

Case studies: Sustainable solutions for transforming the smartphones and ICT sector

How to offset your phone

[Closing the Loop \(CTL\)](#) is a Dutch social enterprise operating between Europe and sub-Saharan Africa. It was founded after Joost de Kluijver saw how mobile phones turn into harmful e-waste in developing countries. Second-hand phones are valuable in low-income countries, and can contribute to several [Sustainable Development Goals](#). However, their contents – for example heavy metals and flame retardants – also create a dangerous waste problem. Two-thirds of used phones shipped from Europe and the US are sent to countries lacking safe e-waste recycling infrastructure. After their second or third life, they are dumped or processed in a way that harms health and the environment. At the other end of the equation, mining for new materials causes devastating environmental and social impacts. CTL uses a circular economy approach to reduce the harms of smartphones at the start and end of their lives.

Business model

CTL sets up systems in several African countries to bring scrap phones to the proper recycling facilities. Its clients are organisations that use a lot of phones and want to offset the negative impact of this. Clients pay a fee for each phone they purchase or dispose of. This fee allows CTL to recover a scrap phone from a developing country. CTL has the scrap phones sent to a specialist recycler, where the metals are extracted, plastic is used as fuel for smelting, and inert materials become building aggregate.

How it works

- Client buys new phones or sells old ones, and pays CTL a fee per phone
- CTL arranges collection of scrap phones in Africa
- Local community gains environmental health and financial benefits
- CTL sends the phones to certified recyclers
- Waste is safely converted into resource.

Client benefits

- Client achieves a smaller CO₂ and materials footprint, plus positive social impact
- Tangible results allow better engagement with employees, customers and investors
- Client has a commercial advantage with more sustainable services when bidding for contracts where sustainability is valued.

This 'one-for-one' model creates a memorable story for clients and their stakeholders: for every phone a client buys, they offset its new metals and prevent one scrap phone from causing harm in a developing country. The client also receives information for impact reporting and storytelling. CTL's service can be an add-on to a client's existing phone contract, or as part of a new supply bid. It can also deal with reuse policies, so that each used phone shipped to the developing world is made waste-free by the recycling of one African scrap phone.

To recover scrap phones, CTL works with local entrepreneurs in Africa. These range from individual students to large entities, and can receive support to expand their business. CTL sets up logistics (storage and transport) compliant with local and international law. The growth of this network was enabled by CTL's co-founder, who grew up in Ghana.

Impact and reach

CTL now retrieves scrap smartphones from Ghana, Cameroon, Mali, Nigeria, Uganda, Rwanda and Zambia, collecting more than 2.2 million phones from 2014-2018. About 3,000 people in these countries have earned income by participating. Local communities enjoy better environmental health, now that this e-waste is saved from landfill or burning, and recovery of the materials reduces the need for mining elsewhere. There is also a significant increase of awareness about circularity among CTL's clients and local networks. There is a demonstrable appetite for this sort of impact in procurement, as CTL has so far introduced circular telecoms for 32 organisations. Clients include ING Bank, Schiphol Group, KPMG, the Dutch government and Rabobank. CTL also helped leading IT reseller Centralpoint to win a tender by writing its 'one-for-one' service into a supply bid.



Image credit: Closing the Loop

Insight: e-waste – the future of mining?

The economic payoffs of electronics recycling could be enormous.

For example, gold mining yields six grams of gold per metric tonne of earth – involving huge inputs of energy, water, toxic chemicals and labour. But in a tonne of smartphones, the amount of gold can be 50 times higher¹.

With the right infrastructure, 'mining' old phones could be much more efficient than mining the earth.

Recycled materials can also claim the coveted status of being 'conflict-free' – offering manufacturers a way to leapfrog the legal complications of conflict minerals regulation.

¹ [Some ICT specialists state](#) there is about 362g gold in a ton of smartphones, [while others have indicated](#) 300g per tonne. However, these figures are changing as smartphone designs evolve to use materials more efficiently.

Scale-up, obstacles and replication: what next?

The 'material offsetting' model may also be replicable with other ICT equipment, and CTL is exploring a new scheme to offset network devices such as servers. And [in 2018 CTL began working directly with T-Mobile](#), a major European phone provider. A new 'Recycle Deal' lets customers sell their handset back to T-Mobile at the end of contract so that it is reused or recycled according to CTL's 'one-for-one' model. This partnership represents a great opportunity to upscale.

At present, CTL has to transport scrap phones to recyclers in Europe, which have certificates to prove they operate responsibly. An eventual goal could be to help develop safe recycling facilities in the countries where scrap phones are found. One obstacle is that specialist recyclers tend to believe there are unacceptable risks with operating in sub-Saharan Africa.

Project director Reinhardt Smit reports that three key types of cooperation are needed for scale-up.

Firstly, governments and companies must practice what they preach – many have targets to ‘be more circular’, but this is not yet built into procurement. Secondly, governments must adjust regulation that currently restrains the circular economy. Second-life phones are permitted to travel to developing countries, but the Basel Convention inhibits them from travelling back as ‘waste’. Batteries in particular fall foul of this regulation. It was intended to block export of waste to countries that cannot process it, but instead forces electronics down a one-way street. As a result, one-third of CTL’s time is spent trying to get containers of scrap phones moving. In some countries, CTL has found that officials are unwilling to provide permits to export scrap phones, as they are unfamiliar with the process and cannot risk legal sanctions. Smit observes that legislation around ‘waste’ is a conceptual failure – instead, it should be about ‘resources’. It is vital that governments cooperate towards circularity in a global way, and not only in their own countries.

Finally, CTL encourages those following its lead to act now rather than wait for a system to be perfect. For example, it may soon engage with additional recycling companies that do not have all optional certifications. They would help them work towards certification, expanding the capacity for safe e-waste recovery. The crucial thing is to build the momentum and networks that will allow a completely circular system for smartphones to develop over time.



Image credit: Fairphone

Find out more

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Keys to success

- A story to visualise the positive impact of paying for a ‘circular’ service
- Logistics expertise on safe and legal e-waste transport
- Strengthening the capacities of those at the front line of e-waste collection
- Building the networks for e-waste recovery now, and perfecting the details over time.

Next steps

- Large organisations to reflect sustainability aspirations in their ICT procurement
- Governments to cooperate on adjusting the law so it does not inhibit the transport of e-waste to proper recycling facilities
- Develop better recycling facilities in countries where e-waste is accumulating.

About Transform Together

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Designing for sustainability – designing for better systems

It is estimated that [over 80% of all product-related environmental impacts](#) are determined during the design phase of a product. For smartphones and ICT products this means decisions on the selection of raw materials, computing power, types of components, reparability, and recyclability. Product design also largely determines how consumers use the products and how attached they are to them.

Look and feel may be as equally important as functionality when consumers decide on the products they want to buy. A certain hype often surrounds new designs of high-end consumer products such as smartphones. New devices with new functionality are often revealed in big launch events. Early adopters eagerly await the next big product announcement and the opportunity to experiment with new features.

These constant design updates are the biggest pitfall of smartphones and ICT products from a sustainability perspective. Whilst a best-case scenario could make products more sustainable, more energy and resource efficient, and less

dependent on critical raw materials, the number of new designs keeps the product replacement rate high. Shiny new products quickly become obsolete as consumers are drawn to new, 'better' products in the fear of missing out.

In other words, smartphones and ICT products are not designed to ensure the valuable materials they contain are kept in circulation for as long as possible. How do we change that?

Enabling sustainable design

Appropriate policies and legislation can encourage sustainable design, such as the EU Ecodesign policy, which sets minimum efficiency requirements for different product categories. This kind of regulation can help phase out the worst-performing products from the market and promote the best-performing ones.

But product specific criteria in the EU Ecodesign Directive only addresses energy efficiency and does not include smartphones as a product category. The European Commission (EC) ICT Task Force is now looking to add more criteria such as resource

efficiency to ICT products like gateways, mobile phones and base stations. But while regulations can be effective in phasing out the worst-performing products, the policy processes leading up to the adoption and implementation of the regulations are often slow. They therefore fail to induce the rapid action required to transform the industry. That is why innovative solutions going well beyond the regulatory requirements are vital for progress.

“Shiny new products quickly become obsolete as consumers are drawn to new, ‘better’ products in the fear of missing out.”

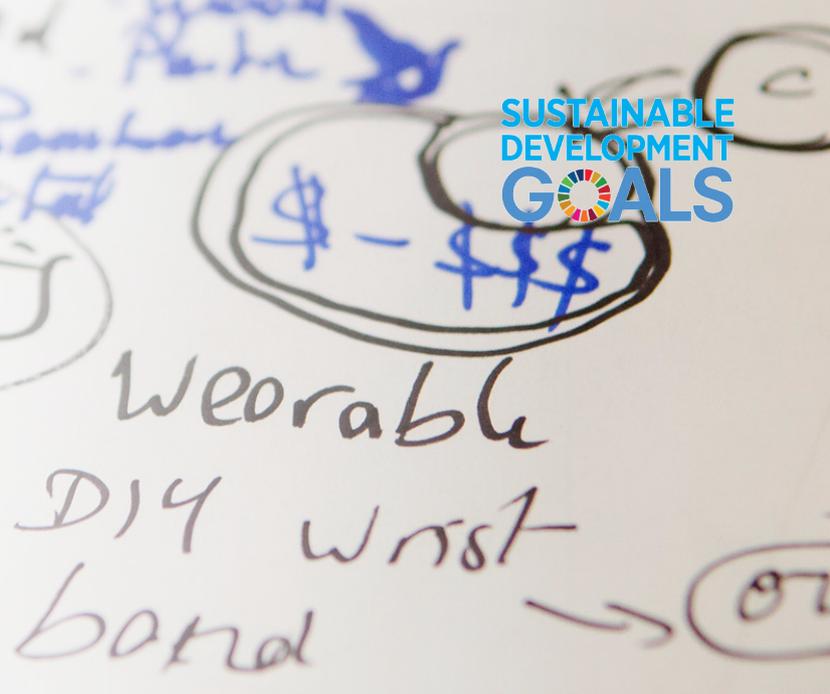




Image credit: Fairphone

discarded prematurely. Designing for sustainability therefore needs to consider the whole industry ecosystem: business models, procurement systems and consumer behaviour. Encouraging consumers to buy used or remanufactured products, to repair not replace, to treasure, and to eventually return for recycling requires action from not only designers and manufacturers, but the whole industry supply chain. Software developers, professional purchasers and buyers, resellers, finance, civil society, consumer organisations and policymakers alike need to collaborate to ensure that it is easy for the consumer to get the most value out of the product while protecting the planet.

Header image credit: Fairphone

The forerunners of sustainable electronics design

Many big ICT and smartphone manufacturers now do include environmental and sustainability principles and criteria into their design processes beyond regulations. These may include specifications on the use of recycled materials, circular design, better energy performance, resource efficiency and replacing hazardous substances with safe alternatives. While this is encouraging, it is still not enough if in practice these better performing devices get discarded long before their expected lifetime ends.

Some companies have taken an inspiring step further and put sustainability into the heart of their business model. For example, Dutch smartphone manufacturer Fairphone wants to make sure that sustainability is designed into their products from the start. It is leading by example by showing that [it is possible to design a smartphone that is made to last](#), both in terms of design and repairability. Fairphone's hardware design is modular, which means that if one part of the phone breaks, only that part needs to be replaced instead of the whole phone. Fairphone's key design principle, designing for longevity, also extends to software, and the source code is available for anyone to use, review and modify. Regular security updates are a priority, but software updates are only made when necessary.

From product design to system design

Achieving a longer product lifecycle in practice however depends heavily on the business model. Consumer behaviour also largely determines the real lifetime of the product. Designing longer lasting products does not help if in reality the product gets

Keys to success

- Set designing for circularity and longevity as the core design principles
- Implement regulatory and legislative changes that genuinely support circular and long-lasting product design
- Ensure that business models support consumer behaviour that extends product lifetime.

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Eco-labels: how to demand comprehensive change with a single procurement choice

Various sustainability criteria for ICT have been developed – by industry, NGOs and international policymakers. Yet uptake by manufacturers has been low and consumers are often unaware of them. There is a need for more demand from procurers, consumers and policymakers if these criteria are to be widely adopted.

Purchaser requests are a [primary driver of sustainability](#) for the ICT industry. A critical mass of demand from high-volume procurers is crucial to incentivise change among ICT brands, who in turn must collectively demand change in their suppliers. But it is next to impossible for procurers to keep up with what sustainability looks like in each product. Each product contains hundreds of components, and the industry is notorious for constant and rapid change in design and supply chains.

Eco-labels are a well-established concept to help buyers make decisions without being experts in the evolving detail of the industry. They also allow many

organisations to ask for the same thing – creating mass demand for specific positive changes. Several eco-labels are available for ICT, covering a growing range of products and sustainability issues. Many major public and private entities now demand particular eco-labels in all their ICT supply contracts, but some buyers settle for single-issue labels – such as [Energy Star](#) – which are helpful but do not address the full set of issues.

TCO Certified

TCO Certified is an independent sustainability certification for ICT. Its criteria cover environmental and social responsibility from a whole life cycle perspective. It started out in 1992 with basic criteria for product energy efficiency and product safety. Over the years it has added comprehensive additional criteria on other environmental impacts, product lifespan and social responsibility. It was

the first ICT eco-label to require socially responsible manufacturing, such as freedom of association for workers. It is a type 1 eco-label in accordance with ISO 14024, meaning that criteria

are based on scientific principles and are developed with multiple stakeholders and experts in an open process. It offers certification for eight product types: displays, notebooks, tablets, smartphones, desktops, all-in-one PCs, projectors and headsets. A brand can apply to have individual products certified, at which point it must show that its tier 1 suppliers¹ comply with the criteria or are on a path to do so.

¹ Tier 1 is the last facility before a product is shipped, undertaking the final assembly and packing.

“Eco-labels help buyers make decisions without being experts in the evolving detail of the industry.”

TCO Certified updates criteria every three years. This is vital to keep abreast of industry changes. For example in 2015, an independent review of smartphone sustainability criteria found that TCO Certified was strong on lifespan, recyclability, packaging, and hazardous substances in the final product. For some other points, it came closer to benchmarking the industry's existing practice². However, since TCO Certified was [updated in December 2018](#), it now includes stronger criteria on some of these elements, such as following OECD guidance on conflict minerals including cobalt³.

TCO also adopts or harmonises with other specialist frameworks which have already developed robust sustainability criteria that are relevant. For example, on phasing out halogenated flame retardants, the replacement chemical must be independently verified and benchmarked as safe in accordance with the [Green Screen for Safer Chemicals](#) hazard assessment framework.

How it works

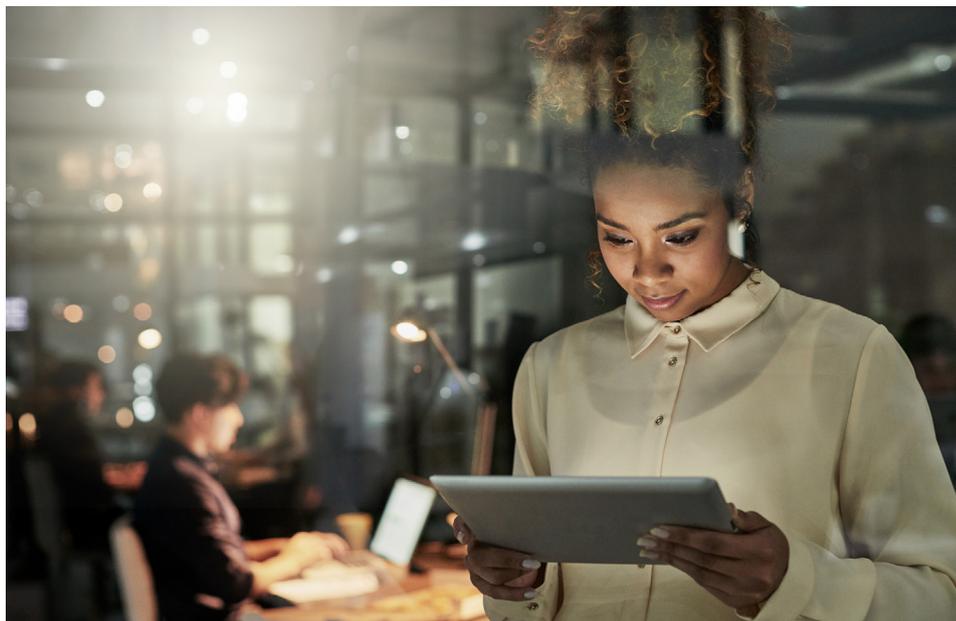
When a brand applies for TCO certification, it must commit to long-term transparency in its supply chain. The product itself is tested up-front to make sure it complies with performance and safety requirements. TCO Certified arranges third-party social audits of first-tier manufacturing sites, and the report from this is analysed by an independent verifier. With the audit comes an action plan for the factory to follow, addressing any areas of concern and specifying a timeframe for correction. A follow-up audit occurs roughly a year later, and again after that, to ensure that corrective [actions are done](#). Certificates are valid for two years. ² [The study](#) argued that 'benchmark' areas included responsible minerals sourcing, water and energy, and health impacts of hazardous substances in the supply chain. It also claims that an 'independent audit' methodology may not detect some breaches of social criteria. However, the date of this study means that it does not reflect 'Generation 8' of TCO Certified. ³ Tin, tantalum, tungsten and gold are the most frequent focus of initiatives on conflict minerals, but cobalt is also a risk.

“When a brand applies for TCO certification, it must commit to long-term transparency in its supply chain.”

years. After certification, there are regular visits to periodically review any changes at each factory. If standards slip, the certificate can be revoked. Based on this interaction, TCO Certified maintains a list of 'approved' and 'preferred' factories. Those that show continued compliance and rapid correction of non-conformities are subject to less frequent auditing.

All checks are undertaken by independent partners of TCO Certified. The partners and the test methods are reviewed regularly by TCO Certified and by independent accreditation organisations.

For procurement departments, there is a free step-by-step guide to embed TCO Certified in their contracts and business culture. This includes educating colleagues on the sustainability risks of ICT products, making sure that the overarching sustainability strategy covers ICT, informing vendors early to give them time to source the right products, and requiring the certificate as proof.



Impact

About 3,000 products currently hold TCO Certified, and can be found [on this database](#). Currently, factories manufacturing products for more than 20 IT brands are compliant with TCO Certified criteria. This includes some factories producing for major brands such as Dell, HP, Lenovo, Casio and Epson. Once a factory has met the criteria in order to fulfil demand from high-volume procurers, an added benefit is that sustainable practices begin to percolate through the

industry, gradually becoming standard practice in some cases.

Major buying departments are using this certification to easily improve their ICT procurement. One example is the government of Swedish city Vetlanda, which did not have the staff time or expertise to develop their own ICT sustainability purchasing criteria. It also would have been next to impossible to verify them. Asking for TCO Certified allows them to save time and money while ensuring that their



purchases contribute towards Vetlanda's wider sustainability aspirations. Other notable buyers of TCO Certified products include the Canadian federal government, public bodies in Europe, Swedbank, Electrolux, and Svenska Handelsbank. These organisations state that it is chosen for its independent verification and its full range of social, environmental and performance criteria.

Other eco-labels for electronics

Blue Angel was initiated by the German government in 1978 as the world's first eco-label. It is available for various consumer products, including several categories of ICT (projectors, computers, keyboards, various types of phone, data centres, shredders, monitors, and printers). Like TCO Certified, it is a Type 1 ecolabel (ISO14024), sets criteria by life-cycle stage of the product, and incorporates criteria from other frameworks such as Energy Star and ILO labour

standards. For some products, Blue Angel accepts TCO Certified as fulfilment of part of its own criteria⁴. On materials, Blue Angel used to focus mostly on recyclability but has recently adopted OECD guidelines on conflict minerals.

Like TCO Certified, Blue Angel covers points about device quality as well as environmental impact, and criteria are updated every two to four years depending on product type. However, verification is based on declarations submitted by the applicant,

not independent audits. Some tests must be carried out at laboratories that meet certain ISO standards, but the applicant can undertake and write-up their own tests if their laboratory qualifies for the tests. Documents are assessed by Blue Angel itself. Most evidence must refer to measures taken less than a year before applying.

ECOLOGO is another Type 1 (ISO14024) eco-label, established in 1986. In electronics it covers seven types of product including [phones](#), printers, cameras, tablets, and wearables. It focuses mostly on reduced environmental impact, again based around the lifecycle

stages of the product. The label and its standards are created by Underwriter Laboratories (UL). Product tests and factory audits are carried out by UL itself. Audits occur every three years but spot-checks can occur at any time. ECOLOGO is recognised in

at least one major registry for greener electronics, the [EPEAT Registry](#).

EPEAT is its own eco-label, standing for Electronic Product Environmental Assessment Tool. It is run by the [Green Electronics Council](#), and assigns ratings

to products at three levels: bronze, silver and gold. This allows buyers to compare and reward improved performance. All EPEAT certified products are searchable at the [EPEAT Registry](#). Testing and certification are carried out by 'conformity assurance bodies' which are overseen by the Green Electronics Council to ensure they are qualified to do so. Among

⁴ For example, [Blue Angel accepts TCO Certified as fulfilment of basic criteria](#) for reparability, materials selection and ergonomics – but also includes further criteria.

Once a factory has met the criteria, sustainable practices begin to percolate through the industry, gradually becoming standard practice in some cases.

other buyers, EPEAT is particularly sought-after by the procurement departments of various parts of the US government (and is mandatory in some). EPEAT encourages buyers to require suppliers to record all EPEAT products that are bought, allowing an annual calculation of the sustainability benefits achieved through this procurement.

Find out more:

[TCO Certified](#)

[Blue Angel](#)

[ECOLOGO](#)

[EPEAT](#)

Keys to success

- Third-party, independently-verified audits of manufacturing sites and products
- Scientifically-based criteria comprehensive across social and environmental matters
- Continuous revision of criteria to stay abreast of changes
- Eco-labels allow procurers to efficiently combine their demand for change
- Eco-labels can allow brands to combine their leverage for change in complex component supply chains.

Next steps

- Growing the demand for eco-labels from major procurement departments
- Delving deeper into the supply chain
- Exploring stronger ways to verify human rights compliance – perhaps working with other initiatives that have a successful track record in this.

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Powering green ICT and smartphones

Although ICT products and smartphones are generally getting more energy-efficient, their growing complexity and production volumes continue to push up the energy demand required to manufacture and operate them. It is estimated that the ICT industry's relative contribution could exceed 14% of global greenhouse gas emissions by 2040 if no dramatic reductions are made.¹ The footprint of smartphones alone could exceed the combined contribution of desktops, laptops and displays.

Smarter devices – more energy demand

The majority of ICT's energy impact and smartphone products comes from manufacturing and extracting the materials they require. A small share of the impact comes from using the devices, but when it comes to smartphones and other devices connected to the internet, the impact is increasingly shifting towards data transmission. Increased data transmission speeds require continuous updates of the physical network infrastructure, which again requires more energy and natural resources. Additionally, data centres, where user data or content provider data is stored, use ever more electricity. If left unchecked, servers and data centres could represent 45% of ICT emissions by 2020.



By contrast, smartphones and ICT can also help to save energy in other sectors, for example in smart technologies that allow for real-time monitoring of energy consumption and balancing supply and demand on the grid. ICT can also help reduce travel emissions by enabling virtual meetings. Therefore, strategic action is required to keep the ICT sector's own energy demand in check whilst making sure it contributes to energy efficiency and energy reduction in other sectors.

¹ Belkhir, L., & Elmeligi, A (2018): Assessing ICT global emissions footprint: Trends to 2040 & recommendations. Journal of Cleaner Production. [bit.ly/2W9m8tW](https://doi.org/10.1016/j.jclepro.2018.08.088)

Renewable energy champions lead the way

Many of the world's leading tech companies are aware of these challenges and acting on them. For example, Google, Facebook and Apple, as part of the [RE100 initiative](#) run by The Climate Group in partnership with CDP, have set ambitious targets to power their entire operations, including data centres, with 100% renewable energy. Google and Apple announced that they reached their goals in 2018. Whilst this is very encouraging, it does not mean that all the electricity these companies consume is necessarily renewable. These businesses are still partly



dependent on the energy mix in local grids where they operate, which are powered partly by fossil fuels in most countries. The companies often need to offset this impact by buying renewable energy equal to their total annual electricity consumption, validated by green electricity certificates.

Ambitious renewable energy targets are therefore not enough to ensure emissions from the ICT industry do not skyrocket before it is too late. What really matters is the actual reduction in carbon emissions and decarbonising the supply chains. This means drastically reducing energy consumption, and increasing investment in

renewable energy projects where the products and components are made.

Green energy from manufacturing to data centres

[Apple has showed leadership](#) in this regard having made a renewable energy commitment for both its own operations as well as its supply chain. The

Apple has a 2020 goal to deploy 4 GW of renewable energy to its supply chain, which represents one third of the electricity required to make its products.

company now has a 2020 goal to deploy 4 GW of renewable energy to its supply chain, which represents one third of the electricity required to make its products. Furthermore, [Apple announced in 2018](#) that together with its ten suppliers, it has created an investment fund in China where the majority of its products are made. The purpose of the China Clean Energy Fund is to invest in clean energy projects and connect Apple's Chinese suppliers with these renewable energy sources.

Decarbonising the whole smartphone and ICT supply chain does not stop with the device and component manufacturers either.

Data transmission through mobile networks also requires a lot of energy. In response to this, many telecommunication network operators have

A YouTube video watched five billion times is estimated to have used 850 GWh of energy, equivalent to 360,000 tons of carbon per year.

developed innovative solutions to improve their energy efficiency. For example, [Nokia's AirScale Base Stations have a 60% lower energy consumption than its previous generation radio access solution](#).

The company states that modernising a typical legacy base station site to a Single Radio Access Network (SRAN) can achieve an energy saving of up to 70%.

Energy-hungry data centres also have a massive impact on emissions. For example, a single YouTube video watched five billion times is estimated to have used 850 GWh of energy, equivalent to 360,000 tons of carbon per year. In response to this, data centres need to become zero-carbon – and beyond. A promising example of this comes from Falun in Sweden, where [EcoDataCenter](#) announced the launch of the world's first 'climate-positive' data centre. This new facility promises to be not only zero-carbon, but to contribute to overall reduction in carbon emissions. It aspires to achieve this with state-of-the-art energy efficiency, running its operations with 100% renewable energy and making use of excess heat in the local district heating system.

Calling governments and consumers

Significant commitments and efforts on all fronts are therefore required to decarbonise the entire smartphone and ICT supply chains. In addition to the action businesses are taking, governments need to act on decarbonising the energy networks on which business operations depend. This means setting ambitious climate and energy policies and targets in line with climate science, and working on greening the power networks as part of this.

Consumers too have a significant role to play in this. The lifecycle energy and carbon impact of ICT devices and systems depends not only on how energy efficient they are, but also how consumers use them and whether they recycle them. But as most of the energy and carbon impact of smartphones and ICT comes from production, what matters most is designing them to last longer. This is to avoid, or at least delay, the impact of producing new products altogether.

Find out more:

[RE100](#)

[Apple](#)

[Nokia](#)

[EcoDataCentre](#)

Keys to success

- Business and governments set ambitious renewable energy and carbon targets
- Create partnerships and initiatives that accelerate clean energy transition in the supply chain
- Promote the use of smartphones and ICT that support long product lifetimes and energy-efficiency of other sectors.

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Getting responsibly-sourced materials into electronics

Materials used in ICT equipment are widely known to be associated with devastating environmental and social impacts. [Representing 7.5% of global demand for gold](#), electronics are a major user of metals and minerals whose mining and processing involves huge inputs of energy, water, toxic chemicals and often unsafe labour. Global trade of some commonly-used metals is funding decades-long armed conflict in politically unstable regions such as the DRC (Democratic Republic of Congo). Tin, tantalum, tungsten and gold – a.k.a. 3TG – have been the focus of most scrutiny. These ‘conflict minerals’ are linked to violence, corruption, forced labour, child labour, unsafe conditions and other human rights violations. Artisanal, small-scale mines are most at risk of these unsafe conditions, which are especially typical for tantalum due to the way it is geologically deposited. Because the mining often takes place in areas where legal enforcement is weak or absent, it is often carried out with no regard for environmental harms and related health impacts – e.g. toxic pollution, deforestation and CO₂ emissions.

3TG have become subject to legislation in the USA (Dodd-Frank Act 2010) and EU (Conflict Minerals Regulation 2017). These require companies to investigate and disclose which countries they source 3TG from, and report the measures taken to reduce the risk of funding conflict ([e.g. following OECD](#)

[guidelines](#)). The Dodd-Frank act names specific countries as high-risk – [causing many manufacturers to abandon these sourcing locations to reduce their due diligence burden](#). This puts thousands of impoverished miners out of work and makes them more vulnerable to militia control, while the minerals may simply be illicitly exported via ‘safe’ countries. EU legislation aims to avoid this effect by not naming particular places as high-risk, instead offering [guidelines to help identify them](#). While only 3TG is the focus of legislation, cobalt and copper are also [associated with conflict and human rights violations](#).

OECD due diligence guidance for responsible mineral supply chains

- Developed via an intergovernmental process, this guidance forms the core of most conflict minerals legislation and industry efforts
- Designed to help companies respect human rights and avoid funding conflict through their mineral sourcing practices
- Aims to cultivate transparent supply chains and let countries with mineral resources gain the benefit of extracting them
- Gives a five-step framework to identify the risks of contributing to conflict and human rights violations in their mineral supply chain, mitigate those risks, set up independent audits, and report
- Voluntary guidance – not legally mandatory
- Covers all minerals, with extra guidance for 3TG.

Trading of these materials via global commodity markets reduces transparency, making it difficult to establish their origins. While US legislation focuses on the DRC and its neighbours, industry analysis in 2017 has concluded that 3TG are now entering electronics supply chains from other conflict zones (e.g. parts of Colombia and Myanmar) – [and other areas with similar risk for child labour and forced labour](#). Meanwhile, e-waste may be the world's fastest-growing waste stream, and [only 20% of it is known to be properly recycled](#). With increasing consumption of ICT per capita worldwide, this indicates a growing throughput of raw materials whose environmental and social impacts are understood to be serious.



Image credit: Fairphone

Reaching the source: hands-on, not the cold-shoulder

Rather than turning away from sourcing locations that are deemed high-risk, some industry partnerships have decided to get hands-on to improve conditions and connect responsible miners to global demand. This way, mining communities in 'high-risk' countries earn vital income, while industry alliances engage with them to improve practices while keeping a close eye on avoiding funding conflict. The aim is to show the industry that it is possible to source responsibly (as per OECD guidelines) from 'high risk' locations.

One example is the Conflict Free Tin Initiative (CFTI). From 2012 to 2014, this project used an existing tin industry programme to work towards due diligence and traceability in Kivu, an area of DRC that was hit particularly hard by buyer withdrawal after the Dodd-Frank Act. The CFTI assembled a range of partners from mines and manufacturers to NGOs to verify, set up and monitor a traceable, conflict-free tin supply chain from Kivu. This contributed to formalization of mining, [which in turn helped](#)

[improve working conditions](#). The learnings informed the ongoing work of iTSCi (below) and others.

Various multi-stakeholder industry-based organisations are taking a related hands-on approach to improving the sourcing of minerals from so-called high-risk locations. Examples include:

[Alliance for Responsible Mining](#)

- Focuses on artisanal and small-scale mining (ASM)
- Created the '[Fairmined](#)' standard – a certification label for precious metals – which has [two levels](#), basic and ecological (with stringent environmental elements)
- Works to directly support ASM mining communities and promote public policies to include them
- Can consult to analyse existing supply chains, work directly with specific miners, or set up responsible supply chains for gold
- Builds influence via online educational resources and alliances/partnerships.

[iTSCi](#)

- Works to build responsible, transparent mineral supply chains – in the market and on the ground
- Works with any size company in all parts of mineral supply chain to help them achieve full due diligence in line with regulation
- Focuses on minerals from DRC, Burundi, Rwanda and Uganda
- iTSCi's 'upstream programme' was the basis of the Conflict Free Tin Initiative (above)
- Originally a tin industry initiative, now includes tantalum and tungsten.

[Responsible Minerals Initiative](#)

- Set up in 2008 by electronics industry bodies but now open to many sectors
- Offers its members access to various resources to support compliance, due diligence and reporting

- Special focus on smelters and refiners as the key point in the supply chain, who are in a strong position to know the origin of raw materials. There is a small number of them worldwide, so they can be efficiently and effectively audited.

Some manufacturers have adopted this hands-on approach to minerals sourcing, or work directly with the above initiatives to comply with legislation while supporting mining communities in Africa's Great Lakes region. Perhaps the best-known example is Fairphone. Having started in 2010 as a [campaign for awareness of conflict minerals](#), in 2013 Fairphone became "[a social enterprise that makes smartphones to create an impact in the electronics supply chain](#)". It worked with the CFTI (above) and [Solutions for Hope](#) to source conflict-free tin and tantalum. Later Fairphone conducted research trips to Rwanda – which had also been impacted by Dodd-Frank legislation – and then engaged its components suppliers to source tungsten from responsible Rwandan suppliers via a smelter in Austria.

Other key materials required a different approach, as there was a lack of conflict-free gold supply chain initiatives in 'high-risk' locations. Instead, with the help of Fairtrade Netherlands, Fairphone found a source of Fairtrade gold in Peru. By collaborating with three tiers of its supply chain, Fairphone was able to use this gold in its phones through a company that supplies gold salt for printed circuit boards (PCB). A key to success was that the PCB manufacturer was also interested in exploring a Fairtrade gold supply. This is the first ever Fairtrade gold supply chain for consumer electronics.

Understanding what is 'material'

Part of the difficulty in creating a more sustainable supply chain lies in the complexity of ICT products. With hundreds of components coming from different and fast-changing supply chains, knowing the product's material content is a challenge. For this reason, some brands are carrying out in-depth analysis to understand what is in the product and which materials require most urgent attention. One



Image credit: Responsible Minerals Initiative

example is Apple, [which announced it has analysed 45 materials, but has not published the results](#). Another is Fairphone, [which published an analysis of 38 materials typically present in smartphones](#). Each material is given ratings of low, moderate, high or very high impact across 14 different criteria. The criteria range from how crucial a material is for consumer electronics, through to what extent a material is associated with conflict and various environmental and health impacts.

This analysis helped to establish which materials to address first – due to their social and environmental impacts, and due to the electronics industry's leverage to demand change in the supply chain. [Fairphone chose ten materials on which to focus its efforts](#): 3TG, cobalt, copper, gallium, indium, nickel, and rare earth metals. Having already looked at 3TG, Fairphone is now able to develop initiatives for better sourcing of other materials.

Responsible resources: raw or recycled?

While responsible sourcing of raw materials is helpful, it does not address the problem of resource depletion or waste. An alternative is to seek recycled materials. For the manufacturer, a major benefit of traceably recycled metals is that they are presumed by default to be conflict-free.

Some manufacturers have started to do this, with Dell using recycled plastic via a take-back scheme, and [Apple committing to recover tin and aluminium as part of its goal to achieve a closed-loop supply chain for all its products](#). Apple has begun to recover materials directly from its own

end-of-life devices by incentivising consumers to return them – [and has built a specialist robot to disassemble them](#). [Fairphone 2 contains recycled tungsten, gold, copper and PC plastic in amounts up to 50%](#). Cofounder Miquel Ballaster has observed that convincing suppliers to seek recycled sources has a lot to do with the price of recycled versus new material. Global commodity trading can erase price differences between some new and recycled materials – like gold – making it difficult to be sure how much of the final product is from a recycled source. However, Fairphone continuously asks questions of its suppliers in order to put this topic on their radar. It is soon embarking on research (with supplier Alpha Assembly) to understand the possibilities for a recycled tin supply chain.

Multiplying impact

With its mission, Fairphone may have more scope to focus on sustainability than conventional consumer electronics companies do. It acts as an expert to give examples of what good practice can look like. However, its leverage in global supply chains is very limited when it acts alone. This is why it is so crucial to have partners – like AT&S, which supplies the industry with printed circuit boards and has enthusiastically taken part in Fairphone’s efforts to explore Fairtrade gold supply chains. Another example is Signify (formerly Philips Lighting). [In June 2018, Signify joined forces with Fairphone](#) to work towards sourcing responsible Congolese cobalt via Huayao, a major global supplier including to Apple. This partnership will work with the [Better Cobalt](#) programme, which uses field agents to engage five small Congolese mines, and technology to trace the progress. The programme intends to monitor and improve working conditions, and ultimately set up fully traceable supply chains from these mines, meeting OECD guidance. [To sum up, Fairphone’s cofounder states](#): “We define success by making an impact that goes far beyond Fairphone ... We work to make other manufacturers view us as sustainable innovators and potential collaborators – not as competitors.”

The message from such initiatives is clear. For truly responsible sourcing of ICT materials, companies must go beyond regulatory compliance. They need to know their product and understand the impacts of its materials. With existing analysis in the public domain, there is a wealth of knowledge available to draw on. With this insight, companies must work directly with their suppliers to understand where key

materials come from. They can then find projects that are already taking steps to make real change in those locations rather than defaulting to what is safe ‘on paper’. Finally, like-minded companies must join forces and use their collective leverage to connect responsible suppliers to a willing market.

Keys to success

- Understanding which materials require urgent attention
- Legislation on conflict minerals that can respond to changing risks
- Manufacturers to trace individual materials step-by-step through the supply chain to identify opportunities for change
- Sourcing according to OECD guidelines on minerals from conflict-affected areas
- Industry initiatives that work to improve the mining situation in ‘high-risk’ locations
- Sourcing from recycled or certified origins (e.g. Fairtrade and Fairmined)
- Manufacturers creating systems to take back their devices at end-of-life
- Collaborating with others to increase leverage through the supply chain.

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Sustainable and circular ICT through procurement: learnings from the Netherlands

Representing a significant portion of global ICT demand and a mandate for social good, the public sector has the scope and scale to create sustainable change in the electronics industry.

However, public bodies currently do not always act as a unified front, nationally or internationally. To achieve the meaningful social good demanded by the citizens it serves, the public sector will need to unify its demands for products and services that respect wellbeing and the environment. Meanwhile, each government body needs up-to-date knowledge of how to build the best possible sustainability criteria into its procurement. There have been national and international government initiatives to develop guidance for public bodies on how to do this. ICT is a key focus as it often represents a large part of public spending¹.

“The Netherlands’ central government is now procuring all its furniture according to circular values.”

One country taking the lead on this is the Netherlands. Its government is taking concrete steps to make its own procurement more sustainable and to collaborate with the market to develop more circular business models. This includes breaking down barriers like regulatory hurdles and outdated procurement habits.

‘PIANOo’: The Dutch public procurement expertise network

Set up in 2005 and administered by an arm of the government, [PIANOo is a knowledge and expertise network](#) that provides guidance for public procurement in the Netherlands, including on sustainability. It works ‘for and with’ a network of 3,500 professionals in public procurement and tendering. It works to develop and spread ‘best practice’ via resources that include conferences, manuals, research papers and briefings, and via dialogue with the market. The online resources are available in Dutch and English and are also open to private sector organisations.

Part of PIANOo’s focus is ‘[Sustainable Public Procurement](#)’ (SPP), under which it defines seven key

themes. While the procurement profession has traditionally focused on value for money and legal compliance, [SPP recognises that public procurement can and should contribute towards public policy aims](#) – such as the UN Sustainable Development Goals and the Paris Agreement.

Many of these seven themes are relevant to ICT. For example, under ‘green public procurement’, guidance is given on [how to set environmental](#)

¹ For example, [in 2010 to 2016, ICT represented over 20% of asset spending](#) by the UK’s local and national government.

[criteria](#) for different product groups including various types of ICT device. Meanwhile in the ‘circular procurement’ theme, [there are examples of various projects](#) that have experimented with circular ICT procurement, and a [sector report](#) looking at how more circular ICT business models might align with public procurement.

[Seven themes of Sustainable Public Procurement \(SPP\) in the PIANOo network:](#)

1. Social conditions in global supply chains
2. Social return on investment (SROI)
3. Green public procurement (GPP)
4. Procurement of bio-based products
5. Circular procurement
6. Public procurement of innovation (PPI)
7. Opportunities for SMEs

The Dutch ‘Green Deal on Circular Procurement’: Learning through action

This [Green Deal \(GDCl\)](#) was originally a three-year project from 2013 to 2016. It convened procurement professionals from various levels of the Dutch government, along with multinational corporations such as Philips and Interface, and many smaller companies. Brokered by the Ministry of Infrastructure and Environment, this ‘community of practice’ investigated how procurement could encourage circular business models. It implemented about 80 pilot projects, which experimented with contracts that would ensure that a product has a long life, retains value, and is returned to the supply chain. This included purchase-and-buyback, purchase-and-resale, and product-as-a-service. Procurement possibilities for specific types of product, such as workwear, catering and ICT were addressed in smaller market meetings within this ‘community of practice’.

GDCl generated valuable insights that were [gathered into an online report](#) for other organisations to learn from. For example, some of the pilots failed simply because it was impossible for the market to fulfil the sustainability criteria that were initially set. In this kind of situation when the buyer is not sure what is possible, ‘[competitive dialogue](#)’ can serve as a more effective approach. It sets out a more open

set of ambitions in a tender and invites suppliers to respond with how they could innovatively fulfil the goal of sustainability or circularity.

Another lesson from some GDCl pilots is that the potential financial savings of circular purchasing may be hidden because the ‘purchase’ is not in the department where the savings will appear. A ‘product-as-a-service’ could mean a monthly fee instead of a one-off purchase price. Although this seems more expensive for the department that buys the service, the organisation as a whole could have lower costs due to the service provider taking over responsibility for the product’s maintenance and eventual disposal.

An example GDCl pilot – [reusing ICT from central government](#)

- For data security, old equipment was previously shredded and sold as scrap
- This pilot investigated the potential for data wiping and resale instead
- The State Property Service (DRZ) released a tender for data deletion and making suitable for reuse
- Analysis indicates CO₂ savings of 2-10% and material savings of 5 – 21%
- Due to a low proportion of resalable equipment, the data wiping process did not pay for itself. Not enough devices in good condition were surrendered, while others were poorly handled after disposal because they had ‘no value’
- The DRZ is now investigating ways to increase the proportion of resalable devices – e.g. selling off devices earlier in their lives while they still have good residual value, and educating staff and waste managers to handle the disposed devices with care
- GDCl leader Cuno van Geet reports that it is necessary to assure colleagues the data wiping can be trusted – that it is in fact more secure than shredding
- Another GDCl pilot that also attempted to wipe and resell ICT devices [was more successful](#).

Impact, scale-up and replication

In total, GDCI pilots [represented over €100 million](#) of circular procurement. The final report states that “thanks to the GDCI, circular procurement is now firmly established in the Netherlands, both within central government and in the business community”. The central government is also now procuring all its furniture according to circular values. As of 2018, there is a follow-on project to upscale the approach with the “[Green Deal Circular Procurement 2.0](#)”. Here, there are eight working groups, [one of which focuses on ICT](#). The success of the GDCI initiative [is being replicated in other European countries](#) – Belgium and Finland – which are also collaborating with the Dutch GDCI.



Find out more:

Cuno van Geet, Senior policy advisor SCP, Ministry of Infrastructure and Water Management

cuno.van.geet@rws.nl

www.pianoo.nl/en

www.gdci.nl

Keys to success

- Government-brokered schemes like GDCI can provide space for buyers and sellers to experiment and learn how to ‘do’ circularity, starting small and building up
- Policymakers must speak with the market to address real and perceived barriers to circular economy, including regulatory hurdles
- ‘Circular’ procurement means managing the value of the product over time – the procurer becomes a ‘supply chain manager’ who connects the stages of a product’s life cycles
- Make knowledge and resources on sustainable procurement available centrally ([PIANOO](#)).

Next steps

- Follow-up Green Deal project in Netherlands 2018-2021 – [including ICT working group](#)
- Replication of the government-convened ‘green deal’ model in other countries
- International collaboration and knowledge sharing between sustainable procurement initiatives to unify the ask for sustainable products and services in order to transform the market.

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Circular Computing: giving laptops a new lease of life

Circular Computing is a specialist in laptop remanufacturing for supply to corporates and institutions. It solves the typical problems that prevent large buyers from choosing used equipment. By making laptops as good as new, and by educating buyers and sellers, Circular Computing is proving that second-hand tech is now a real alternative to buying first-hand.

Laptops are essential to the modern workforce but are often replaced as warranties expire – often within three years – as businesses cannot risk compromising on performance. Organisations also need large numbers of the same product. The only option most buyers know is to buy new equipment from trusted brands via familiar channels. They don't have the time or expertise to assess the varying conditions of 'refurb' laptops, even if available at volume. Many organisations cannot even accept unused ICT that has been unboxed as they no longer consider it 'new' or 'safe'.

Businesses and institutions also need the security of a long warranty – typically not available for second-hand products. There is also a perception that pre-used ICT is less pleasant to use. While some Original Equipment Manufacturers (OEMs) incorporate recycled plastics

or metals into new products, the process of material recovery uses a great deal of energy and fails to retain the full value of the equipment.

Solution and business model

Circular Computing takes bulk volumes of ex-lease laptops from businesses or institutions across the world and sends them to its remanufacturing facility in the United Arab Emirates. Here they are conditioned to a standard indistinguishable from a new product in every way, from appearance to performance. Keyboards can be reprinted, and scratches repaired with full cosmetic detailing. Defunct parts of laptops are replaced with functioning parts from others, and a new battery is added. A large 'components library' allows repair across a wide variety of models. Instead of recycling the laptop into materials, this process retains the maximum possible value of the original product. Only truly unusable parts (less than 1% of weight) are sent to a specialist e-waste processor for materials recovery. After valuable metals are extracted, the residue is recycled into various products including shipping pallets.

“Bulk volumes of ex-lease laptops are conditioned to a standard indistinguishable from a new product in every way, from appearance to performance.”

Tests by Cranfield University show that the remanufactured laptops achieve 97% of the performance of new laptops – perfectly viable for most users. They are sold with a warranty

similar to those that come with a new product, and they arrive via the same resellers from which the purchaser would usually buy their ICT. Thanks to global sourcing of pre-used products, large numbers of identical units are made available. The result is a

far more sustainable purchase, with zero compromise in the user experience or buying process. After the new warranty runs out, buyers are offered a discount on the next purchase (12% of the price of the first product). This is an incentive for the user to return their equipment into the reuse cycle.

A key to this business model's success is the team's logistics expertise. They have been able to develop a smooth operation, using a keen understanding of legal issues around the movement of e-waste and how to take advantage of reverse logistics routes.



Image credit: Circular Computing

Empowering clients to make the sustainable choice

Circular Computing also creates demand by building the market's knowledge of what is available. Remanufactured laptops are often a completely new product for resellers, so Circular Computing runs learning activities for resellers and their clients. This helps all parties understand the product benefits. Resellers gain the confidence to talk about remanufactured ICT with key target clients such as the educational sector.

A particularly effective approach has been to bring together the CSR and IT departments of a company, with the financial director as a bridge between them. This helps to create a logical link between reduced cost and better social and environmental impact, while removing doubts about the product. Some of these workshops even reassess the company's whole approach to sustainability, allowing it to teach staff about the downsides of new IT and the benefits of remanufactured IT.

Impact and influence

With careful remanufacturing and warranties to back it up, Circular Computing adds up to three 'life cycles' to a laptop, beyond the typical 3-year initial use. This can extend use to over 12 years. It has processed about 10,000 tonnes of laptop parts – the weight of the Eiffel Tower and its foundations – that would have otherwise become e-waste.

Remanufacturing, transport and extended use of a laptop do involve energy and carbon emissions.

A key challenge in growing the demand for sustainable ICT is making a clear and emotive connection between the buying decision and the meaningful impact that follows. To make this connection, Circular Computing works with WeForest to plant trees at projects in India and Zambia to offset the carbon emissions of remanufacturing and laptop use. Local families receive long-term income for caring for the trees and support for forest-related livelihood activities. This gives resellers and end users a story to tell.

One of Circular Computing's biggest potential impacts is its scope to influence industry practice. In a sector where everyone from manufacturers to end users consider only original, sealed equipment to be 'new' and therefore risk-free, the most important task may be the re-education of the industry. Today, legal regulation and procurement policies actively impede development of a thriving pre-used ICT industry because of these perceptions. As the world's first and only 'Secondary Equipment Manufacturer', Circular Computing is well-positioned to help realign standards and policies to reflect what remanufacturing can offer.

Circular Computing has processed about 10,000 tonnes of laptop parts – the weight of the Eiffel Tower and its foundations – that would have otherwise become e-waste.

For this purpose, Circular Computing speaks at the EU and UN, and sits on the British Standards advisory committee for manufacture, disassembly and end-of-life processing. Parts of this committee's work have now been adopted into international ISO standards.

Through engagement with public and industry bodies, Circular Computing is changing perceptions in the sector that 'new is good' and 'used is bad'.

What next, and how?

Circular Computing sells mostly through resellers in the UK, Netherlands, Belgium and Sweden, and possibly soon in the USA. Major end users thus far are SMEs and educational institutions. These users see great value in high-end, high-grade laptops at a lower cost than the recommended retail price. They are also more agile in their scope to change their procurement criteria. However, Circular Computing argues that the public sector should be leading the charge. With 20% of ICT global purchase value and a mandate to create social good, the public sector has the scope and the scale to really power-up the demand for innovative circular ICT. Its 'clients' are citizens – so to serve them fully, public purchasing should tally with its other ambitions on sustainability.

One potential bottleneck is the supply of well-cared-for, second-hand ICT products, and replacement parts. This requires both the OEM and the first user to develop a sense of 'duty of care' towards the product's next life. Advances in 3D printing technology may also offer ways to invigorate the remanufacturing industry. If OEMs could release 3D printing files for components, this would enable remanufacturers to keep renewing old and rare laptop models long after the original parts run out.

ICT remanufacturing's true potential will be realised when it becomes well-known in the wider market and can compete with the allure of pristine 'new' tech. Circular Computing is inviting users to ask themselves "how new is new enough?" – and offering them a more sustainable choice that matches up to their expectations.

Find out more:

www.circularcomputing.com



Image credit: Circular Computing

Keys to success

- Develop ways to restore second-life electronics to good-as-new condition
- Target markets that appreciate quality at lower cost
- Sell via channels that don't require buying procedures to change
- Tell stories to help the customer understand the true social value of the product.

Next steps

- Electronics industry to understand, regulate and trust second-life electronics
- Public sector procurement to lead the charge in demanding sustainable ICT
- Manufacturers and consumers to develop a 'duty of care' to keep devices in use for multiple life-cycles.

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Case studies: Sustainable solutions for transforming the smartphones and ICT sector



Electronics Watch: opening doors for bottom-up monitoring of factories

The electronics industry is notorious for widespread poor working conditions, despite some exceptions. The supply chain is complex and fast-changing, due to constant innovation, just-in-time supplies and downward price pressure. To remain profitable in this market environment, the industry uses a high ratio of temporary, migrant or otherwise precarious workers. The workforce faces safety risks, such as exposure to hazardous chemicals, or extreme overtime to earn a living wage. Meanwhile, precarious workers generally do not have scope to self-organise and challenge this.

It is also difficult for external observers to be sure of real-time conditions, and to track change. Existing 'sustainability certification' systems (e.g. eco-labels) are not always suitable to detect labour abuse. This is because they rely on either self-reporting – which is biased – or external audits, which can only take a time-bound snapshot of conditions. Such audits cannot pick up ongoing dynamics, and a precarious workforce is often afraid to speak to an auditor. Also, audits are not always conducted by organisations independent from both the industry and the certifier.

External audits cannot pick up ongoing dynamics, and a precarious workforce is often afraid to speak to an auditor.

As the purchasers are the source of downward price pressure and demand for cutting edge devices, they are also key to drive the industry to perform better on social and environmental issues. Public bodies form a major proportion of global ICT purchasing, and want to address such issues in their supply chains for various reasons: Firstly, their electorate increasingly expects tax-funded bodies not to exacerbate global injustices. Also, international obligations may push them to make changes – such as the UN Guiding Principles on Business and Human Rights, or the EU Procurement Directive.¹

Solution

Electronics Watch is an independent monitoring organisation that helps public procurers to address the rights and safety of workers in their electronics supply chain. By bringing together many public buyers as "affiliates", it allows them to achieve this more effectively than they could on their own. It does this by offering tools and guidance to buyers and suppliers, and by directly monitoring

factories. This [multi-pronged approach](#) was developed via an EU-funded

¹ Article 18(2) of the EU Procurement Directive now allows for social criteria in public procurement. bit.ly/2RGaNmz

Electronic Watch's mission

To help public sector organisations work together and collaborate with local monitoring partners to protect the labour rights and safety of workers in their electronics supply chains.

project in 2013-2015, which also recruited the first affiliates. In 2015, Electronics Watch became an independent, non-profit NGO.

Affiliates get access to a toolkit which includes risk mapping in their supply chains, reports about on-the-ground compliance investigation and remediation, and clauses to be inserted into procurement contracts. These contract mechanisms are a means for a buyer to follow-up on contractual obligations (relating to social and working conditions) that they have agreed with the supplier. They form the basis for the compliance process for supply chain transparency as well as remediation of problems – for example, committing suppliers to co-operate with monitoring and transparency. Engaging directly with the industry provides a means to guide suppliers step-by-step towards compliance with the Electronics Watch Code of Labour Standards. This code adopts criteria from relevant international, domestic and industry-specific laws and labour standards.

Electronics Watch handles the majority of the engagement with the industry and the suppliers, on behalf of the affiliates. This allows it to support its affiliates in a number of ways including pre-tender market engagement, suggesting questions to be asked during the tender, contract compliance

monitoring, regular dialogue with suppliers, and engagement with the [Responsible Business Alliance](#) at the wider industry level.

Why it works: eyes on the ground

As well as providing tools for buyers, Electronics Watch has set up the networks to implement monitoring, and remediation on the ground. Instead of third-party auditors, its model uses ‘worker-driven monitoring’. This is crucial because the workers are always present. They can detect harms that might

go unnoticed by drop-in auditors, can report on previous abuses that might affect dynamics today, and know whether corrective actions are properly implemented in the long term.

Worker-driven monitoring is run via existing civil

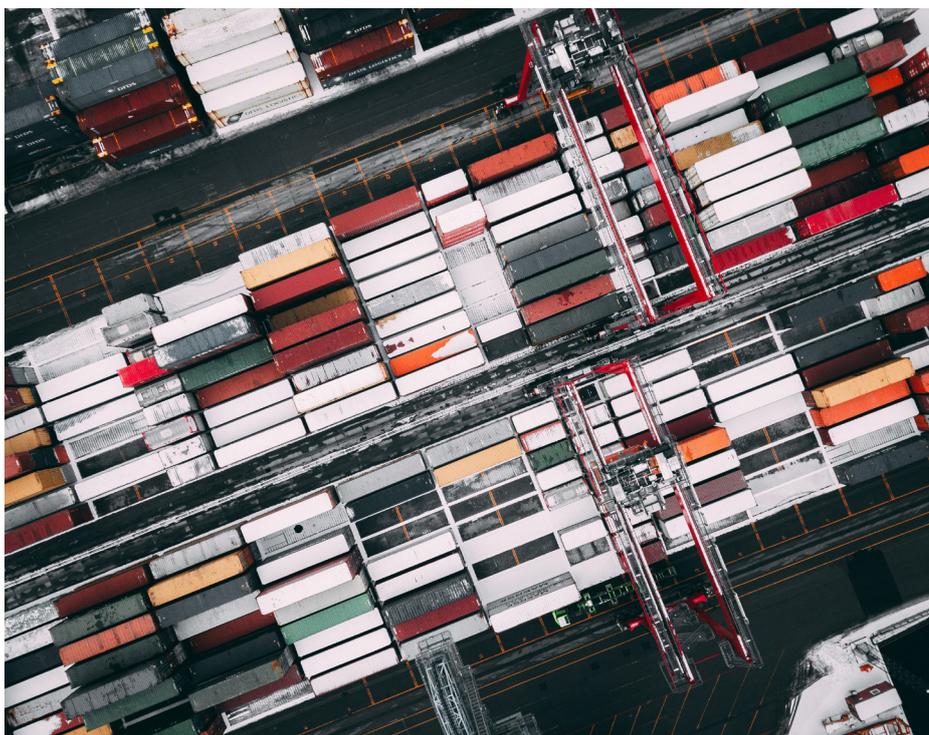
society organisations (CSOs) that are present in the production regions, and have no ties to any company being monitored by Electronics Watch. These ‘monitoring partners’ are familiar with relevant labour issues in the electronics industry, and are trusted by the workforce. Their main instrument is off-site interviews where workers find a safe space to report on issues in their workplace. They also use a wider range of typical social audit techniques.

As well as involving the workers in monitoring and remediation, the CSOs also help workers understand

their rights and risks to their safety, and the industry conditions which may cause their employers to breach those rights and safety risks. This means that the industry becomes more transparent for the workers, as well as for the buyers.

This worker-driven approach allows deep, constant monitoring rather than the superficial snapshot that an external auditor would collect. It also strengthens and amplifies the democratic voice of the workers, who become active stakeholders in the whole process.

Electronics Watch’s approach strengthens and amplifies the democratic voice of the workers, who become active stakeholders in the whole process.



Impact, and potential for scale-up or replication

Founded only in 2015, Electronics Watch already [monitors and addresses working conditions in 11 countries](#). Its affiliates (procurement members) now include more than 300 organisations in seven countries whose combined influence represents about €1 billion of the electronics market. This model – direct engagement via workers and buyers – is starting to drive concrete changes. This has directly “contributed to reinstatement of workers illegally fired for union organising, guaranteed pay for temporary agency workers, and ended forced labour by students and migrants” [according to the 2016-17 report](#).

Until recently, Electronics Watch has focussed on the wellbeing of workers in electronics manufacturing. However, under the new [Make ICT Fair project](#), Electronics Watch is now working with ten partners to mobilise European ICT buyers to reform the wider minerals supply chain. This may allow Electronics Watch to expand its reach as far as the mining industry.

Other collective procurement initiatives could replicate this model – contractual mechanisms along with worker-driven monitoring – to address other sustainability factors in electronics. Even for issues that do not directly harm the workforce, the method could be used to include the bottom-up perspective and understand long-term change. The ‘Make ICT Fair’ project may lead to collaboration with other industries that use the same raw materials, scaling up the leverage for change.

Find out more:

www.electronicswatch.org

Keys to success

- For social and human rights issues, worker-driven monitoring is far more effective than third-party auditing
- Contractual mechanisms in procurement can influence ICT producers to engage with initiatives to improve workers’ wellbeing
- ICT producers also need guidance to meet the demand for improved working conditions.

Next steps

- Attracting even more public procurers to become ‘affiliates’ to scale-up demand for change
- Reaching beyond manufacturing to include more parts of the supply chain via the ‘Make ICT Fair’ project (2017-2020)
- Exploring how worker-driven or community-driven monitoring could offer a way to monitor local environmental impacts, as well as social and human rights issues.

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Karo Sambhav: creating a cohesive e-waste movement in India

India is the world's 4th largest producer of e-waste with 2 million tonnes in 2016. At present, 95% of this is processed by the informal sector, often exposing workers and their communities to toxic substances from the discarded products due to lack of protections and poor waste handling practices. Meanwhile these informal entrepreneurs do not contribute tax revenue, and their livelihoods are made more precarious due to a lack of legal recognition and certainty.

To address the mounting e-waste problem, the Indian government strengthened its Extended Producer Responsibility (EPR) legislation in 2016. Producers are now required to ensure that a certain share of the electronics they have produced gets appropriately collected and processed at the end of life. They must also help consumers understand how e-waste can be properly disposed of.

Producers can meet their EPR responsibilities through a Producer Responsibility Organisation (PRO), such as [Karo Sambhav](#), which sets up systems to redirect bulk amounts of waste towards responsible disposal and spreads information on e-waste disposal among consumers. Karo Sambhav uses the cash flow from its EPR clients to build deeper social value and fairness into its model, and to attack the problems in the e-waste system from all angles.



Image credit: Karo Sambhav

The right partners

Four major tech producers – Apple, Dell, HP and Lenovo – needed to find ways to meet EPR in India, and also wanted to push forward on a circular economy for electronics. As a group, they consulted with Karo Sambhav's founder Pranshu Singhal and became its 'principal partners'.

When seeking out recycling facilities which would receive its waste, Karo Sambhav found that even many official recyclers had practices that are no

better than the informal sector. There was no official certification system to prove that a recycler was operating sustainably. Therefore Karo Sambhav researched best practices and developed its own criteria, which it has used to choose just three recyclers. An important criterion is that the recycler must be able to provide all necessary documentation in order to create transparency. This builds trust in the system and helps Karo Sambhav's EPR clients to show that they have truly fulfilled their legal responsibilities.

Invigorating the informal e-waste sector

Karo Sambhav needed to harness the potential of India's existing vast and vibrant informal e-waste sector in order to aggregate e-waste streams at volume. To gain trust and to fulfil its social value goals, Karo Sambhav needed to offer real advantages to these informal e-waste aggregators in return for their supply of e-waste. Karo Sambhav now sends its own vans to collect the e-waste in bulk so that aggregators do not have to disassemble it themselves, allowing them to save time and to avoid health risks. In return they are offered assistance in opening bank accounts and registering as an official legal business, and they receive automated payments on time. This brings financial security, social dignity and legal rights.

In one year, Karo Sambhav has redirected more than 3,000 tonnes of e-waste to sustainable recycling.

Sharing knowledge

To address the other aspect of EPR legislation – consumer awareness – Karo Sambhav developed an educational program for schools. Teachers are trained to deliver this three to four-month program, where pupils learn about the problems of e-waste in India. They are also taught the importance of disposing of old products correctly, and how to do so. Karo Sambhav gives an award to the school that collects the most e-waste at its new drop-off point. Students get strongly involved in this competition, making posters, talking to family and spreading awareness through their communities.

Finally, to draw all stakeholders together, Karo Sambhav developed a mobile app which absorbs and provides 360-degree information to all stakeholders. A map shows where Karo Sambhav operates, so that new stakeholders can join or request a pickup of waste.

Waste-pickers and aggregators can enter data on the amounts they have collected or transported, which feeds into graphs that show progress against larger targets. This helps to track waste through the system, creating transparency which is especially valuable for EPR clients.

Impact and scalability

In one year, Karo Sambhav's operations have expanded from one city to 68 across 32 states, and has redirected more than 3,000 tonnes of e-waste to sustainable recycling. Throughout its activities, it builds both the mechanisms and the demand for transparency. It now plays a mutually advisory role with the International Finance Corporation (IFC) of the World Bank, which is looking for ways to invest in improving India's e-waste system.

In the process, Karo Sambhav has engaged 5,000+ informal e-waste processors and 800+ repair shops, helping them to gain livelihood security and legitimacy, as well as reducing the exposure of people and the environment to toxic hazards. As these newly formalised e-waste businesses are drawn into tax mechanisms, this also generates public revenue that can be re-invested.

This extremely rapid expansion has been made possible by tapping into existing networks of NGOs and social enterprises in new locations. In return



Image credit: Karo Sambhav

they receive cash flow and support to strengthen their existing activities and take on new ones.

Lessons learned and further opportunities

At present, India only has a small capacity for sustainable recycling of e-waste. The small number of facilities which undertake truly safe and responsible recycling cannot process the full volume and variety of products in the e-waste stream. Karo Sambhav notes that this is a major bottleneck which inhibits up-scaling. Options to address this could include government investment to bring more sustainable recycling facilities to the country, and the introduction of proper checks and balances to ensure all licensed recyclers operate according to best practices. Greater transparency is also key, with automation of documentation crucial to traceability and time-saving. Karo Sambhav wishes to see the e-waste system start to function more like a proper market, encouraging investment in a truly circular economy.



Image credit: Karo Sambhav

Find out more

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Keys to success

- Government adopting Extended Producer Responsibility legislation
- Including marginalised communities at the frontline of e-waste collection
- Using technology to track e-waste throughout the system to create transparency
- Knowing the best domestic recycling facilities.

Next steps

- Improving the national capacity for proper recycling of e-waste
- More stringent responsibility criteria for recycling facilities before official licensing.

About Transform Together

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Case studies: Sustainable solutions for transforming the smartphones and ICT sector

Phone-as-a-service: banishing the linear ownership model

Like many retail sectors, the smartphone industry is built on selling large numbers of units with a short lifespan. Marketing of smartphones is heavily based on the allure of the latest, most cutting-edge edition of similar products. Users have fully absorbed this message and often upgrade to newer models well before it is necessary. Once a phone is sold, the manufacturer relinquishes control and responsibility. In fact, given the focus on newness as a value proposition, the release of new models hastens the obsolescence of existing ones. Manufacturers compete to constantly release new devices, with no incentive to design for longevity.

Meanwhile, because phones are small and because people value the data left in them, old phones often languish forgotten in a drawer and never make it back into the materials supply chain. Those which are resold often end up in countries where there is no capacity to safely recycle them when they are no longer usable.

Together, these factors result in vast and rapid throughput of scarce materials, whose production and disposal has highly detrimental impacts on environment and human wellbeing. But this fast-moving linear model is not inevitable; rather it is a business model that currently dominates the market.

“Old phones often languish forgotten in a drawer and never make it back into the materials supply chain.”

Some innovators are improving product longevity via modular smartphone design. One of these innovators, Fairphone, is now going one step further to create a circular business model for their devices – by offering ‘Fairphone-as-a-service’.



Image credit: Fairphone

Selling circularity: What are customers really paying for?

A business model based on ‘Product-as-a-service’ (PAAS) starts from the view that when someone makes a purchase, what they are paying for is not the item itself but the function that the item provides.

Examples of this approach include lift-sharing apps or car clubs as an alternative to car ownership. Advantages for the supplier may include a regular cash flow from users, and a new long-term asset in the product. The user benefits from not having to deal with maintenance or eventual disposal, paying only for the duration for which they need the product. As they are paying for

access to a functioning product, they also have the security of knowing that the product will be replaced if it malfunctions or becomes obsolete. Businesses and large institutions may be more receptive to this model than consumers. This is because:

- They are more likely to buy for function rather than feeling – it’s a less personal purchase than it would be for an individual consumer, so the desire to ‘own’ the item may be lessened.
- Procurement teams often have already planned a specific end point to their ownership of a product (e.g. writing-off the device after two years).
- They are often used to a leasing ownership model already, for big-ticket items like cars and large ICT – and it’s a relatively small step from ‘leasing’ to ‘pay-per-access’.

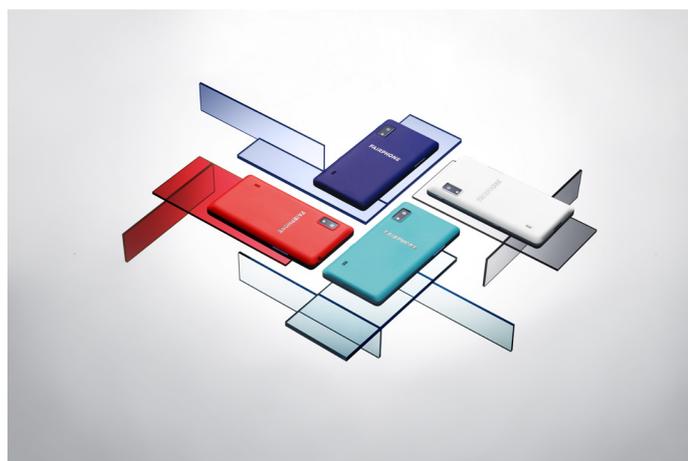


Image credit: Fairphone

The sustainability dividend: with ownership comes great responsibility

When the manufacturer has ownership of the product until end of life, the product becomes a long-term asset that brings in cash flow. This gives the manufacturer a reason to make sure the product remains in top condition and recover maximum value from its parts at end of life. Not only does this incentivise maintenance, but also design for longevity and recycling – immediately attacking the biggest sustainability problems in ICT.

Fairphone’s own website notes that retaining ownership “puts us in a better position to take advantage of the circular economy ... we can ensure that all the resources [in the phone] are used optimally over the phone’s life cycle, including when

it’s time to be used by another client or recycled.” It also allows Fairphone to provide the right product for different customer segments – such as lower prices for customers willing to accept cosmetic wear.

Data collection from rented devices could also form a key opportunity for sustainability. Access to the devices

across their whole life span could offer a wealth of data to inform future design of products, service agreements, and maintenance schedules. While this would entail certain privacy issues which would have to be addressed, the data could inform more robust or material-efficient designs – for example, by understanding how often a phone actually tends to be dropped, or what humidity it endures.

Fairphone-as-a-service (FAAS)

The proposition for this new business offering was developed by Fairphone in concert with several partners including legal, financial and circular economy experts as well as potential service clients. This ‘community of practice’ identified several factors that would shape the success of Fairphone-as-a-Service¹. These include:

- Finding the right flexible finance with up-front funding before cash flows become positive
- Establishing when it is acceptable to collect user data
- Establishing service level agreements (SLA) that ensure devices can function at all times at a level that is acceptable to all parties, and allocates each risk and responsibility to the most suitable party.

One finding is that Fairphone’s existing repairable modular design makes the product an ideal candidate for this business model. As it is designed to be easily repaired by anyone simply by swapping out modules, this gives a means to alleviate one key risk for both buyer and user: how to maintain access if the product breaks. This is solved by keeping a small pool of replacement parts on the client’s premises, as well as the regular preventative hardware and software maintenance that Fairphone undertakes.

¹ The consortium released a report detailing its findings, which can be found here: www.circle-economy.com/the-circular-phone

Product-as-a-service incentivises the manufacturer to design for longevity and reuse – immediately attacking the biggest sustainability problems in ICT.”

Fairphone is engaging with two potential 'clients' to pilot FAAS: one public sector body, and one large business. As of late 2018, the pilot is still at the stage of negotiating contracts to make sure that these are acceptable to both supplier and clients. Both clients in the pilot are taking part for the purpose of organisational learning. These entities want to learn how to operate more sustainably, and circular procurement is seen as a promising route towards this.

This approach is a completely new experience for all parties in the pilot. The challenge is to develop pricing and SLAs that align with the needs of all relevant departments of the client and do not clash with the client's existing procurement agreements with third parties. Getting the procurement model right is a key part of this, with an opportunity to set a great example for circular procurement.

What next for Product-as-a-Service (PAAS)? Keys to success, challenges, and replicability

PAAS is not a completely new idea – existing examples range from tools to lighting to jeans. The model may be replicable for other ICT products, if all parties are committed to getting the contracts right for everyone.

Device data privacy – real and perceived – must be carefully navigated in order to keep all parties happy while gaining all the sustainability benefits that PAAS can offer. Some countries' privacy laws prohibit the collection of data that could identify an individual. It is technologically feasible to anonymise lifecycle data collected from rented devices, but some users may find it inherently invasive. Even if the data will never affect a user's own contract, the perception of privacy is more difficult to achieve. Fairphone co-founder Miquel Ballester observes that it is vital to first develop a trustworthy brand.



Image credit: Fairphone

Find out more:

bit.ly/Fairphoneforcompanies

Header image credit: Fairphone

Keys to success

- Targeting markets that buy for functionality and are used to a leasing model
- Cooperation between buyer and supplier to work out who can best carry different aspects of responsibility for the device
- Flexible finance with up-front cash to invest in producing devices.

Next steps

- Exploring and identifying an ethical balance between privacy and data collection
- Finding ways to build in data privacy and to increase trust in this.

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