

Corporate Sustainability Lessons Learned

Going circular: Towards 100% reuse and recycling

PwC in the UK

Third edition
September 2016



Our *Lessons Learned* publications are designed to share our experiences of implementing our sustainability strategy, in order to allow others to learn from our successes – and our mistakes. This document, first published in November 2015, is part of a series focusing on our ‘**Going Circular**’ programme, which seeks to alleviate pressure on materials, water and the climate.

Having gone ‘zero to landfill’ in 2012, we’re now working towards an aspirational goal to reuse or recycle 100% of our waste by 2017, as well as exploring fully ‘circular’ solutions, in the longer term.

This document is our third edition, updated to reflect new solutions introduced over the past year or so, and better data. It’s accompanied by a new series of videos which bring to life the collaborations at the heart of our programme.

All of these materials can be found on our Going Circular website at www.pwc.co.uk/goingcircular. We hope they’ll provide a useful resource for others looking to take a similar approach.



Get the full story

We’ve produced a series of six short videos to explore what ‘going circular’ means for a typical business. To find out what we learned about making better use of the materials used in every business, everyday – such as furniture, IT, clothing, and food waste – visit www.pwc.co.uk/goingcircular.

If you don’t have time to watch them all in one go, sign up to be emailed a different film each week, at: <http://bit.ly/GCregister>.

What do we mean by the ‘circular economy’?

The ‘circular economy’ (see [Chart 1](#) on [page 2](#)) is a conceptual model used to underpin decision-making for sustainable development. It’s intended to replace the existing, linear, ‘take-make-dispose’, global system of production and consumption, by which we extract resources (by mining or growing them), and then manufacture, transport and use products, before disposing of them. This system has been enabled by a century of declining commodity prices but is no longer viable.

First, the global population is set to rise from seven to nine billion by 2050, putting pressure on global stocks of raw materials. Second, the upstream stages of primary extraction and manufacturing often require large quantities of energy and water (known as embodied carbon and water) which could be avoided by using resources more efficiently. Third, traditional methods of waste management are not always well-regulated and can cause pollution, or – at least – lock materials away in landfill, where they are no longer available to the economy.

In contrast, the circular economy is driven by innovation and entrepreneurship. It involves change at each stage of the value chain:

- Improving extraction and production processes for greater efficiency, or switching to the use of alternative, renewable materials;
- Reducing consumption by, for example, encouraging consumers to buy products that are more durable, or moving away from products towards services (i.e. providing customers access to products when needed rather than having to own them): this shift is being enabled through new technology, and there are already established models for peer-to-peer accommodation, car sharing, and clothing rental via ‘sharing’ platforms¹;
- Moving to systems where products are repaired, reused or remanufactured to give them a second-life; and
- Improving waste collection and recycling systems so that materials are recovered in a way that enables them to be put back into the economy as useful inputs.

1. www.pwc.co.uk/issues/megatrends/collisions/sharingeconomy.html



Chart 1
 'Going circular' explained

The circular economy is often depicted as a series of loops, each representing a different way of managing products that are no longer required by their owners (because they are damaged, defective, or simply unwanted). The loops represent a hierarchy. The closer to the centre the loop is, the less waste and environmental pollution created and the more economic value retained in the product or materials.

1. Recycling

Recovering materials from end-of-life products for use as raw materials in another process, excluding incineration to generate energy. May lead to materials of the same quality, lower quality (down-cycling) or higher quality (upcycling). For organic matter, may refer to composting or anaerobic digestion.¹

2. Remanufacturing

Disassembling products at the component level rather than into separate materials, replacing broken or out-dated parts to make a new product for sale or lease. This avoids a new product having to be manufactured.

3. Reuse

Selling or donating a product in its original form, or with little change, which avoids a new product having to be manufactured. May also include redistribution of unwanted food.

5. Redesign

Developing products that use fewer materials or have a smaller environmental footprint, that are designed to be more durable, or to be offered as a service through a leasing or take-back model. Also includes adaptations to make products easier to repair or disassemble at end of life. Aims to tackle the most material impacts, based on lifecycle analysis.

4. Maintenance

Extending the life of a product with its first owner, either via a repair service or making it easier for users to repair it themselves. This delays the purchase of a replacement product.

1. Anaerobic digestion is a process whereby waste organic matter, such as food or garden waste, is converted into digestate (which can be used as a fertiliser on farmland) and biogas (which can be used to generate clean energy)

Why ‘go circular’?

The circular economy requires a change in mindset towards ‘materials stewardship’, focusing on the protection and renewal of resources. It’s a timely concept, as it will not only help nations and businesses to improve their resource resilience, but will foster economic growth, and create new jobs. This is true globally, and also in the UK.

But why would PwC want to ‘go circular’? Well, there are three main reasons:

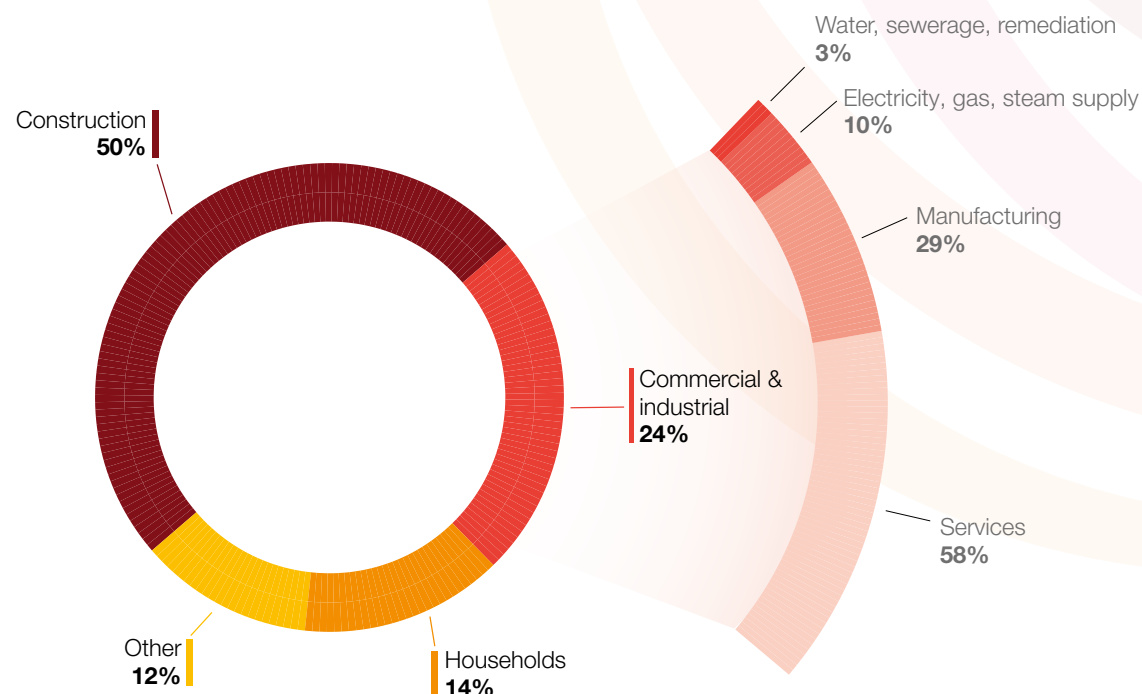
Walking the talk

The circular economy is a compelling vision of the future and an area where business can make a big impact. This means that it’s an opportunity for us. Our Sustainability and Climate Change practice includes experts who are helping several leading clients to innovate, adopting circular solutions by incorporating them into their business models and operational processes.¹ Wherever possible, we try to apply the same best practice advice that we recommend to our clients to ourselves, and circular economy principles are no exception.

Tackling environmental issues

Carbon emissions, waste and water are important global issues so our sustainability strategy includes actions to reduce our negative impacts, both in our operations (as measured in our sustainability scorecard²) and in terms of our total impact³. It’s easy to assume that the majority of the UK’s waste emanates from households, when in fact that only represents 14% of the total, with businesses (commercial and industrial) accounting for another 24% and construction (much of which is commissioned by businesses) for 50% (see [Chart 2](#)). And, even though our sector – professional services – is itself resource-light, we procure services from companies with a bigger waste footprint. As a result, we’re able to influence considerable upstream impacts, and feel it’s important to play our part, pioneering new processes and contributing to new markets.

Chart 2
 UK waste, by type (with commercial & industrial breakdown)



Source: Eurostat ‘Generation of waste by economic activity and hazardousness (2012)’ dataset

Stakeholder expectations

Our business depends on our people and our reputation, so it's important that we meet the expectations of our stakeholders, wherever possible. Our clients expect us to have high standards in relation to resources and waste, and our people, too, have strong views on the topic: waste is a visible and symbolic workplace issue, which they expect their employer to be tackling. Business is also expected to play its part in achieving government targets, whether at EU, UK or city level, while NGOs expect us – as a big business – to be doing our bit, too.

1. www.pwc.co.uk/circulareconomy
2. www.pwc.co.uk/annualreport/assets/2016/pdf/pwc-uk-sustainability-performance-and-commitments-2016.pdf
3. 'Total impact' refers to a methodology created by PwC to measure the impact on society, good or bad, by business operations or specific decisions. It includes economic, tax, environmental or social impacts. For more on the methodology, see www.pwc.com/totalimpact. For PwC's own impacts, see www.pwc.co.uk/who-we-are/corporate-sustainability/valuing-our-total-impact.html.

“The professional services sector has relatively low direct impacts, so the challenge is probably to work jointly with others, such as clients or suppliers, to reduce collective impacts.”

Dustin Benton, Green Alliance

“I want to do my bit for the environment, so it's important that I can recycle at work.”

Adam Blacklay, employee, PwC

Where we've come from and where we're going

Our work on materials and waste is progressive, and we're evolving our approach over three successive stages as we pilot new solutions and build momentum (See [Chart 3](#)).

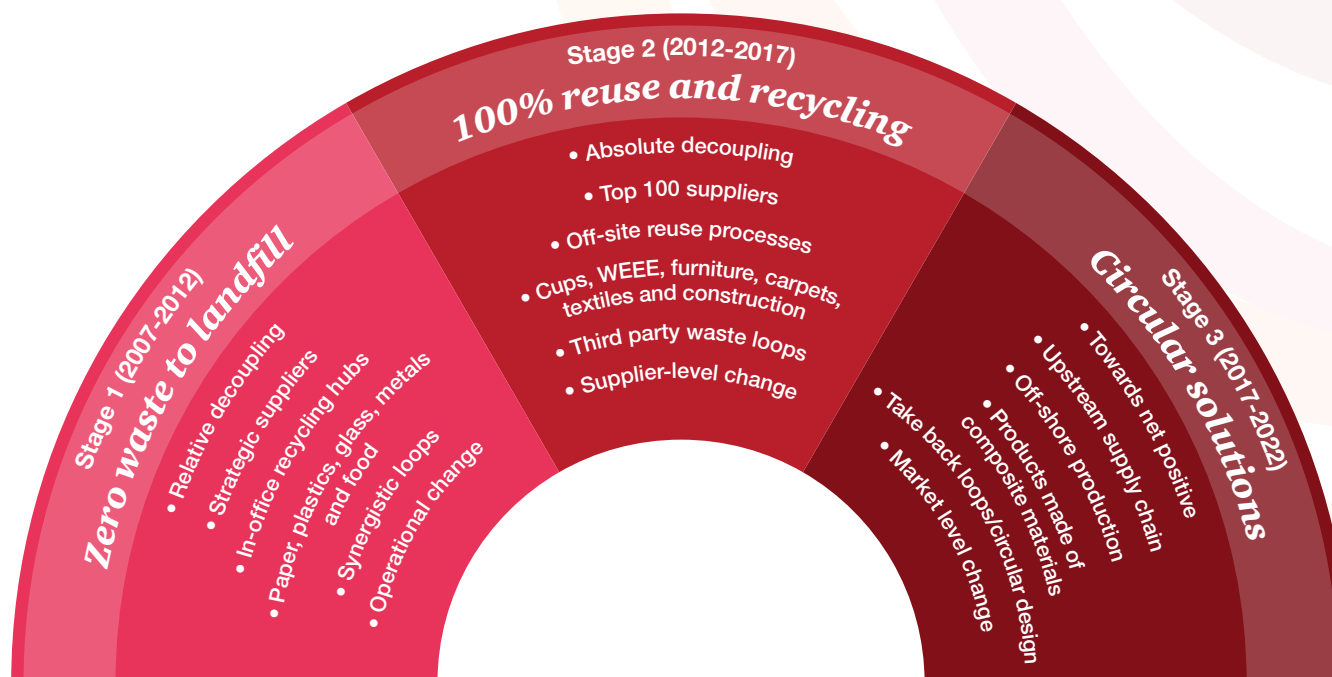
Stage 1 – Zero waste to landfill

2007-2012 was the period in which we first made waste a real focus area in our sustainability programme. We were unsure what was possible, so set targets to reduce our waste and consumption that were relative to our size, and focused on changes to our 'practice floors' – i.e. the main areas of our offices where all our people work, both internal and client-facing. Removing desk-side bins, we implemented recycling hubs with segregated waste streams, which forced our people to separate out paper, plastics, metals, glass and – later – **food waste** (see photo on [page 6](#)). Our primary goal was 'zero waste to landfill'¹ which we achieved in June 2012, having collaborated with our national waste management provider to source appropriate waste collection and recycling services for all of our c. 30 offices in the UK. We also worked with them to improve our methods for estimating waste volumes and weights, improving our measurement and reporting.

We established a 'waste to energy' solution for materials that couldn't be recycled. We also tested a couple of 'loops', working with suppliers to convert our archive paper into hand-towels for use in our washrooms, and to refine the used cooking oil from our on-site restaurants to **make biofuel** that we can burn in our tri-generators to generate heating, cooling and power for our buildings.²

We shared the lessons from this stage, including the cost savings and tips for overcoming the challenges we experienced, in a previous Lessons Learned document, available on our [website](#).³

Chart 3
 Our three-stage approach to the circular economy



Stage 2 – 100% reuse and recycling

In 2012, we reset our ambitions and goals. With the confidence that came from our successes of the first five years we moved to absolute decoupling of our growth and our impacts – setting targets to reduce our material consumption (e.g. paper, water) and our waste generation by 50% versus our 2007 baseline. We also set a new, aspirational goal to achieve 100% recycling of our hub waste – a target designed to encourage us to think differently about our operations, and set about finding solutions for the outstanding waste streams.

In parallel, we expanded our work on waste with our suppliers, by engaging the top 100 or so as part of our overall supply chain sustainability programme. We're encouraging them to help us find better reuse and recycling solutions: as our 'Going Circular' videos show, this often requires collaboration across multiple parties.

This document sets out what we've done so far, and what we've learned as a result.

Stage 3 – Fully circular solutions

Even before we reach 2017, however, we're looking ahead to the next stage of our waste strategy. We envisage that it will take a further five years to achieve our long-term aspiration to set up fully circular solutions, engaging with suppliers to comprehensively tackle upstream impacts and identify sustainable designs that can complement or supplant our current, end-of-pipe solutions. We're putting the foundations of this in place, even now, identifying the main opportunities for circular procurement in our business, in accordance with the PwC [Circular Business Model Transformation methodology](#). We're also including circular economy requirements in relevant supplier evaluation and selection processes, as contracts come round for renewal, to identify partners who can help create sustainable solutions even if they are not yet available in the market.



Segregated waste recycling hub

¹ Hub waste and waste from on-site catering facilities only.

² For more on this innovative collaboration, see our video: <http://bit.ly/biofuelGC>

³ Lessons learned - Zero waste to landfill: towards 100% recycling.
www.pwc.co.uk/who-we-are/corporate-sustainability/downloads.html

Our stage two story to date – what we’ve done

Driving waste down, recycling up

Over the past four years, we’ve taken further steps to reduce our hub waste and increase our recycling. We finished the rollout of centralised, multifunctional devices for printing, copying and scanning, to replace desk-side printers. With secure printing and a default, double-sided print setting, this has been one of the major contributors to reducing our paper consumption by 60% since our baseline year of 2007 (exceeding our target of 50%), avoiding costs of c. £1.3m.

Overall, we’ve significantly reduced our waste versus nine years ago. We set a target to halve the waste reported in our [sustainability scorecard](#)² by 2017, and have already exceeded it, achieving a reduction of 53%.

We’ve also significantly increased our recycling rate. Because wax cups¹ used for hot drinks by our staff during the day were a large percentage of our non-recycled hub waste, we’d already found a recycling solution for those generated in our largest offices during stage one of our Going Circular programme, sending them off to be used in the making of building materials. More recently, however, we decided to replace all the cups and food packaging issued by our main, on-site hospitality supplier with compostable alternatives, so that they can be sent for in-vessel composting or [anaerobic digestion](#), along with any waste food. This has helped increase the proportion of our total waste that is reused or recycled. It now stands at over 85% (see [Chart 1](#) on [page 2](#)).³

But some items remain challenging. There’s no mainstream market solution for composite food packaging – from external food retailers and eateries near our offices, for example – yet this now represents a large part of the waste we send to incineration. Meanwhile, stationery items such as staplers and hole punchers, although durable, cannot be easily recycled if they eventually break, because they’re made from multiple materials and cannot easily be disassembled. We’re trying to identify solutions to both.

Taking stock

This year, however, mid-way through stage two, we took stock to check we were on track. Part of this was to refresh our understanding of what stakeholders expected, interviewing key groups – internal and external.

We conducted research amongst our people to understand their perceptions of PwC’s current waste management, and their expectations of the firm, as well as identifying barriers to behaviours that would help us achieve our goals. A couple of lunchtimes stopping people on the way out of the work restaurant and a simple set of survey questions yielded interesting findings that have helped shape an employee campaign (see [Let’s talk rubbish](#) on [page 8](#)). We hope this will further increase our recycling rates.

Meanwhile, interviews with around a dozen clients, waste experts and NGOs reminded us that our business is associated with items beyond our hub waste. It’s why we’re extending the scope of our measurement and reporting to cover all our waste categories including our electronic goods such as PCs, laptops, and mobiles, and the furniture and carpets used in our offices (see [Chart 4](#) on [page 10](#) and [Table 1](#) on [page 11](#)). Uniforms worn by suppliers providing services on our sites are also included, in light of the priority being placed on textiles in EU and UK circular economy plans.

Our discussions also caused us to expand our horizon to assess the waste impact of our construction projects.

Filling the gaps

In the last year, we interviewed various managers around our business – in the facilities, real estate and IT teams – to gather more information about this non-hub waste.

We already had good practices established in nearly every area, although data had not always been systematically captured. So, we set about collating figures for all our non-hub waste. Where actual data was not available, we estimated the number of units disposed of and weighed items, to be able to aggregate volumes and establish an approximate annual tonnage (see [Chart 4](#) on [page 10](#)).

We were also able to confirm that, when it comes to treating items at end-of-life, our service owners in the business have well-established processes, ensuring that as many items as possible are reused, and residual items are disassembled to recover all the materials. Sometimes – such as for our [IT waste](#) – specialist organisations provide a reuse and recovery service. In other cases – such as our [furniture](#) – an employee is responsible for distributing items to charities as part of their job, supported by the Community Affairs team which runs a ‘furniture exchange’ programme, offering items to social enterprises in the PwC Social Entrepreneurs’ Club. In yet other areas – such as our office carpets – we send old products to a take-back scheme run by the original manufacturer, which repurposes what it can for new carpet manufacture, and down-cycles the rest to make other building materials.

One of the few areas where we found we did not have a circular solution in place was the [uniforms](#) worn by suppliers’ staff in our offices. Disposal of corporate workwear items was left to the individuals who wore them, via municipal waste collection systems. We’ve now engaged the suppliers in question to establish a take-back scheme, so that old items are returned when new uniforms are issued, to maximise reuse and value retention (see [Textile take-back](#) inset on [page 9](#)).

Finally, we also looked at what happened to waste generated during our recent, large-scale real estate projects – our completely new office at London Bridge, and the refit of our existing headquarters at Charing Cross. We decided to treat the waste from construction as project-based rather than as ‘business as usual’ (i.e. ongoing waste), due to the fact that the schedule of building works is ad hoc. Nevertheless we still view it as our responsibility to influence any construction we commission and encourage the highest standards possible. Here, too, good practice has been followed, with our real estate development partners delivering high levels of recycling of all materials (including significant quantities of gypsum and metals). The overall recovery rate was over 95%, varying according to whether it was strip-out or fit-out waste and depending on the building. Plus, driven by the BREEAM sustainable buildings

Let's talk rubbish

Our people have an inherent interest in waste and recycling, and want to do the right thing, but are often confused about how to dispose of particular items. In early 2016, we launched a campaign – 'Let's Talk Rubbish' – to tackle this confusion, by engaging our people in a dialogue about waste, and clarifying the right way to dispose of rubbish in our offices.

For example, our research had shown that, when busy, people sometimes 'bundle' waste items inside one another and then put the whole lot into the 'waste to energy' bin. So, we gave a bag of mixed rubbish a personality, naming it 'Bertie Bundle', to raise awareness of the fact that this behaviour prevents us from recycling the individual items.

In a similar vein, we found that people do not realise that leaving food on packaging contaminates 'dry' recycling, and prevents food being recycled. So, we created a 'Larry Leftovers' character, and asked people to give him a 'new lease of life' by scraping food off their packaging at the end of their meal.

We're using the same concept to raise awareness of our new lightweighted, compostable coffee cups and how to dispose of them, by creating a 'Verity Vegware' character. (The cups themselves feature a space for individuals to write their name, so they can use the same cup multiple times a day, further reducing the volume we use).

Tackling waste behaviours in this fun, light-hearted way has been well-received and we're monitoring results to see how far the campaign can help us progress towards our recycling goal.

Let's talk rubbish



Perplexed by packaging?
 Flummoxed by food waste?
 Confused by compostable cutlery?

Join the new conversation about our waste.

Search Spark places for 'Let's talk rubbish'.



Say bye-bye to Bertie Bundle

When you're juggling waste on the way to the bins, Bertie Bundle lends a hand to carry your rubbish.

But Bertie needs sorting out. Just a few items in the wrong bin could mean the whole lot can't be recycled. And, putting recyclable packaging in the 'waste to energy' bin sends resources that could have been turned into new products up in smoke.

So, make sure you bid Bertie farewell, and sort your rubbish when you get to the bins.

To find out more, and join the conversation about our waste, search Spark places for 'Let's Talk Rubbish'.

Give Larry Leftovers a new lease of life

Sometimes, there's no way of avoiding Larry Leftovers.

But next time you're left with more than a smear or a smudge, take a few seconds to scrape unwanted food into the food waste bin. That way, it can be recycled into fertiliser, so today's leftovers can help grow tomorrow's lunch.

To find out more, and join the conversation about our waste, search Spark places for 'Let's Talk Rubbish'.



All change for Verity Vegware

Meet Verity Vegware. She's made from compostable materials, so she's got a much smaller carbon footprint than our old, plastic-lined 'wax cups'. Verity's also now thinner, which means she uses fewer resources.

Make sure you pop Verity – and any other Vegware items – into the compostables bin, so they can be recycled into fertiliser.

Non-compostable cups from outside the office should still go in the waste to energy bin, though.

To find out more about Verity, or to join the conversation about our waste, search Spark places for 'Let's Talk Rubbish'.

standard – where both London buildings won the first ‘outstanding’ rating in their category – innovative practices were deployed to reduce waste in the first place, including offsite, custom, made-to-measure cutting of key materials, such as partition wall plasterboard, flooring and audio-visual cables.

Our non-hub waste mapping exercise was conducted by a full time individual from the sustainability team, over several months, and allowed us to see the relative size of each waste stream (Chart 4 on page 10) and to conclude that we had a good solution in place for most of our material items (see Table 1 on page 11).

Supporting circular start-ups

One of the key tenets of our sustainability strategy is to not only ‘do the right thing’ but to be a ‘catalyst for change’. With this in mind, we’ve been supporting circular start-ups as part of the PwC Social Entrepreneurs’ Club. Membership gives them access to a wide range of resources to help them get set up, be successful and expand their businesses. It includes investment-readiness and impact measurement masterclasses, access to funding, free learning and development in key business skills, as well as mentors and networking. And, as a founder signatory of the government’s new Buy Social Challenge⁴, we’re now seeking to help them become suppliers to PwC, wherever possible.

1. ‘Wax cups’ is the generic term used internally to refer to plastic-lined paper cups.
2. www.pwc.co.uk/annualreport/assets/2016/pdf/pwc-uk-sustainability-performance-and-commitments-2016.pdf
3. This differs from the percentage reported in our sustainability scorecard (77%), which just includes assured data and therefore represents our hub, catering, electronic goods and paper waste streams only.
4. www.socialenterprise.org.uk/challenge

Textile take-back

We have six suppliers that provide services – such as catering, security, hospitality, cleaning, etc. – in our offices. Together, they employ around 675 non-PwC people to work in our buildings, most of whom are issued with uniforms, on our behalf, by their employers. We estimate that this accounts for some 3,300 items of clothing every year, weighing just under one tonne. So, we approached these suppliers to ask them if they would be willing to collaborate on a simple ‘take-back system’ so we could gather up old uniforms, and find better, more circular, end-of-life destinations for them.

All were receptive and we’ve already piloted this new system with three of them, taking back just over 450 items and sending them to a specialist textile recycling company in the Midlands, where they are assessed and categorised according to their condition.

Items in good condition are sent overseas for resale; those that are damaged have cuffs, pockets, etc. removed and are cut into large pieces that can be sold as industrial rags; smaller or damaged pieces of fabric are shredded and become an input to make other products, such as the sound insulation used in the bodies of cars. In addition, buttons and zips are removed and sold for use in clothes manufacturing in Pakistan.

So far, we’ve learnt that just under 20% of our items can be reused in their original state. Around 60% can be reused as rags. Approximately 20% have to be shredded. All can be used for some other market, reducing environmental impacts by eliminating the need for virgin materials. Moreover, we assessed all the returned items and this provided us with insight about why they can no longer be worn – primarily because wear and tear causes the seams to come

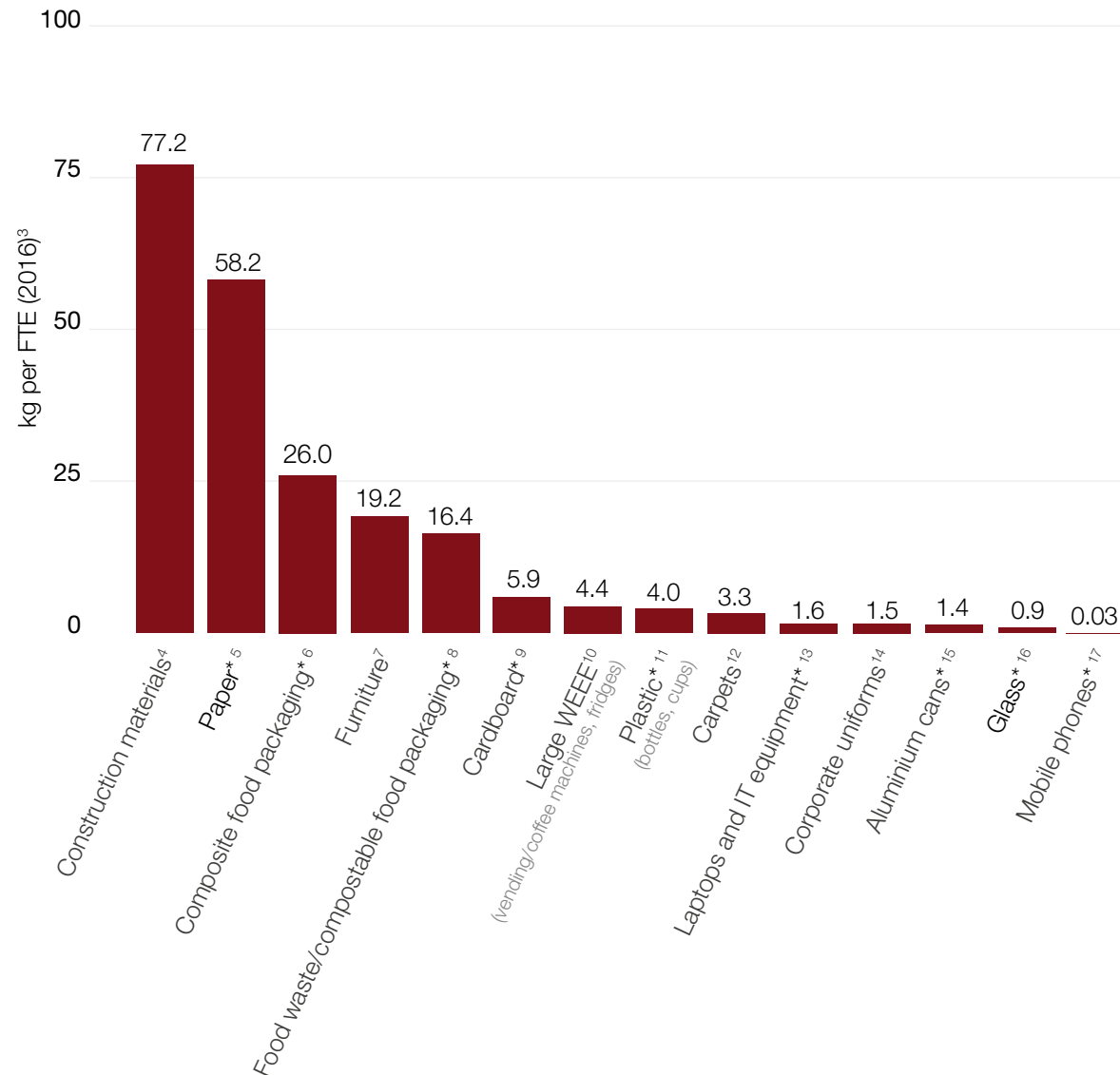
away at the seat of the trousers or on the shoulders of jackets. In addition, we realised that integral logos mean uniforms can’t be reused. As a next step, therefore, we’re working with suppliers to change to logos that can be easily removed, and aiming to approach the original manufacturers to see if they can adapt their designs to give the items more durability.

The suppliers’ employees who were affected by the new scheme were happy to bring their old uniforms back in, feeling that it was the right thing to do for the environment. And, we used the opportunity to provide them with a leaflet on caring for their new uniform, which encouraged them to wash at 30 degrees and to dry on a line (rather than tumble drying), to help reduce the clothes’ in-use environmental impacts. It also gave them tips on how to ensure their uniform stays smart for as long as possible.



We now reuse or recycle supplier uniforms.

Chart 4
 Kg per full time equivalent (FTE) by waste stream^{1,2}



1. Includes combination of waste measured and assured (indicated with*) as part of our sustainability reporting each year (see www.pwcannualreport.co.uk), as well as other waste which is currently estimated only, using the best, most recent data available.
2. FTE relates to PwC employees, except for figures relating to corporate uniforms, for which it relates to the FTE of suppliers' employees working on PwC sites.
3. Annualised estimates used where 2016 data not available or unrepresentative (construction materials, furniture, large WEEE, carpets and corporate uniforms).
4. Includes gypsum, metals, wood, packaging, general waste etc. Multi-year real estate programme underway in period in question. Figure represents annualised quantity as at end year five. May be lower for organisations with no renewals.
5. Includes shredded paper from offices and archive files. Volume has been reduced by move to multifunctional devices. May be higher for organisations who have not put such programmes in place.
6. Items disposed of in our 'waste to energy' bins. In large part comprises composite consumer food packaging from external eateries.
7. Includes desks, chairs, cabinets. Driven largely by rolling, multi-year office renewal and rebranding programme. May be lower for organisations where furniture is only being replaced when broken.
8. Includes food waste from onsite restaurants/cafes, and post-consumer food waste from meals purchased offsite and eaten in offices.
9. Includes packaging for products used to run our buildings, and post-consumer packaging from e-commerce deliveries to staff at office sites. May be lower if organisation policy does not allow personal deliveries.
10. Offices have coffee machines, vending machines and fridges on all floors and data pertain to period of significant asset renewal. May be lower for organisations without this facility within their buildings or for whom the equipment is earlier in its serviceable life.
11. Mostly PET bottles, some single-material plastic food packaging, and cups from vending machines.
12. Some correlation with significant office moves. May be lower for organisations where carpet is only being replaced when worn out or other flooring materials are used.
13. Includes laptops, PCs, and all peripherals as well as servers. Renewals for laptops every 2-3 years. Other organisations may find volumes are higher or lower if their replacement programme has different schedule.
14. Uniforms for suppliers providing security, welcome, facilities, catering, cleaning and other services on site. Includes footwear, issued to 35% of people with uniforms. Take-back pilots underway.
15. Drinks purchased on site or at external retailers.
16. Primarily post in-office hospitality events (e.g. bottled drinks) and packaging from ingredients used in on-site catering facilities.
17. Programme to issue phones to all members of staff has only recently been initiated, so organisations which already do this may have higher volumes.

* Denotes assured data.

“Our Going Circular programme is all about showing what’s possible – by any business.”

*Bridget Jackson,
 Director of Corporate
 Sustainability, PwC*

Table 1
 Waste quantity (tonnes) and designated treatment¹

| Waste category | Total tonnes (annual, estimated) ² | Percentage reused | Percentage recycled | Percentage incinerated | Percentage sent to landfill |
|---|---|-------------------|---------------------|------------------------|-----------------------------|
| Construction materials | 1,423 | - | 97% | - | 3% |
| Paper* | 1,073 | - | 100% | - | - |
| Composite food packaging* | 479 | - | - | 100% | - |
| Furniture | 355 | 95% | 5% | <1% | - |
| Food waste/compostable food packaging* | 303 | - | 100% ³ | - | - |
| Cardboard* | 110 | - | 100% | - | - |
| Large WEEE (vending machines, coffee machines, fridges) | 82 | 99% | 1% | - | - |
| Plastic (bottles, cups)* | 74 | - | 100% | - | - |
| Carpets | 61 | - | 98% ⁴ | - | 2% |
| Laptops and IT equipment* | 30 | 66% ⁵ | 34% | - | - |
| Aluminium cans* | 27 | - | 100% | - | - |
| Glass* | 17 | - | 100% | - | - |
| Corporate uniforms | 1.0 | n/a ⁶ | n/a | n/a | n/a |
| Mobile phones* | 0.5 | 88% | 12% | - | - |
| Total | 4,034 | 11% | 76% | 12% | 1% |

1. Some rows may not sum to 100% due to rounding.

2. See note 1 to [Chart 4](#) on [page 10](#).

3. Recycled via a mix of composting and anaerobic digestion, depending on local solution availability.

4. Treatment in line with maximising value and minimising environmental impact. Where split across reuse/recycling is currently unknown, recorded as recycled on a conservative basis.

5. Laptops - 97% reused. Other IT equipment - 9% reused.

6. Early pilot implies c. 20% reuse of whole items, c. 60% recycled as industrial rags, and c. 20% shredded and downcycled. Figures will be updated once take-back system rolled out to all suppliers and actual, annual figures are available. Figures based on PwC assessment at time of collection, using the same classification as the textiles recycler, as data on actual end destination not available.

* Denotes assured data.

Triple bottom line benefits

Lots of companies are interested in the circular economy, but are unsure where to start, or how to build a business case for action. Over the past few months, therefore, we've revisited our programme to both pull out financial cost-benefit information and to estimate the carbon savings associated with the initiatives we've put in place so far. As a result, we now have a lot more insight on the benefits of 'going circular', which we've set out in the rest of this section.

There are multiple benefits to be had from making changes to material and waste practices in line with circular economy principles. The idea originally came from sustainability groups concerned about a growing global population and the need to reduce the negative environmental impacts associated with increasing levels of consumption. But, as the idea has been further explored, it's become clear that it also maintains goods at a higher value in the economy (enhancing GDP), and can deliver financial benefits to the businesses adopting its principles, through resource efficiency or innovation. Moreover, many circular solutions generate additional social value, by providing incremental jobs - for example in reuse or recycling. The circular economy, then, is a concept that really does have triple bottom line benefits.

Reducing materials consumption, water use and carbon emissions

It's also attractive because the environmental impacts are three-fold: first, the circular economy keeps raw materials in circulation, and maximises their utilisation; second, it reduces the energy required for upstream processes to source raw materials, and manufacture goods, which - in turn - obviates the associated greenhouse gases; and, it reduces the need for water in the same, upstream processes.

Disposal switches – a key transition step

In the long term, the circular economy will require new business models - for example, with more products being

leased or shared. But, many benefits can be derived even with simple changes to end-of-life treatments. If the majority of businesses were to adopt such 'disposal switches', they could, together, make a step-change in material recovery and reuse, and build a better foundation for the more visionary elements of the circular economy. Moreover, their understanding about the challenges relating to better end-of-life treatment could also inform upstream procurement policies, with insight on how products should be designed for reuse, remanufacturing, disassembly, or recovery (see [Textile take-back](#) on [page 9](#)). Thus, they could have a profound influence over whole supply chains.

No-cost solutions

Our experience, at PwC, is that disposal switches can generate revenues and reduce business costs, as well as provide significant environmental benefits.

The most striking of these is the revenue-generating opportunity from refurbishing and reselling old laptops and mobile phones: we use a best-practice, approved treatment facility with strong environmental credentials instead of a basic WEEE-compliant facility, thereby achieving between 88% and 97% reuse. We estimate that we raise between £50-75 per person per year through reuse of our laptops, and between £30-50 for our smartphones (see [Table 2](#) for key assumptions).

Whilst other end-of-life materials do not command such high prices, they still offer modest cost savings, or 'no-cost solutions'. By diverting waste that would attract considerable gate fees¹ if sent to landfill (£102 per tonne, including landfill tax²) or incineration (£95 per tonne), reuse and recycling frees up funds that can easily cover any costs to set them up.

For example, donating our unwanted office furniture to other organisations avoided 80% of the associated landfill costs. We try to find a new home for our furniture within 10 miles of our offices. However, even if we had to transport furniture 20-100 miles to get it to its new home, we estimate that we would still make a net cost saving of £1-2 per person



per annum (see [Chart 1](#) on [page 2](#) and [Table 2](#) on [page 14](#) for our volumes and treatment ratios). Similarly, sending our food waste to composting (for which gate fees are typically £47 per tonne) and anaerobic digestion (AD) (c. £40 per tonne) instead of landfill reduces costs by around 40%, with a positive cash impact of c. £1 per head, per year. Switching from standard, plastic-lined coffee cups to compostable alternatives (provided for beverages our people drink throughout the day) was cost neutral, whilst sending them to composting or AD instead of incineration creates a 50% cost reduction (c. 15-20p per person, per year).

The only material, so far, which has been more expensive to reuse and recycle is corporate uniforms, which we estimate cost us 5-15 pence per head per year, even though the textile recycling service is free. This is due to the costs of transporting the old uniforms to the recycler, and the fact that there is no offset through reduced landfill, as the uniforms were

previously disposed of by our suppliers' employees. We feel that this is a small price to pay to know that uniforms carrying our brand are being securely and responsibly disposed of.

Whilst these numbers are only estimates, and will vary from organisation to organisation, we wanted to share our most up-to-date insight into the cost-benefit of such 'disposal switches' to help other businesses looking to move towards circular economy principles. More details, including key assumptions in each case are set out in **Table 2** on **page 14**, which we hope will help people to create strong business cases for reuse and recycling of their own waste streams. Overall, we believe our results show cost should not be a barrier to better reuse and recycling.

Environmental benefits for society

We not only wanted to understand the financial implications of better waste management, but we also wanted to get a sense of how much better our 'disposal switches' were for the environment, all other things being equal i.e. assuming that no changes are made to the design, manufacture or in-use aspects of any products, at this stage.

We analysed the impact on the greenhouse gases associated with 'end-of-life waste treatment', based on Defra's conversion factors³ but – due to the emphasis on material consumption choices in carbon measurement – this only made incremental improvements to our own, operational carbon footprint. That's not to say that there are no climate benefits from better reuse and recycling. Far from it. Rather, the benefits are made on behalf of society, by obviating the need for new items made of virgin materials, and purchased by another organisation. And on that basis, our analysis shows that the overall carbon savings from 'disposal switching' are considerable – ranging between 20% and 100%⁴ (see **Table 2**). Reuse of laptops and smartphones, for example, can reduce associated carbon emissions by more than 90%, as can recycling of food waste. Reusing office furniture can cut emissions by 60%, whilst a switch to eco-friendly coffee cups delivers 35% saving, and even recycling old uniforms can cut carbon by 20%.

Given that it costs next to nothing to make such changes, or can even generate a positive cash flow, we feel that these

simple, end-of-life improvements are well worth the effort to set up.

Social benefits

In addition to the financial and environmental benefits of 'going circular', we found that many of our solutions create social value, too, providing valuable resources to charities that might otherwise not be able to afford them, in a period when government funding is being cut. One such example is shared in our 'Old furniture, new home' video story, which shows how our office desks were remanufactured for use in the Meningitis Research Foundation's new offices.⁵

Or, circular solutions can provide employment to disadvantaged or hard-to-reach groups. For example, our IT waste refurbishment provides work experience to offenders, with training that leads to an NVQ, helping them get back on their feet and reducing reoffending rates once they leave prison (see our video story, 'Restart, refresh, reuse' for more details⁶).

With such a broad range of benefits, businesses should consider all three categories when shaping their waste management strategies, as it may be possible to collaborate across different departments, drawing on different budgets to get a holistic programme in place.

1. Average from Wrap Gate Fees report 2016. May vary. Cost benefit analysis based on PwC actuals.
2. £84.40 from April 1st 2016.
3. We've focussed on the carbon savings arising from each of the switches we've made, for simplicity and as a first step, although in some cases the main benefits may relate to reduced pollution, protection of scarce materials or minimising the demand for scarce water reserves.
4. Our analysis is based on Defra conversion factors for end-of-life waste treatment and material consumption. It assumes that a switch from waste treatments that lock away materials (landfill and incineration) to treatments that reuse the goods or recycle the materials will benefit society by obviating the need for an item made of virgin materials i.e. it enables a switch from material consumption using virgin materials to consumption of a product with reused/recycled content.
5. <http://bit.ly/furnitureGC>
6. <http://bit.ly/ITwasteGC>

“At PwC, you're light years ahead.”

*Charlie Devine,
Zero Waste
Scotland*

“I am impressed by the work that PwC is doing in terms of the corporate uniform take back programme.”

Sarah Clayton, WRAP

“I am proud to work for a firm which... cares about the environment.”

PwC employee, annual people survey response

Table 2
 Financial and environmental benefits of disposal switches

| Material | Disposal switch made | Financial impact to business (£, per individual, per annum) ¹ | | Societal CO ₂ e benefit (per individual, per annum) | | Key assumptions ^{2,3} | |
|-------------|--|---|--|---|--|--------------------------------|---|
| | | | | | | | |
| Laptops | Shredding to reuse ⁴ | £50 to £75 | | 0.3kg (>90% reduction) | | Material | Laptops on 24-30 month contract |
| | | | | | | Financial benefits | Revenue dependent on condition of items |
| | | | | | | Baseline | Meeting minimum WEEE requirements of 70% recycled, 10% recovered with the rest going to landfill ⁵ |
| Smartphones | Shredding to reuse ⁴ | £30 to £50 | | 0.04kg (>90% reduction) | | Material | Smartphones on 24 month contract |
| | | | | | | Financial benefits | Revenue dependent on condition of items – considerably higher for newest models in best condition |
| | | | | | | Baseline | Meeting minimum WEEE requirements of 70% recycled, 10% recovered with the rest going to landfill ⁵ |
| Furniture | Landfill to reuse | £1 to £2 (c. 80% reduction) | | 12kg (c. 60% reduction) | | Material | One desk, chair and cabinet per employee. Sharing other furniture e.g. storage, meeting rooms etc. |
| | | | | | | Financial benefits | 50% of 'reuse' displaces production of new furniture. ⁶ |
| | | | | | | Baseline | 14% office furniture reused, rest going to landfill ⁷ |
| Food | Landfill to composting/ anaerobic digestion | c. £1 (c. 40% reduction) | | 7kg (111% reduction – net positive) | | Material | Per employee, we dispose of roughly 13kg of food waste per year into dedicated food waste bins. |
| | | | | | | Financial benefits | Food waste goes to anaerobic digestion where facilities exist (c.80%) with the rest going to composting. ⁸ Based on anaerobic digestion obviating need for grid electricity. |
| | | | | | | Baseline | Disposal into general waste bins, with c.80% disposed in landfill, c.20% incinerated ⁹ |

[Continued on next page]

| Material | Disposal switch made | Financial impact to business (£, per individual, per annum) ¹ | Societal CO ₂ e benefit (per individual, per annum) | Key assumptions ^{2,3} | |
|---------------------------|--|--|--|--------------------------------|--|
| Compostables | Wax cups and landfill/incineration to ecofriendly cups and composting/AD | £0.15 to £0.20 (c. 50% reduction) | 1.1kg (c. 35% reduction) | Material | One cup per working day per employee |
| | | | | Environmental benefits | As per food waste, c. 80% directed to anaerobic digestion, remainder to composting ⁸ |
| | | | | Financial costs/benefits | Eco-friendly, corn-derived, poly-lactic acid (PLA) lined cup cost comparable with wax/plastic-lined cup ⁸ |
| | | | | Baseline | Wax cups c.80% disposed in landfill c.20% incinerated as per mixed, ordinary waste ⁹ |
| Corporate clothing | Introduction of textile take-back scheme for reuse/recycling | £-0.05 to £-0.15 | 6kg (c. 20% reduction) | Material | Corporatewear worn by supplier employees on site with average of 5 items per employee and mix of logo types (tax tabs, embroidered or no logos). Costs may be lower if fewer items issued. |
| | | | | Environmental benefits | 85% of reuse displaces production of new clothes ¹⁰ |
| | | | | Financial costs | Dependent on distance to recycling facility. Assumes use of pre-existing in-house logistics for first leg, and additional payment for final leg, between 20-100 miles |
| | | | | Baseline | 90% to landfill or incineration ¹¹ |

1. Based on full time equivalents throughout, for consistency, except for corporate clothing, which is based on suppliers' employees.

2. See [Table 1](#) on [page 11](#) for post-switch reuse and recycling rates.

3. Material consumption and disposal CO₂e from Defra 2016 (www.gov.uk/government/collections/government-conversion-factors-for-company-reporting).

4. Dispose using a best-practice, approved treatment facility with strong environmental credentials instead of a basic, WEEE compliant facility.

5. Source: UK Government.

6. In line with assumptions in www.wrap.org.uk/sites/files/wrap/Office%20Furniture_final.pdf, Wrap 2011. Production CO₂e based on FIRA Source: "Benchmarking carbon footprints of furniture products", FIRA, 2011.

7. Source: www.wrap.org.uk/sites/files/wrap/Office%20Furniture_final.pdf, Wrap 2011.

8. Source: PwC data.

9. Source: Eurostat 2012 UK treatment data for mixed ordinary waste.

10. Source: "Environmental benefits from reusing clothes", The International Journal of Life Cycle Assessment 15(7):726-736, August 2010

11. Source: "A review of corporatewear arisings and opportunities", Wrap 2012.

Our stage two story to date – what we’ve learned

Interim findings

We typically analyse our programmes and publish our insights once they’re complete. However, given the market interest in the circular economy, and the desire of our people to know more about our waste practices, we’ve decided to share our interim findings even though we still have 10 months to go to our target date. There are some interesting reflections:

- As discussed earlier, some waste streams are surprisingly big – construction, food and furniture, for example – and consequently merit attention.
- Some waste streams can generate significant financial value from reuse and recycling, notably electronic goods, such as laptops and phones.
- It’s not as hard as you might imagine to find ways to reuse many waste items, if you’re willing to go beyond the traditional solutions, and create a portfolio of providers.
- Like us, other organisations may find that there is good practice underway, but not being measured.
- We also learned that there are no easy, existing, cost-effective market solutions for some hub waste, especially composite materials that are not standardised and of low value (e.g. food packaging, stationery, and corporate merchandise). Tackling these will probably require market level change and take some time.
- Existing carbon factors for waste do not incentivise recycling or reuse, but measurement is still valuable, to garner insight for better management of materials in your business and to inform future design of products.

Combining our experience in this phase of our Going Circular programme with that from our first five years, we’ve summarised a table of lessons which we hope will be helpful for others thinking of starting or accelerating their own journey towards the circular economy. See [Table 3 on page 17](#).

Next steps

As described in the previous sections, we still have lots of work to do.

In this, the last year before our 10 year targets, we’re focussed on three things. First, we’re working to get as close as possible to our 2017 goals, whilst simultaneously setting up processes for reporting on any waste streams where detailed, ongoing measurement is still outstanding. Second, we’ll continue to seek ways to influence providers and the UK market towards more circular products in categories where no solution currently exists – typically those made of composite materials. Third, as we outlined above, we’re also engaging our existing suppliers and identifying new ones, in readiness for stage three of our journey, when we hope to play our part in the shift towards ‘circular procurement’. We envisage that this will entail upgrading our current, primarily end-of-life solutions with even better ones that can encourage the use of recycled content, design for circularity and circular business models.

Our client-facing teams continue to advise and support clients in manufacturing, retail and other sectors to pioneer circular solutions, which we hope we will – in due course – be able to make use of ourselves, such as the use of natural capital accounting to ensure new circular solutions are really better for the environment.

The circular economy is a concept whose time has come, and every business should be actively seeking to implement better practices to safeguard resources, water and energy, and to mitigate climate change. We hope that this document will help many wondering where to get started to do precisely that.

About sustainability at PwC

For more details on PwC’s Going Circular programme, visit www.pwc.co.uk/goingcircular. This dedicated microsite includes six short videos that bring our story to life, and show how the principles of the circular economy can be put into practice.

- **Going circular:** How we’re applying the principles of the circular economy to our business. <http://bit.ly/overviewGC>
- **Restart, refresh, reuse:** How we’re generating money by refurbishing and reselling our old laptops and phones. <http://bit.ly/ITwasteGC>
- **From fork to farm:** How we’re recycling our food waste and food packaging. <http://bit.ly/foodwasteGC>
- **Old furniture, new home:** How remanufacturing our old furniture gives it a new lease of life in the offices of charities. <http://bit.ly/furnitureGC>
- **Cut from the same cloth:** How we’re reusing and recycling the uniforms used by suppliers working in our offices. <http://bit.ly/textilesGC>
- **Out of the frying pan, into the fire:** How we’re making biofuel from used cooking oil to power our buildings. <http://bit.ly/biofuelGC>

For more on our circular economy work for clients, please visit www.pwc.co.uk/circulareconomy.

For more information on our overall corporate sustainability agenda, visit www.pwc.co.uk/corporatesustainability.

We welcome input from any interested parties, so do feel free to get in touch with our Director of Corporate Sustainability at bridget.h.jackson@uk.pwc.com. You can also keep up with our Going Circular programme on Twitter by following [@BridgetHJ](#) or searching for [#GoingCircular](#).

Table 3
 Lessons learned

| | |
|--|--|
| Take baby steps | Although the circular economy is a simple concept, its breadth can be overwhelming, making it hard to know where to start, especially when there are so many views about the right thing to do. Businesses should feel comfortable to 'start small', and take pride in each tangible achievement in their journey towards a more circular business. |
| Estimate the 'material materials' and check what stakeholders think you should focus on | Organisations should focus on their material impacts, of course. But since lifecycle analyses are not easily and cheaply available for all products and services, it's pragmatic to start with waste streams that are likely to be biggest for you. Chart 4 on page 10 sets out figures for the weight of each waste material generated by our business, per full time equivalent, which other non-manufacturing organisations may find useful to get a first, rough estimate of how much waste they have – just by identifying the materials they know they throw away and multiplying the number of their staff by the per capita weight provided (adjusted, if necessary, for the notes accompanying the chart). In addition, asking stakeholders about their expectations can be quick, and ensure you're covering all bases. |
| Create a business case by combining waste streams | Whilst reductions in consumption of, or increased recycling and reuse of, any items in a business has an environmental benefit, and can generate a positive social impact, not all have a financial value strong enough to merit attention in isolation. By including several waste streams in the same programme, the financial returns of one waste stream can offset the costs of others. That said, many end-of-life recycling and reuse solutions have a cost benefit, and are easy to implement, if you have the will. |
| Set targets to create momentum | Targets help to focus teams on action and empower individuals to find solutions. Set modest goals for the short term, whilst you test what is possible, and increase the number of targets, or the level of ambition expressed by them, once you gain confidence in what's achievable. |
| Make circularity part of your contracts | Including service level agreements in key supplier contracts sets an agenda for collaboration, but takes time. Start with the most strategic suppliers, and extend coverage to new categories, progressively. Sustainability teams can have a valuable role helping procurement and facilities with guidance on circular economy concepts and solutions. |
| 'Choice edit' first | It's far easier, and quicker, to make changes for the whole business than to engage employees in behaviour change. Wherever possible, make central 'choices' such as removing unnecessary items to reduce consumption/waste, or substituting others to enable recycling. Focus employee campaigns on the outstanding problems once you've gone as far as you can with these central changes. |
| Test, then do | Setting up a part of the business as a test environment, where you can assess employee reactions to changes (such as new waste hub configurations, product substitutions etc.) before roll-out minimises resistance when you introduce new initiatives at scale. A test environment also allows you to get basic measurement in place and identify approximate volumes for problem items, which will help in discussions with new, circular solution providers as you seek to set up reuse and recycling arrangements. |
| Spot synergies | Sometimes the solution just requires connections to unusual parts of the organisation e.g. linking the facilities department to your community team can accelerate reuse by leveraging existing charity relationships. |
| Tell the story to maximise the business benefits | Employees care about waste: it's a tangible item they deal with every day. Telling them about any recycling achievements builds engagement and pride – delivering business benefits. |

About PwC

At PwC, our purpose is to build trust in society and solve important problems. PwC is a network of firms in 157 countries with more than 208,000 people who are committed to delivering quality in assurance, advisory and tax services. Find out more and tell us what matters to you by visiting us at www.pwc.co.uk.

About this publication

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