SDG Accord Case Study

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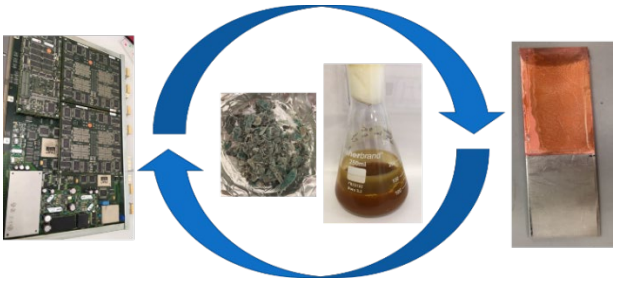
The SDG Accord

The University and College Sector's Collective Response to the Global Goals

Coventry University



Integration of SDGs in

☐ Institutional governance/strategic level
☒ SDGs in research
☐ SDGs in campus operations
☐ SDGs in curriculum development
☐ SDGs in student engagement activities
☐ SDGs into community activities
☐ SDGs at a whole-institution level

Focus on

☐ Goal 1 - No poverty
☐ Goal 2 - Zero hunger
☐ Goal 3 - Good health and wellbeing
☐ Goal 4 - Quality education
☐ Goal 5 - Gender equality
☐ Goal 6 - Clean water and sanitation
☐ Goal 7 - Affordable and clean energy
☐ Goal 8 - Decent work and economic growth
☒ Goal 9 - Industry, innovation and infrastructure
☐ Goal 10 - Reduced inequalities
☐ Goal 11 - Sustainable cities and communities
☒ Goal 12 - Responsible consumption and production
☒ Goal 13 - Climate action
☐ Goal 14 - Life below water
☒ Goal 15 - Life on land
☐ Goal 16 - Peace, justice and strong institutions
☒ Goal 17 - Partnerships for the goals

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Summary:

Over 50 million tonnes of electronic waste are generated globally each year, equal to the weight of 4,500 Eiffel towers. With only 20% formally recycled, e-waste is routinely shipped overseas for disposal where it is burned through inefficient extraction processes, exposing workers and ecosystems to toxic by-products.

E-waste is not just "another plastic" as it is estimated that worldwide €55bn of rare metals including gold, silver, copper and platinum are lost annually. At Coventry University (CU), we have developed a Bioleaching-based innovative, efficient and green solution to recover precious metals from e-waste. The process, which involves the use of non-toxic bacteria to extract the metals from their solid support, does not require high-energy nor toxic chemical. Its impacts have been acclaimed by DEFRA at the launch of their Sustainability Alliance for IT, demonstrating not only its vital economic and environmental impacts but also its potential role towards policy changes.

Bioleaching is a process whereby microorganisms are used to extract metals from their solid support. This natural process has been used in the mining industry for decades, but for waste applications it has remained mainly an academic exercise for specialised publications. Our initiative at Coventry University is, to our knowledge, the first industrial application of bioleaching to the recycling of metals. To complete a closed-loop system, the processes are not limited to the microbiological solubilisation of the metals, but combined to a range of sustainable electro-chemical methods to obtain metals with a high degree of purity, to be recycled back into multiple supply chains. Through a KTP, a knowledge transfer Partnership, with a Company, N2Sltd, the technology has been transferred to industry and its applications are starting to replace classical unsustainable methods such as Hydrometallurgy and pyrometallurgy that use strong acid and high heat, while creating a new industry.

Outline the 3 key benefits of integrating this theme:

1. Bioleaching as a Sustainable Technology: the use of microorganisms to recover metals, instead of hydrometallurgy and pyrometallurgy, which by using strong acids and high temperature melting are unsustainable with unacceptable carbon footprint.

2. Selective recovery of rare precious metals that belong to Critical Raw materials, much more efficient than classic methods, therefor opening new products form waste for new supply chains.

3. Avoiding the loss of materials abroad: Bioleaching plants are created in –house, and avoid transport and loss of waste and rare material abroad, some of which we have to buy back!

Outline the barriers or challenges encountered in integrating this theme and how you overcame these:

1. Developing new methods to adapt the technology to electronic waste materials was challenging. By working across centres with multidisciplinary approaches, we combined microbiology expertise from life sciences with electro-chemistry from engineering to develop

closed –loop cycle systems to recover metals with high degree of purity, with very low carbon footprint, no production of acid waste and no need for high energy.

2. Transferring knowledge to societal applications is always a challenge for academic and fundamental research. Working in partnership with N2Sltd (now Bioscope) created the way for us to have an impact, to transfer and apply our methods to the real world to make a real change. N2S had not only the material and the context, but also all the understanding of the issue of e-waste, and the right network including DEFRA, for us to access all stakeholders in the industry and policy.

3. Partnership between industry and academia is also often a challenge to manage. Whereas industry focusses on economic targets, academics tend to target knowledge and publications. The Innovate UK funding KTP helped us to create this successful partnership between N2S and CU. Thanks to all the internal support and the will on both side, this partnership turned to be very successful and continues to this day.

Please outline your conclusions and recommendations to others:

This project represents the reason why academia and industry should and need to work together, towards a solution to save our world! Thanks to this partnership, our group has been able to transfer our methodology to the real world to have a real impact. The project has been submitted as an Impact Case study to REF21, and among the 11 awards it received, was the National Innovate UK KTP award for the category "changing the world", which is what our aim is! Our bioleaching research group has continued to expend its impact in other fields of metal recovery including with EV batteries. Thanks to this project, N2S has benefitted from a very large private investment, which has led to the creation of a new company, Bioscope Tech, which is now developing further technologies and applications in their facilities in Cambridge, while our bioleaching research group has continued to expend its impact internationally. My main recommendation would be that only if academics and industry work together, can academic fulfil their aim, where our knowledge and expertise can be beneficial to our world and make it a better place.