



High-grade global deposits of coal, oil, gas and other minerals are declining to levels where extraction costs will increase dramatically, says Ugo Bardi, energy expert in a new Report to the Club of Rome.

Berlin, 6 June 2013: In *Plundering the Planet*, energy expert and professor of chemistry Ugo Bardi says that we are reaching the limits of economically feasible extraction of a number of mineral commodities, including metals and fossil fuels. The world will never run out of its minerals but extracting them will prove far more expensive. This will be one of the most important challenges of our civilization's future, he says.

Our current economies are built on cheap fossil fuels and high grade mineral ores which can be economically exploited. However, if we continue with a 'business as usual' approach, we will soon reach the limits to which fossil fuels and other vital resources can be exploited. The increasing exploitation of non-conventional fuels, such as shale gas and tar sands could prolong the fossil fuel age for a few years. But this would lead us faster into the age of uncontrollable climate change.

Bardi also argues that given the countries in which certain minerals are found, future shortages could have geopolitical effects. For example, Chile, Australia, China and Argentina produce almost 95% of the world's copper.

Plundering the Planet concludes that there is no magic bullet to solve the problem of the depletion of high-grade ores. As they become scarcer, we will be forced to exploit them at progressively lower concentrations and that will make mining more expensive, up to the point when some mineral commodities will no longer be affordable for the industrial system.

However, says Ugo Bardi, there is a solution. "If we meticulously manage what is left and use renewable energy, human civilisation can continue, provided we are willing to abandon our most wasteful habits. We need to close the industrial cycle, recover the minerals used and transform our approach to using resources".

In welcoming the new Report, Ian Johnson, Club of Rome Secretary General says: "This book shows how careless humanity has been about wasting the earth's finite resources. It is a warning that I hope we will heed, that without a change of direction some mineral commodities which are especially critical for their industrial applications will reach their productive peak within less than two decades."

Some of the book's findings

- We have nearly reached the limit at which we can economically extract the most important energy resources: fossil fuels and uranium. Conventional oil production will soon peak and then decline, followed shortly by other oil and gas resources. It is probably possible to increase coal production, but this will create tremendous damage to the ecosystem.
- The future shortage of oil and gas reserves will increase the speed of climate change as the fossil fuel industry extracts from dirtier, more polluting resources.
- The extraction of metals such as copper, zinc, nickel, gold and silver could peak and then decline in less than 20 years. Other mineral commodities that are irreplaceable in their industrial uses may become in short supply in the near future: e.g. platinum group metals for automotive catalytic converters, rare earths for magnets, and more.
- Most modern agriculture is dependent on phosphorus as it is a crucial element for plant growth that cannot be replaced by any other element or substance. Some 75% of known mineable phosphate reserves are found in Morocco and the Western Sahara. In several decades this might create a geopolitical 'hotspot' in Northern Africa.
- The distribution of non-renewable resources across the globe is likely to have geopolitical implications. For example, China produces more than 30% of the world's zinc output. Australia, Canada, Kazakhstan, Russia, Brazil and South Africa own the bulk of known uranium reserves.

Notes:

Plundering the Planet is the 33rd Report to the Club of Rome, signifying that it has been peer reviewed by experts to ensure it is scientifically rigorous, innovative and contributes a new, important element to the debate about humanity's predicament.

Ugo Bardi is a Professor, teaching physical chemistry at the University of Florence, in Italy. He is an expert in resource depletion, system dynamics modeling, climate science and renewable energy. His most recent book is *The Limits to Growth Revisited* (Springer 2011).

For more details, for copies of *Plundering the Planet* and interviews with the author, please contact: Alexander Stefes, Club of Rome: astefes@clubofrome.org or Tel: +41 76 771 3541

***Plundering the Planet* (German language version) is launched on Thursday, 6 June, 11.00 at Hotel Aquino, Tagungszentrum Katholische Akademie, Hannoversche Straße 5b, 10115 Berlin-Mitte, Germany in cooperation with WWF Germany, the Worldwatch Institute and the German Association of the Club of Rome.**

<http://www.clubofrome.org/?p=6166>