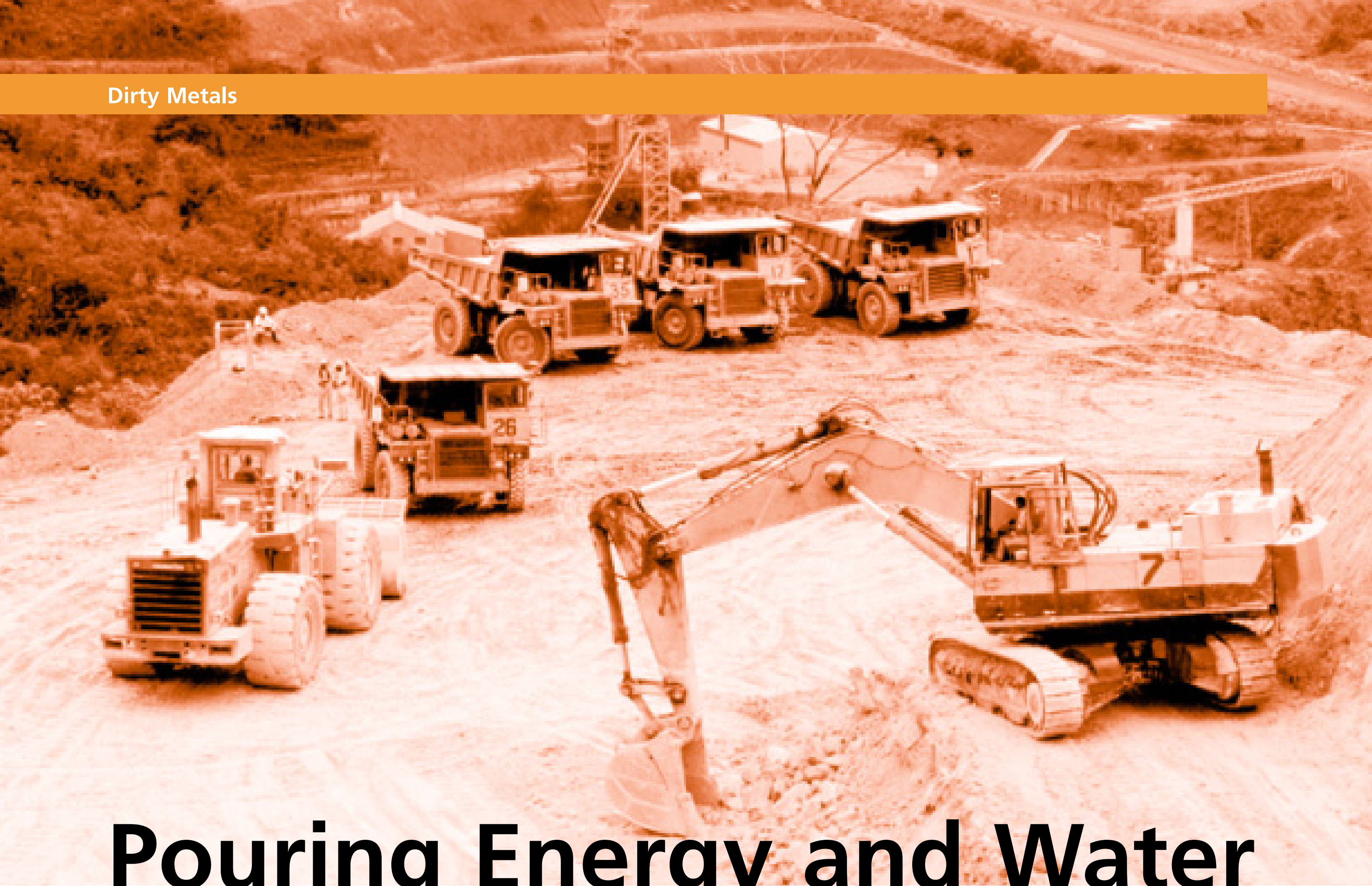


Clearing land for mine, Ghana / Photo: Penny Tweedie/Oxfam

Pouring Energy and Water into a Bottomless Pit

Mining is one of the most energy-intensive industries in the world. The mining sector is thought to consume 7 to 10 percent of annual global energy production. In the United States alone, mining uses 2.3 quadrillion (that's 2,300,000,000,000,000) BTUs of energy per year—enough power to supply over 25 million single-family American households for a year, roughly 23 percent of the country's population. Most of the energy consumed by mining comes from fossil fuels, primarily coal and oil. (Nearly all of the rest comes from the hydro-electric power used in aluminum smelting.)[25]

Mining also requires gargantuan quantities of fresh water. (Salt water cannot be used because it corrodes equipment.) Large amounts of water are needed for virtually every aspect of the operation—drilling, dust control, grinding ores, and so forth. At many mines, water is recycled—that is, it is fed through the same operation repeatedly. But the systems leak. Tailings disposal, especially, results in a high volume of water loss, so more water must be regularly pumped into the system.

Paradoxically, given the huge water demand, mining is also frequently challenged with the problem of *too much water*. Constant pumping can be necessary to keep the mine accessible as it drops below the water table. The pumping sometimes dries up streams and other surface waters. This type of disruption can outlive the operation itself: once a mine has closed and the pumping ceases, the pits may fill with water, drawing flow from natural sources. Evaporation and seepage from the pits can permanently alter groundwater movement—and the seepage is frequently contaminated with sulfuric acid and other pollutants.

There are no comprehensive estimates of the water volume that flows through the industry. (In the United States, pumping water out of mines is not defined as a "use" of that water, so there is no requirement to measure that at all.) But it is clear that mining can cause substantial hydrological disruption. In Nevada, for example, the US Geological Survey has found a decline in water tables by as much as 300 meters around some of the state's largest open-pit gold mines. One of these mines, Barrick's Betze mine, pumps out 380,000 cubic meters (100 million gallons) of groundwater per day.[26] ■

Close-Up: An Aluminum Can

When was the last time you drank something from an aluminum can? If you're living in the United States, chances are it was sometime today—on average, an American consumes 350 single-serving canned beverages per year.

What went into the creation of those cans? Aluminum begins as bauxite ore, which is 45 to 60 percent aluminum oxide. Bauxite is formed deep underground, and is typically mined in open pits, a process that produces vast amounts of waste rock. After it's extracted, the bauxite undergoes extensive cleaning and processing, after which it is dissolved in a caustic solution under high temperature and pressure to produce a fine, white powder called alumina.

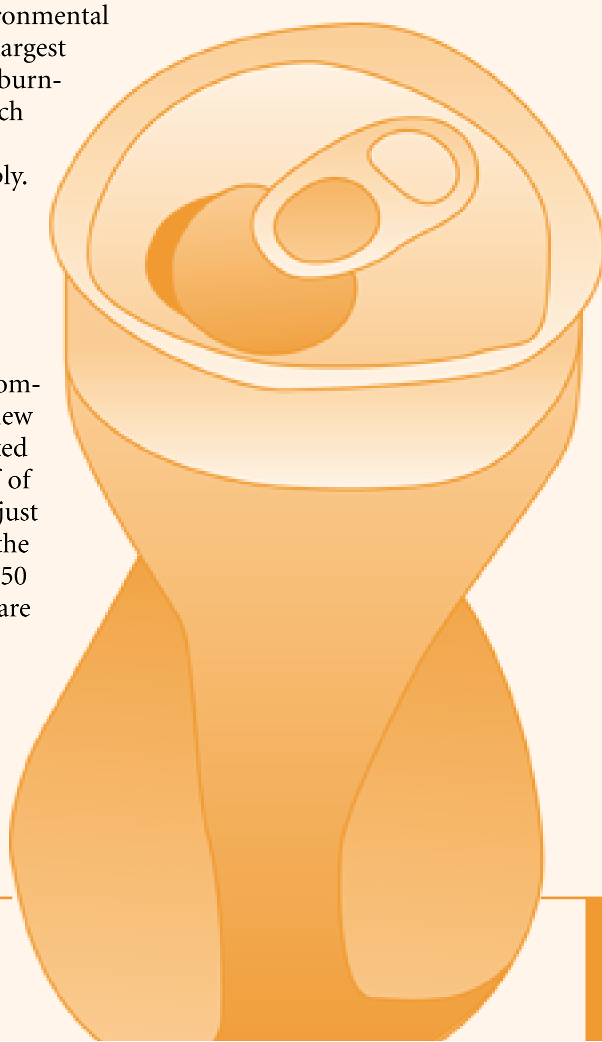
The dried alumina is then shipped to a smelter, a metal-working furnace, where it is reduced to molten aluminum. This is done by liberating oxygen from the alumina, a change that occurs only at a very high temperature—over 1,200 degrees Celsius—so the process is extremely energy intensive. Primary (that is, non-recycled) aluminum production demands more energy per unit mass of finished metal than does the production of any other metal. According to the Container Recycling Institute in Washington, DC, the amount of energy needed to produce enough aluminum for one beverage can is equivalent to about one-quarter of that can filled with gasoline. In 1999, aluminum production accounted for 2 percent of the world's energy use.

Because aluminum smelting is so energy intensive, mining companies look for the cheapest energy they can find, and that usually means shipping the alumina great distances. The aluminum in your soda or beer can probably originated as bauxite in Australia, Brazil, Guinea, or Jamaica—the countries that produce three-quarters of the world's bauxite. The smelters themselves are often sited next to power plants—and indeed, many power plants are built especially to supply aluminum smelters. (Virtually all aluminum smeltering is done with electricity.)

Worldwide, over half the aluminum industry's energy supply comes from hydroelectric dams, and the industry is a powerful lobby for dam construction. Like mines, these dams cause enormous social and environmental disruption. The next largest energy source is coal-burning power plants, which account for about a third of the total supply. Coal combustion is a principal source of greenhouse gas emissions.

Fortunately, used aluminum cans can be completely recycled into new metal. But in the United States, more than half of all aluminum is used just once and tossed into the trash. Currently, over 50 billion beverage cans are wasted in the United States every year—that's a quarter of a million tons of scrap metal valued at $750 million. Laid end to end, these wasted cans would encircle the globe at the equator 153 times.

Recycling aluminum cans consumes only 5 percent of the energy needed to make them from virgin ore. In the United States, the energy wasted by not recycling all those cans is equivalent to the annual electricity use of 2.7 million American households. During the 1990s, Americans discarded 7 million tons of cans—enough aluminum to make 316,000 Boeing 737 airplanes. That's a fleet 25 times the size of all the world's commercial airlines combined. Think about that the next time you finish a beer or a soda, and make sure that can finds its way into a recycling bin![27]



Sketch: Chris Engnoth