

RESOURCE TRADE AROUND THE GLOBE

FACT SHEET FOR THE REdUSE PROJECT

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TABLE OF CONTENTS

1. INTRODUCTION	3
2. MATERIAL FLOWS EMBODIED IN TRADE	4
DIRECT TRADE BETWEEN EUROPE AND LATIN AMERICA	4
DIRECT AND INDIRECT TRADE BETWEEN EUROPE AND LATIN AMERICA	5
DIRECT TRADE BETWEEN EUROPE AND ASIA	6
DIRECT AND INDIRECT TRADE BETWEEN EUROPE AND ASIA	6
DIRECT TRADE BETWEEN EUROPE AND AFRICA	7
DIRECT AND INDIRECT TRADE BETWEEN EUROPE AND AFRICA	8
THE GENERAL PICTURE	8
3. CASE STUDY: RARE EARTH MINERALS	9

FIGURES

Figure 1: Direct and indirect material trade flows between Latin America and Europe in 2007	5
Figure 2: Direct and indirect material trade flows between Asia and Europe in 2007 (adapted from Lutter and Giljum 2013) ⁹	6
Figure 3: Direct and indirect material trade flows between Africa and Europe in 2007	8
Figure 4: Rare Earth extraction in Bayan Obo, China (The Guardian 2012) ¹⁶	10

1. INTRODUCTION

Our life on Earth is based on natural resources, including materials, water, energy and fertile land. However, serious – if not in some instances – irreversible environmental damage is escalating in parallel with increases in humanity’s consumption of resources. Our climate is changing as a result of our consumptive choices: fresh water reserves, fish stocks and forests are shrinking, fertile land is being lost at unprecedented rates, and too many plant and animal species stand on the brink of extinction. Our lifestyles need to become more sustainable in order to conserve our natural resource base and fragile ecosystems, to be able to continue to thrive on this planet (SERI et al. 2009)¹².

REdUSE is a three-year action within the EuropeAid strategy “Public awareness and education for development in Europe” that aims to highlight the global impacts of Europe’s growing resource use, focussing on imported resources from the global south and the consequences of resource extraction. In the course of the project, two reports were produced which focused on the interrelations between Europe and other parts of the world through international trade. The first report, “Under Pressure,” (SERI et al. 2011)¹³ examined how material consumption and water use are interrelated. The second, “Hidden Impacts” (SERI et al. 2013)¹⁴ dealt with Europe’s enormous land use within and outside of its borders and its corresponding social and environmental consequences in other parts of the world. In both cases, different types of natural resources, material and water and material and land were examined.

This short report discusses the most recent results of analyses regarding the direct and indirect material flows between the European Union and other parts of the world. The report findings highlight that Europe’s dependency on natural resources from outside its borders is placing the continent in an economically vulnerable situation. The report also goes on to demonstrate that the high demand for materials and manufactured goods from outside Europe are also causing significant environmental and social impacts, areas which are typically ignored. The impacts of increased consumption and resource flows around the globe shall be illustrated by means of a case study on rare earth extraction in China.

2. MATERIAL FLOWS EMBODIED IN TRADE

International trade in raw materials and products has increased significantly in recent decades. Whilst trade can support economic development, as resource-rich countries can raise revenues through the export of resources, growing world trade also poses severe environmental and social challenges. By linking local resources in all parts of the world with global demand, world trade accelerates resource extraction. Additionally, the current trading system reinforces unequal levels of resource consumption by shifting resources from poorer, low-consuming countries to richer, high-consuming countries (SERI et al. 2009)¹².

Raw materials are not only traded directly from one country to another (e.g. a freight ship transporting coal, iron ore or timber), but also indirectly via the traded goods and services for which they are used. Indicators such as the “material footprint” or “material rucksack” quantify all materials used to produce the product, to transport it between different stages of processing and manufacturing and from factories to consumers. These indicators include the material and energy used by, for example a retailer selling a product (its construction, maintenance, heating and cooling, etc.), the energy and materials needed to use the product (electricity or fuel, for example) and finally, everything that is required for safe dismantling and / or disposal. Hence, if a product is traded between countries, these resource requirements are also “indirectly” traded; another way of expressing it is to speak of “embedded” resources.

For the analysis of direct and indirect resource trade between Europe and other regions, it is necessary to evaluate the trade relationships between the specific economic sectors (e.g. agriculture or industrial sectors) of each pair of regions and to combine this information with data on the resource use of each of the sectors. The result of such an analysis shows which resource flows are directly related to inter-regional trade (as resource trade) or indirectly (embedded in traded products, see above). Below we will examine these direct and indirect trade flows between Europe and other world regions.

DIRECT TRADE BETWEEN EUROPE AND LATIN AMERICA

Ordinary economic trade statistics only reflect direct trade flows and are measured in monetary terms. For example, in 2010, Latin America’s imports had a value of almost EUR 90 billion, 27% more than in 2009. Brazil was the EU’s largest trading partner in Latin America. Other important partners were Argentina and Chile, which delivered more than 10% of all EU-27 imports from Latin America. EU-27 imports from Latin America represent more than 6% of the total imports into the EU. Brazil had a 2% share of those European imports, followed by Mexico (0.9%), Argentina and Chile (both 0.6%) (EUROSTAT 2011)⁶.

The most popular imports from Latin America into the EU are food products. In 2010, more than a quarter of the total EU-27 imports from Latin America were “food and live animals” which include meat, eggs, dairy products, cereals, sugars, coffee, and, most importantly, feedstuff for animals – the largest import category. Brazil and Argentina supplied more than 50% of all EU-27 food and live animal imports from Latin America. Argentina is critically dependent on these exports to the EU-27, in contrast to Brazil, which has a wider spectrum of exports.

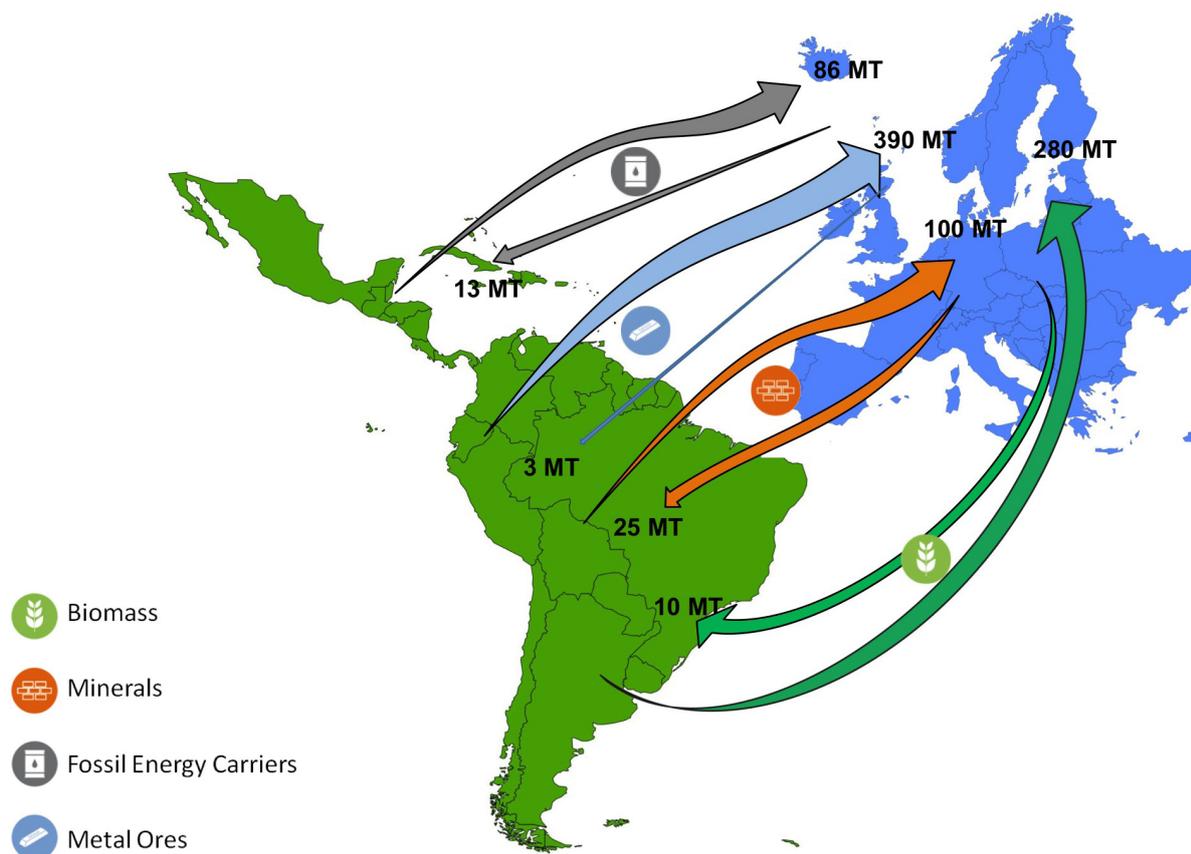
The second largest European import category was “crude materials” (e.g. wood, pulp, textile fibres, crude fertilizers and minerals, metalliferous ores), including iron ores. Brazil supplied more than half of these imports, while other major exporting countries were Chile and Peru.

Chile was the biggest exporter of manufactured goods to the EU (e.g. leather products, non-ferrous metals, and manufactures of metals) – largely copper and other metals that are converted into semi-manufactures before exporting. Brazil and Chile accounted for around three quarters of the total EU-imports of manufactured goods from Latin America (EUROSTAT 2011)⁶.

DIRECT AND INDIRECT TRADE BETWEEN EUROPE AND LATIN AMERICA

After the summary of the direct trade in raw materials and products, we now turn to the results of model calculations, which illustrate the total (direct and indirect, i.e. embedded) trade of materials. The following Figure 1 illustrates the combined direct and indirect trade flows between Europe and Latin America in 2007 in physical terms (million tonnes). They are disaggregated into four main resource groups: biomass (e.g. soybeans, wood), minerals (e.g. sand and gravel), metal ores (e.g. copper, aluminium), and fossil fuels.

Figure 1: Direct and indirect material trade flows between Latin America and Europe in 2007



The total trade flow of raw materials between Latin America and Europe in 2007 was 900 million tonnes. Europe is a net-importer of resources from Latin America, as 95% of the total flows correspond to imports coming from Latin America (850 million tonnes vs. 50 million tonnes respectively). These numbers include direct trade flows (trade in raw materials) as well as indirect flows (materials used to produce the product, to transport it between factories and from factory to the consumer, etc).

Metal ores make up the biggest trade flow from Latin America to Europe (390 million tonnes), as Latin America is very rich in metal ores such as copper, lithium and bauxite (see SERI et al. 2011, 2013)^{13,14}, compared to Europe. The second largest trade flow from Latin America to Europe is biomass (280 million tonnes) that is largely used for agro fuels or as concentrated feed (11% of which is comprised of fruits and vegetables; 11% corresponds to sugar cane; 10% to oil seeds). Europe also imports large amounts of minerals (100 million tonnes) and oil (86 million tonnes) – mainly as materials embodied in traded e.g. semi-processed goods. By contrast, exports from Europe to Latin America are significantly smaller than imports, ranging from 3 million tonnes (metal ores) to 25 million tonnes (minerals).

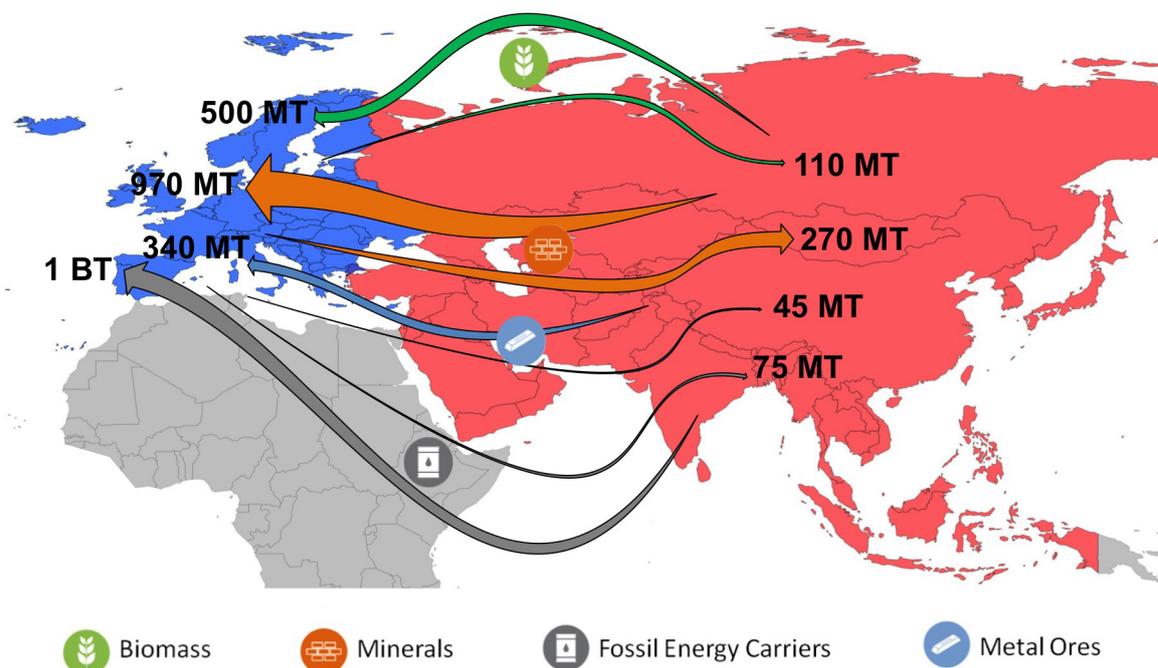
DIRECT TRADE BETWEEN EUROPE AND ASIA

The top Asian exporters of direct raw materials and products to the EU-27 countries are China (with 16% of the share), Russia (12%), Turkey (3%), South Korea and India (both 2%) (Eurostat 2012)⁷. The EU and China are two of the biggest traders in the world. EU-China trade has increased dramatically in recent years. Indeed, China is by far the EU's largest source of imports, and has also become one of the EU's fastest growing export markets. The EU has also become China's biggest source of imports. Overall, China and Europe now trade well over EUR 1 billion a day (Delegation of the European Union to China 2013)¹. EU imports from China are dominated by industrial and consumer goods: machinery and equipment, footwear and clothing, furniture, lamps and toys. EU exports to China are primarily machinery and equipment, motor vehicles, aircraft, and chemicals (ibid). While China is still playing an important role in Asian-European trade, other countries such as India (minerals) or Indonesia (metal ores) are catching up quickly. These trends are increasing and result in a growing dependency of Europe of imports from Asia.

DIRECT AND INDIRECT TRADE BETWEEN EUROPE AND ASIA

After the summary of the direct trade in raw materials and products, we turn again to the results of model calculations, which illustrate the total (direct and indirect, i.e. embedded) trade of materials. The following Figure 2 illustrates the combined direct and indirect trade flows between Europe and Asia in 2007 in physical terms (million tonnes). The four main resource groups are the same: biomass, minerals, metal ores, and fossil fuels.

Figure 2: Direct and indirect material trade flows between Asia and Europe in 2007 (adapted from Lutter and Giljum 2013)⁹



The total flow trade of raw materials between Asia and Europe adds up to 3.3 billion tonnes. Again, Europe is a net-importer of resources, as 85% of the total flows correspond to imports from Asia. In order to analyse these trade flows in more detail, the trade relationship between specific economic sectors of both continents is assessed and combined with data on the resource use of the sectors.

The biggest trade flow is the one of fossil energy carriers from Asia to Europe (1 billion tonnes). 44% of the exports flows are through oil, 37% coal, and 20% gas, followed by minerals from Asia (970 million tonnes). The large imports of fossil fuels have their origin mainly in the Middle East and Russia, with 500 million tonnes of biomass and 340 million tonnes of minerals originating from Asia. A large share of biomass is related to biomass grazed by animals that are needed in the production chain of products such as dairy, manufactured leather products or the like. In regards to minerals, the numbers are dominated by indirect flows of construction minerals. These are used for e.g. the construction of ports and industrial buildings for the Asian export sectors. Again, exports from Europe to Asia are significantly smaller than the imports, ranging from 45 million tonnes (metal ores) to 270 million tonnes (minerals).

DIRECT TRADE BETWEEN EUROPE AND AFRICA

After years of relative stagnation, trade between the EU and Africa increased rapidly in 2004, a trend that ended in 2009 due to the world economic crisis. The increase in the value of imports in the years prior to 2009 could largely be attributed to energy products, which follow world prices and were mainly imported from Algeria, Libya, Nigeria and Angola. Libyan and Algerian gas dominate EU imports.

In terms of EU-27 imports, the main African partners in 2009 were Libya (98% of goods from Libya were 'mineral fuels'), followed by Algeria (also 98% 'mineral fuels') and South Africa (with a more diverse product mix in which 'manufactured products' accounted for 29%). These three countries together represented 49% of all EU-27 imports (in monetary terms) from Africa in 2009 (EUROSTAT 2010)⁵.

When having a look at regions, the most important region for trade between the EU and Africa is West Africa. This region accounts for 40% of all trade between Europe and Africa. The European imports from West Africa are mainly dominated by basic commodities such as oil (Nigeria and Ghana), cocoa and bananas (Ghana and Ivory Coast), processed fisheries products (Cape Verde and Senegal). Other exports from West Africa include a variety of agricultural commodities such as mango, pineapple, groundnuts, and cotton. To a far lesser extent, diamonds and some metals are exported, e.g. copper and gold (DG Trade 2013a)².

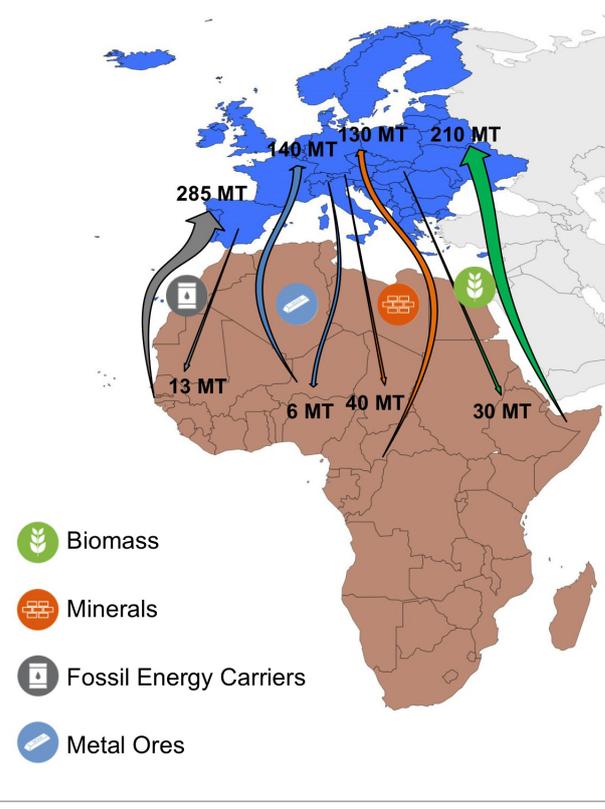
In Central Africa, oil is dominating the exports to the EU with a share of 70%. Other main exports are cocoa, wood copper, bananas, and diamonds. Eastern and Southern Africa (ESA) export mainly sugar, coffee, fish, tobacco, copper and crude oil to the EU. In comparison, the East African Community's (EAC) exports are dominated by coffee, cut flowers, tea, tobacco, fish and vegetables. The Southern African Development Community (SADC) countries are strong in the exports of diamonds, and in South Africa, Botswana, Lesotho and Namibia these constitute a large to dominant share of their exports to the EU. Other products from the region include agricultural products (beef from Botswana, fish from Namibia or sugar from Swaziland), oil from Angola or aluminium from Mozambique. South Africa's exports to the EU are much more diversified and range from fruit to platinum and from manufactured goods to wine (DG Trade 2013b)³.

DIRECT AND INDIRECT TRADE BETWEEN EUROPE AND AFRICA

Also in this case, we now have a look at the results of model calculations, which illustrate the total (direct and indirect, i.e. embedded) trade of materials. The following Figure 3 illustrates the combined direct and indirect trade flows between Europe and Africa in 2007 in physical terms (million tonnes). Also here, the four main resource groups are the same: biomass, minerals, metal ores, and fossil fuels.

The total trade flow of raw materials between Africa and Europe is 850 million tonnes. Again, Europe is a net-importer of resources, as 90% of the total flows correspond to imports from Africa. Fossil energy carriers make up the biggest trade flow from Africa to Europe (285 million tonnes, 37% of the total flows) tonnes, which split into 38% of the fossil exports as oil, 32% as gas, and 30% as coal. Biomass trade flows from Africa (210 million tonnes) are dominated by forestry activities (25%), followed by vegetables. 140 million tonnes of metal ores are traded directly and indirectly from Africa to Europe, as well as 130 of minerals. Again, European exports to Africa are of at least one order of magnitude lower than the imports, ranging from 6 million tonnes (metal ores) to 40 million tonnes (minerals).

Figure 3: Direct and indirect material trade flows between Africa and Europe in 2007



THE GENERAL PICTURE

The above outlined facts and figures regarding direct as well as direct and indirect trade flows between Europe and the three world regions Latin America, Asia and Africa paint a very clear picture: Europe is a big net-importer of materials. Out of the 5 billion tonnes of materials flowing between Europe and the three regions, 4.4 billion tonnes have Europe as their destination. A similar picture is painted in our analyses on water and land in the two reports published throughout the REdUSE project (e.g. SERI et al. 2011, 2013)^{13,14}.

From amongst the three world regions trading with Europe, Asia is by far the most important partner, with the total trade flows being more than three times larger than those of Africa and Latin America. While the total flows from these latter regions to Europe are similar, one can clearly distinguish the different resource endowments – resources that are abundant in the specific region: both regions export a lot of biomass; Latin America has a strong focus on metal ores, while Africa has large reserves of fossil fuels – especially in the north of the continent.

These facts underscore the critical situation Europe is facing. As resource scarcity increases, it is essential to focus on two strategies: reducing the overall consumption of resources and increasing the efficiency with which we use them. Europe is already consuming more than its fair share of natural resources, and therefore is in a position to pay more than lip service to global responsibility and justice. A reduction in European consumption may encourage an altered development paradigm in other world regions; a paradigm which is hopefully more oriented towards developing domestic markets and consumption, which will also reduce the pressure put on the world's ecosystems.

3. CASE STUDY: RARE EARTH MINERALS

China and the European Union are two of the largest traders in the world. After the United States, China is now the EU's second largest trading partner and, on the other hand, the EU is China's biggest trading partner. Additionally, China has become one of the EU's fastest growing export markets. Today, China and Europe have a daily trade volume of more than €1 billion. The biggest share in EU imports from China is covered by industrial and consumer goods: machinery and equipment, footwear and clothing, furniture and lamps, and toys. On the other hand, EU exports to China are dominated by machinery and equipment, motor vehicles, aircraft, and chemicals (DG Trade 2013c)⁴.

However, the profits of increasing trade come at a high cost: for instance, production of LCD screens or hybrid cars would be impossible without the input of minerals, fossil fuels, and other natural resources from around the world. One essential mineral group is rare earth minerals, which are mined primarily in China (NRC 2008)¹⁰.

The United States used to be the world's biggest producer of rare earths until the 1990's. Due to market pressure related to cheap Chinese products, the main rare earth mine – Mountain Pass in California – shut down – also due to environmental regulations due to the harmful extraction of by-products like thorium. Consequently, the Chinese rare earth industry has grown unchallenged to the point where it essentially owns the market – and is experiencing the negative impacts. The mining of rare earth minerals can produce as much as 2,000 tonnes of solid waste, including toxic heavy metals and radioactive thorium, for every tonne of rare earth mineral produced (Rong and Yu 2009; Farago 2009; The Guardian 2011)^{11,8,15}.

In China, the town of Baotou in Inner Mongolia is the largest source of rare earths. Mined at Bayan Obo – an area originally used for agricultural production, the minerals are then brought to Baotou for processing. Due to a very low concentration in the ore, a separation and purification process using hydro-metallurgical techniques and acid baths is necessary. These processes release toxic chemicals, but also radioactive elements such as thorium (see above) which can cause cancers of the pancreas and lungs, and leukaemia. According to local communities near the mine, the cases of diabetes, osteoporosis and chest problem have increased dramatically.

However, it is not only the minerals themselves causing pollution, the great number of new factories around the processing facilities and the fossil-fuel power station feeding Baotou's new industrial fabric add to the environmental pressures. Hence, people living in the area are inhaling solvent vapour, particularly sulphuric acid, as well as coal dust which is clearly visible in the air between houses.

Financial compensation from the local government was promised (and partly fulfilled) and new living areas were built, however they remain empty, due to the government's requirement that villagers buy the right to occupy their flat, but yet they are not able to pass it on to their children (The Guardian 2012)¹⁶.

The international media has primarily focused on the economic impacts related to China's control of the rare earth material market, however the focus should also be shifted to highlight the environmental and societal costs that these mines are having on communities living in the vicinity of the mines, and how our consumption of electronic devices can be construed as causative link to these problems.

Figure 4: Rare Earth extraction in Bayan Obo, China (The Guardian 2012)¹⁶



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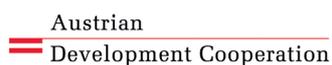


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REdUSE is a project involving GLOBAL 2000, the Sustainable Europe Research Institute (SERI), Friends of the Earth Europe and national Friends of the Earth member groups in England Wales and Northern Ireland, Czech Republic, France, Italy, Hungary, Brazil, Cameroon, Chile and Togo. It aims to raise awareness of the amount of natural resources that Europe consumes and the negative consequences of overconsumption on the environment and societies in the Global South.

For more information see: www.reduse.org



GLOBAL 2000 was founded in Vienna in 1982 and has been a member of the Friends of the Earth International network since 1998. With 60,000 members, GLOBAL 2000 is the largest and most well-known Austrian environmental protection organisation. Through its work, GLOBAL 2000 not only uncovers environmental scandals and advocates Austria's responsibility to contribute to solving global environmental problems, but also offers sustainable solutions.

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