

TheNational

‘Peak metal’ problems loom, warns scientist

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Armin Reller holds a synthetic ruby while sitting in front of a floating zone furnace, an oven used for growing crystals.
Ralph Orłowski / Getty Images

Armin Reller, a materials chemist at the University of Augsburg in Germany, is actually a storyteller. The tale he has to tell is this: in daily life where almost everyone has a mobile phone, television or a car, no one sees the correlation between the product and the raw materials necessary in its fabrication.

“In any mine, you find a poor chap pulling the metal out by hand. At the opposite, polar end of the chain, at the recycling spot, the labour conditions, the humanitarian conditions, are horrible,” he said.

Countries in South Asia and Africa, where labour is cheap and poverty widespread, are where most scrap metal is sent to be disassembled, a potentially dangerous job given the noxious and often harmful chemicals involved. “People using these devices must know they are part of the story,” said Mr Reller.

Now for the scary part: the world is running out of the raw materials used to make televisions, laptops, mobile phones and many of the other digital gadgets of the 21st century.

An article in *New Scientist* magazine last year quoted Mr Reller as having said the Earth has 10 years left of indium, which – although only one gram of it is used in a 32-inch liquid-crystal display (LCD) television – is absolutely essential to the screen’s clarity. Indium is also used in the windows of aeroplanes and trains. The metal’s rarity has driven up its price. In 2003, the metal sold for about \$60 (Dh220) per kilogram. By 2007, the price had shot up to more than \$1,000 per kg.

Mr Reller now shies away from giving expiration dates for precious metals. It leads to speculation, he said, and the higher price can lead to conflict, as in the eastern Democratic

Republic of Congo, where a war was fought 10 years ago partly over Rwandan-controlled mines of columbite-tantalite (coltan), one of 25 different metals needed to make one mobile phone.

Resource use has become a global geopolitical issue. By way of example, Mr Reller said China holds a lot of mineral sources, but it is short in copper. "If you follow Chinese politics, you'll see they are in Africa; they go where they find copper." China also has about 60 per cent of the world's refined indium production and one-fourth of indium reserves, but that amounts to only about 1,300 tonnes, according to geology.com.

Among other metals the Earth is running out of are gallium, also used in mobile phones, and which, with indium, is being used to make a new type of ultra-efficient solar cell; platinum, zinc, copper, nickel and phosphorous.

The scarcity of metals has made news around the world recently. In July, a Japanese ship carrying lead and zinc was seized by Somali pirates; there has been a rise of 150 per cent in the theft of all metals in Britain over the past 24 months, including iron railings and 400,000 beer kegs; and in Philadelphia, 2,500 manhole covers and sewer grates have been stolen in the past year, costing the city about \$300,000 a year in replacement costs.

The use of metals Mr Reller is studying, including the possibility of their depletion, has led to the idea of "peak metal", similar in notion to "peak oil", which refers to the maximum rate of oil production given that it is a finite resource. Metals, too, are finite resources except, as Mr Reller points out, when they are used they do not evaporate into the air. Metals can be recovered, but only to a point.

"We have to do a better job recycling, so these items don't end up in the trash," said Glen Hiemstra of Washington state, founder of futurist.com.

"We must continually, as all labs do, look for alternative materials that can give you the same results."

What the world needs, Mr Hiemstra said, is "breakthrough thinking on every level about everything, about how to do things more efficiently, with different materials, and sustainably".

People, however, will continue to want to live a high-quality lifestyle. But it will have to be done with less material consumption," he said.

"It cannot be done with current stocks of raw materials. I learnt at the Prince of Wales programme on business and the environment at Cambridge University in May that it would take six Earths to enable eight billion people to live a 'western/Dubai' lifestyle."

Both Mr Reller and Mr Hiemstra suggested that substitution might be part of the answer. "Silicon can replace copper in phone lines," Mr Hiemstra said. "Wireless can replace physical things altogether, and for electricity transmission we can replace physical wires with electromagnetic waves, among other things."

One problem with substitution, however, is that substitutes rely on technology and so far the technology has not kept pace with itself.

“Substitution is often possible, but frequently degrades performance,” Thomas Graedel, a professor of geology and geophysics at Yale University, wrote in an e-mail. “In addition, a substitute material may not be available on the timescale needed, or in the quantities needed.”

Mr Reller, working with the World Environment Center in Washington and Augsburg to involve governments and industries in examining metal issues, and creating modules to teach his concepts returned to his initial thought. “People using these devices must know they are part of the story.” And the people to whom he is referring are not living in third world countries. “Metals always end up in the rich society,” he said. With the exception of mobile phones, “poor people can’t afford any metal device”.

It is possible that at some future point, the world will become sated with its digital playthings, but that time is not here. “In the long term,” Mr Graedel wrote, “ethical questions will certainly arise if we pay no attention to possible constraints on nonrenewable resources.”

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