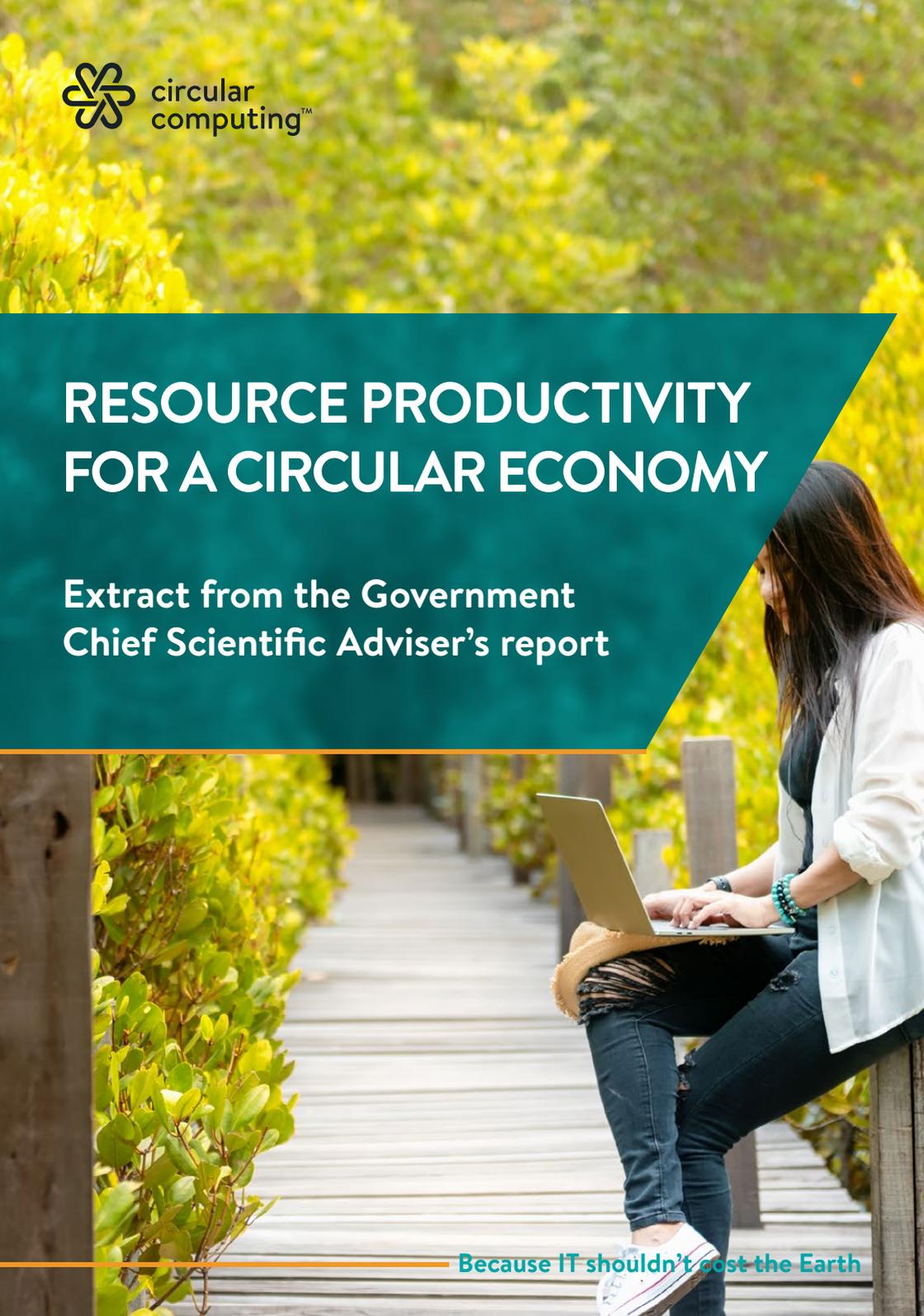


RESOURCE PRODUCTIVITY FOR A CIRCULAR ECONOMY

Extract from the Government
Chief Scientific Adviser's report



Because IT shouldn't cost the Earth

From Waste to Resource Productivity: ICT and Remanufacturing

Novel technologies, processes and business models have the opportunity to transform systems of production, distribution and consumption.

In a series of extended case studies, expert authors consider the potential impacts of developments ranging from 3D printing to the 'sharing economy' enabled by online platforms. In each area, policymakers can help stimulate these developments to create more sustainable waste solutions.

Understanding ownership and production chains are both critical to reducing waste.

Andy Clifton explains how the Rolls-Royce TotalCare® scheme aims to provide ongoing management of the engines they make. This reduces repair and maintenance demands, encourages improved product design, and provides data that feed back into design and innovation to improve future products and services.

Walter Stahel and Conrad Mohr pick up the theme of product ownership, illustrating how end-of-lease remanufacturing of information and communications technology (ICT) can be profitable and at the same time reduce greenhouse gas emissions, build national resource security, and contribute to 'intelligent decentralisation' (using radically different models of manufacture and service such as 3D printing, repair cafes and energy autonomous buildings).

Remanufacturing ICT Equipment

ICT hardware is an ideal candidate for remanufacturing, a process that rebuilds, repairs and restores equipment to meet or exceed its original performance specifications. It enables yesterday's technology to deliver the same performance as today's new technology, and can be applied to equipment that has been sold or leased to corporate clients, public bodies, or individuals. ICT remanufacturing offers a range of

environmental and societal benefits, and is also profitable.

The 2008 EU Waste Directive lists waste prevention as its first priority, and reusing products – or extending their lifespan through remanufacturing – are the best tools to achieve this goal (managed under the EU Waste Electrical and Electronic Equipment (WEEE) Directive).



Remanufacturing supports 11 of the UN's 17 Sustainable Development Goals to end poverty, fight inequality and injustice, and

tackle climate change by 2030. It is also the most economically- and environmentally-profitable business model of the circular economy.

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A typical microchip incorporates 42 elements of the periodic table, and recycling these separately is an almost impossible task. Instead, remanufacturing can bypass bottlenecks in recycling and turn imported goods into a national resource. This helps to preserve metallic and mineral resources (including rare earth elements), prevents the loss of these resources in recycling processes, and reduces the global trade in electronic waste.

Carrying out safe, low-carbon processes here in the UK can replace mining operations and ICT production processes abroad that

may have a larger environmental footprint. As a consequence, it also offers a way to help tackle the health, safety and environmental hazards of mining and the global waste management industry.

Remanufacturing businesses in the UK can increase skilled local employment and taxable revenue, potentially playing an important role in the 'intelligent decentralisation' of high-tech industries and contributing to regional reindustrialisation.

Circular Computing™ in Portsmouth, for example, is a leading ICT remanufacturing company that employs 100 skilled people who processed 700,000 desktops and laptops from 2013 to 2015.

Circular Computing™ has developed a process to remanufacture 99% of compliant end-of-lease ICT, upgrading it to meet customer specifications.

This typically extends the useful life of 3- to 5-year-old PCs by at least another nine years, providing another

three lifecycles of operation. The lower sales price of remanufactured ICT also helps to bridge the 'digital divide', by making the equipment more affordable for a wider range of customers.

Circular Computing™ is developing additional services, such as geolocation tracking software to create a transparent chain of custody for used ICT, and social inclusion programmes that donate equipment to charities.

The future outlook for remanufacturing

The potential for remanufacturing is set to grow, as manufacturers and consumers shift their focus from simply buying the latest hardware to ensuring that they have the software (or apps) that they need. Reprogrammable microchips can extend the service life of ICT equipment by remotely upgrading key functions, thus removing one of the main reasons for periodic replacement of hardware.

This all makes renting or leasing hardware more attractive, potentially increasing the demand for local ICT repairs and remanufacturing. National and local governments potentially have a key role to play in this sector. Using remanufactured ICT equipment could help them to make better use of their budgets, providing 'more IT for less money'.

The UK government is one of the country's largest users of ICT equipment, and has advocated ICT reuse. The US government has already adopted and accepted ICT reuse in public procurement policy, and has a stated preference for buying services instead of hardware.

Policymakers could also substantially increase national competitiveness by promoting remanufacturing as part of the circular economy as a whole, through a number of measures:

- **Much of the economic and technical knowledge of the circular economy is currently in the hands of SMEs such as Circular Computing™; and fleet managers such as Xerox, Rolls-Royce, the armed forces, and Caterpillar. Bringing this knowledge into universities and vocational training will help the economic transition to a circular economy**
- **Stimulating basic research into technologies to depolymerise, de-alloy, de-laminate, de-vulcanise materials, and de-coat surfaces could improve and extend remanufacturing, and its associated recycling processes**
- **Policymakers can help to close 'liability loops' by clarifying the ownership of waste ICT equipment, through schemes such as Extended Producer Responsibility. If there is no available loop option (eg. remanufacturing or environment-friendly recycling) at the end of a product's service life, the manufacturer or importer should be liable to take the product back and develop such a method or process at their expense.**



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www.circularcomputing.com
enquiries@circularcomputing.com



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