Recycling of 'Specialty Metals' Key to Boom in Clean-Tech Sector From Solar and Wind Power to Fuel Cells and Energy Efficient Lighting

Big Energy and Greenhouse Gas Savings Also Possible from Upping Recycling Rates of Iron and Copper Says New UN Environment Report

New York, 13 May 2010—Moving the global economy towards environmentally-friendly, clean technologies will increasingly hinge on rapid improvements in the recycling rates of so called 'high-tech' specialty metals like lithium, neodymium and gallium.

Such metals, needed to make key components for wind turbines and photovoltaics to the battery packs of hybrid cars, fuel cells and energy efficient lighting systems, exist in nature in relatively small supplies or in discreet geographical locations.

Yet despite concern among the clean tech industry over scarcity and high prices, only around one per cent of these crucial high-tech metals are recycled with the rest discarded and thrown away at the end of a product's life.

Unless future end-of-life recycling rates are dramatically stepped up these critical, specialty and rare earth metals will "become essentially unavailable for use in modern technology," warn experts.

These are among the preliminary findings of a new report entitled *Metals Recycling Rates* to be issued by the International Panel for Sustainable Resource Management hosted by the UN Environment Programme (UNEP).

The report, the final version of which is to be published later in the year, also underlines the big energy and climate change gains that could be achieved if greater end-of-life recycling rates of more commonly known metals were achieved.

Metals such as iron and steel, copper, aluminum, lead and tin enjoy recycling rates of between 25 per cent and 75 per cent globally with much lower rates in some developing economies.

Boosting those further through better collection systems and recycling infrastructure, especially in developing countries, could save millions if not billions of tones of greenhouse gas emissions while also generating potentially significant numbers of green jobs.

This is because recycling metals is between two and ten times more energy efficient than smelting the metals from virgin ores, says the report.

Achim Steiner, UN Under-Secretary General and UNEP Executive Director, said: "Urgent action is now clearly needed to sustainably manage the supplies and flows of

these specialty metals given their crucial role in the future health, penetration and competitiveness of a modern high-tech, resource efficient Green Economy".

"Boosting end-of-life recycling rates not only offers a path to enhancing those supplies and keeping metal prices down, but can also generate new kinds of employment while ensuring the longevity of the mines and the stocks found in nature," he added.

"Meanwhile, improving the recycling rates of common, mass-produced metals such as copper and steel could also play an important part in meeting climate change targets and keeping the global temperature rise below 2 degrees C by 2050. There is currently a gap between the ambition of nations and the science amounting to several gigatonnes of C02. Metals recycling could play a part in helping to bridge that gap," said Mr Steiner.

Also launched today was another final report called *Metals in Society*. The two reports, launched during a meeting of the UN's Commission on Sustainable Development in New York, are part of six being prepared on metals by the Panel.

The Panel is co-chaired by Drs Ashok Kosla from India and Ernst von Weizsacker of Germany and its Working Group on metals is chaired by Thomas Graedel, professor of Industrial Ecology at Yale University.

Professor Graedel said: "One of the phenomenons of our modern, industrial age is that increasingly metal stocks are 'above ground' in structures such as buildings and ships to products from cell phones to personal computers".

"For example around 240 kg of copper per person in the United States is now 'above ground' and this could increase three to nine fold over the coming years given global development patterns," he said.

"Yet these above ground supplies of both common and specialty metals represent an extraordinary resource for sustainable development not only in terms of supplies but also the opportunity for reducing energy demand while curbing pollution including rising greenhouse gas emissions," he added.

Key Findings from *Metals in Society* and Preliminary Ones from *Metals Recycling*

- The amount of steel per person in the United States is now 11 to 12 tonnes and in China it is 1.5 tonnes

- World-wide stocks of metals in society have grown such there is enough copper 'above ground' equal to 50 Kg per person.

- Since 1932, the amount of copper per person in the United States has grown from 73 Kg to close to 240 Kg now.

- If this pattern is followed by all countries, the amount of copper and other metals in structures and products would be three to nine times today's levels.

- The lifetime of copper in buildings is 25 to 40 years whereas in PCs and mobile phones, the lifetime of the metal is less than five years

- For many technology or specialist metals like indium and rhodium, more than 80 per cent of all such metals ever extracted from natural resources have been dug up and mined in the past three decades

- Global demand for metals like copper and aluminum has doubled in the past 20 years

- Lack of adequate recycling infrastructure for WEEE (Waste Electrical and Electronic Equipment) in most parts of the world causes total losses of copper and other valuable metals like gold, silver, palladium, tin etc

Producing metals from recycled sources has multiple, Green Economy benefits when compared with producing and using primary metals from mines.

These include reduced impacts on the environment including water resources and biodiversity; reduced energy requirements and hence cuts in greenhouse gas emissions and an opportunity to create new jobs and livelihoods.

Other considerations concern the fact that some of these metals deposits and mines are confined to certain geographical locations. For example Lithium in South America and rare earth metals in China.

Other Key Facts

- Current global steel production uses 1.3 billion tones of steel which cause 2.2 billion tones of greenhouse gas emissions

- 'Secondary', reclaimed steel causes 75 per cent less greenhouse gas emissions

- Emissions from recycled aluminum are seven times lower that primary aluminum production

- But currently only a few metals, such as iron and platinum, have end-of-life recycling rates of 50 per cent or above.

- For each 100 million tones of primary steel, substituted by secondary or recycled steel, a saving of around 150 million tones of CO_2 is possible.

The reports cites palladium as a good example of the around eight precious metals studied including gold and silver.

Palladium is used in car catalysts; industrial catalysts and areas such as dentistry and jewelry

- Currently recycling rates can be as high as up to 90 per cent in industrial applications with more moderate rates in automotive uses where rates are around 50 per cent to 55 per cent.

- However in electronic applications recycling rates are just between five and ten per cent in part because less than 10 per cent of consumer cell phones are recycled properly.

The researchers cite indium as one of close to 40 specialty metals, including rare earth metals, studied.

Indium is used in semi conductors; energy efficient light emitting diodes (LEDs) advanced metal imaging and photovoltaics.

The report underlines that such metals are crucial for sustainable, clean technologies like renewable energy and advanced batteries.

- Indium is also a metal found in low concentrations in nature and as a by-product of zinc ores.
- Strong growth in gross demand is predicted for indium: from around 1,200 tonnes (2010) to around 2,600 tonnes (2020)

- Current recycling rates are thought to be below one per cent with a similar story for other specialty metals
- Other specialty metals include tellurium and selenium for high efficiency solar cells
- Neodymium and dysprosium for wind turbine magnets
- Lanthanum for hybrid vehicle batteries
- Gallium for LEDs

Notes to Editors

The Secretariat of the Resource Panel has prepared the following webpage for these metal reports:
http://www.unep.fr/scp/rpanel/Metals1.htm.

On this webpage you can download the flyer announcing the first two metals reports of the Resource Panel on metal stocks in society and recycling rates in six UN languages. The first report and will be downloadable on this webpage on 13 May.

Until 13 May, the first metal report on "Metal Stocks in Society: Scientific Synthesis" can be downloaded" at:
www.unep.fr/scp/publications/details.asp?id=DTI/1264/PA

Moreover, an illustrative PowerPoint presentation is available for download with the report and the flyers at:
www.unep.org/metalstocks

The PowerPoint presentation gives in a user-friendly way an introduction to the work of the Global Metal Flows group, highlights the conclusions of the first report "Metal Stocks in Society: Scientific Synthesis" and indicates current findings of the second report on "The Recycling Rates of Metals: A Status Report" that is to be finalized by autumn.

The International Panel for Sustainable Resource Management, or Resource Panel for short, was officially launched in November 2007 and is expected to provide the scientific impetus for decoupling economic growth and resource use from environmental degradation. The objectives of the Resource Panel are to:
a. provide independent, coherent and authoritative scientific assessments of policy relevance on the sustainable use of natural resources and in particular their environmental impacts over the full life cycle;
b. contribute to a better understanding of how to decouple economic growth from environmental degradation.

For more information on the Resource Panel see:
http://www.unep.fr/scp/rpanel/

On 16 October, 2009 UNEP Executive Director Achim Steiner joined Steering Committee Co-Chair Timo Makela, European Commission, to the launch of the first assessment report of the Resource Panel on "Assessing biofuels - Towards sustainable production and use of resources: Assessing Biofuels". Please find more information on the report and download it at:
http://www.unep.fr/scp/rpanel/Biofuels.htm

On 22 February UNEP Executive Director Achim Steiner launched the report "Recycling -- From E-Waste to Resources" at a meeting of chemical experts prior to UNEP's Governing Council in Bali, Indonesia. The report prepared together with UNU's Solving the E-waste Problem (StEP) Initiative identifies an urgent need to prepare developing countries for surge in e-waste. Please download the report at:
http://www.unep.fr/scp/publications/details.asp?id=DTI/1192/PA

In 2009 UNEP published already the report "Critical Metals for Future Sustainable Technologies and their Recycling Potential" prepared with the Oeko-Institute. The focus of this study lies on future sustainable technologies (FST), such as renewable energies and energy efficient technologies, which will make use of indium, germanium, tantalum, PGM [platinum group metals, such as ruthenium, platinum and palladium], tellurium,

cobalt, lithium, gallium and rare earths. These are also classified as ‘green minor metals’, which are the basis for cleaner technology innovation and therefore an issue for recycling. Please download the report at:
http://www.unep.fr/scp/publications/details.asp?id=DTI/1202/PA

Acknowledgements;

Yale school of Forestry & Environmental Studies (http://environment.yale.edu/)
The Yale school of Forestry & Environmental Studies is internationally known for its excellence. Founded in 1901, the school offers master’s degrees and doctoral programs and serves as a locus for research into local, regional and global environmental issues.

Öko-Institut (http://www.oeko.de)
The Öko-Institut is a leading European research and consultancy institution working for a sustainable future. It employs more than 130 staff, including 100 researchers, at three locations: Freiburg, Darmstadt and Berlin.

Umicore (http://www.umicore.com)
Umicore is an international speciality materials group. It's business unit Umicore Precious Metals Refining offers eco-efficient recycling services for electronic scrap and other valuable metal bearing materials to a global customer base. In its state-of-the-art integrated metals smelter and refinery at Hoboken/Belgium precious metals as well as base and special metals are recovered and brought back to the market as pure metals.

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