Creating a circular economy in ICT

Innovations for reducing the impact of e-waste

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TES

We're living in a **'take-make-waste'** linear economic model, where materials are extracted, used and then thrown away. This isn't the model we need if we're to create a sustainable world economy, one that's both equitable and eco-friendly for our living planet.

We need a circular economy; an economy that redefines growth, extracts the maximum value from materials and decouples that growth from overconsumption. This means extending the life of products and materials by utilizing the best of modern technology.

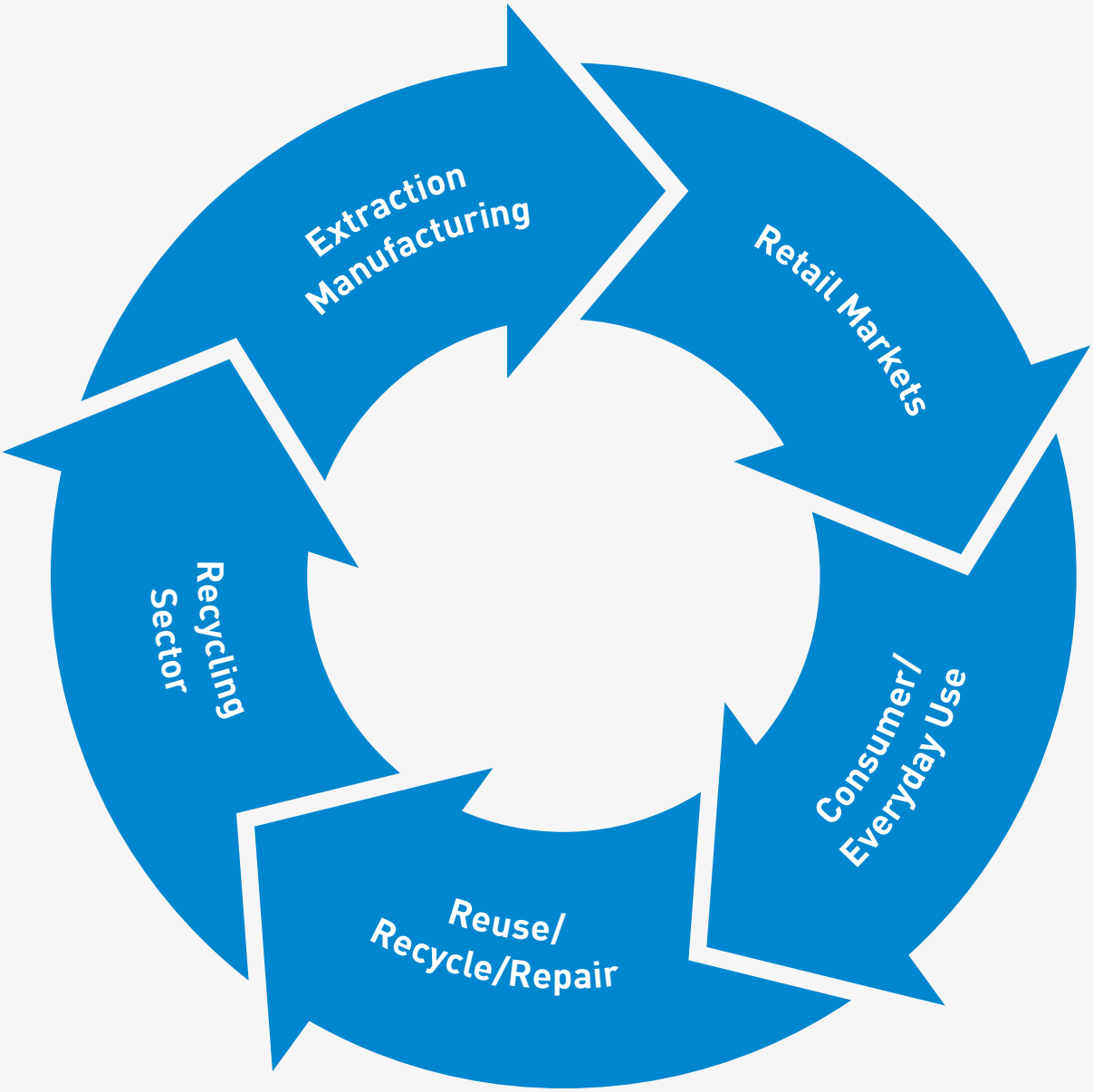
It's an economy that re-evaluates what is and isn't waste, with green transitions driven by eco-friendly innovation. It's an economy that realizes infinite growth can't happen on a finite planet and so works to ensure sustainable business continuity, for today and tomorrow.

The circular economy we promote builds natural, economic and social capital. Read on to discover what the circular economy looks like in practice and how TES is contributing to this sustainable economic model.

Exploring the circular economy

A circular economy represents a more environmentally-friendly and equitable alternative to the linear economy. In it, resources are used for the longest period of time and when discarded, the materials which are still commodity-grade can be reintroduced into new products.

In the circular economy, materials undergo the following process:



The linear disposal method

The linear disposal model - or the take-make-waste model - is the traditional model for resource and product consumption that's long been widely used within our global economy.

Extraction

At this point, raw materials, such as heavy or precious metals (commonly used materials in electronics) are extracted from the earth. **Mining is currently responsible for 4-7% of greenhouse gas emissions (GHGs)** with 1.9-5.1 gigatonnes of CO2 equivalent.

Manufacturing

The stage in which raw materials are processed and formed into products. According to World Bank data, in 2014 (the latest available data) **manufacturing equated to 19.96% of all fuel combustion.** Manufacturing in construction, textiles and transport equipment (amongst others) account for 10.6% of GHGs.

Use

In the traditional linear model, products, such as smart phones and laptops, are only used once. While this may be for a long amount of time with some tech, others can inhabit a small use life. For example, the average age of the installed base computer seems to be reducing, decreasing from 4.13 years in 2017 to 2.94 years in 2021, showing that the lifespans of computers are decreasing before being replaced.

It's what happens next that truly differentiates the linear from the circular economy.

End of Life

End of Life - or EOL - is a term used to describe technology no longer supported or maintained. This doesn't necessarily mean that a specific technology needs to be disposed of. However, in a linear economy, this is no longer seen as a valuable product and is therefore thrown away.

Electronic products, with new models and software that come out year upon year, are some of the most common items to be given the EOL status by corporations.

Disposal

This is the point where e-waste is physically sent to landfill (or incinerated) after it has been discarded. In low and middle-income countries, the amount of waste recycled is very low. The recycling is usually unsafe, such as burning circuit boards to recover copper.

In unsafe practices like this, toxic metals such as cadmium, lead and mercury leach out, affecting not only the environment but also severely impacting the health of workers and local communities. It's estimated that 50 tonnes of mercury originating from e-waste is dumped every year.

Information & Communications Technology (ICT) and e-waste statistics

Supporting the transition towards a circular economy first begins with ingratiating yourself with the data. The scale of e-waste globally is vast and the environmental footprint it represents is similarly massive.

In the 2019 'A New Circular Vision for Electronics' report by the World Economic Forum (WEF), it was found that on average, six kilograms of electronic waste was generated per person globally. This is equivalent to 125,000 jumbo jets.

This isn't the only statistic that describes the size of the waste material we're facing.

In 2016, 44.7 million metric tons of e-waste was generated globally. That's the same weight as 4,500 Eiffel Towers.

Europe and the US alone contribute to almost one-half of all the e-waste generated globally.

Roughly 80% of e-waste is either sent to landfill, burned, traded illegally or treated in a sub-standard way.

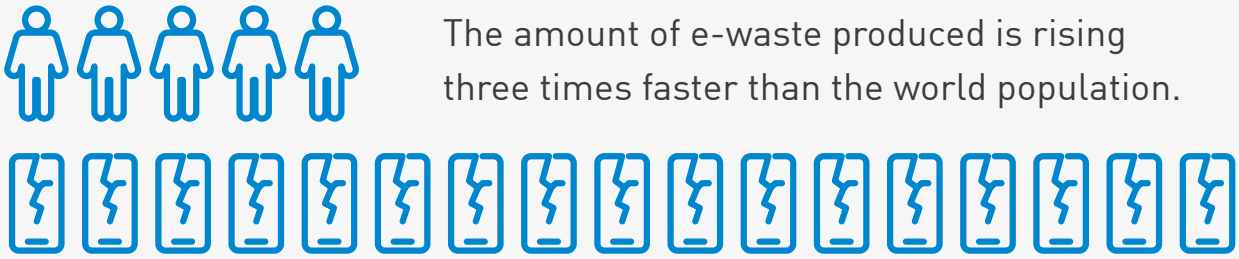
Around 50% of e-waste is made up of personal devices; laptops, smartphones, computer (The rest is larger household appliances, alongside heating and cooling equipment).

21% In 2019, the amount of e-waste generated had grown by 21% over five years.

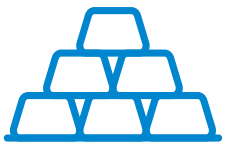
52 million In 2021, the annual e-waste total is expected to rise to 52 million metric tons.

14% It's expected that by 2040, 14% of our annual carbon emissions will be attributable to electronics production.

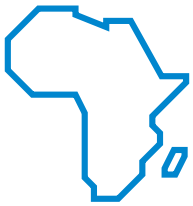
120 million By 2050, at current rates, e-waste production could hit 120 million metric tons per year.



The amount of e-waste produced is rising three times faster than the world population.



According to the UN's Global E-waste Monitor Report, at least $10bn worth of precious metals, such as gold and platinum, end up in landfills.



E-waste generation isn't globally consistent. In 2019, the per capita production of e-waste in Northern Europe was roughly 23kg. In Africa, this was roughly 3kg.

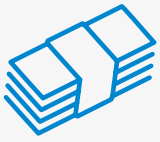
E-waste recycling rates vary globally. In Europe, this was at 42% in 2019. In North and South America it was 9% and in Africa, the rate was 0.9%.

Recycled metals can range from two to 10 times more energy-efficient than those smelted from virgin ore.

In many countries, unregulated recycling processes means that roughly 30% of the workforce is made up of vulnerable women and children.

The full amount of informal workers employed in the e-waste recycling industry is unknown. In China, numbers are thought to be around 690,000 and in Nigeria, this is around 100,000.

In terms of emissions, manufacturing a tonne of new laptops equates to around 10 tonnes of carbon dioxide (CO2).



In 2017, the value of raw materials in e-waste was worth $US62.5 billion annually.

Being able to sustainably and ethically dispose of IT waste is a way to help the planet, but also a way for companies to differentiate themselves from their competitors. It is that 'good news' story that brands can tell their customers, as many won't be considering the environmental and social implications of an enterprise IT infrastructure.

The circular economy model

The circular economy is regenerative. There's an emphasis on reuse and repairability. For example, France requires technology products to be sold with a 'repairability index' - a score of how easy it is to repair products, in order to lessen the environmental impact of technology use.

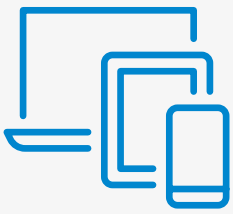
With the energy needed for production and distribution of new products being vastly larger than for reuse or repair, it makes environmental sense to pursue these kind of circular methodologies.

In a circular economy, organizations large and small recognize the need for efficiency, working to three key principles:

1

The regeneration of natural resources and systems.

2

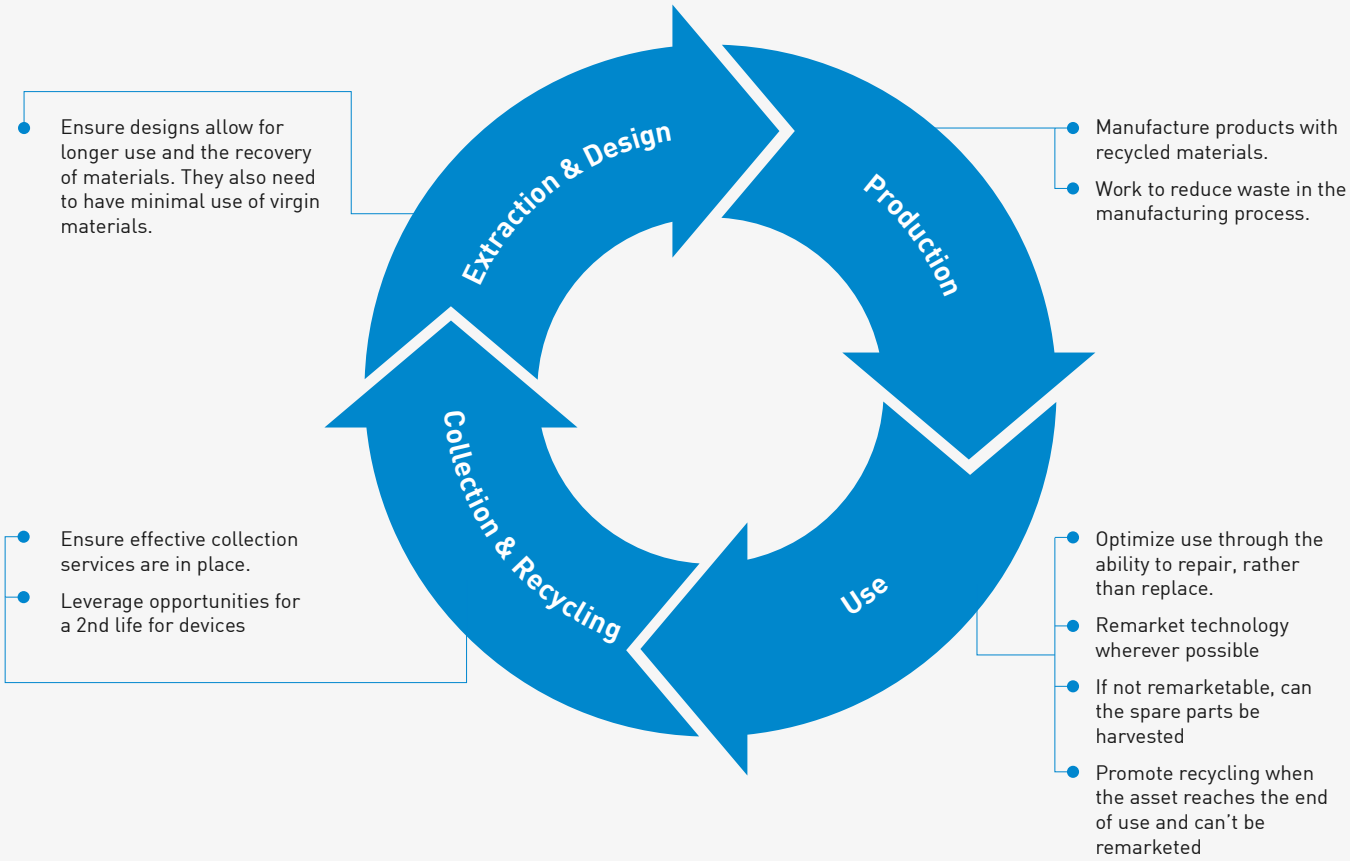


Extending the value and use of products by increasing their lifespans.

3

Designing out both waste and pollution.

This isn't about limiting the negative impacts of the linear economic model, but rather demanding systemic change. So what does it look like?



Similarly, a sustainable circular economy also needs to consider investing in recycling infrastructure and promoting and developing the market for recycled materials.

The benefits of a circular economy include:

- ✓ Reduced dependency on resources.
- ✓ Minimized waste production and disposal.
- ✓ Lower cost of materials.
- ✓ Reduced environmental footprint.

The TES process

Here at TES, we employ a number of key processes that can take what could be disposed of e-waste and turn it into commercially viable products. In 2020, we processed over 70,000 metric tonnes of e-waste - at a rate of 98.7% of materials recycled.

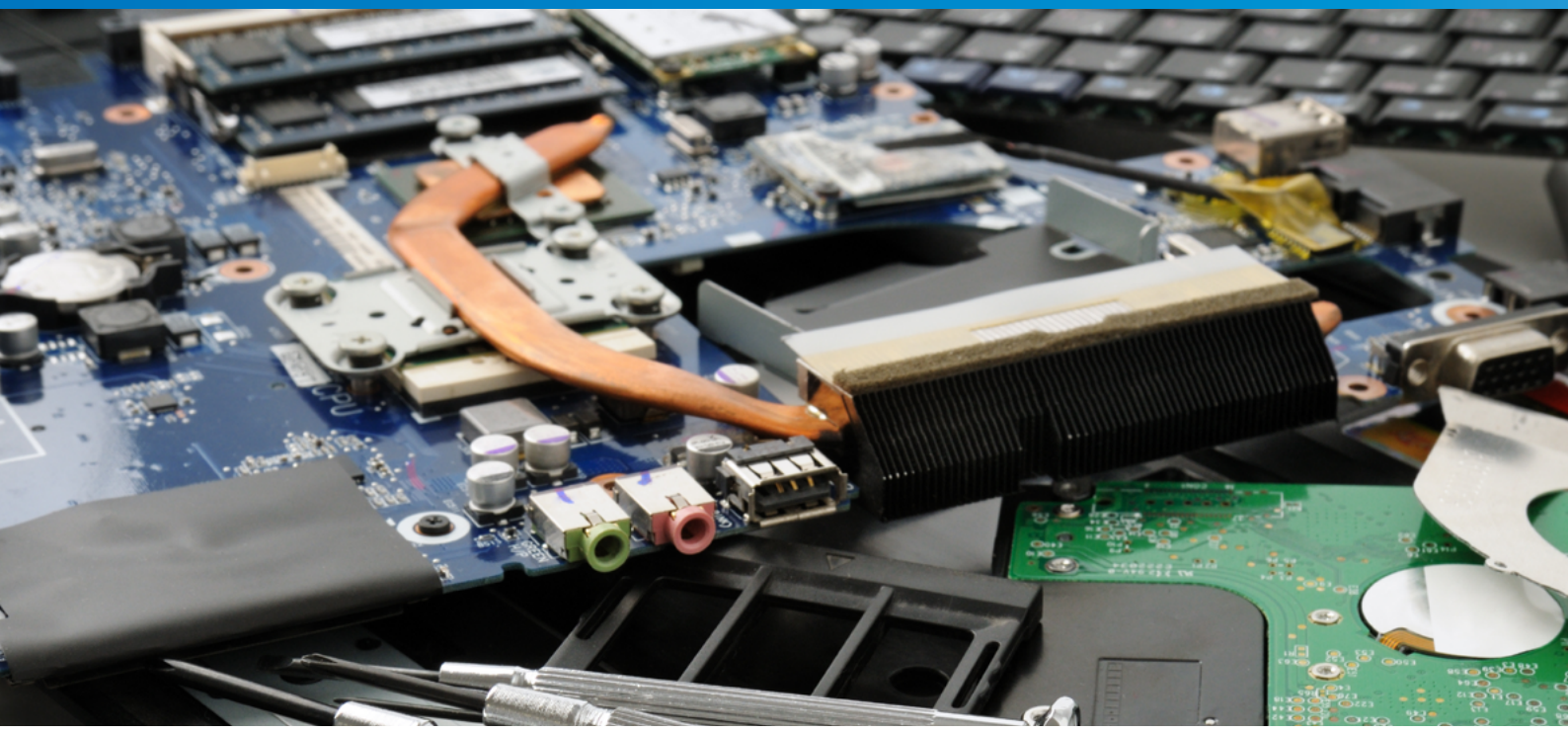
So what are the benefits? It's not just about recycling.

Extending the first life of products:

Before we recycle, we see if we can re-market, therefore extending the lifespan of the technology. We follow a regimented testing, refurbishment, and data sanitization process to prepare it for its next life.

Spare parts harvesting:

If there's no potential for re-market, we will see if there are valuable parts to be harvested for reuse.



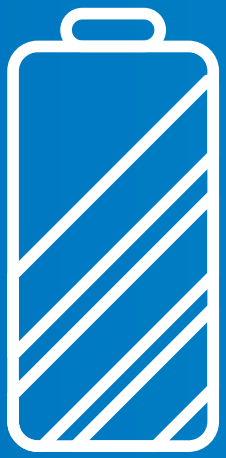
If that isn't possible, then we recycle - efficiently and compliantly. Throughout our process, TES can guarantee:

Cleantech processing reduces environmental impact: Using innovative techniques, we extract precious metals and other components which would otherwise be lost. These are then fit for reuse. We're helping to close-the-loop on e-waste recycling.

Eliminating compliance risks: TES's processes, security, transboundary permits, certifications, and in-house capabilities inherently lower our client's risk profiles. As a leader in the industry, we're helping to develop national and local guidelines for e-waste leveraging our compliance expertise in the regions we operate in.

In-house processing: From beginning to the end, every device you need recycled is handled by a professional.

Recycling in-line with best practice certifications: Our facilities are certified to ISO 9001, ISO 14001, ISO 27001, ISO 45001:2018, and R2.



One of our latest innovations is around lithium battery processing. Lithium batteries are one of the most popular types on the market, being driven by a rise in smartphones, IoT, and electric vehicle usage. Because of that, the need to recycle batteries is growing exponentially.

Here are the facts:

$100.4 billion

The lithium battery market is expected to $100.4 billion by 2025, compared to a market size of $30.2 billion in 2017.

67% market demand

Electric passenger vehicles are expected to account for 67% of total market demand for lithium batteries by 2030.

2,600 GWh

Global demand for batteries is expected to increase to 2,600 GWh by 2030, compared to 184 GWh in 2018.

$137 per kilowatt hour

The price of a lithium battery pack dropped to $137 per kilowatt hour in 2020. This price is expected to continue to drop further as the popularity of the technology increases.

5 million tonnes

By 2025, the weight of lithium batteries being sold each year will increase five-fold to nearly five million tonnes.

11 million tonnes

Over 11 million tonnes of used lithium batteries are forecast to be discarded by 2030.

Our proprietary technology is environmentally friendly, offers industry leading recovery rates, and produces commodities like cobalt and lithium at a purity that can go directly back into the forward supply chain.

The TES Sustainability Report

We've compiled performance data from all operational sites, setting a new baseline for TES, allowing us to plan and build on our sustainability initiatives and promote transparency for businesses.

It highlights progress and achievements in contributing to the circular economy and demonstrates the ongoing commitment to sustainable practices and innovation.

We're proud to have achieved:

- A 98.7% recycling rate.
- 11,167 hours of training delivered.
- Ensured stakeholder engagement with the Carbon Disclosure Project (CDP) Supply Chain Program.
- Innovated lithium battery recycling and reuse.

2019 Sustainability Report

Inside, you'll find full transparency on our environmental initiatives, ethics and business conduct, data security efforts and innovations within the circular economy, amongst other key insights.

You can download our Sustainability Report here.

Conclusion

This information is just the starting point for businesses to make note of their impact and begin to reduce it. Currently, our system is characterized by overconsumption and waste. The circular economy is an efficient, economically-wise alternative.

The transition towards a circular economy must also be equitable. All stakeholders involved, from recycling center workers to business owners, must take responsibility to get the benefits. We invite you to start redesigning your business operations in order to make a difference. To find out how you can begin, contact us today.

Contact us