

# ALUMINIUM

- ▶ Aluminium is 100% recyclable.
- ▶ Aluminium recycling processes use only 5% of the energy required for its initial extraction and processing,<sup>1</sup> 10% of the initial capital equipment costs<sup>2</sup> and saves 97% of the greenhouse gas (GHG) emissions.<sup>3</sup>
- ▶ Despite aluminium being the third most abundant element found in the Earth's crust, Europe is highly dependent on its import.



## CONSUMPTION AND DEMAND CONTINUES TO CLIMB

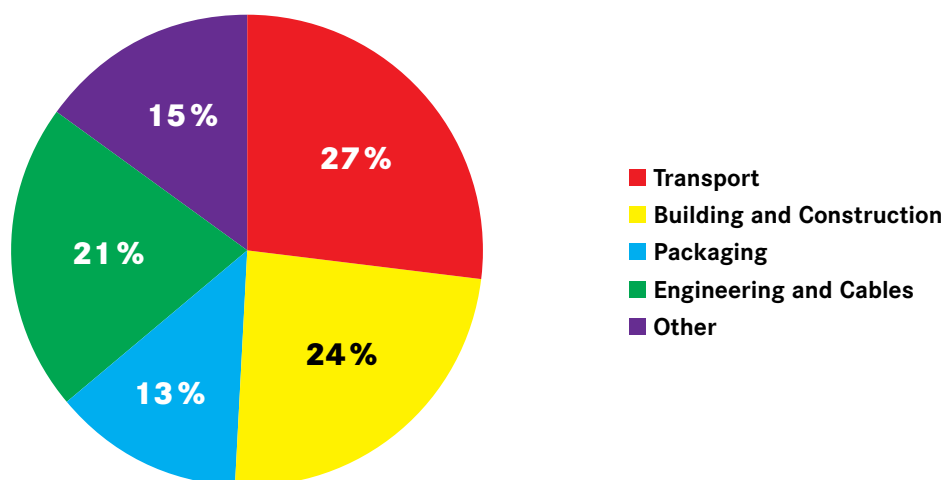
Aluminium is the dominant non-ferrous metal in use today because it is strong and lightweight. Alumina is extracted from bauxite ore and then transported to primary aluminium processing plants where it is manufactured into a range of products from beverage cans through to vehicle parts and construction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

Aluminium is an ideal material for architectural applications due to the ease with which it can be shaped and its inherent resistance to corrosion. It is also a key material in the transport sector, because of its strength, combined with its light weight. It is used to manufacture cars, aircraft, ships and trains.<sup>4</sup>

At present consumption levels, there are enough commercially available deposits of bauxite, the raw, oxidised form of aluminium, to last for 300 years.<sup>5</sup> However, despite it being the third most abundant element found in the Earth's crust, after oxygen and silicon,<sup>6</sup> the EU is highly reliant on importing bauxite. In 2008, the biggest producers of bauxite were Australia (30%), Brazil (13%) and China (10%).<sup>7</sup> In the EU, the final production of aluminium from its raw materials<sup>8</sup> is dominated by Germany, followed by France, Spain, the Netherlands and the UK. However, overall European production has declined, largely as a result of the economic crisis.<sup>9</sup>

Nevertheless, the consumption of aluminium continues to climb. From 1980 until 2008, consumption rates in Europe rose from 14kg to 22kg per capita.<sup>10</sup>

Figure 1: Global end-use for finished aluminium products 2007 <sup>11</sup>



## IMPACTS OF ALUMINIUM PRODUCTION

Aluminium manufacturing harms the environment. It is an extremely energy-intensive process and emits significant quantities of carbon dioxide (CO<sub>2</sub>), along with some perfluorocarbon (PFC) gases.<sup>12</sup> As a result, the aluminium industry alone is responsible for around 1% of global greenhouse gas emissions.<sup>13</sup> Critically, because of the much lower energy requirements involved in recycling, each tonne of aluminium recycled avoids nine tonnes of CO<sub>2</sub> equivalent<sup>14</sup> emissions.<sup>15</sup>

Bauxite mining has significant negative environmental and social impacts in Jamaica,<sup>16</sup> Australia,<sup>17</sup> India, Brazil and elsewhere<sup>18</sup> including the contamination of water and fishing supplies, the destruction of land and displacement of local communities.<sup>19</sup>

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 50,000 ha of land owned by Ribeirinho communities that inhabit the shores of Lake Juruti.<sup>20</sup> Brazil has an estimated 8.2 billion tons of bauxite reserves, with most of the bauxite mining taking places in the state of Pará, in the northern Amazonian region.<sup>21</sup> 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.<sup>22</sup>



## ALUMINIUM RECYCLING RATES ARE GOOD - BUT COULD BE MUCH BETTER

Importantly, aluminium can be recycled continually without losing its characteristic properties. Used aluminium is 100% recyclable, and 75% of all the aluminium ever used, equivalent to 540m tonnes, is still in use today. If recycling rates can be improved this percentage can be increased further.<sup>23</sup>

Critically, the aluminium recycling process uses only 5% of the energy required for its initial extraction and processing<sup>24</sup> and 10% of the initial capital equipment costs.<sup>25</sup> Recycling also saves 97% of the greenhouse gas (GHG) emissions<sup>26</sup> generated in the primary production process.<sup>27</sup>

Aluminium recycling rates are good in many parts of Europe – although there is still both scope and a pressing need to improve that rate because of increasing demand. Extensive recycling infrastructure is now in place, with 273 aluminium recycling plants across Europe in 2008.<sup>28</sup> Recycled aluminium production reached around 4.3 million tonnes in 2010, of which 2.2 million was produced by refiners.<sup>29</sup> 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.<sup>30</sup>

The recycling of aluminium from buildings is now as high as 92-98% across Europe.<sup>31</sup> 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.<sup>32</sup> Similarly, across Europe 90-95% of the aluminium used in cars is collected and reused, or introduced into the recycling loop.<sup>33</sup>

Recycling rates for aluminium packaging in the EU are still relatively low, despite the fact that aluminium commands the highest price per tonne for any recycled product collected at the roadside.<sup>34</sup> 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).<sup>35</sup>

Up to 99% of all aluminium packaging produced is consumer packaging, with the majority of it used in the home.<sup>36</sup> In particular, the aluminium beverage can is the world's most recycled container<sup>37</sup> because it is easy to collect, crush and recycle. In Europe, two-thirds of aluminium beverage cans were recycled in 2010, representing a record number of at least 24 billion cans, and tripling the recycling rate over 20 years.<sup>38</sup>

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 due to efficient and well-established collection and sorting infrastructures.<sup>39</sup> 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.<sup>40</sup>

**Figure 2: Aluminium can recycling in the EU27, EFTA and Turkey, 2010<sup>41</sup>**

| 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 |
| <b>Total recycling rate</b>          | <b>75</b>        |   |
| <b>Russia + other C&amp;E Europe</b> | <b>75</b>        | Incentive based collection, incl. unregistered collection & recycling |

## INCREASE RESOURCE EFFICIENCY, REDUCE BAUXITE IMPORTS

Despite high levels of aluminium recycling and declining production levels, around 15 million tonnes of bauxite is still imported into the EU every year.<sup>42</sup> 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.<sup>43</sup>

Considering that aluminium is almost 100% recycleable, the profile of and support for aluminium recycling should be raised with respect to its reusability in packaging, vehicles, architecture and other applications. Progressive national and EU public procurement policies should also stop the sourcing of bauxite from mines that cause social displacement and environmental harm. There is a clear opportunity to reduce consumption levels through legal targets that guarantee full recovery rates and continued reuse. Indeed, the revision of the Waste Framework Directive recycling targets for all materials in 2014 will offer an important opportunity to achieve full recovery rates.<sup>44</sup>

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