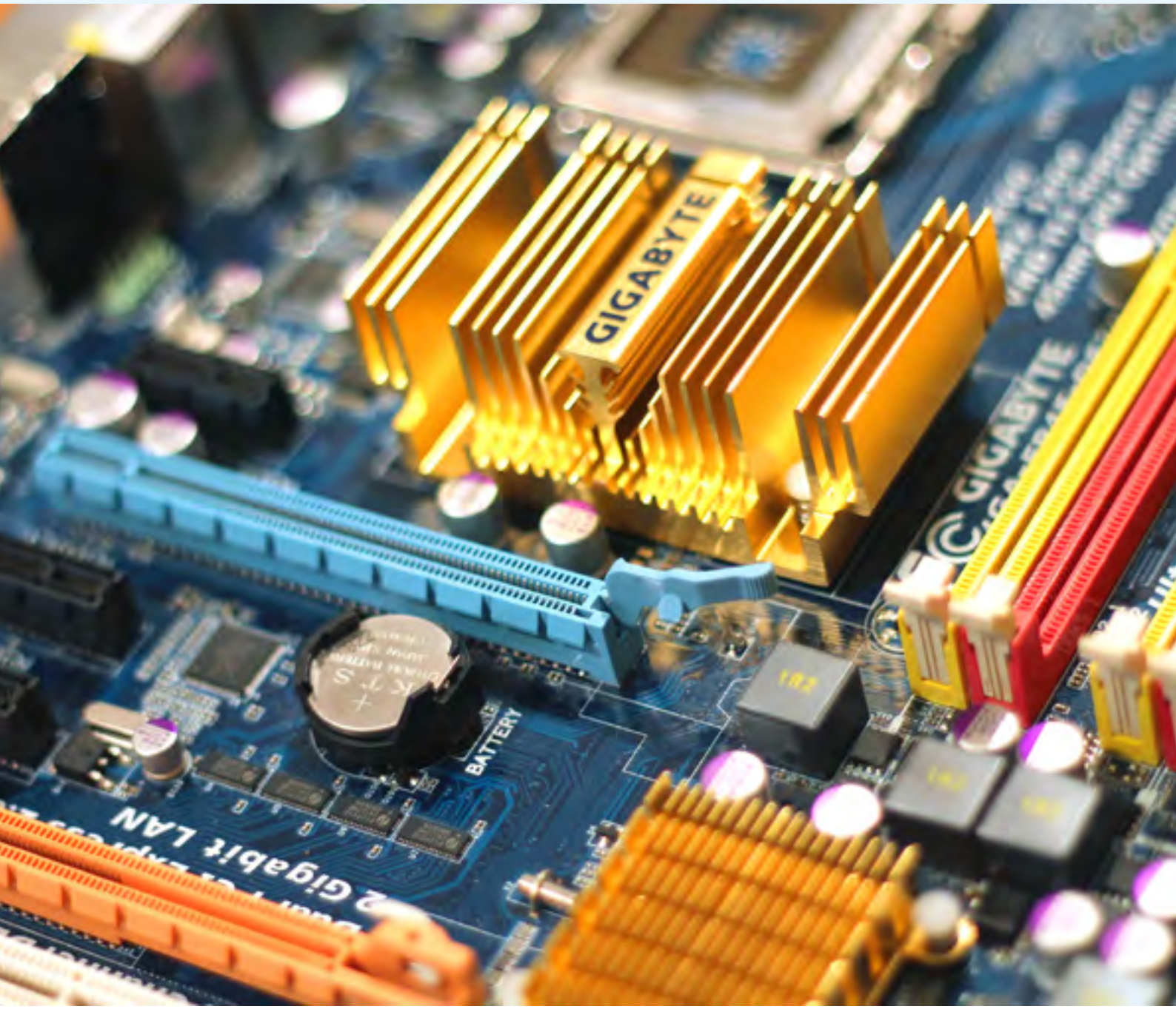
Rijkswaterstaat
Ministry of Infrastructure and the Environment

REBus ICT
Sector report



www.rebus.eu.com

Inhoud

The EU LIFE REBus (Resource Efficient Business Models) project[1] aims to reduce the use of raw materials or extend the lifetime of products by demonstrating the commercial case for European businesses to change their business models. As a REBus partner, the Dutch Rijkswaterstaat has aligned these business models with public procurement budgets, asset management and legislation across a variety of procurement categories including textiles, furniture, electricals and construction.

This category report focusses on the opportunities and learnings from the REBus pilots relating to ICT (information and communications technology) and electrical equipment (EE). ICT is the umbrella term that typically includes, inter alia, physical communication devices encompassing radio, television, mobile phones, computer and network hardware, satellite systems, as well as the various services and applications associated with them, such as videoconferencing. In this report, we discuss the ICT related electronic equipment, or ICT related hardware.

1 Developing Resource Efficient Business Models – REBus. LIFE12 ENV/UK/000608 www.REBus.eu.com

1 ICT production in Europe

General market

Sales of information technology and telecommunications products and services across the globe increased by 3.8% to €2.81 trillion in 2015 according to the European IT Observatory (EITO). Europe accounted for about 20.1% (€564.8 billion) of the global ICT market by region, behind only the USA (30.5%). ICT companies constitute around 5% of all European companies and 5% of total EU employment. The number of European ICT service companies is growing and now exceeds 900,000. However, only around 3% of these are manufacturing businesses and 7% are ICT retail and supply. The remaining 90% provide ICT services. This highlights the reliance of EU public procurement bodies on global supply chains for ICT hardware, and by extension, reduces their potential to influence the circularity of products through design and manufacturing led practices.

Production & consumption estimates

Reporting of EU ICT production is by unit, so the overall tonnage of ICT produced and consumed within the EU is difficult to estimate given the range of ICT equipment produced. Around 74 billion ICT units (NACE Revision 2 codes 26.1-26.4) were produced in the EU27 states in 2015 according to Eurostat. This does not equate to consumption due to import and export factors.

The total value of reported ICT produced across the EU27 in 2015 was €111.6 billion which is significantly less than the EITO figure noted above (€564.8 billion) if the EC 2015 JRC macroanlaysis report for EU ICT is correct. Differences in scope of hardware equipment included will account for some of the difference, as will production versus sales. However there is a significant variance. The top four producers (Germany, France, United Kingdom and Italy) accounted for around 42% (€47.25 billion) of this value. Germany is by far the largest producer accounting for 19% of all reported EU ICT value.

France produces fewer units than UK or Italy by volume but products have higher value add – almost double that of UK and Italy. However, even where EE is manufactured in the EU, many components and raw materials are sourced through extended global supply chains.

Table 1 is based on OJEU tendering estimates that show around €197 million of public procurement tenders were awarded in 2015 for ICT products and services, with 54% still based on least cost criterion according to the procurement returns.

Table 1 TED ICT procurement contract awards, 2015

Service	TED Value (€)	percent
Education	€ 4,594,881	2.3%
Security & Defence	€ 11,664,646	5.9%
Health	€ 16,971,082	8.6%
Environment	€ 17,393,502	8.8%
General services	€ 114,266,318	16.4%
Other	€ 32,415,626	57.9%
Total	**€ 197,306,055**	

Source: Extracted from SIMAP: Information about European public procurement

2 Circular procurement and ICT

Circular procurement provides the opportunity for adapting the typical business-as-usual (produce-consume-dispose) model to more resource efficient procurement approach that delivers broader policy goals as well as cost savings, reduced environmental impacts and improving social wellbeing. There are broadly three types of business models:

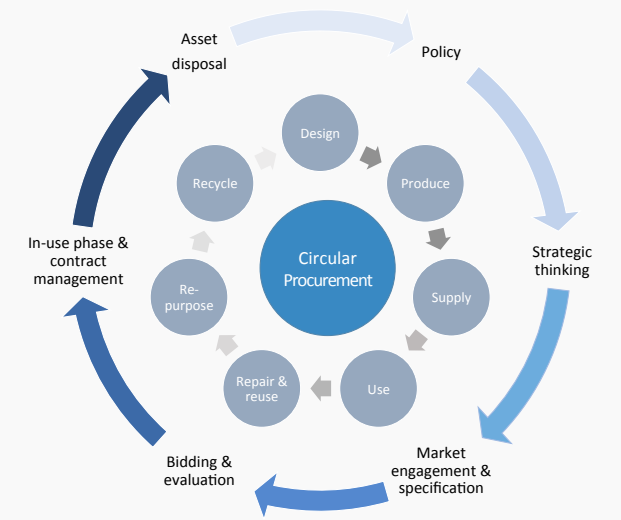
take-back – suppliers and /or manufacturers take-back ICT at end of use cycle so that they can either be reused, repurposed or recycled more effectively than general ICT collections;

buy & sell on (or sell back) – these models can create revenue streams by incorporating arrangements for the purchasing body to sell-on (or sell back) ICT at end of use either for reuse or recycling; and,

servicisation - product service system (PSS) models, like leasing and pay-per-use of ICT equipment can reduce in-use impacts by improving functional life. Procurement requirements need to be organised and specified in the right way to incentivise PSS to include sustainable practices to ensure sustainability is fully embedded within the services required if the potential of circular ICT products is to be realised.

If it is considered in a circular way, the procurement cycle can be proactively used to influence key areas in product design and manufacture, use and disposal. Both procurement and product life can been seen as loops (Figure 1). The inner loop of Figure 1 shows a simplified process cycle, in this case, for ICT. The outer loop highlights the key stages for embedding circular thinking and decisions within the product and procurement cycles. Each stage is complex particularly with production and distribution typically being on a global scale. A key element of circular thinking in procurement is embedding thinking and action by the relevant stakeholders in each stage of the cycle. The following sections provide some guidance, evidenced by examples from the REBus pilots.

Figure 1 Embedding circular thinking within the material and procurement cycles



3 Key themes

Office ICT and electrical equipment range from high volume, low cost items such as screens, tablets and telephones etc, through to high cost and low volume specialist items such as medical scanners, ICT servers etc. ICT comprises a wide variety of materials often from extended global supply chains. Traceability is a significant challenge in terms of materials and components sourcing. Typically the most common materials in ICT are from the metals and plastics groups. ICT also includes critical raw materials (CRMs). CRMs are fundamental to Europe's economy, growth and jobs, however in many cases, manufacturers are reliant on a small concentration of supply from a few countries outside of the EU. This can potentially lead to a resource security risk. Ensuring the collection and appropriate, high value, recycling has the potential to recover CRMs as well as more common materials and to go some way towards mitigating this risk.

Rethinking the need

» **Key internal stakeholders:** policymakers, budget holders, finance teams, central and bi-lateral purchasing bodies and teams, asset managers

» **Key external stakeholders:** brands, suppliers, service and rental businesses, organisations that buy our obsolete equipment for re-use, financers

As with any category the initial challenge is ensuring internal buy-in. The REBus pilots have shown the need to set a circular ambition or vision and then to ensure circular targets are translated into procurement policy and objectives. These, in turn, need to be translated into procurement practice. This integrated approach can often highlight contradictions in existing policy, targets and practice as it takes account of a more holistic view of the procurement cycle.

Make equipment superfluous. What really does need to be replaced? Be critical about it. Universal docking stations and accompanying mice do not need to be replaced, nor do screens. Are the accessories still sufficiently functional, including bags, locks? The initial opportunity within the procurement cycle is to challenge the need for new ICT products as the REBus Province of Utrecht pilot identified. An internal poll within the Province found that 37% of employees would accept a refurbished unit. Refurbished second-user systems can offer savings of 60% to 90% from list price and there has been a growing interest in refurbished equipment, due to the effects of the economic recession and the waste electrical and electronic equipment (WEEE) directive2. Understanding and distinguishing between the varying specifications requirements for new and existing devices rather than a one-size-fits-all solution can also encourage refurbished products. A question is where to place value retention, e.g. at the front or at the back of the procurement. A high level specification tends to mean devices retain their value longer whilst a lower level specification - still fit for purpose – can enable refurbished items to be offered.

Hardware technology is continuing to enable greater durability, which has caused many businesses to extend their technology refresh cycles. Four-year refresh cycle for desktops and a three-year refresh cycle for notebooks are typical. However even these are still only around half the functional life of the devices. Software development is also ageing hardware before its functional life is completed. For example, the ongoing development of faster processors drives the development of faster applications making existing computers and smart devices less productive in the same environment. This highlights the benefits in differentiating user needs as many computers and smart devices are only used for a limited range of applications.

2 Define 'refurbished'. It is important to be explicit because there's no agreed definition for it. There are examples of administrative and logistical tricks in order to sell new items as 'refurbished'.

Leasing equipment over a fixed period and returning it all on time can be less expensive than getting a poor deal on repeatedly buying smaller quantities every year. It addresses functional obsolescence and avoids direct and often hidden costs such as disposal costs and finding a buyer for aging second-user systems or paying to recycle them.

REBus lessons

Gaining internal commitment to ensure a common ambition and/or vision for circularity is a critical step in transitioning to more circular procurement of goods and services. Enabling enough time to identify and understand the benefits and barriers to increasing circularity of ICT procurement is important. Circular procurement practice, like other change processes, requires time to gain a critical mass. Addressing barriers in thinking and processes means change needs to be incentivised e.g. by embedding in personal performance.

In terms of getting started, market engagement is critical to identifying the supply chains current and full potential to deliver circular products and services. This development needs to assess not just the capability of the market to deliver more circular products but also the length of time required. Initial engagement has to be encouraged from demand-side and as the Province of Utrecht found, initial enthusiasm from the supply chain can often be disappointing.

Implementing new practices means factoring in a longer lead time as the REBus pilots have shown. Initial pilots require more time especially in terms of understanding ICT needs and current and potential options available through market engagement.

Netherlands, Province of Utrecht

Tender Board

To address the policy contradictions that a whole approach to products services flagged up, the Province of Utrecht has a Tender Board intended to elevate circular procurement and sustainability decisions to a higher level. The Tender Board consists, *inter alia*, of the team leader, department manager and a general manager. This leads to a more balanced decision when considering the needs of the organisation, finance, users and technical teams.

Factsheet & Lessons learned report

Sourcing and design

» **Key internal stakeholders:** policymakers, users, central and bi-lateral purchasing bodies and teams

» **Key external stakeholders:** product designers, brands, manufacturers & assemblers, trade bodies. Also potentially academia

In terms of design and production, a limiting factor for high volume ICT items, is that public sector bodies in the EU can only exert limited influence on what is, a global market despite being large consumers at a national level. In order to increase influence in these areas, broader collaboration is required to improve design aspects that will reduce dependency on certain materials and/or improve the potential for repair, reuse and remanufacturing after the first life cycle in order to maximise functional use.

One area in terms of design and production that procurement can influence is to encourage the incorporation of recycled materials in new products. Specifying recycled content as a procurement target can help encourage greater demand for recycled materials (plastics as well as metals) which in turn will contribute to closing material loops. Another one is stimulation of design for dismantling, repair, upgradeability.

REBus lessons

ICT supply chains for low value, high volume items are often dominated by a small number of global manufacturers. For these products, market engagement is often limited to suppliers and not the manufacturers. Therefore circular expectations (e.g. those beyond standard SP requirements for safety and health, energy consumption etc) need to focus on other areas like in-use and end-of-life for 'quick wins'.

It may be appropriate to consider separate strategies for high volume, low value items and more specialist high value, low volume items. For the latter, this would enable design considerations to be factored into the procurement exercise. These items may also have a higher impact in terms of resource security as the strategic need, i.e. dependency, is likely to be higher. Encouraging more circular procurement here will improve security of supply, for example encouraging remanufacture and recovery of CRMs and platinum group metals.

Purchasing and supply

» **Key internal stakeholders:** budget holders, central and bi-lateral purchasing bodies and purchasing teams, users

» **Key external stakeholders:** brands, suppliers, service and rental businesses, financers

EU Green Public Procurement Criteria (GPP) exist for the following ICT categories:

- Computer and monitors
- Electrical and Electronic Equipment used in the Health Care Sector
- Imaging Equipment

Related categories also include indoor and street lighting. GPP criteria are an important tool in ensuring that minimal sustainability efforts are embedded within purchasing decisions, as well as energy consumption and sourcing considerations, criteria can be used to shape the service provision as well as end of life options such as recycling.

Criteria documents are, however, only an aid to achieving the goal. It's even more important to be aware that circular or sustainable procurement is not something you can simply add on. Sustainability demands a balanced assessment of "people, planet and profit".' Procurement organisations are, however, usually insufficiently equipped to assess the people and planet values. They lack the time and knowledge for this. It is naive to imagine that a procurement manager can put sustainability into practice sufficiently, using merely criteria documents but without extra knowledge and time.

Understanding financial options and available services is also important given the growing variety of financing options from leasing and rental providers.

REBus lessons

The REBus pilot projects show that, in the Netherlands, the reality does not yet match the circular ambition of the policy. During the short period of tendering exercises, the market is being asked what is possible now in terms of circularity. The current results appear to be beneath the circular ambition. It is therefore necessary to adapt the ambition to the short term possibilities offered by the market now as well as the long terms policy goals for a more circular economy. This needs to happen through clear and achievable steps. This insight calls for tenders to be given a form so that they:

- provide an incentive to challenge the market to suggest circular solutions as much as possible; and
- using functional or performance based specifications to address as many potential barriers for the circular economy as possible, which could play a role in a later phase.

For example:
- not asking for 'new' equipment, keeping the door open for second-hand (or refurbished); and,
- where possible, create space so that new, innovative companies are not excluded in advance

To achieve a circular IT hardware economy, the interests of value retention need to be linked to the interests of producers.

This means that the returns from value retention must trickle back into the chain (cycle); producers need to be able to earn from value retention, in which the value of use instead of ownership is central. Although there are undoubtedly many more options, common instruments include:

- Leasing;
- Extensive guarantee periods; and/or,
- Incentives for keeping equipment in functional use for longer.

U.K., Natural History Museum

Tendering KPIs and leasing options

In 2015, the Museum was retendering the IT hardware contract for approximately 1,300 PCs, laptops and high end workstations (estimated value of circa £150,000 over the life of the contract). It also purchases audio visual (AV) equipment which is used in its exhibitions. Both IT hardware and AV equipment are procured through framework agreements.
Circular economy procurement support provided by WRAP identified that the leasing of IT and AV equipment may provide an economically, socially and environmentally viable alternative procurement model for the Museum. The IT Hardware Refresh Mini Tender documentation was amended and the associated tender evaluation sustainability criteria were updated to include, *inter alia*:

- Maintenance support and repair.
- Management of obsolete and redundant equipment.

There is scope to increase the amount of reuse and recycling currently being undertaken for IT and AV equipment which is no longer required by the Museum.

Use and asset management

» **Key internal stakeholders:** asset managers (internal and/or outsourced), users, budget holders

» **Key external stakeholders:** suppliers, service and rental businesses, repair

According to IBM, whereas 'cash is king' was the mantra, increasingly cashflow can be a constraint on growth. Managing it, and optimising its use remains a critical business objective, and that in turn drives interest in financing. Spreading the cost over a fixed term can be the cheapest way to fund major IT projects, refresh hardware and ensure the business does not fall behind in technology developments. Moving IT spending from a capital expenditure (capex) to operational expenditure (opex), is significant benefit of ICT service such as cloud computing. Pay-per-use can help reduce adoption barriers. ICT businesses often use pay-per-use in conjunction with other revenue models e.g. the SaaS (software as a Service) model. However, for start-ups and SMEs, the pay-per-use revenue model is highly dependent on high transaction volumes. This makes it a less appropriate model for encouraging early-stage companies or SMEs.

When looking for finance to cover an entire IT implementation, businesses have normally turned to banks or other finance companies to provide loans. However, ICT leasing has grown into an expert area of finance, and specialist IT finance companies. This third party relationship can be a barrier within public procurement financing rules.

Leasing and pay per use requires some form of reliable asset management, and is all the more important if new IT or security policies have come into force within the company during the life of the lease - especially if these require modifications to hardware and/or data-wiping.

Consider ownership and good care. How easily do you provide your employees with equipment? Are you critical (is it really needed?), who is responsible for damage? If the organisation covers this, the user shrugs his/her shoulders. Reward employees if they handle equipment with care. There are business models in which employees are even offered money to purchase the equipment of their choice, and keeping this equipment for x years. These models demonstrate that there is much less damage and waste.

REBus lessons

Expectations for refurbishment within pilots had to be managed due to barriers around quality specifications and data security. Annually there are about 30,000 units dealt with through the Dutch DRZ contract. The equipment is destroyed for data security, cost and the shredded 'scrap' then sold to the market. The intention was to create a model for reuse and resale after accredited data wiping. The estimate of saleable items was unrealistic given current awareness and collection methods. Although incentives were trialled these would need to be adapted to reduce the leakage into other disposal routes - up to 24%. Greater communication would be required with other ministries in order to scale-up the potential but the overall concept for extending product lifetimes remains sound.

Lifetime optimisation for ICT

Based in the UK, IT4Kids helps schools to raise funds for additional resources or extra-curricular activities through the re-use of unwanted IT equipment. Seven schools took part in pilots, helping IT4Kids to prove that schools are receptive to the idea and that the logistics work. Engagement with schools was good, but the execution of the promotion of the service was poor and auditing items and collection costs for small numbers of items are barriers that need to be addressed before scaling up.

The UniGreenScheme, also in the UK collects, stores and sells surplus equipment for UK universities and returns them a share of the profits. The goal of the project was to bring an asset resale service to market so that university equipment waste could be reduced.

In the Netherlands, Recover-E® is a shared responsibility programme that applies circular thinking to ensuring ICT equipment remain valuable and reusable for as long as possible. Theory is that by involving everyone from product owner and user, to recoverer and recycler in this approach, there is no waste. Track and trace system that provides an overview of ICT equipment and its component parts at every stage of the chain from initial purchase to end-of-life.

Facilities Managers' benefit from recouping space and generating revenue for surplus assets. Procurement teams benefit from reduced expenditure on waste disposal, and assistance in meeting financial savings targets. Environmental services benefit from easy achievement of waste reduction targets and reduced utilities. The Recover-E® scheme also provides a collated dataset, including the potential CO2e benefits.

Asset disposal and waste management

» **Key internal stakeholders:** asset managers (internal and/or outsourced), users, budget holders, health & safety

» **Key external stakeholders:** collection services, date and security services, service and rental businesses, reuse organisations, remanufacturing businesses, recyclers, regulators

Opportunities exist for ensuring reuse and resale outside of the organisation. A key challenge is data security, so a certified data wiping or 'flushing' process should be factored in. The Dutch Ministry of Finance Personal Estate Office (DRZ) are responsible for disposal of around 30,000 redundant, data supporting ICT items per year of the national government. Their research (see factsheet) into alternatives to destruction of the equipment found that in the current system around 25% of items collected can be data-wiped and then reused. But there is a high potential for improvement.

Netherlands, Ministry of Finance (DRZ)

increasing functional life through reuse

A survey in the Dutch Ministry of Finance (DRZ) REBus pilot found up to nearly 75% of items were unfit for reuse due to faults, leakage from the asset register, missing equipment (e.g. power supply, leads etc) and obsolescence.

The survey showed that the pilot was done in a 'throw-away-system', resulting in a lot of damaged and/or incomplete items. It is expected that the percentage for reuse will increase significantly if the collection logistics and asset management thinking is changed from 'throw-away' to 'resell'.

Therefore, thinking about reuse potential and how equipment is disposed of, and collected, is an essential part of closing the ICT materials loop.

Related article & Factsheet

4 Replication scale-up potential

Implementing circular economy pilots in a linear setting involves running into linear barriers. High volume, low cost business models for ICT depend on selling as many new products as possible. A circular approach means keeping the functional value as long as possible, e.g. through reuse, followed by high quality recycling to recover raw materials. The linear ICT production model currently doesn't match the interests of the circular economy. ICT producers therefor need to change their practices and their business models to help deliver a more circular service. This will only happen if they can see tangible benefits from shifting to more resource efficient business models.

A quick win however is encouraging the procurement of reused items, where fit for purpose, instead of new. Reused items are potentially cheaper than new items where backed by appropriate length guarantees. However, the focus should be on quality and sustainability rather than least cost. This can be encouraged through Most Economically Advantageous Tendering (MEAT) or EMVI (Economisch Meest Voordelige Inschrijving) in Dutch.

This means that more time needs to be made available for interpreting quality and sustainability. MEAT facilitates this, the consequence being that a lot of time needs to be made available for assessing tenders. After all, quality and sustainability are not usually quick and easy to assess; certainly more difficult to assess than something as one-dimensional as 'cost'. If you take sustainable procurement seriously, you should spend three times as long on procurement as you do on non-sustainable procurement.

Implementing circular economy principles through procurement is still in its infancy. Businesses and procurers have to collectively define what is required and how it works in practice. This takes time, and, as the pilots have shown, initially takes longer than an equivalent procurement project. At the tendering stage, procurement can only ask for what is currently available – or near to market through innovation. Therefore, in parallel to tendering, procurement policy makers need to initiate ongoing dialogue with the market in order to encourage more circularity in products and services. Encouraging innovation is important in enabling both the procurers and suppliers understand the risks and benefits inherent in switching from business as usual.

The REBus and Green Deal ICT pilots in the Netherlands have demonstrated that encouraging the procurement of more circular ICT items is not only possible but that it is practical.

It delivers on national circular economy goals as well as reducing environmental impacts and in some case providing revenue streams. The Green Deal Community of Practice is jointly working towards the alignment of circular procurement of ICT hardware. The community includes state government, provinces, cities, individual departments, agencies, universities and companies. There is also an end-of-life ICT community that addresses datawiping, re-use and recycling. As well as procurement, the state government has an internal group that considers in-use aspects of ICT to increase utilisation. Results are however shared in a broader perspective. Sharing knowledge is key to stimulate the circular economy.

Delivering the wider potential identified by the REBus pilots requires a broader and longer term vision for an ICT sector that is currently driven mainly by volume of sales linked to rapid technical and software innovations. The tender analysis has shown that in order to encourage a shift towards more circular products and service, the current prominence of least cost tendering has to be switched to a life cycle based approach, for example through total cost of ownership or Best Price-Quality Ratio.

The current situation of the sustainable or circular IT hardware chain is not clear. The pilots provide an initial attempt to form a picture of the situation. This exploration into the circular future is being carried out in a linear system, contrary to all regimes, patterns, systems and practices.

This linear context has proven to be unmanageable and generally too rigid to complete the pilots at the hoped-for level. The tangible results of the projects were disappointing but, as a learning project, the pilots were a success. Many mechanisms have been exposed that preserve the linear system. If we want a sustainable, circular IT hardware chain, we will have to address these mechanisms. And this will take time.

A Rijkswaterstaat impact analysis demonstrated that the pilots achieved CO2 savings of approximately 2% and equipment savings amounted to 5%. The savings were disappointing because the users who participated in the pilot were not prepared for circular collection and because the estimated replacement ratio was limited to just 37% (used equipment as a replacement for new procurement). If users had been better prepared for this form of reuse and the replacement ratios had been higher (e.g. 70%), the pilots' CO2 and equipment savings could have increased to, respectively, 5% and 19%.

But, as stated, the potential would be much greater if steps were taken at system level, in cooperation with all parties in the chain. The outcomes of the pilots offer good initial suggestions to continue the process with a step-by-step approach.

Factsheets Dutch pilots ICT

- Domeinen Roerende Zaken (Dutch government)
- HIS (joined procurement center of the national government)
- Province of Utrecht
- PON

Colophon

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REBus

REBus (Resource Efficient Business Models) is a project financed by EU Life+ with the goal of gaining knowledge about the potential of circular business models and investigating whether they can deliver the target of 15% savings in resources and costs. The project is partially being implemented in Great Britain and partially in the Netherlands.
In the Netherlands, REBus is working with other governments and progressive companies to explore models that make circular procurement possible within five industries: IT, office furniture, construction, textiles and catering. By conducting pilot projects, REBus is learning more and more about what is needed for circular procurement. REBus also applies the knowledge gained in new pilot projects and stimulates participants to share their knowledge.

With the intended ripple effect, a project such as REBus will not longer be necessary over time. More information:
www.rebus.eu.com