23.1	14	Czech_Republic	3.9	14	Turkey	25.5
15	Slovak_Republic	18.5	15	Spain	3.4	15	Spain	19.9
16	China	17.3	16	Australia	3.3	16	Romania	14.5
17	Spain	16.9	17	Italy	3.2	17	South_Africa	11.7
18	South_Korea	16.7	18	Germany	3.2	18	Norway	8.1
19	Indonesia	16.7	19	India	3.1	19	Russian_Federation	7.0
20	Australia	16.6	20	China	2.8	20	Japan	1.5
21	Ireland	12.8	21	Japan	2.4	21	Portugal	0.7
22	United_States	10.7	22	Hungary	2.3	22	Austria	-
23	France	9.3	23	South_Africa	2.3	23	Belgium	-
24	Austria	7.7	24	Turkey	2.2	24	Cyprus	-
25	Brazil	6.1	25	Brazil	2.1	25	Czech_Republic	-
26	Sweden	5.7	26	Sweden	2.0	26	Denmark	-
27	Canada	5.4	27	Norway	1.5	27	Estonia	-
28	Latvia	5.0	28	Netherlands	0.8	28	Finland	-
29	Denmark	4.9	29	Denmark	0.7	29	France	-
30	United_Kingdom	4.8	30	Cyprus	0.3	30	Germany	-
31	Mexico	4.7	31	Taiwan	0.3	31	Hungary	-
32	Norway	4.5	32	Portugal	0.3	32	Ireland	-
33	Netherlands	4.1	33	Indonesia	0.2	33	Italy	-
34	Italy	3.9	34	United_Kingdom	0.2	34	Latvia	-
35	Lithuania	3.6	35	Austria	0.1	35	Lithuania	-
36	Japan	2.7	36	Estonia	-	36	Luxembourg	-
37	Taiwan	0.6	37	Ireland	-	37	Malta	-
38	Belgium	-	38	Latvia	-	38	Netherlands	-
39	Cyprus	-	39	Luxembourg	-	39	Poland	-
40	Luxembourg	-	40	Malta	-	40	Slovenia	-
41	Malta	-	41	Poland	-	41	Switzerland	-
42	Portugal	-	42	Slovenia	-	42	Taiwan	-
43	Switzerland	-	43	Switzerland	-	43	United_Kingdom	-

Note: - means no domestic extraction.

Table 1 continued: Domestic extraction used – kilogram per € output by country, ordered

	aluminum ores			*copper ores*			*precious metals*	
1	India	237.9	1	Brazil	608.6	1	Bulgaria	95.3
2	France	80.6	2	United_States	358.6	2	France	64.2
3	Hungary	45.8	3	Bulgaria	325.2	3	South_Korea	51.1
4	Australia	32.3	4	Indonesia	172.6	4	Australia	44.0
5	Greece	19.5	5	China	118.6	5	Brazil	37.0
6	Brazil	15.8	6	Russian_Federation	110.0	6	Hungary	30.2
7	United_States	11.3	7	Mexico	91.9	7	Spain	30.1
8	Turkey	9.2	8	Australia	88.9	8	Indonesia	30.1
9	Indonesia	8.8	9	Spain	86.1	9	United_States	26.8
10	China	0.7	10	Romania	71.7	10	Sweden	22.7
11	Russian_Federation	0.3	11	Sweden	69.4	11	Russian_Federation	21.3
12	Italy	0.1	12	Turkey	53.9	12	China	18.5
13	Austria	-	13	France	47.1	13	Japan	18.2
14	Belgium	-	14	Poland	46.3	14	South_Africa	14.4
15	Bulgaria	-	15	Japan	41.1	15	Ireland	13.4
16	Canada	-	16	South_Africa	39.8	16	Canada	12.4
17	Cyprus	-	17	India	30.2	17	Turkey	11.7
18	Czech_Republic	-	18	Canada	28.7	18	India	6.1
19	Denmark	-	19	Portugal	3.6	19	Romania	5.3
20	Estonia	-	20	Finland	1.0	20	Mexico	4.1
21	Finland	-	21	Cyprus	0.3	21	Italy	2.6
22	Germany	-	22	United_Kingdom	-	22	Slovak_Republic	1.8
23	Ireland	-	23	Taiwan	-	23	Finland	0.7
24	Japan	-	24	Switzerland	-	24	Norway	0.5
25	Latvia	-	25	South_Korea	-	25	Greece	0.5
26	Lithuania	-	26	Slovenia	-	26	Portugal	0.4
27	Luxembourg	-	27	Slovak_Republic	-	27	Poland	0.2
28	Malta	-	28	Norway	-	28	Austria	-
29	Mexico	-	29	Netherlands	-	29	Belgium	-
30	Netherlands	-	30	Malta	-	30	Cyprus	-
31	Norway	-	31	Luxembourg	-	31	Czech_Republic	-
32	Poland	-	32	Lithuania	-	32	Denmark	-
33	Portugal	-	33	Latvia	-	33	Estonia	-
34	Romania	-	34	Italy	-	34	Germany	-
35	Slovak_Republic	-	35	Ireland	-	35	Latvia	-
36	Slovenia	-	36	Hungary	-	36	Lithuania	-
37	South_Africa	-	37	Greece	-	37	Luxembourg	-
38	South_Korea	-	38	Germany	-	38	Malta	-
39	Spain	-	39	Estonia	-	39	Netherlands	-
40	Sweden	-	40	Denmark	-	40	Slovenia	-
41	Switzerland	-	41	Czech_Republic	-	41	Switzerland	-
42	Taiwan	-	42	Belgium	-	42	Taiwan	-
43	United_Kingdom	-	43	Austria	-	43	United_Kingdom	-

Table 2: Environmental multipliers by country –kilogram per € demand

	fossil fuel carriers			*chemical/fertilizer minerals*			*iron ores*		
	i10	i23.1	i40.11.a	i14.3	i26.e	i26.d	i13.1	i27.a	i27.5
Australia	35.61	18.35	8.71	3.30	0.09	0.03	60.77	3.91	-
Austria	23.24	27.53	10.66	0.23	0.18	0.04	-	0.22	0.08
Belgium	-	1.62	2.76	4.48	0.10	0.03	-	0.29	0.10
Brazil	52.04	5.76	14.74	2.37	0.43	0.04	81.26	6.13	0.36
Bulgaria	136.08	1.23	66.84	8.98	0.57	0.34	28.63	1.37	0
Canada	64.08	1.15	17.12	8.39	0.25	0.04	31.18	1.78	0.08
China	27.75	14.54	10.95	2.98	0.50	0.30	157.49	8.34	1.17
Cyprus	0.22	-	-	0.34	0.05	0.05	-	-	-
Czech Republic	50.81	29.51	18.43	4.11	0.11	0.03	0.04	1.22	0.10
Denmark	-	0.67	5.69	0.80	0.08	0.02	-	0.14	-
Estonia	-	0.16	0.50	0.19	0.84	0.23	-	0.39	-
Finland	25.81	2.87	23.52	17.34	0.41	0.23	-	2.71	0.14
France	19.38	20.42	6.06	4.74	0.03	0.01	-	0.70	0.06
Germany	42.09	16.87	10.73	3.33	0.05	0.02	-	1.13	0.06
Greece	157.34	0.91	50.60	14.49	0.73	2.11	59.40	1.29	-
Hungary	272.73	38.75	18.43	2.34	0.41	0.10	-	2.28	-
India	49.26	17.41	17.26	3.12	0.19	0.10	157.67	4.06	1.79
Indonesia	24.44	-	20.23	0.20	0.20	0.01	182.03	0.28	-
Ireland	25.78	-	12.41	0.02	0.03	0.02	-	0.03	-
Italy	0.60	6.26	1.68	3.21	0.02	0.01	-	0.59	0.01
Japan	59.12	20.86	10.68	2.41	0.15	0.08	1.52	1.48	0.05
Latvia	5.83	1.58	3.19	0.01	0.79	-	-	0.40	0.12
Lithuania	3.31	0.91	-	16.35	9.45	1.27	-	0.16	0.01
Luxembourg	-	-	-	0.08	0.09	0.06	-	0.36	0.11
Malta	-	-	-	0.06	0.07	-	-	0.64	0.00
Mexico	47.09	0.47	14.54	9.11	0.24	0.20	41.69	1.45	0.07
Netherlands	-	0.58	1.08	1.08	0.17	0.08	-	0.72	-
Norway	8.91	8.08	0.09	1.83	1.20	0.33	8.11	0.90	0.13
Poland	36.06	23.47	13.67	-	0.00	0.00	-	1.39	0.15
Portugal	-	1.12	2.61	0.28	0.07	0.04	0.78	0.43	0.11
Romania	70.40	32.31	34.46	78.96	2.62	1.75	19.77	2.88	-
Russian Federation	111.42	5.63	21.73	40.68	0.05	0.03	8.08	1.97	0.11
Slovak Republic	47.79	2.51	16.37	6.48	0.26	0.07	121.06	1.70	0.18
Slovenia	32.27	0.09	22.31	0.45	0.16	0.04	-	0.33	-
South Africa	71.70	34.44	19.52	2.29	0.19	0.02	11.67	0.05	0.02
South Korea	16.96	23.25	10.33	4.53	0.16	0.07	43.07	2.50	0.44
Spain	19.98	3.47	14.93	3.41	0.01	0.00	20.07	1.59	0.06
Sweden	6.65	1.59	7.91	2.08	0.04	0.01	96.89	0.43	0.06
Switzerland	0.09	0.05	-	0.01	0.03	0.01	-	0.12	-
Taiwan	0.59	23.88	17.92	0.50	0.31	0.17	2.83	1.19	0.14
Turkey	42.33	0.70	18.72	2.32	0.40	0.22	25.59	1.86	-
United Kingdom	13.83	2.38	6.94	0.55	0.24	0.06	-	0.89	0.13
United States	44.81	5.16	18.25	15.99	0.18	0.08	34.96	1.36	0.07
World	38.23	16.55	13.53	4.89	0.29	0.11	38.14	1.58	0.38

Note: - means no value.

Table 2 continued: Environmental multipliers by country –kilogram per € demand

	aluminum ores			*copper ores*			*precious metal ores*		
	i13.20.13	i27.42	i27.5	i13.20.11	i27.44	i27.41	i13.20.14	i27.41	i13.20.12
Australia	32.34	16.36	-	88.87	46.25	0.16	45.26	25.59	0.05
Austria	-	-	0.05	-	1.14	-	-	-	-
Belgium	-	-	0.04	-	1.96	-	-	-	-
Brazil	17.57	0.09	0.01	609.45	0.82	0.03	59.58	0.82	0.00
Bulgaria	-	-	-	325.67	91.24	1.59	127.78	34.45	-
Canada	0.00	1.36	0.03	28.80	20.85	1.37	12.46	0.01	0.02
China	0.86	0.45	0.22	118.61	3.76	0.08	18.50	0.01	0.00
Cyprus	-	-	-	0.35	0.94	-	-	-	-
Czech Republic	0.00	-	0.02	3.18	-	-	0.00	-	0.00
Denmark	-	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-	-
Finland	-	-	0.03	1.15	13.73	0.57	0.67	0.01	0.01
France	81.05	0.21	0.02	47.18	0.04	0.04	78.57	1.45	0.19
Germany	-	0.40	0.04	-	3.68	-	-	-	-
Greece	19.55	2.66	-	-	-	0.01	0.48	0.00	0.00
Hungary	45.85	3.24	-	-	0.57	-	30.20	-	-
India	237.92	3.31	0.02	30.26	8.15	0.19	6.06	0.43	-
Indonesia	10.10	3.80	-	187.65	0.94	0.22	31.67	0.19	0.00
Ireland	-	-	-	-	-	0.00	13.41	0.01	-
Italy	0.14	0.13	0.00	-	0.02	0.01	2.65	0.00	-
Japan	-	0.59	2.61	41.13	3.89	1.18	18.29	4.67	-
Latvia	-	-	0.05	-	-	-	-	-	-
Lithuania	-	0.11	0.00	-	0.31	0.03	-	0.03	-
Luxembourg	-	0.07	0.01	-	0.20	0.05	-	0.01	-
Malta	-	0.24	0.00	-	0.01	0.09	-	0.00	-
Mexico	-	0.17	0.00	92.28	31.11	0.33	5.22	1.71	-
Netherlands	-	0.13	-	-	-	-	-	-	-
Norway	-	0.65	0.02	-	4.31	-	0.49	-	0.00
Poland	-	0.35	0.02	46.59	2.86	10.84	0.17	0.01	-
Portugal	-	-	0.07	3.65	-	0.06	0.41	0.02	-
Romania	-	2.74	-	80.89	50.81	0.33	7.23	1.57	-
Russian Federation	0.77	0.33	0.01	110.11	4.55	0.15	27.03	2.42	0.04
Slovak Republic	-	0.18	0.02	-	-	0.23	1.85	0.08	-
Slovenia	-	0.13	-	0.00	-	-	-	-	0.01
South Africa	-	5.88	0.34	39.77	0.85	0.14	14.37	0.15	0.00
South Korea	-	-	0.00	0.01	5.95	-	51.05	-	-
Spain	-	0.12	0.00	86.14	2.86	0.03	30.14	6.10	-
Sweden	-	0.15	0.02	69.46	11.04	0.55	23.23	1.32	-
Switzerland	-	0.09	-	-	-	-	-	-	-
Taiwan	0.01	-	0.24	0.01	2.88	0.09	0.00	0.26	0.00
Turkey	9.26	1.37	-	53.94	15.62	0.28	11.80	1.09	-
United Kingdom	-	0.15	0.01	-	1.36	-	-	-	-
United States	11.37	0.13	0.03	359.44	13.19	2.16	29.13	1.37	1.64
World	6.23	0.93	0.41	102.95	9.74	0.75	18.96	2.61	0.62

Note: 0 means no value.

Table 3: International environmental multiplier as % of total environmental multiplier – Herfindahl index of international multipliers – fossil energy carriers

fossil energy carriers	% international multiplier					Herfindahl index of intern. multipliers				
			i40.11					i40.11		
	i10	i23.1	.a	i11.b	i11.a	i10	i23.1	.a	i11.b	i11.a
Australia	0	0	0	0	0	0.17	0.15	0.15	0.16	0.16
Austria	0	**98**	**100**	4	1	0.25	0.44	0.44	0.25	0.23
Belgium	-	**100**	**100**	-	-	-	0.15	**0.62**	-	-
Brazil	0	40	26	0	1	0.21	0.23	0.24	0.26	0.29
Bulgaria	3	**59**	6	35	7	**0.86**	**0.90**	**0.64**	**0.90**	**0.90**
Canada	0	38	**58**	1	1	0.25	0.34	**0.86**	0.27	0.27
China	0	0	0	1	1	0.15	0.18	0.22	0.19	0.19
Cyprus	**100**	-	-	-	**100**	**0.63**	-	-	-	**0.57**
Czech_Republic	2	4	5	24	0	**0.77**	0.47	0.49	**0.83**	**0.80**
Denmark	-	**69**	**99**	0	0	-	0.38	0.41	0.11	0.13
Estonia	-	**100**	**100**	**100**	-	-	**0.90**	**0.82**	**0.94**	-
Finland	1	**100**	**66**	-	-	0.45	**0.51**	0.46	-	-
France	18	**90**	**74**	1	0	0.18	0.22	0.21	0.23	0.14
Germany	0	37	4	1	0	0.18	0.22	0.19	0.22	0.20
Greece	0	47	0	6	1	**0.88**	**0.52**	**0.77**	**0.91**	**0.61**
Hungary	1	**93**	4	3	0	0.36	0.36	**0.58**	**0.73**	**0.65**
India	0	1	1	0	0	0.15	0.24	0.33	0.18	0.19
Indonesia	1	-	10	0	0	**0.75**	-	**0.81**	0.24	**0.80**
Ireland	10	-	13	5	**93**	0.25	-	0.24	**0.70**	**0.66**
Italy	45	**100**	**100**	0	0	**0.62**	0.19	0.18	0.32	0.24
Japan	0	**100**	**100**	4	10	0.21	0.35	0.35	0.20	0.20
Latvia	13	**100**	**96**	-	-	**0.83**	**0.68**	**0.97**	-	-
Lithuania	8	**100**	-	**100**	15	**0.62**	**0.85**	-	**0.94**	**0.90**
Luxembourg	-	-	-	-	-	-	-	-	-	-
Malta	-	-	-	**100**	**100**	-	-	-	0.17	0.18
Mexico	0	**96**	38	0	0	0.30	0.33	0.38	0.26	0.35
Netherlands	-	**95**	**99**	2	0	-	0.26	0.30	**0.81**	0.42
Norway	1	**78**	**88**	0	0	0.19	0.26	0.34	0.17	0.17
Poland	0	1	3	-	-	0.46	0.40	0.46	-	-
Portugal	-	**100**	**100**	-	-	-	0.26	**0.58**	-	-
Romania	3	9	15	5	9	**0.86**	**0.72**	**0.73**	**0.92**	**0.92**
Russian_Federation	0	0	0	0	0	0.09	0.11	0.14	0.13	0.12
Slovak_Republic	2	**100**	**95**	**91**	16	**0.70**	**0.67**	0.40	**0.98**	**0.98**
Slovenia	0	29	1	-	-	0.29	0.35	0.17	-	-
South_Africa	0	1	0	0	2	0.11	0.31	0.19	0.11	0.12
South_Korea	1	**98**	**93**	-	-	0.19	0.25	0.24	-	-
Spain	1	18	**57**	2	0	0.20	0.30	0.39	0.13	0.15
Sweden	3	**100**	**64**	-	-	0.17	0.22	0.29	-	-
Switzerland	**100**	**100**	-	**100**	**100**	0.17	0.17	-	0.20	0.19
Taiwan	**76**	**100**	**100**	2	17	0.21	0.24	0.24	0.19	0.22
Turkey	1	32	37	0	2	0.42	**0.53**	0.43	0.27	0.30
United_Kingdom	1	42	30	1	1	0.13	**0.62**	0.23	0.37	0.22
United_States	0	6	1	1	1	0.28	0.29	**0.57**	**0.67**	**0.64**

Note: - means no value, 0 indicates a value smaller than 0.5

Table 4: International environmental multiplier as % of total environmental multiplier – Herfindahl index of international multipliers – chemical/fertilizer minerals

chem/fert minerals	% international multiplier					Herfindahl index of intern. multipliers				
	i14.3	i26.e	i26.d	i27.5	i26.b	i14.3	i26.e	i26.d	i27.5	i26.b
Australia	0	15	37	-	**56**	0.20	0.21	0.26	-	0.15
Austria	43	**100**	**100**	**100**	**100**	0.18	0.18	0.18	0.11	0.14
Belgium	4	**98**	**96**	**96**	**97**	0.12	0.12	0.11	0.09	0.09
Brazil	4	46	38	45	39	0.48	0.48	0.45	0.46	0.41
Bulgaria	0	15	10	-	17	0.24	0.23	0.25	-	0.19
Canada	0	22	16	**75**	**51**	0.19	0.20	0.23	0.32	0.38
China	0	7	5	15	13	0.20	0.22	0.21	0.20	0.16
Cyprus	1	**100**	**100**	-	**96**	0.25	0.42	0.29	-	0.19
Czech_Republic	5	**99**	**96**	**98**	**95**	0.22	0.22	0.21	0.16	0.17
Denmark	8	**100**	**99**	-	**97**	0.20	0.20	0.19	-	0.16
Estonia	**100**	**100**	**100**	-	**100**	**0.84**	**0.85**	**0.83**	-	**0.79**
Finland	1	9	5	**88**	31	0.16	0.16	0.19	0.18	0.22
France	0	**82**	**71**	**90**	**64**	0.14	0.15	0.13	0.11	0.09
Germany	3	**62**	49	**94**	**78**	0.10	0.10	0.09	0.12	0.18
Greece	0	1	0	-	5	0.24	0.25	0.24	-	0.12
Hungary	2	**100**	**100**	-	**91**	0.45	0.48	0.47	-	0.39
India	0	**60**	46	49	**59**	0.14	0.13	0.13	0.16	0.13
Indonesia	0	**84**	**86**	-	**86**	0.15	0.18	0.17	-	0.15
Ireland	**100**	**100**	**100**	-	**100**	0.13	0.11	0.14	-	0.11
Italy	1	**99**	**96**	**89**	**90**	0.12	0.12	0.12	0.09	0.09
Japan	0	35	17	**94**	**65**	0.15	0.19	0.18	0.14	**0.60**
Latvia	**100**	**100**	-	**100**	**100**	**0.78**	**0.62**	-	**0.82**	**0.66**
Lithuania	13	**100**	**100**	**98**	**100**	**0.98**	**0.98**	**0.98**	**0.98**	**0.98**
Luxembourg	**100**	**100**	**100**	**100**	**100**	**0.54**	**0.53**	**0.53**	0.15	0.35
Malta	**100**	**100**	-	**100**	**100**	0.38	0.38	-	0.12	0.19
Mexico	3	42	14	**90**	49	0.34	0.34	0.34	0.36	0.47
Netherlands	12	**84**	**78**	-	**91**	0.16	0.16	0.16	-	0.15
Norway	17	**100**	**100**	**100**	**99**	0.48	0.48	0.47	0.40	0.41
Poland	-	**100**	**100**	**100**	**100**	-	0.28	0.21	0.18	0.23
Portugal	11	**87**	**77**	**99**	**93**	0.29	0.29	0.24	0.29	0.12
Romania	0	13	6	-	11	0.39	0.39	0.39	-	0.34
Russian_Federation	0	17	16	11	9	0.21	0.18	0.18	0.10	0.12
Slovak_Republic	2	**100**	**99**	**99**	**96**	0.37	0.37	0.35	0.21	0.17
Slovenia	**100**	**100**	**100**	-	**100**	0.42	0.41	0.37	-	0.14
South_Africa	0	**96**	**95**	**90**	**95**	0.15	0.27	0.26	0.13	0.26
South_Korea	4	**68**	**64**	**80**	**69**	0.42	0.41	0.40	0.22	0.31
Spain	0	**80**	**77**	**74**	**78**	0.14	0.13	0.11	0.09	0.10
Sweden	4	**83**	**68**	**97**	**94**	0.17	0.16	0.15	0.27	0.16
Switzerland	**100**	**100**	**100**	-	**100**	0.15	0.15	0.14	-	0.11
Taiwan	38	**85**	**83**	**96**	**91**	0.26	0.26	0.26	0.15	0.21
Turkey	1	38	18	-	32	0.21	0.22	0.21	-	0.18
United_Kingdom	**65**	**100**	**100**	**99**	**98**	0.38	0.38	0.37	0.28	0.33
United_States	0	6	8	35	33	0.12	0.13	0.12	0.15	**0.72**

Note: - means no value, 0 indicates a value smaller than 0.5

Table 5: International environmental multiplier as % of total environmental multiplier – Herfindahl index of international multipliers – iron ores

iron ores	% international multiplier					Herfindahl index of intern. multipliers				
	i13.1	i27.a	i27.5	i13.20 .13	i28	i13.1	i27.a	i27.5	i13.20 .13	i28
Australia	0	8	-	16	11	0.45	0.38	-	0.18	0.23
Austria	-	**100**	**100**	-	**100**	-	0.20	0.20	-	0.20
Belgium	-	**100**	**100**	-	**100**	-	0.20	0.21	-	0.21
Brazil	0	0	1	3	1	0.15	0.14	0.15	0.16	0.14
Bulgaria	0	16	-	-	26	0.46	0.47	-	-	0.30
Canada	0	41	**74**	**52**	**61**	0.46	**0.67**	0.23	0.41	0.30
China	0	4	18	10	13	0.29	0.30	0.30	0.29	0.30
Cyprus	-	-	-	-	**100**	-	-	-	-	0.15
Czech_Republic	**100**	**100**	**100**	**100**	**100**	**0.71**	**0.90**	0.41	**0.71**	**0.60**
Denmark	-	**100**	-	-	**100**	-	0.17	-	-	0.17
Estonia	-	**100**	-	-	**100**	-	**0.50**	-	-	0.49
Finland	-	**100**	**100**	-	**100**	-	0.48	0.31	-	0.40
France	-	**100**	**100**	**100**	**100**	-	0.31	0.25	0.33	0.27
Germany	-	**100**	**100**	-	**100**	-	0.25	0.19	-	0.22
Greece	0	24	-	**66**	**60**	0.19	0.22	-	0.18	0.22
Hungary	-	**100**	-	**100**	**100**	-	**0.82**	-	**0.66**	**0.57**
India	0	1	3	6	4	0.29	0.22	0.31	0.26	0.29
Indonesia	0	**98**	-	**100**	**98**	0.38	0.26	-	0.22	0.22
Ireland	-	**100**	-	-	**100**	-	0.17	-	-	0.17
Italy	-	**100**	**100**	**100**	**100**	-	0.37	0.23	0.23	0.31
Japan	3	**100**	**100**	-	**100**	0.36	0.38	0.27	-	0.36
Latvia	-	**100**	**100**	-	**100**	-	**0.52**	**0.56**	-	**0.53**
Lithuania	-	**100**	**100**	-	**100**	-	**0.50**	**0.78**	-	0.45
Luxembourg	-	**100**	**100**	-	**100**	-	0.24	0.23	-	0.23
Malta	-	**100**	**100**	-	**100**	-	0.17	0.16	-	0.17
Mexico	0	36	**72**	-	**68**	**0.56**	**0.58**	0.27	-	0.28
Netherlands	-	**100**	-	-	**100**	-	0.27	-	-	0.21
Norway	0	**61**	**99**	-	**98**	0.17	0.39	0.18	-	0.18
Poland	-	**100**	**100**	-	**100**	-	**0.63**	0.46	-	0.46
Portugal	4	**99**	**100**	-	**100**	0.37	0.38	0.37	-	0.38
Romania	26	**95**	-	-	**96**	0.41	0.40	-	-	0.34
Russian_Federation	0	1	8	4	9	0.28	0.19	0.18	0.17	0.18
Slovak_Republic	0	**88**	**91**	-	**91**	**0.70**	**0.96**	**0.71**	-	**0.74**
Slovenia	-	**100**	-	-	**100**	-	0.22	-	-	0.22
South_Africa	0	**91**	**88**	-	**92**	0.19	0.21	0.23	-	0.24
South_Korea	0	**100**	**100**	-	**100**	0.34	0.37	0.32	-	0.32
Spain	1	**96**	**98**	-	**97**	**0.64**	**0.83**	0.50	-	**0.66**
Sweden	0	37	**77**	-	**70**	0.17	0.20	0.22	-	0.21
Switzerland	-	**100**	-	-	**100**	-	0.23	-	-	0.23
Taiwan	**100**	**100**	**100**	**100**	**100**	0.47	0.31	0.24	0.36	0.28
Turkey	0	**77**	-	**81**	**81**	0.22	0.22	-	0.21	0.22
United_Kingdom	-	**100**	**100**	-	**100**	-	0.28	0.27	-	0.20
United_States	0	28	**66**	18	45	0.35	0.35	0.22	0.32	0.24

Note: - means no value, 0 indicates a value smaller than 0.5

Table 6: International environmental multiplier as % of total environmental multiplier – Herfindahl index of international multipliers – aluminum/bauxite ores

aluminum/bauxite	% international multiplier					Herfindahl index of intern. multipliers				
	i13.20				i13.20	i13.20				i13.20
	.13	i27.42	i27.5	i23.3	.12	.13	i27.42	i27.5	i23.3	.12
Australia	0	0	-	-	3	0.30	0.20	-	-	0.19
Austria	-	-	**100**	-	-	-	-	0.24	-	-
Belgium	-	-	**100**	**100**	-	-	-	0.27	0.39	-
Brazil	0	18	31	**72**	12	**0.50**	**0.56**	**0.57**	**0.54**	**0.51**
Bulgaria	-	-	-	-	-	-	-	-	-	-
Canada	**100**	**100**	**100**	**100**	**100**	0.35	**0.53**	0.48	0.28	0.35
China	9	50	**70**	**72**	**72**	**0.90**	**0.91**	**0.90**	**0.89**	**0.89**
Cyprus	-	-	-	-	-	-	-	-	-	-
Czech_Republic	**100**	-	**100**	-	**100**	0.23	-	0.22	-	0.22
Denmark	-	-	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-	-	-
Finland	-	-	**100**	-	**100**	-	-	0.36	-	0.29
France	1	**98**	**95**	**99**	**100**	0.41	0.32	0.31	0.32	0.31
Germany	-	**100**	**100**	**100**	-	-	0.33	0.27	0.29	-
Greece	0	38	-	-	39	**0.58**	**0.88**	-	-	**0.72**
Hungary	0	9	-	-	-	0.33	0.23	-	-	-
India	0	9	**59**	41	-	**0.86**	**0.94**	**0.75**	**0.87**	-
Indonesia	0	**62**	-	-	**84**	**0.82**	**0.97**	-	-	**0.95**
Ireland	-	-	-	-	-	-	-	-	-	-
Italy	0	**100**	**100**	-	-	0.26	0.27	0.26	-	-
Japan	-	**100**	**100**	**100**	-	-	0.40	**0.96**	0.43	-
Latvia	-	-	**100**	-	-	-	-	0.19	-	-
Lithuania	-	**100**	**100**	-	-	-	0.19	0.19	-	-
Luxembourg	-	**100**	**100**	-	-	-	0.29	0.28	-	-
Malta	-	**100**	**100**	-	-	-	0.35	0.28	-	-
Mexico	-	**100**	**100**	-	-	-	0.38	0.26	-	-
Netherlands	-	**100**	-	**100**	-	-	0.32	-	0.35	-
Norway	-	**100**	**100**	-	**100**	-	**0.80**	0.23	-	0.45
Poland	-	**100**	**100**	-	-	-	**0.60**	0.25	-	-
Portugal	-	-	**100**	-	-	-	-	**0.64**	-	-
Romania	-	**100**	-	**100**	-	-	0.43	-	0.40	-
Russian_Federation	38	**52**	**58**	48	**55**	0.39	0.37	0.30	0.36	0.34
Slovak_Republic	-	**100**	**100**	-	-	-	0.23	0.23	-	-
Slovenia	-	**100**	-	-	**100**	-	0.23	-	-	0.20
South_Africa	-	**100**	**100**	-	**100**	-	**0.98**	**0.97**	-	**0.88**
South_Korea	-	-	**100**	**100**	-	-	-	**0.63**	**0.74**	-
Spain	-	**100**	**100**	**100**	-	-	0.42	0.29	0.25	-
Sweden	-	**100**	**100**	**100**	-	-	0.50	0.50	0.33	-
Switzerland	-	**100**	-	-	-	-	0.27	-	-	-
Taiwan	**100**	-	**100**	-	**100**	0.41	-	**0.96**	-	**0.80**
Turkey	0	20	-	-	-	0.39	0.31	-	-	-
United_Kingdom	-	**100**	**100**	**100**	-	-	0.28	0.29	0.29	-
United_States	0	**96**	**98**	**90**	**88**	0.42	0.36	0.38	0.42	0.42

Note: - means no value, 0 indicates a value smaller than 0.5

Table 7: International environmental multiplier as % of total environmental multiplier – Herfindahl index of international multipliers – copper ores

copper ores	% international multiplier					Herfindahl index of intern. multipliers				
	i13.20.11	i27.44	i27.41	i27.45	i37.1	i13.20.11	i27.44	i27.41	i27.45	i37.1
Australia	0	1	6	6	-	0.25	0.22	0.23	0.27	-
Austria	-	**100**	-	**100**	**100**	-	0.21	-	0.19	0.24
Belgium	-	**100**	-	**100**	**100**	-	0.36	-	0.17	0.20
Brazil	0	5	41	43	-	0.21	0.18	0.21	0.21	-
Bulgaria	0	0	1	1	1	0.25	0.23	0.17	0.16	0.16
Canada	0	0	11	23	**60**	**0.74**	**0.74**	**0.53**	**0.96**	**0.66**
China	0	**99**	**63**	**81**	-	0.15	0.16	0.14	0.17	-
Cyprus	5	**99**	-	-	**82**	0.18	0.20	-	-	0.19
Czech_Republic	**100**	-	-	-	**100**	**0.98**	-	-	-	0.20
Denmark	-	-	-	-	**100**	-	-	-	-	0.32
Estonia	-	-	-	-	**100**	-	-	-	-	0.17
Finland	13	**100**	**100**	**100**	**100**	0.27	0.29	0.26	0.26	0.23
France	0	20	**100**	**100**	**100**	0.34	0.16	0.18	0.19	0.18
Germany	-	**100**	-	**100**	**100**	-	0.30	-	0.18	0.19
Greece	-	-	**100**	**100**	**100**	-	-	0.27	0.33	0.31
Hungary	-	**100**	-	-	**100**	0.00	0.18	-	-	0.39
India	0	**69**	**89**	**81**	-	0.15	0.24	0.18	0.15	-
Indonesia	0	**63**	**66**	**75**	-	0.29	**0.56**	0.47	**0.52**	-
Ireland	-	-	**100**	-	**100**	-	-	0.25	-	0.14
Italy	-	**100**	**100**	**100**	**100**	-	0.15	0.14	0.13	0.15
Japan	0	**100**	**100**	**100**	**100**	0.22	0.25	**0.82**	0.21	0.32
Latvia	-	-	-	-	**100**	-	-	-	-	0.20
Lithuania	-	**100**	**100**	**100**	**100**	-	0.21	0.25	0.22	0.30
Luxembourg	-	**100**	**100**	**100**	**100**	0.00	0.29	0.24	0.25	0.26
Malta	-	**100**	**100**	**100**	**100**	0.00	0.14	0.27	0.17	0.12
Mexico	0	47	**61**	**62**	-	**0.99**	**0.99**	**0.90**	**0.89**	-
Netherlands	-	-	-	**100**	**100**	-	-	-	0.18	0.18
Norway	-	**100**	-	**100**	**100**	-	0.41	-	0.38	0.45
Poland	0	3	0	4	1	0.15	0.22	0.18	0.16	0.20
Portugal	0	-	**100**	**100**	**100**	0.16	-	0.20	0.22	0.23
Romania	8	21	29	**54**	-	**0.81**	**0.81**	**0.64**	0.37	-
Russian_Federation	0	1	4	9	-	0.17	0.18	0.22	0.18	-
Slovak_Republic	-	-	**100**	-	**100**	-	-	**0.62**	-	0.23
Slovenia	**100**	-	-	-	**100**	0.17	-	-	-	0.20
South_Africa	0	**94**	**86**	**93**	-	0.22	0.49	**0.50**	0.50	-
South_Korea	**100**	**100**	-	**100**	-	0.28	**0.63**	-	0.27	-
Spain	0	**72**	**89**	-	**78**	0.19	**0.74**	0.18	-	0.41
Sweden	0	5	45	-	31	0.21	0.30	**0.67**	-	0.21
Switzerland	-	-	-	-	**100**	-	-	-	-	0.17
Taiwan	**100**	**100**	**100**	**100**	-	0.30	**0.53**	0.40	0.28	-
Turkey	0	**72**	**96**	**97**	**72**	0.45	**0.55**	**0.61**	**0.57**	**0.54**
United_Kingdom	-	**100**	-	**100**	**100**	0.00	**0.65**	0.00	0.19	0.17
United_States	0	12	7	10	-	0.21	0.37	0.36	0.35	-

Note: - means no value, 0 indicates a value smaller than 0.5

Table 8: International environmental multiplier as % of total environmental multiplier – Herfindahl index of international multipliers – precious metals ores

precious metals	% international multiplier					Herfindahl index of intern. multipliers				
	i13.20.14	i27.41	i13.20.12	i27.43	i26.b	i13.20.14	i27.41	i13.20.12	i27.43	i26.b
Australia	0	0	1	3	0	0.24	0.33	0.23	**0.90**	0.19
Austria	-	-	-	**100**	**100**	-	-	-	0.27	0.45
Belgium	-	-	-	**100**	**100**	-	-	-	0.38	0.32
Brazil	0	1	8	32	0	0.23	0.48	0.22	**0.56**	0.23
Bulgaria	1	1	-	4	3	**0.98**	**0.97**	-	0.37	0.42
Canada	0	**97**	**98**	**99**	**87**	**0.65**	0.31	**0.65**	**0.93**	0.21
China	0	27	21	46	4	0.21	0.24	0.21	0.31	0.21
Cyprus	-	-	-	-	**100**	-	-	-	-	0.36
Czech_Republic	**100**	-	**100**	**100**	**100**	0.35	-	0.30	0.32	0.30
Denmark	-	-	-	**100**	**100**	-	-	-	0.21	0.21
Estonia	-	-	-	-	**100**	-	-	-	-	0.43
Finland	1	**100**	**100**	**100**	**100**	0.40	0.26	0.37	0.38	0.32
France	18	**99**	**100**	**100**	**100**	**0.91**	**0.90**	**0.90**	0.38	**0.89**
Germany	-	-	-	**100**	**100**	-	-	-	0.24	**0.58**
Greece	1	**77**	**100**	**100**	**89**	0.22	0.23	0.23	0.23	0.37
Hungary	0	-	-	-	36	0.32	-	-	-	0.36
India	0	14	-	**99**	**96**	0.26	**0.76**	-	**0.74**	0.24
Indonesia	0	**100**	**92**	**100**	22	**0.95**	**0.80**	**0.64**	**0.91**	**0.92**
Ireland	0	31	-	**96**	**52**	0.26	0.28	-	0.25	0.23
Italy	1	**98**	-	**100**	**100**	0.23	0.22	-	0.26	0.15
Japan	0	**98**	-	**100**	**79**	0.45	0.48	-	**0.71**	0.50
Latvia	-	-	-	-	**100**	-	-	-	-	0.46
Lithuania	-	**100**	-	**100**	**100**	-	0.48	-	0.48	0.42
Luxembourg	-	**100**	-	**100**	**100**	-	0.23	-	0.21	0.37
Malta	-	**100**	-	**100**	**100**	-	0.17	-	0.26	0.19
Mexico	12	41	-	**90**	21	**0.84**	**0.76**	-	**0.77**	**0.82**
Netherlands	-	-	-	**100**	**100**	-	-	-	0.16	0.32
Norway	0	-	**100**	**100**	**94**	0.28	-	0.33	0.26	0.34
Poland	6	**97**	-	**96**	**73**	0.39	0.27	-	0.26	0.36
Portugal	0	**100**	-	**100**	**100**	0.32	0.49	-	0.37	0.21
Romania	0	0	-	**91**	9	0.21	0.21	-	0.20	0.24
Russian_Federation	2	21	35	47	**57**	**1.00**	**1.00**	**0.92**	**0.87**	**0.99**
Slovak_Republic	0	16	-	**96**	15	0.42	0.33	-	0.32	0.44
Slovenia	-	-	**100**	**100**	**100**	-	-	0.23	0.17	0.38
South_Africa	0	**98**	**61**	**98**	**73**	**0.61**	**0.98**	0.41	**0.98**	**0.54**
South_Korea	0	-	-	**100**	**79**	0.17	-	-	0.42	**0.90**
Spain	0	14	-	**79**	17	0.18	**0.90**	-	0.50	0.18
Sweden	2	39	-	**52**	**93**	**0.93**	**0.92**	-	0.41	**0.64**
Switzerland	-	-	-	**100**	**100**	-	-	-	0.19	0.21
Taiwan	**100**	**100**	**100**	-	**100**	0.23	0.47	0.23	-	0.26
Turkey	0	1	-	**64**	2	0.25	0.26	-	0.28	0.28
United_Kingdom	-	-	-	**100**	**100**	-	-	-	0.49	0.26
United_States	1	18	1	3	**59**	0.39	0.37	0.38	0.38	0.39

Note: - means no value, 0 indicates a value smaller than 0.5