LESS IS MORE

Resource efficiency through waste collection, recycling and reuse of aluminium, cotton and lithium in Europe

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EXECUTIVE SUMMARY

As part of its "Europe 2020" strategy, the European Union (EU) has prioritised a "Resource Efficient Europe" as one of its seven flagship initiatives intended to boost growth and jobs in a time of economic crisis and rapid natural resource depletion.

Yet these policies come into conflict with the desire to continue to meet high levels of consumer demand as the basis for economic growth. In addition, parallel developments such as the promotion of "bio-economies" are set to speed the consumption of natural resources, given the reliance on biomass crops and timber as sources of energy and other needs. Moreover, the EU's insufficient waste policies continue to allow valuable materials to be unnecessarily incinerated and sent to landfill, as this report shows.

Europe's reliance on materials from outside its borders is not sustainable. This report explores three different commodities – lithium, aluminium and cotton – to exemplify how our linear consumption patterns (extraction, manufacture, use and disposal) not only have major social, economic and environmental impacts, but also represent a missed opportunity for job creation and global resource security.

It does not have to be this way. For example, aluminium can be recycled continuously without losing its valuable qualities. Legally-binding targets for high collection rates for the whole of the EU could be met through appropriate investment in recycling infrastructure that enables almost zero waste and widespread recycling to reduce consumption levels.

Lithium is used in batteries for electronic devices like mobile phones and laptops, electric vehicles and energy storage devices and, unlike aluminium, it has extremely low collection rates across Europe. Legal standards and state support could enforce much higher collection rates and ensure the design and manufacture of electronic goods that are not built to require endless upgrades and replacement and do not contain multiple hazardous materials.

Cotton is a widely used textile that has major cradle-to-grave impacts, including the depletion of local water supplies. Moreover, many high-street brands have seen their images tainted by their reliance on cotton garments produced using sweatshop labour. Recycling, reuse and, most importantly, reduced consumption can radically reduce the amount of cotton ending up in European landfill sites or being incinerated.

As the largest net importer of natural resources per capita, Europe requires integrated solutions to reduce consumption. Sustainable resource efficiency measures are necessary to ensure that European countries avoid being trapped using technologies, processes and structures that increase dependency on raw materials, including metals extracted through destructive mining practices, crops requiring high pesticide inputs, and land and water grabbing.

The EU has recently expressed a political commitment to measure the land, materials, water and carbon used across the supply chain to meet our current consumption levels. However, little has been done at the political level to ensure this policy will be introduced and implemented across the EU. In order to challenge this inaction, the environmental movement – including marginalised communities, consumers, workers, designers and youth – has to intensify its actions from the grassroots upwards, to demand systemic change to slow the exhaustion of the planet's natural resources upon which we all depend.

MOVING BEYOND WASTE TOWARDS REAL RESOURCE EFFICIENCY?

This report explores three materials that are imported into the European market: lithium, aluminium and cotton. The extraction, production and disposal of all three of these commodities are associated with significant environmental and social harm, especially in the exporting countries. Cotton for textiles and garments, for example, has a grave impact on water resources during its cultivation, and often impinges on labour rights during its production. The mining and processing of ores and metals such as bauxite (for aluminium) and lithium are also associated with extreme environmental consequences in terms of water and energy use, and pollution. Mining is also frequently associated with human rights abuses.

In terms of opportunities for collection, recycling and reuse, aluminium provides a particularly strong example of how certain resources can be endlessly recycled and reused without losing their key characteristics, as long as the appropriate infrastructure is put in place. In stark contrast, very little lithium is currently collected in spite of its growing use in batteries for electronic devices, energy storage and electric vehicles, leaving much scope for improved collection and recycling. Given the devastating impacts that cotton has on water resources, the recycling and reuse of textiles and garments should be made a priority.

The EU's response so far to the need to increase resource use efficiency has been the establishment of a 50% target for the recycling of all key materials in household waste (plastic, metal, paper and glass) by weight by 2020.[1] This statutory target is an important development in achieving improved household waste recycling rates but it is a generic target and does not address specific commodities or even sector-based goals. Higher targets and new policy measures to encourage the reuse of materials and reduction of wasteful consumption are needed to drastically improve existing legislation. On average, 60% of EU municipal waste still ends up in landfill sites or is incinerated.

Figure 1: Municipal waste generation and treatment in EU 27 [2], 2010

	MUNICIPAL WASTE GENERATED, kg per person	TOTAL MUNICIPAL WASTE TREATED, kg per person	MUNICIPAL WASTE TREATED, %			
			Landfilled	Incinerated	Recycled	Composted
EU27	**502**	**486**	**38**	**22**	**25**	**15**
Belgium	466	434	1	37	40	22
Bulgaria	410	404	100	-	-	-
Czech Republic	317	303	68	16	14	2
Denmark	673	673	3	54	23	19
Germany	583	583	0	38	45	17
Estonia	311	261	77	-	14	9
Ireland	636	586	57	4	35	4
Greece*	457	457	82	-	17	1
Spain	535	535	58	9	15	18
France	532	532	31	34	18	17
Italy*	531	502	51	15	21	13
Cyprus	760	760	80	-	16	4
Latvia	304	304	91	-	9	1
Lithuania	381	348	94	0	4	2
Luxembourg	678	678	18	35	26	20
Hungary	413	413	69	10	18	4
Malta	591	562	86	-	7	6
Netherlands	595	499	0	39	33	28
Austria*	591	591	1	30	30	40
Poland	315	263	73	1	18	8
Portugal	514	514	62	19	12	7
Romania	365	294	99	-	1	0
Slovenia	422	471	58	1	39	2
Slovakia	333	322	81	10	4	5
Finland	470	470	45	22	20	13
Sweden	465	460	1	49	36	14
United Kingdom*	521	518	49	12	25	14
Iceland*	572	531	73	11	14	2
Norway	469	462	6	51	27	16
Switzerland	707	708	-	50	34	17
Croatia	369	363	96	-	3	1
Turkey	407	343	99	-	-	1

* Estimated by Eurostat | 0 equals less than 0.5% | "-" indicates a real zero

"ROADMAP TO A RESOURCE EFFICIENT EUROPE"

The European Commission's 2011 "Roadmap to a Resource Efficient Europe"[3] is one of seven flagship initiatives constituting the "Europe 2020" strategy. It identifies unsustainable consumption as the root cause of the scarcity of minerals, metals and energy, biodiversity loss and a changing climate.[4] It highlights the fact that 2.7 billion tonnes of waste are discarded every year, 98 million of tonnes of which is hazardous.[5]

The Roadmap's analysis clearly points towards the need for strong rules to enforce resource efficiency, especially given the fact that Europe is the highest net per capita importer of natural resources[6] and is dependent on secure and constant sources of minerals, metals, energy, feed, fuel and fibre to maintain current consumption patterns. As the European Commission states, 60% of the world's major ecosystems that produce these resources have already been degraded: by 2050, we could need the equivalent of two planets to maintain current levels of over-consumption.[7] However, in contradiction to these objectives, the Commission is also pursuing a trade liberalisation approach, seeking greater access to developing countries' resource markets.[8]

"Green economy" concept no substitute for robust and reliable solutions

The Roadmap lacks robust and reliable solutions focused on reducing consumption, including through sustainable energy, trade and investment policies that would reduce Europe's overall impact on the global environment. Instead, the opportunities in the Roadmap are seen "in the context of worldwide efforts to achieve a transition towards a green economy",[9] a concept which the EU forcefully promoted at the Rio+20 Summit in June 2012.[10]

The Roadmap focuses on "natural capital", arguing that "ecosystem services" give natural resources – soil, land, air, water and seas – an economic value that will protect them from depletion and pollution.[11] This economic approach is no substitute for real regulations shaping and guiding the use and disposal of resources, and resource-friendly manufacturing processes.

The EU's promotion of a "green economy" has been linked to efforts in certain Member States to develop "bio-economies" designed to shore up the EU's competitive edge in industrial biotechnology and promote a shift from fossil fuel to biomass-based economies.[12] In contrast to the Resource Efficient Europe approach, such developments risk unleashing yet more land grabs, forest degradation and emissions from deforestation, potentially on an unprecedented scale, as crops and timber are increasingly imported to meet growing feed, fuel and fibre demands.

To illustrate, in relation to developing bio-economies, the Commission states:
"There is a need for speeding up production rates and developing forest raw materials with new properties. Forests of the future will be increasingly dedicated to producing fibres, timber, energy or customised needs." [13]

This aligns with previous European Commission communications on the "green economy":
"Forests are likely to become increasingly important in a green economy as sources of new materials such as bio-based plastics and in renewable energy strategies." [14]

These strategies contradict the Roadmap, which calls for the protection of biodiversity. Furthermore, the consequences of importing minerals and metals are not dealt with in the Roadmap, despite their major life-cycle impacts and the fact that new and emerging technologies for vehicles, electronics, energy storage devices and other consumer goods will place increasing demands on the supply of minerals and "high-tech metals" such as lithium.[15]

Measuring resource use

In May 2012, the European Parliament showed overwhelming support for measuring Europe's use of resources, i.e. land, water, carbon and materials. This constitutes an important step towards greater resource efficiency and recognition of its importance within the "Europe 2020" economic agenda.[16]

Any EU-wide resource use policies and targets need to reduce pressure on our declining global natural resource base and create new jobs. Over half a million new jobs could be created in Member States' recycling sectors if every country recycled as much as the best EU performers.[17] There is no lack of public will: nine out of ten EU citizens believe that Europe could be more efficient in its use of resources.[18]

LITHIUM

The vast majority of lithium consumed in Europe is incinerated or ends up in landfill due to very low collection rates and flawed waste legislation.

Lithium (Li) is the lightest metal on Earth and is very efficient at converting chemical energy into electrical energy.[19] Analysts project that lithium-ion (Li-ion) batteries have the highest potential for future energy storage systems.[20] It is therefore in high demand for use in the production of batteries, in particular as a component in rechargeable lithium-ion[21] batteries, which are used to power electronic goods like mobile phones, energy storage systems and (hybrid) electric vehicles.[22]

Accessible, high-quality lithium reserves are largely concentrated in a few Andean countries, primarily Bolivia and Chile. Bolivia is not yet exporting its lithium resources on an industrial scale.

Figure 2: Identified lithium resources worldwide, 2012 [23]

COUNTRY	MILLION TONNES
Bolivia	9
Chile	7.5
China	5.4
United States	4
Argentina	2.6
Australia	1.8
Brazil	1
Congo (Kinshasa)	1
Serbia	1
Canada	0.36

COLLECTION, RECYCLING AND REUSE

Overall, the EU produces around 24kg of electrical and electronic waste per citizen per year, which includes lithium used in high-tech industries.[24] The amount of Li-ion batteries collected in the EU in 2010 was estimated at 1,289 tonnes along with 297 tonnes of lithium primary batteries.[25] This is around 5% of the Li-ion batteries put on the market, according to Belgian recyclers Umicore.[26] Germany, France, Belgium and the Netherlands have the best track records for battery collection including primary and secondary lithium-ion batteries.[27] Yet even these countries have very low collection rates, as seen in Figure 3.

The EU has regulations concerning the collection, recycling, treatment and disposal of batteries,[28] which required overall collection rates of at least 25% by the end of September 2012 and will require 45% by the end of September 2016. This legislation does not specifically address lithium battery collection and recycling.

Barriers to collection and recycling

The EU's existing legislation aims to reduce mercury, cadmium, lead and other metals in the environment by minimising the use of these substances in batteries in the first place, and by treating and re-using old batteries.[29] However, it focuses on the relatively simple recycling of, for instance, alkaline and lead-acid batteries.[30] It does not address the complex chemistries of newer battery technologies, including lithium batteries, which contain compounds of various metals.[31] The potential scope for the recycling of lithium is especially complicated because the material is toxic,[32] highly reactive and flammable.[33] It tends to be incinerated or ends up in landfill due to very low collection rates and flawed waste legislation.

Low collection rates, the low and volatile market price of lithium and the high cost of recycling relative to primary production have contributed to the absence of lithium recycling.[34] There are complexities involved in recovering both lithium metal from primary batteries and lithium salt used in rechargeable batteries.[35] Lithium's commercially valuable salt powder form, lithium carbonate, can be recovered from primary lithium batteries. Rechargeable lithium-ion batteries, on the other hand, tend to be processed to recover some of the numerous other metals they contain, such as cobalt, nickel, aluminium and copper. Remaining elements, including lithium, are most often discarded.[36]

LITHIUM COLLECTION

Lithium collectors use different sorting processes, some of which are subject to commercial confidentiality. For example, French metal recycling company SNAM is authorised to process up to 300 tonnes of lithium-ion batteries annually. After the batteries are sorted, they go through a process of pyrolysis[37] to get rid of plastic and paper materials. Cobalt, aluminium, copper and iron are recycled but lithium is not currently recovered.[38] SARP Industries/Euro Dieuze, also in France, specialises in battery recycling, including the recovery of lithium using hydro-metallurgical processes. However, as a new activity undergoing research and development, the details of its activities are restricted by confidentiality agreements.[39]

Figure 3: European lithium battery collectors [40]

COUNTRY	COMPANY	CAPACITY (tonnes of batteries per year)
France	SARP/Euro Dieuze Recupyl SNAM	200[41] 110[42] 300[43]
Switzerland	Batrec Industrie AG	200[44]
Belgium	Umicore	7,000[45]
Germany	Stiftung Gemeinsames Rücknahmesystem Batterien	340[46]
Netherlands	Stibat	n/a[47]
United Kingdom	G&P Batteries	145[48]

FUTURE DEMAND FOR LITHIUM

The future of lithium collection and potential reuse and recycling in the EU is dependent upon future demand for lithium as well as the price and availability of lithium imports. Certain analysts believe that demand for lithium is likely to rise dramatically, including with respect to the manufacturing and marketing of electronic devices like smartphones, tablets and laptops.[49] What is known already is that lithium use in rechargeable batteries increased from 0% in 1991 to 80% of the market share in 2007. The European Commission has stated that the tonnage for lithium used in portable batteries could increase ten-fold between 2010 and 2020.[50]

A key factor in the rise of lithium consumption will be its use in large electric vehicle batteries. Large, lightweight lithium-ion batteries for new electric vehicles[51] are set to be launched by over a dozen automobile manufacturers, including Mercedes Benz, BMW, Audi and Volkswagen, by the end of 2013.[52] Toyota, Mitsubishi and others[53] have expressed concerns that consumer demand may overtake lithium supply by 2020. In January 2010, Toyota's subsidiary company Toyota Tsusho and Australian lithium mining company Orocobre Ltd announced a joint venture to develop the Olaroz Argentine Lithium-Potash lithium mining project, to secure access to lithium deposits.[54]

As acknowledged by the European Commission:
"[The] deployment of 'green' vehicles reduces the use of fossil fuels but increases the demand for electricity and certain raw materials, some of which are subject to supply restrictions and concentrated in a few geographical areas (e.g. rare earth elements for electronic components and fuel cells, lithium for batteries)." [55]

Recyclers are also reacting to these predicted trends. The Belgian recyclers Umicore have expanded their capacity as they expect the collection of Li-ion batteries from (hybrid) electric vehicles to be significant, both in terms of tonnage because of their size and the fact that people are unlikely to hoard them.[56]

LITHIUM MINING

Lithium is found in the brine of salt flats. Holes are drilled into the salt flats and the brine is pumped to the surface, leaving it to evaporate in ponds. This allows lithium carbonate to be extracted through a chemical process.

The exploration of lithium has significant environmental and social impacts, especially related to water pollution and depletion. In addition, toxic chemicals are needed to process lithium. The release of such chemicals through leaching, spills or air emissions can harm communities, ecosystems and food production. Moreover, lithium extraction inevitably harms the soil and also causes air contamination.[57]

The salt flats where lithium is found are located in arid territories. In these places, access to water is key for the local communities and their livelihoods, as well as for the local flora and fauna. In Chile's Atacama salt flats, mining consumes, contaminates and diverts scarce water resources away from local communities.[58] The extraction of lithium has caused water-related conflicts with different communities, such as the community of Toconao in the north of Chile[59]. In Argentina's Salar de Hombre Muerto, local communities claim that lithium operations have contaminated streams used for humans, livestock and crop irrigation.[60]

There has been widespread speculation about whether Bolivia could become a lithium superpower, possibly overtaking Chile, by unlocking its massive resources, which may exceed 100m tonnes in its salt flats.[61]

Lithium exploration and investment is also taking place outside the Andean region. The American Nova mining corporation, for example, is moving ahead with the purchase of licensing agreements for lithium mining properties in Mongolia, in response to the current boom in sales of electronic goods.[62]

Bolivia has, so far, resisted large-scale industrial mining of lithium, although it has plans to build a pilot project in Salar de Uyuni as a precursor to the possible development of a lithium mining industry in the future.[63] However, the already existing San Cristóbal silver mine in the same area, which opened in 2007, has already caused an "environmental and social disaster that affects all of Southwest Potosí" including through the use of 50,000 litres of water per day.[64]

SOLUTIONS

The development of electric vehicles powered by lithium-ion batteries means that demand for lithium, which is already high, is almost certainly destined to soar. Major investment in collection and recycling infrastructure and technologies, combined with effective regulation, could result in major improvements. Financial incentives for the production of more sustainable devices through responsible product design could lead to reduced demand.

Extensive social and environmental impact assessments should also underpin new legislation on the procurement, waste and reuse of natural resources including metals such as lithium. Investment in public awareness-raising programmes about the environmental impacts of wasteful consumption of luxury items, including electronic goods, should be prioritised.

ALUMINIUM

Aluminium is 100% recyclable.
Recycling one tonne of aluminium saves nine tonnes of CO_2 equivalent emissions.[65]

At present consumption levels, there are enough commercially available deposits of bauxite, the raw, oxidised form of aluminium, to last for 300 years.[66] However, despite it being the third most abundant element found in the Earth's crust after oxygen and silicon,[67] the EU is highly reliant on imported bauxite. In 2008, the biggest producers of bauxite were Australia (30%), Brazil (13%) and China (10%).[68] The complex and harmful process of bauxite mining has led to deforestation, soil degradation and human rights violations, as shown further below.

Alumina is extracted from the bauxite ore and then transported to a primary aluminium processing plant where it is manufactured into a range of products, from beverage cans through to vehicle parts and construction materials. Aluminium is the dominant non-ferrous metal in use today because it is strong and lightweight.

RECYCLING AND REUSE

Importantly, aluminium can be recycled continually without losing its characteristic properties. Used aluminium is 100% recyclable, using only 5% of the energy required for its initial extraction and processing[69] and 10% of the initial capital equipment costs.[70] Recycling also saves 97% of the greenhouse gas (GHG) emissions[71] generated in the primary production process.[72] 75% of all the aluminium ever used, equivalent to 540m tonnes, is still in use today and this percentage is set to increase further.[73]

Extensive recycling infrastructure is now in place, with 273 aluminium recycling plants across Europe in 2008.[74] Recycled aluminium production reached around 4.3 million tonnes in 2010, of which 2.2 million was produced by refiners.[75] Refiners and remelters play integral roles in aluminium recycling, establishing links with collectors, dismantlers, metal merchants and scrap processors who deal with the collection and treatment of scrap.[76]

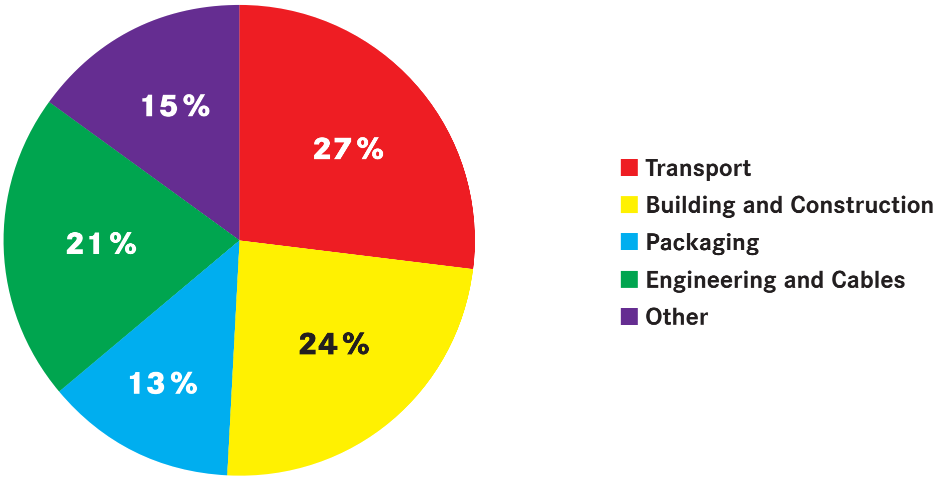
Yet despite high levels of aluminium recycling and declining production levels, around 15 million tonnes of bauxite are still imported into the EU every year.[77] Major savings could be made across Europe if resource efficiency measures were deployed to their full potential. As recognised by the European Commission, for example, UK businesses could save around €5.1 billion (£4 billion) per year in the metal manufacturing sector if resource efficiency measures were properly applied.[78]

CONSUMPTION AND PRODUCTION

In the EU, the production of aluminium from its raw materials[79] is dominated by Germany, followed by France, Spain, the Netherlands and the UK. However, overall European production has declined in recent years, largely as a result of the economic crisis.[80]

Nevertheless, the consumption of aluminium continues to climb. From 1980 until 2008, industrial consumption rates in Europe rose from 14kg to 22kg per capita.[81] In recent years, France and the UK have had falling rates of industrial consumption of metals, including aluminium, because manufacturing has increased among other Member States and moved elsewhere. Industrial consumption in Italy and Spain has increased.[82]

Figure 4: Global end-use for finished aluminium products 2007 [83]



PACKAGING

In Europe, the collection rate for all aluminium packaging is around 50%, in line with the EU regulations on packaging waste, which require all Member States to achieve this target for the return and/or collection of metals.[84] Aluminium commands the highest price per tonne for any recycled product collected at the roadside.[85] Up to 99% of all aluminium packaging produced is consumer packaging, with the majority of it used in the home.[86]

The aluminium beverage can is the world's most recycled container[87] because it is easy to collect, crush and recycle. In Europe, two-thirds of aluminium beverage cans were recycled in 2010, representing at least 24 billion cans, three times more than 20 years ago.[88] Belgium, Finland, Germany, Switzerland and Norway collect more than 90% of their aluminium beverage cans. These countries have achieved such high aluminium can recycling rates thanks to efficient and well-established collection and sorting infrastructures.[89]

Relatively low levels of beverage can recycling are prevalent in Eastern European countries including Romania (20%), Slovenia (27%) and Latvia (30%). Considering that the UK is a wealthy industrialised European country, its recycling levels of 50% are also relatively low.[90]

Figure 5: Aluminium can recycling in the EU27, EFTA and Turkey, 2010[91]

COUNTRIES	RECYCLING RATE %	COMMENTS ON THE RECYCLING RESULTS
Austria	65	Green dot scheme (metal packaging)
Belgium (+Luxembourg)	91	Green dot scheme (average for all beverage containers)
Bulgaria	50	Eurostat (metal packaging)
Cyprus	70	Eurostat (estimate, metal packaging)
Czech Rep. & Slovakia	52	Eurostat (combined average results all metal packaging)
Denmark	89	Deposit system (all beverage containers)
Estonia	61	Deposit system (cans only)
Finland	95	Deposit system (cans only)
France	57	Green dot scheme and others (rigid aluminium packaging)
Germany	96	Deposit scheme (cans only)
Greece	38	Eurostat (aluminium packaging only)
Hungary	50	Eurostat (metal packaging)
Ireland	45	Green dot scheme (extrapolations for cans)
Italy	72	Green dot scheme (aluminium packaging)
Latvia	30	Green dot scheme + industry report for cans only
Lithuania	40	Green dot scheme + industry report for cans only
Malta	59	Eurostat (metal packaging)
Netherlands	88	Industry reports (metal packaging)
Poland	72	Incentive based collection, combined industry reports
Portugal	45	Green dot scheme (metal packaging)
Romania	20	Incentive based collection, industry reports
Slovenia	27	Eurostat (metal packaging)
Spain	61	Green dot scheme + data industry study
Sweden	87	Deposit system (cans only)
United Kingdom	54	Packaging Recovery Notes (PRN) trading only
Switzerland	91	Levy based system
Norway	93	Deposit system (cans only)
Iceland	85	Deposit system (cans only)
Turkey	75	Incentive based collection, incl. unregistered collection & recycling
Total recycling rate	**75**	
Russia + other C&E Europe	75	Incentive based collection, incl. unregistered collection & recycling

BUILDINGS AND TRANSPORT

Aluminium is an ideal material for architectural applications due to the ease with which it can be shaped and its inherent resistance to corrosion. Recycling rates from buildings are as high as 92-98% across Europe.[92] This can even take place on a very large scale, as shown in the UK: 96% of the aluminium used in the old Wembley Stadium (over 400 tonnes) was recovered and recycled during the demolition process.[93]

Aluminium is a key material in the transport sector, because of its strength, combined with its light weight. It is used to manufacture cars, aircraft,[94] ships and trains. Across Europe 90-95% of the aluminium used in cars is collected and reused, or introduced into the recycling loop.[95]

SOCIAL AND ENVIRONMENTAL IMPACTS

Aluminium manufacturing harms the environment. It is an extremely energy-intensive process and emits significant quantities of CO_2, along with some perfluorocarbon (PFC) gases.[96] As a result, the aluminium industry alone is responsible for around 1% of global greenhouse gas emissions.[97] Critically, because of the much lower energy requirements involved in recycling, each tonne of aluminium recycled avoids nine tonnes of CO_2 equivalent[98] emissions.[99]

Bauxite mining has significant negative environmental and social impacts in Jamaica,[100] Australia,[101] India, Brazil and elsewhere[102] including the contamination of water and fishing supplies, the destruction of land and displacement of local communities.[103]

As highlighted by Friends of the Earth Brazil, bauxite exploitation poses severe and ongoing threats to local communities and their fragile Amazonian environment. For example, Alcoa, a world leader in the extraction of bauxite and the production of aluminium, is currently set to take over 50,000ha of land owned by Ribeirinho communities that inhabit the shores of Lake Juruti.[104] Brazil has an estimated 8.2 billion tonnes of bauxite reserves, with most of the bauxite mining taking place in the state of Pará, in the northern Amazonian region.[105] The extraction of bauxite and the aluminium supply chain are controlled by multinational corporations including Vale, Norsk Hydro, BHP Billiton and Rio Tinto.

In Eastern India, there are further significant deposits of bauxite in the states of Orissa and Andhra Pradesh, where hundreds of indigenous communities live. Since the 1980s, bauxite and alumina projects have been fiercely opposed by local communities, who have been blighted by pollution, land and water grabbing, displacement, repression and serious human rights abuses.[106]

SOLUTIONS

Considering that aluminium is 100% recycleable with no downgrading of its valubale qualities,[107] more priority and support should be given to its reusability in packaging, vehicles, architecture and other applications. Progressive national and EU public procurement policies should stop the sourcing of bauxite from mines that cause social displacement and environmental harm. There is a clear opportunity to reduce consumption levels though legal targets that guarantee full recovery rates and continued reuse. Indeed, the revision of the EU Waste Framework Directive recycling targets for all materials in 2014 will offer an important opportunity to achieve full recovery rates.[108]

COTTON

An average cotton t-shirt uses 2,700 litres of water.[109]

Although the EU has established a voluntary “ecolabel” and is developing “green” public procurement policies for textiles including cotton,[110] these measures are inadequate when it comes to dealing with the over-consumption of cotton and its cradle-to-grave impacts. These include water depletion, proliferation of GMOs and the associated harmful environmental and social impacts, pesticide usage and workers’ rights abuses in the garment supply chains.

PRODUCTION AND CONSUMPTION

Cotton production is highly concentrated in a few countries with the top four producers being the US, China, India and Pakistan.[111] The US’s substantial and highly subsidised cotton industry has now out-competed many poorer developing countries operating in the international market, including West African states. China and India are also the largest overall cotton consumers, which is unsurprising given the fact that both their populations exceed one billion people.[112]

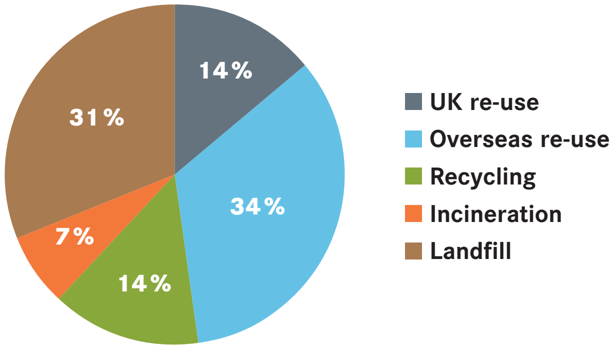
In the past, India and China used cotton and, to a much lesser extent, silk and hemp, whilst Europe tended to use wool and flax for clothing and household goods.[113] This changed dramatically during the Industrial Revolution when the British cotton industry grew rapidly. Cotton is now widely used throughout the European textile and clothing industry, which is dominated by the import of finished garments, rather than home textiles, yarns or fibres.[114] The UK is likely to retain its place as one of the world’s main importers of cotton clothing and home textiles, despite a recent slump in demand as a result of recession.[115]

Over one third of large European textile and clothing companies are now based in Germany. Italy follows with 14% of all large textile companies and 32% of clothing companies.[116] However, both countries have recently experienced a massive drop in their textile, clothing and fashion industries, primarily driven by the economic crisis and general decline of the EU cotton industry which is relatively uncompetitive compared to low-cost producing countries, particularly in Eastern Europe and Asia.[117] EU Member States’ increasing reliance on cotton imports raises particular concerns about human rights issues in clothing factories in exporting countries.

WASTE

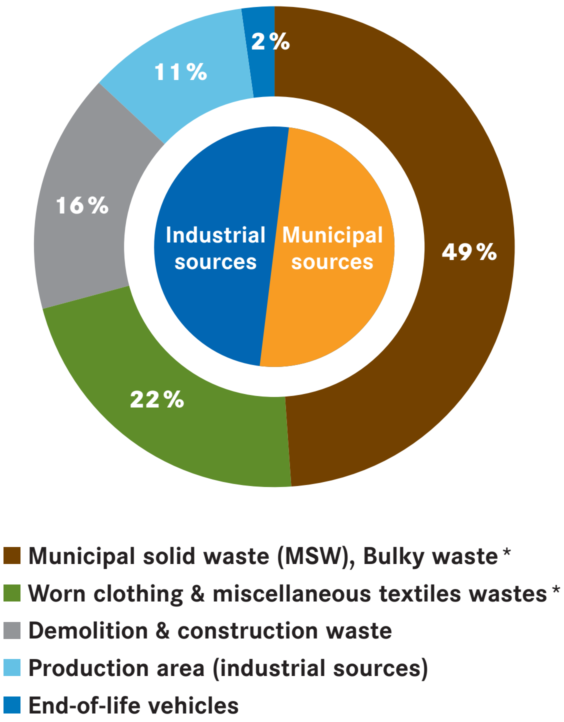
Due to the lack of data specifically relating to cotton waste, recycling and reuse, the following sections frequently refer to textile recycling more broadly. Recent research shows that 31 % of clothing ends up in landfill in the UK, amounting to around 350,000 tonnes of used clothing, with an estimated value of €180 million (£140 million), every year.[118]

Figure 6: Destinations of end-of-life clothing in the UK [119]



According to the European Commission, EU consumers discard 5.8 million tonnes of textiles every year, with only 1.5 million tonnes (25 %) of these post-consumer textiles being recycled by charities and industrial enterprises. The remaining 4.3 million tonnes goes to landfill or is burnt in municipal waste incinerators.[120] There is no available data on what percentage of this is specifically cotton waste.

Figure 7: Estimated textiles waste generation by sources [121]



* includes waste fractions from MSW

COLLECTION, RECYCLING AND REUSE

In places where textiles are not collected as part of the household recycling collection scheme, donations to charity shops and the use of commercial roadside collection bins can be used to ensure that textiles do not end up in landfill or incineration.

After collection, used textiles are usually separated by hand in waste treatment facilities and can be reused depending on their quality. On average, 40-50% of waste textiles are suitable for reuse as wearable textiles, 25-20% can be used for cleaning cloths, and 20-30% can be used as a secondary raw material by other industries, including through processes that fray out and mix inferior fibers with other substitutes to produce paper, board and fleece.[122] Unfortunately, the sector is suffering from a decrease in the quality of materials donated, as modern clothes frequently come from cheap producers.[123]

Improvements in the reuse of textiles are vital in both environmental and social-economic terms. The sector provides employment, including for those who are disadvantaged. In France, it costs €20,000 per year to support an unemployed person, but for work integration contracts in the field of textile collection, reuse and recycling, the state only pay half of this amount whilst boosting green jobs and developing the skill-sets of workers.[124] In the UK, about 50% of discarded cotton t-shirts, amounting to 120 million t-shirts (around 30,000 tonnes), are reused in some form every year. This avoids 450,000 tonnes of CO_2 equivalent emissions and each t-shirt can yield £1 (€1.25) of net revenue to reuse organisations.

Certain Member State textile recyclers have limited available information on aggregate amounts of textile recycling, but not specific data relating to cotton. However, in those EU countries where there are established trade associations for textile recyclers, certain data is aggregated for all textiles, although still not specifically for cotton. Around 4kg of textiles per capita per annum are collected in Belgium.[125] The Netherlands has set a target for textile collection at 5kg of textiles per capita per annum.

The Finnish Red Cross Recycling Department Store chain has specialised in the mass collection, sorting and sale of used clothes and textiles for reuse and recycling into rags.[126] In France, organisations that place clothing textiles onto the French market pay a financial contribution that funds an organisation called EcoTLC, which is responsible for the reuse and recycling of clothes.[127]

The largest tonnages of textiles have been collected in Germany.[128] This has involved engaging commercial establishments, charities and church organisations, all of which have collaborated with textile recyclers for decades.[129] Recycled textiles are used for a variety of purposes, such as for insulation in the automotive, furniture and building sectors.

The donation of clothes that are exported to the Global South can provide cheaper clothing, but it can also have a negative impact on local textile markets.[130] Certain charity shops and not-for-profit projects, such as U-landshjälp från Folk till Folk in Finland, support the domestic recycling system and also donate both clothes and profits to development projects in poor countries.[131] It is important that quality control is maintained for second-hand garments that are exported, otherwise there is a major risk of transferring disposal costs to poorer countries.

SOCIAL AND ENVIRONMENTAL IMPACTS OF COTTON USE

From the cultivation of cotton crops to the production of garments, there is a wide range of negative impacts across the world that need to be addressed. West Africa, one of the poorest cotton growing regions, faces strong competition from subsidised growers in the EU, US, China and India. The unfair trade system exacerbates an already precarious situation facing West African cotton growers.[132]

In 2011, Friends of the Earth Togo carried out on-the-ground analysis showing how cotton cultivation tends to restrict the ability of farmers to diversify their local food production. In Togo, cotton is mainly grown and handpicked by poor, low-paid family farmers, including children, who have had their environment degraded and health jeopardised by high levels of pesticide use. Peasant farmers have provided testimonies that cotton “kills” the soil and poisons local water supplies.[133]

In Cameroon, family farms also dominate cotton production, which is concentrated in monoculture plantations. This sector is similarly characterised by high pesticide usage and poverty (due to indebtedness from the high input costs and the low market price of cotton). Friends of the Earth Cameroon has observed how cotton production has driven the clearing of forests and grasslands, exposing soils to erosion and a loss of fertility.[134]

Water

Some estimates indicate that cotton is the largest user of water of all agricultural commodities, representing more than half of the irrigated agricultural land globally.[135] Cotton production requires 550-950 litres per square metre planted, or 7,000-29,000 litres of water for each kilogram of cotton produced.[136] An average cotton t-shirt can require 2,700 litres of water and an average pair of jeans can use over 10,000 litres of water.[137]

European consumers and policy-makers have a major role to play in reducing these terrible impacts on water resources. 90% of the water footprint of UK clothing is overseas, often in countries that already face water stress or scarcity.[138] Clothing contributes up to 8% of the global water footprint of UK products and household use.[139] Moreover, cotton production and processing are also major sources of fresh water pollution.[140]

Pesticides

Globally, cotton accounts for 11% of all pesticides used every year, even though the area of production only covers 2.4% of the world's arable land.[141] Field studies carried out in Vidharbha, the eastern region of the Indian state Maharashtra, by Navdanya (a network of seed keepers and organic producers spread across 16 states in India) also showed that pesticide use had dramatically increased. Bollworm pests that attack crops have become more resistant to GM cotton and new pests have emerged, leading to larger applications of pesticides.[142]

In Togo, the use of pesticides for the cultivation of cotton has not only harmed the health of workers, it has caused tensions as the winds carry toxic pesticides into neighbouring fields, poisoning land and livestock. Friends of the Earth Togo promotes solutions to the cotton industry’s over-reliance on harmful pesticides by replacing them with organic and mineral fertilisers, bio-pesticides and non-persistent pesticides.[143]

GM cotton

During the last two decades, India has opened up its agricultural sector to the global market, which has resulted in increased costs and lower profits for small farmers. A national agrarian crisis has ensued as farmers have fallen into spiraling debt. This dire situation has triggered the largest ever recorded suicide epidemic: during the past 16 years more than a quarter of a million farmers have committed suicide,[144] which is likely to be a significant underestimate considering the fact that women are often excluded from such figures due to their lack of land titles and recognition as farmers.[145]

This tragedy has blighted the Indian cotton sector, which is virtually monopolised by Monsanto's gene technology: 90% of the total area of cotton production is under Bt (*Bacillus thuringiensis*)[146] cotton, according to the Indian government.[147] Indeed, the highest rates of suicides coincide with the areas producing the highest amount of cotton.[148]

Since its first introduction in 1996, the use of Bt cottonseeds has expanded rapidly in several countries including India. The higher costs associated with Bt cottonseeds and related pesticides have contributed to farmers ending up with crushing debts. Economic hardships faced by family farmers have resulted in suicides on a massive scale, often committed by swallowing the poisonous pesticides that are used to spray their Bt cotton crops.[149]

Emissions

The production, export and consumption of cotton generates around 0.8% of global CO_2 equivalent emissions.[150] Mechanised farming techniques, particularly in the US and Australia, cause emissions from combustion of fuel, as well as those resulting from fertiliser and pesticides.

Moreover, around one third of these emissions are associated with the international trade of cotton, given that most European countries have no cotton production, but import significant amounts in the form of clothes and other goods.[151] Indeed, it is calculated that the carbon emissions generated by the clothing of an "average" British household is the equivalent to driving a modern car 6,000 miles (9,656 kilometres) or 1.5 tonnes of CO_2 equivalent emissions per year.[152]

Supply chains and human rights

Throughout South-East and East Asian countries including Thailand, Cambodia, Malaysia, India, China and Bangladesh, migrant workers – especially women and even more so teenage women – are relied upon as a cheap, exploited workforce to produce clothing for retailers like Marks & Spencers, H&M, Gap, Levi-Strauss and Zara.[153] Many Western brands and retailers have promised to abolish labour abuses at their suppliers, but continue to depend upon exploited child labour characterised by poverty wages, unhealthy working and accommodation conditions, and the absence of trade unions and basic workers' rights.[154]

SOLUTIONS

Many European citizens are willing to purchase or receive second-hand clothes, especially if there is a broader and better quality range available. In the UK, two-thirds of customers already use second-hand clothes.[155] Clothing reuse is far better for the environment than recycling – for every tonne of cotton t-shirts reused, 12 tonnes of CO_2 equivalent are saved.[156] Therefore, an increase in collection services for quality clothing is significantly more beneficial.

Unnecessary landfill and incineration of clothing and other textiles must be minimised, so legally binding national regulations for high collection rates and investment in recycling infrastructure need to be implemented. The creation of jobs in the recycling and reuse of textiles in Europe would benefit the environment and provide much-needed employment.

In addition, extended producer responsibility (EPR) strategies should be applied, whereby the associated life-cycle environmental costs of clothing products are integrated into their price. This approach holds producers to account for the costs of managing their products at the end-of-life stage in order to reduce toxicity and waste.

The resource impacts of clothing sold to consumers needs to be reduced, which would involve measuring the carbon, water, material and land needed for the production of garments, from the start through to the end of the supply chain. Alternative fibres with lower social and environmental impacts could be sourced. GM cultivation and import bans could be applied to Bt cotton as well as other GM fibres. Bans could also be applied to fuel and feed crops that result in land grabbing, high pesticide usage and environmental damage.

The exploitation of workers in global supply chains has to be ended. The legal enforcement of principles based on equality, human rights and security would ensure workers receive a living wage, fair benefits such as maternity and sick pay, and the freedom of association to form trade unions.[157]

CONCLUSION

In spite of a professed willingness to use resources more sustainably,[158] Europe's wasteful consumption patterns have hugely harmful impacts and must be reduced. As shown throughout this report, there are opportunities to reduce Europe's environmental impact across the world.

Any delay in drastically improving the continent's waste management is a missed opportunity. Reducing waste should be the first step. After that, reuse, repair, and recycling activities need to be prioritised, instead of the continuous extraction of material resources.

Indeed, there is an urgent need for fundamental changes in EU policies to end the spiral of wasteful resource use. Better design of electric and electronic products is needed to achieve higher collection and recycling rates for lithium. When it comes to aluminium, recycling and reuse rates could still improve, resulting in a reduction in the demand for bauxite. Incentives for the reuse of clothing should be put in place in order to create a vibrant EU-wide reuse market.

By increasing reuse and recycling, material extraction can be reduced whilst creating jobs and protecting our global resource base, helping Europe to become prosperous and sustainable.

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WHO WE ARE

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

Friends of the Earth Europe is part of Friends of the Earth International, the world's largest grassroots environmental network. The network unites European national member organisations and thousands of local activist groups in more than 30 European countries. As the people's voice at the heart of the European Union, we campaign for sustainable solutions to benefit the planet, people and our future, influencing European and EU policy and raising public awareness on environmental issues.

For more information see: www.foeeurope.org

Friends of the Earth England, Wales and Northern Ireland is the UK's most influential national environmental campaigning organisation – a unique network of campaigning local groups, working in more than 200 communities. We believe the environment is for everyone. We want a healthy planet and a good quality of life for all those who live on it. We inspire people to act together for a thriving environment. More than 90% of our income comes from individuals so we rely on donations to continue our vital work.

For more information see: www.foe.co.uk

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.

For more information see: www.global2000.at