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## Let's Not Waste Our e-waste

By David Dupont

**W**aste. Most people will associate this word with something they want to get rid of, something without value. But electronic waste or so-called e-waste still contains vast amounts of scarce metals and valuable elements.



E-waste is the most rapidly growing type of waste all over the world, as the first generations of mobile phones and computers are reaching the recyclers. In 2012, 14.2 kg of e-waste was discarded on average by every person on earth.<sup>1</sup> The potential of this type of waste as a sustainable resource for scarce elements is enormous, because e-waste is already a concentrate of gold,

palladium, silver, rare-earths, etc. For example, a mobile phone contains about 305 mg of silver and 30 mg of gold which is 40 to 50 times more concentrated than in the ores from primary mining.<sup>2,4</sup>

In addition, the recycling of e-waste also regenerates the required metals in the ratios needed to manufacture these devices again. The amount of use-



less side products is therefore reduced to a minimum compared to ordinary mining.

### Closed Loop Production

The biggest bottleneck at this moment is the efficient collection of this type of waste. Surveys show that every American consumer holds two unused cell phones on average at home, because 60% cannot be bothered to turn in their old devices—even though the recycling value of modern smartphones can easily reach a hundred dollars.<sup>3</sup> It is estimated that US consumers are sitting on \$33.8 billion in used mobile phones.<sup>3</sup> More effective marketing and financial incentives could motivate people to bring their unused electronic equipment to collection points.



YourFormula.eu is an online platform and multimedia magazine, powered by Cefic (The European Chemical Industry Council) where young chemistry enthusiasts blog about chemistry's role in a sustainable world. In addition to inspiring articles, YourFormula collects videos, news and events, sharing the great innovations taking place in Europe and pointing to a more sustainable future.

This online platform also covers major international scientific discussions, such as the Young Observers World Leadership Meeting 2013, during the IUPAC General Assembly, in Istanbul. IUPAC also wants to support and highlight the views of younger generations on sustainability matters, and will be featuring some blog posts from the YourFormula community in upcoming issues of *Chemistry International Magazine*.

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Several encouraging examples exist like shops offering discounts for a new mobile phone when an old one is handed in.

Fluorescent lights and batteries have an advance compared to other electronic equipment because they contain toxic elements that have to be dealt with accordingly, to avoid them ending up in the wrong places. Governments therefore put in place efficient collection methods and urged the public to bring in their used batteries and energy-saving lightbulbs, using advertising campaigns to raise public awareness about this issue.

These strategies were initially put in place to deal with the toxic elements they contained, but very soon different companies started to develop recycling schemes to retrieve the valuable elements from this new type of feedstock. Several successful examples exist like the recycling of computer circuits, rechargeable batteries, mobile phones, high-end magnets and energy-saving light bulbs by chemical companies such as Umicore and Solvay.<sup>4</sup> These companies have developed a profitable business around this idea of urban mining, where waste is no longer considered a problem but a solution!

With over \$21 billion worth of gold and silver used in electronic gadgets every year, and only 15-20% of that being recycled, it is not surprising that green tech was the most rapidly growing industry of 2013.<sup>5</sup>

The rapidly growing amount of e-waste is therefore receiving increasing attention as the feedstock of the future. The European Commission and the United Nations have identified the recycling of e-waste as a top priority for the development of a sustainable high-tech industry and the safeguarding of scarce resources.<sup>6,7</sup> Reusing the valuable elements trapped inside these devices is the key to a “closed loop” sustainable manufacturing of the electronic gadgets we are all so keen on.

The burden on the environment often associated with primary mining would become too large if the upcoming economies started consuming high-tech products as we do. But in a closed-loop system, very few of these rare elements are lost and a completely new innovative industry can even emerge to try and retrieve them as efficiently as possible – transforming piles of mobile phones into fresh new bars of gold, silver, palladium, cobalt and all the other elements



needed to manufacture these amazing devices that connect us to the world. The way we think about waste is changing rapidly! 🌱

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David Dupont is a PhD student in chemistry at the University of Leuven, Belgium. His research focuses on the recycling of rare earths and valuable metals. He is interested in moving towards (R&D) management or policymaking in the chemical industry or in a European institution. This would combine his interest in chemistry and sustainable resources with his aptitude to think global and change the way we think about resources.

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