



**Annually Bought Products Which Have Secondhand Markets and Their Effects
and Implications in The UK Between 2010 and 2019**

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Abstract

This paper will discover and analyze the causes and effects of annually bought products that have second-hand markets on the Electronic and Electrical waste stream in the United Kingdom between 2010 and 2018. To answer these questions, the amount of electrical goods placed on the United Kingdom market was examined, the amount of goods being collected by official and non-official recycling plants, how much of the base materials are reclaimed from the electrical goods and how much of these base materials get used. Mobile phones and Kettles were used as specific examples of common electrical goods in the UK that are often found in landfill sites. Purchasing reasoning from consumers and if/why they purchase products on an annual basis and methods companies utilize to influence yearly purchases through investigating contract schemes and advertising. The UK is currently on a negative trend in collection rates of electronic waste (down 6% from 2017). The UK does not recycle a sustainable amount of electrical goods, sending 836,031.98 tonnes of electronic waste to landfill in its best collection year in the last decade (2016). There is correlation between mobile phone collection rates and yearly releases of mobile phones being lent out on contracts to associate that annual purchases of products do produce large spikes of waste being put into the waste stream.

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1.1 Introduction

This paper will look at a product development and marketing tactic wherein the consumer purchases a similar product on a yearly or bi yearly basis – whether through contract or purchasing it through their own means. We will call this tactic an annually bought product. In some industries this is called recurring consumer spending (Take-Two Interactive Software, Inc., 2019). This method of marketing allows companies to rely on a large influx of money on a regular yearly basis and relaxes their need for funding throughout the year. These yearly released products usually receive a restyling to stay in trend and technological enhancements. These are both incentives to encourage the consumer to purchase the new generation of product. However, this is where problems of this marketing method begin to surface. Companies will often utilize effective advertising campaigns to encourage previous buyers that they need the new product, even if the previous year's product still functions suitably well for the customer. These businesses will often implement systems such as planned obsolescence (Prakash et al., 2016) to enforce buyers to purchase the newest product. Once the new product has been purchased, the old one will likely go to a landfill site. How many yearly products are sent to landfill and how many are being recycled in the United Kingdom will be displayed to show the problematic side effects of selling products this way.

2.1 What is an Annually Bought Product?

Replacing a product for a newer version is a situation that is familiar to many in 2019. However, the time span between when a consumer purchases a product and when they upgrade is decreasing. In recent years consumers have witnessed a rapidly decreasing lifespan of electronic products as companies seek to increase their customer recurring spending. The problem with doing this is the current lack of a solution for the end-of-life of these electronic products, as WEEE (Waste Electrical and Electronic Equipment) continues to rise every year. WEEE is defined under UN (European Union) directives as being any item with a plug or battery.

While there are an uncountable number of products that are bought, used and disposed of at a much higher pace than products bought annually, this paper will specifically uncover the causes and effects of annually bought products that have secondhand markets (Oh, 2019). Many different industries currently produce yearly products due to its undoubtable effectiveness. Whether it was in pursuit of fashion trends or to utilize the latest technology this method of product development allows companies to keep their products relevant. This paper will investigate the following products as examples of annually bought products: Mobile phones and electric kettles.

The phone market is a prime example of consumers purchasing products on a yearly basis. Many phone companies have releasing phones on a yearly basis since the mid-

1990s (Nokiamuseum, n.d.). One of the leading brands in the phone industry, *Apple*, has been releasing a new generation of phone almost every year since the first release of the iPhone in 2007 (Chang, 2019). *Apple* has seen great success by releasing a new phone every year, because it has allowed them to be the spearhead in phone technology and styling. Due to *Apple*'s success and the potential of this strategy in the phone market, many other companies have followed suit. With so many other companies providing alternatives, it gives the consumer a large variety of choice and thus the ability to upgrade often. Providing consumers with the opportunity to upgrade their device regularly encourages them to replace their current phone with a newer generation of phone. Whether the consumer remains with the same brand or not in their next purchase does not change the outcome for the old phone. Since very few companies provide recycling options when replacing mobile phones, most old phones will end up in landfill sites. The extent of this issue will be explored later when looking at the effects of yearly buy products.

In the domestic side of products, most companies will design a range of products on a yearly basis to fit trends in both styling and technology. A common example that is found in almost every UK home is the kettle. Electric kettles are products that by themselves have not seen a great improvement in their function, aside from ergonomics (Electric Kettles Guide, 2017). A consumer will often swap them out for a different styling or if their current kettle has stopped working. While kettles do not see the same exchange rate as mobile phones, they similarly do not have a sustainable end-of-life plan. Many companies redesign their brand of kitchen appliances every year to keep up with the latest domestic

trends. In doing this, the old goods that do not get sold are disposed into landfill sites. Alongside this, if consumers choose to replace their kettle then they will also be disposed of in an unsustainable way.

3.1 Why do Consumers Purchase Annually Released Products?

To get a better understanding of why consumers purchase products on a yearly basis, it is important to look at how they conduct research when deciding which product suits their needs best. A consumer's buying habits can be affected by reading customer reviews and based off friend or family purchases (Laja, 2019). As well as looking at reviews, a primary method for discovering products to buy is advertising. Advertising plays a large role in influencing consumer purchases. With a variety of mediums hosting adverts, it has become increasingly possible to target advertisements to relevant audiences and achieve better results. While these advertisements are targeting new potential buyers, it is important for these adverts to also convince previous buyers to continue to purchase more products from the brand.

Due to the advancements in technology, advertisers have been given access to more data on customers than ever before (Marr, n.d.). With this increasingly large data on their customers advertisers can tailor adverts to influence further purchases. This is most commonly done through suggesting the most relevant advertisements to the customer. Using this data on spending habits, companies aim to make people to feel more inclined

to buy a new product. That is why companies try to create brand loyalists. Making a customer loyal to a brand aids them to feel less guilty or less unsure when they know what the product will be like before purchasing it. This is usually in conjunction with product contracts, which allow the advertisers to time advertisements to when a customer's contract is about to expire.

Companies that release products on a yearly basis will try to generate a following of brand loyalists. These people are influenced on their purchase because of the prestige of the company associated with the product. People who are loyal to a brand usually are because they prefer that specific brand's design cues. These consumers often base their purchases on similarity and their opinion with their current product as they want one of equal quality. Creating a strong fanbase for a product is paramount to retaining recurring purchases from consumers (Andrews, Drennan and Russell-Bennett, 2012). It is important to update and innovate while staying true to the company's design cues so that previous customers feel like their new product is state-of-the-art while not being too dissimilar to what they have previously bought. This is often a fine balance for companies to manage as straying too much in either direction could alienate their userbase. Customers want to feel like they are getting a product of similar quality, that is also aesthetically and usably similar, but 'up-to-date'.



Figure 1.1 (Amazon, n.d.) Russell Hobbs electric kettle

Kettles, while they do not get marketed heavily on a yearly basis, are always in development for the changing styles of home appliances and for new technology. The problem with this method is that a lot of kettles will go to waste if they are not bought in time because they become undesirable. Therefore, the stores shelving these kettles will have to find some way to get rid of them. Whether selling them for a reduced price, sending them to another company or, more worryingly discarding them to landfill sites.

As previously stated, mobile phones have been released on a yearly basis by multiple companies for over a decade. The reason for this is twofold: keeping up to date with styling trends and staying on par with current technology. Both are made to attract a consumer base that continually wants the newest product. While having brand loyalists allows companies to sell updated versions of the same product, it also means they can create new products knowing that a majority of its most loyal fans will purchase the new product because that specific company is making it. This further exemplifies how easy it is becoming for companies to continue to influence yearly sales of a product.

One of the primary methods companies utilize is advertising. Advertising is used to get customers to purchase their products which builds a fanbase and keeps them loyal to their brand (Laja, 2019). By having a loyal fanbase, companies like *Apple* have managed to keep their customers in their product ecosystem meaning that if a customer buys one of their products, then that product will cooperate more with their other products. This results in a better experience for the customer in terms of convenience and usability. This

encourages customers to remain loyal to the brand and allows them to further influence their userbase to purchase newer versions of their products so that they do not become outdated and stop functioning within that ecosystem (Jones, 2018). *Apple* offer a large variety of products: watches, televisions, computers and phones. This allows their users to surround themselves with products from just one company.

One problem that companies face when creating a new iteration of a product is getting customers of their previous product to upgrade to the newest version. Failure to do so forces the company to keep supporting the old version of the product, whether that be with spare parts or security updates. This issue can potentially cause a lot of financial damage to a company if their userbase refuses to



*Figure 1.2 (TrustedReviews, 2019)
Samsung stopped selling phones with
replaceable batteries in 2014*

purchase newer products. In 2014, *Microsoft* was paid by the UK government to continue security updates for their operating system that was 13 years old and had been succeeded by 4 newer operating systems (Gibbs, 2014). Companies have been dealing with this issue by applying planned obsolescence, wherein a company creates an artificial end-life for their products.

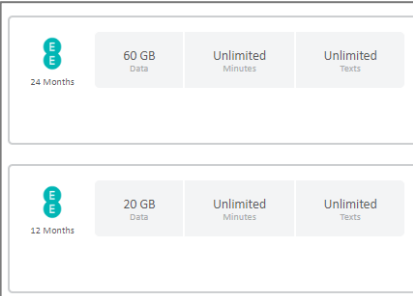
Planned obsolescence has been applied to many different industries of products, whether digital or physical. This could be ending support for old software so that it no longer functions on newer hardware as seen with *Microsoft*, or not allowing users to replace

broken parts in their products, as phone manufacture *Samsung* currently does (Ollie, 2019). However, companies would seldom, if ever, officially state that they are creating their products to fail. Doing so would cause mistrust amongst their consumer base, as making products that are designed to fail would reduce the perceived value of the product for the consumer. The reasoning behind making products non-repairable by the end-user are, in more common cases, for either increasing usability or aesthetics.

No matter the reasoning manufacturers give for their products not being repairable, it will not stop some consumers wanting to keep their old products. To counteract these practices consumers have started campaigning under the right-to-repair movement, where they are campaigning to influence lawmakers to create regulations on companies creating artificial end-lives (Kinokuni, Ohkawa and Okamura, 2010). While the movement has not met all its goals as of 2019, they are making progress with EU lawmakers. As previously stated, companies stop supplying spare parts for older products when they want their customers to upgrade. The new law that will be enacted in 2021 forces companies selling “lighting, washing machines, dishwashers and fridges” (Harrabin, 2019) to continue selling spare parts for 10 years after the product’s initial release. This law should directly impact the amount of people that purchase newer domestic products because their previous one was broken with no way to repair it. This could potentially help consumers keep a product in working condition for longer.

It could be inferred that these new laws will have little effect on the amount of waste that is produced from broken domestic products, as most consumers are likely to upgrade whether their product is broken or not.

A lot of people do not necessarily purchase new products outright. Most people in 2019, especially for electronic devices such as phones, get their new product through yearly contracts. In the UK over 90 million people are on mobile phone contracts (Ofcom, 2018). These contracts for electronic devices allow the customer to pay a monthly fee and then fully own the product once their contract has expired. These contracts usually last 12 or 24 months per term.



 24 Months	60 GB Data	Unlimited Minutes	Unlimited Texts
 12 Months	20 GB Data	Unlimited Minutes	Unlimited Texts

*Figure 1.3 (Carphone Warehouse, n.d.)
Carphone warehouse 12 month and
24-month deals in 2019.*

The main issue with this method of product ownership is that the companies that provide the products often do not give the consumer a suitable solution for recycling the product from their previous contract. Usually when the contract is up, the product they bought usually has depreciated in value to so that most people would not make the effort to recycle the product. This will simply result in the consumer putting the old product into landfill sites. The methods companies use will be described further in chapter

Because of these contracts, products are being bought and discarded in yearly or bi-yearly waves. This happens because a product will become most desirable when it first enters the market and so it will see a lot of purchases around the same date. With these products being kept for 12 to 24 months due to these contracts, it is possible to predict when the next wave of devices will be bought and disposed of. For mobile phones, this is visible in the graph below.

Market Share of Phones UK 2019 (%)

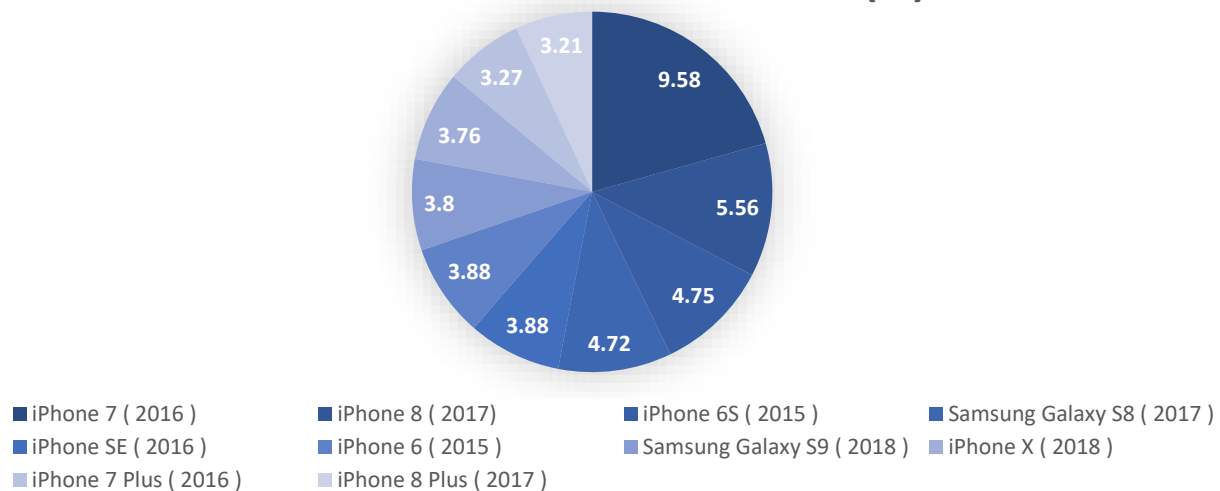


Figure 1.4 (Kielty, 2019)

As visible in figure 1.4, currently the most popular phone is the iPhone 7, which was released in late 2016. With a predicted 14 to 26-month replacement period per *DeviceAtlas* (Kielty, 2019), the large popularity that this phone has is limited and waste sites will soon see an increased intake of this device. Out of these top 10, there are currently 7 phones that could still potentially be in a 24- or 12-month contract. Most of these phones that could be in contract are a few years old, and so it is safe to assume that these phones will be part of the next 'wave' as the owners of these phones will replace

or upgrade their devices. The problem that will come from this wave is how to deal with the extra intake of old phones that depreciate in cost extremely quickly in developed countries. This 'wave' phenomena will be further explored in later chapters, as the number of mobile phones collected yearly in the UK will be explored.

4.1 The Effects of Yearly Buy Products

In 2018, the United Kingdom collected a total of 501 million tonnes of electrical waste, with 493 million from households alone (Data.gov.uk, 2019). This electrical waste is delivered to processing plants where they are either broken down to their raw materials, exported to other facilities or sent to landfill sites. Higher collection rates are usually good, as this means that more WEEE is being processed and recycled. What these collection rates do not include is the amount that is exported prior to collection and amount of WEEE that is being sent directly to landfill sites or to other countries.

One of the main issues with yearly released electrical products is how frequently and consistently they add into the waste stream. An effective way of reducing this waste is making sure that it goes to the appropriate locations where it can be processed by recycling plants. The data below is from government run UK recycling plants.

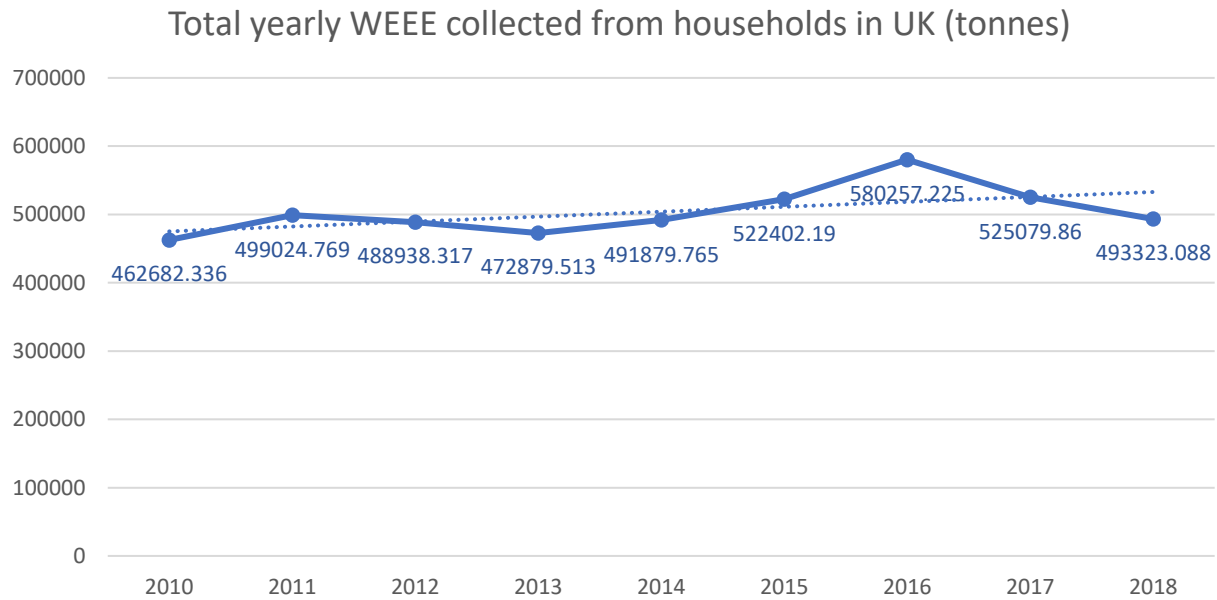


Figure 2.1 (Data.gov.uk, 2019)

Figure 2.1 displays the number of electronic appliances collected in tonnes from UK households since 2010 by AATFs (Approved Authorized Treatment Facility). After the AATFs have processed the Waste, it is then passed over to ATFs (Authorized Treatment Facility) and AEs (Approved Exporter) where they will conduct their own processing. It is important to note that only AATFs are possessed by the UK government, meaning that data from ATFs and AEs is largely unavailable and susceptible to discrepancies. Another important note before beginning the analysis is that there is no data for WEEE collected at landfill sites, as this is not recorded by the UK government. A final note is that a change in data may also be attributed to a lighter or heavier weight from the products delivered (Doherty, 2018). The data in the table contains the following categories of WEEE collected since 2010 to 2018 by AATFs:

- Large household appliances such as fridge or washing machines.

- Small household appliances such as hoovers or kettles.
- IT and telecommunications equipment such computers or telephones.
- Consumer equipment such as TVs or radios.
- Lighting equipment such as tubes and lamps.
- Electrical and electronic tools such as drills or saws.
- Toys, leisure and sports equipment such as gaming or exercise equipment.
- Medical devices from hospitals or doctors.
- Monitoring and control equipment such as heating controls or smoke detectors.
- Automatic dispensers such as snack and hot drinks dispensers.

(Data.gov.uk, 2019)

Small household appliances and IT and telecoms will be investigated in greater detail at a later point as these include kettles and mobile phones. But first, a general overview of the total household electrical waste collected will be provided as context.

As visible in the trendline, the UK currently has an upwards trend in collected electronic waste, seeing an increase of 30,640.752 from 2010 to 2018. The UK saw its highest collection of WEEE in 2016, increasing by 57,855.035 from 2015 then dropping back down to 520,000 in the next year. This was the first year in which the UK reached the EU's WEEE goals, with the collection amount increasing by an average of 11% (Date, 2017). This was mainly achieved through a great increase of large household (increasing by 18%) and IT and communications (increasing by 15%) collection rate since 2015. Before 2010 the UK had a large issue with WEEE in 2010, not meeting any of the goals set by the EU. It was in 2010 when the UK government put a greater emphasis on tackling the waste produced by EEE (Electrical and Electronic Equipment). To try and meet the

following year's collection target, the UK implemented take-back schemes (Environmentlaw.org.uk, n.d.). A take-back scheme allows the customer to return their old product, free of charge, where it will then be recycled. These can either be schemes wherein the consumer gets a new product as well as/or a discount on further purchases (which many annually bought products employ through contracts) or allow the customer to dispose of their old electrical goods at designated collection sites. Take-back schemes are beneficial to reduce the amount of WEEE going to landfill sites as it ensures that the previous product will go to AATFs where they can be processed and recycled. As per the data in figure 2.1, these measures have been beneficial to the collection rates as they have not dropped to 2010's amount since.

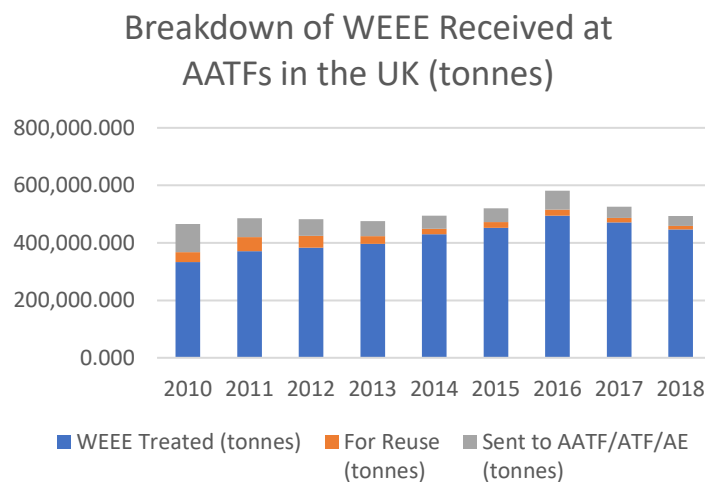


Figure 2.2 (Data.gov.uk, 2019)

Visible in figure 2.2, the total of each year's collection amount differs from the previous graph displaying the total collection amount due to "a number of schemes reporting more WEEE being collected than has been delivered ... whilst others have

reported less WEEE being collected than delivered" (Data.gov.uk, 2019). Therefore, the reliability of the data is subject to criticism. The reuse goods visible in orange illustrate the amount of WEEE that the AATF has deemed to be best fit to return to the UK market. This can happen if the product is still usable and desirable by the UK's consumer market.

As depicted, even when products are being collected by these recycling sites they are not being properly dealt with. While the amount of exported WEEE has been reducing since 2010, more steps will have to be made to make sure that the waste sent to these sites is being effectively processed. Exporting has been a complaint of waste recycling schemes as many countries export their waste to reach recycling and sustainability targets, such as those detailed in the Paris Accord (Holden, 2019). If the problems for the end-life of products that are bought on an annual basis is not resolved in these recycling facilities, then the problem cannot be effectively resolved even if all of waste products are collected.

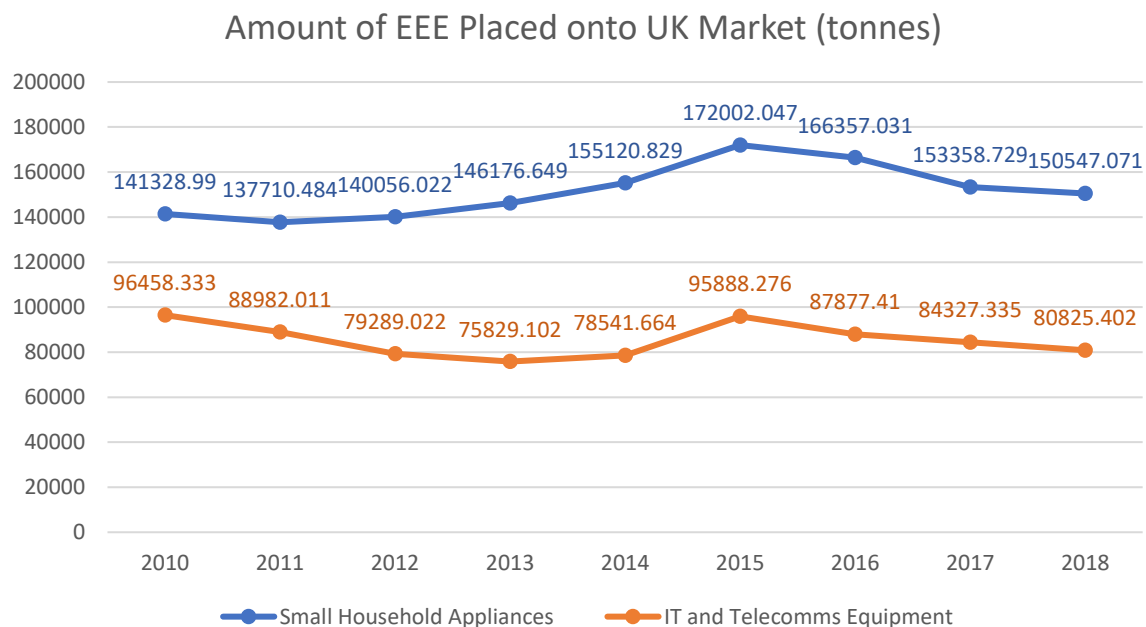


Figure 2.3 (Data.gov.uk, 2019)

Before looking at the amount collected in further depth, the amount of EEE placed onto the market will be displayed. This allows a greater understanding of the separation between the amount collected compared to how many electrical products are being

placed upon the UK market each year. The difference in amount of EEE being put on the market compared to how much is being collected for recycling on a yearly basis displays that there is an ever-increasing amount waste that will be sent to landfill sites.

While the UK government does not post official figures for total WEEE being sent to landfill sites (Fiveash, 2008), it is possible to calculate an estimate through subtracting the total amount of processed WEEE from the total amount of EEE placed on the UK market within that year and then add on the estimate from the exported total in the same year. To get a rough estimate of the amount sent to landfill from ATFs and AEs, the total amount sent to these from AATFs will be taken and subtracted by the percentage processed by AATFs in that year. Using this method to estimate, the UK sent 836,031.98 tonnes of WEEE to landfill sites in 2016. This was the UK's best year for collection, yet this amount of electronic waste was still being sent to landfill. Whether these landfill sites are located within the UK or other countries is not released in any public data tables. Showing how far behind the UK is in making sure that the end-life for these products is sustainable. This increase of EEE products will create a backlog for the AATFs, which they will have to catch up on currently and into the future if this collection rate is not sped up by an exponential rate.

Figure 2.4 displays two subsections in the total amount of collected WEEE. These two statistics have been further analyzed because they contain relevant information when looking at the effects of annually bought products. Small Household Appliances include products such as kettles and IT and Telecomms Equipment includes mobile phones. With each category including so many different products and many varying sectors, the data analyzed can only provide rough estimates into the amount of specific ranges of products that get collected.

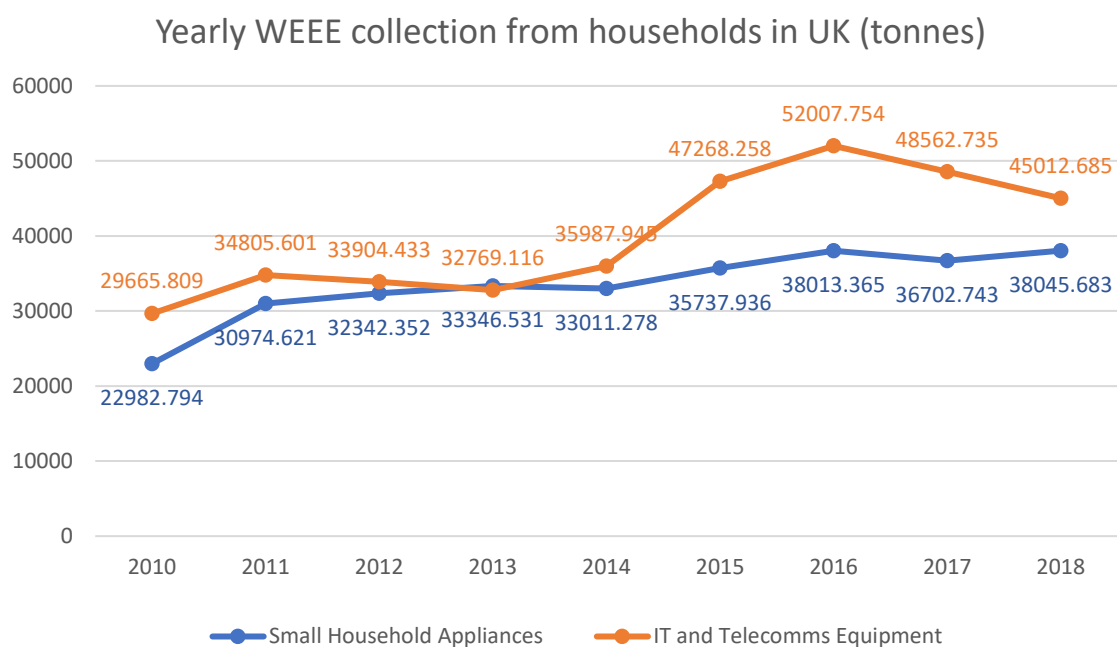


Figure 2.4 (Data.gov.uk, 2019)

As visible in the Small Household Appliances graph, it displays a current trend of increased collection rates. This trend is likely due to the schemes that the UK government has put in place as previously stated. With an increase of 65% between 2010 and 2018, it displays positive progress from the UK in terms of sustainability and ensuring that electrical goods have a suitable end life. As previously stated, 2016 was a progressive

year for recycling in the UK as they collected the most WEEE in the country's history. This is made clearer in this graph as the disparity between the amount of Telecomms collected and Household Appliances is shown clearly. This highlights that not all sectors are collected equally, meaning that they are disposed of at different rates, quantities and that people own less of products in some sectors than others. The data from this graph conveys that kettles are not products that are bought at yearly intervals, as from these 9 years displayed in the graph there is no clear correlation in dips and peaks at a yearly basis in collection rates. This could be due to the variety of other products included in this category that many households keep for many years, with kettles possibly being one of these. If this is to be believed, then it could explain the large increase in 2016 as this could be the year where a large majority of kettle owners are getting rid of their old ones to upgrade to newer versions.

The IT and Telecomms Equipment graph shows similar trends between 2010 and 2018. With an overall increase of 51.7% in collection rates, this clearly displays the UK's efforts to improve how much the country recycles. 2014 and 2017 show dips in collection, which could demonstrate the gap years in which most people keep their previous devices if they are in contracts or if their device still works properly. From the large increase of 2,275.429 tonnes from 2015 to 2016, it could be interpreted that many people replaced their old mobile phones for the most popular phone (the iPhone 7) which was released that year. A wave of mobile phones being phased out is clearly visible between the correlation between the amount of EEE collected in 2015 and the amount that was placed on the market and the WEEE collected the following year. The large surge in both years aligns

with the theory that the phones bought in 2015 were disposed of by consumers to purchase the newest generation in 2016. 2016 was also the year where the most used mobile phone was released which further evidence of this. There are increasing rates of collection because of the growth of population in the UK meaning there is more WEEE to be collected. A further initiative from the UK government is needed to increase the amount they collect by adding additional schemes. After 2016, the collection rates drop so far that the UK missed their collection targets two years consecutively. If the trend graph is to be followed, then the UK will continue to miss their targets in 2019 and the following year if no suitable schemes or incentives are put in place to further encourage an increase in collection rates.

4.2 What Happens to Products in Recycling Plants?

Products going to recycling plants is only half of the end-life for annually bought products. Once kettles and mobile phones have been collected by recycling plants, there is now the concern of how much materials can be reclaimed in the recycling process. Reclaiming materials describes the amount of materials that went into the product which can be reliably used again in the making of a new product.

Many companies seek to aid recycling plants to regain the most possible resources from their products. This is usually accomplished by using a material identification system. One method they apply is through identifying the polymers used in their products utilizing the Resin Identification Code (RIC). Initially created by the *Plastics Recycling Association* (General Kinematics, 2018). these markings on

Resin	Resin Identification Code-Option A	Resin Identification Code-Option B
Poly(ethylene terephthalate)	 1 PETE	 01 PET
High density polyethylene	 2 HDPE	 02 PE-HE
Poly(vinyl chloride)	 3 V	 03 PVC
Low density polyethylene	 4 LDPE	 04 PE-LD
Polypropylene	 5 PP	 05 PP
Polystyrene	 6 PS	 06 PS
Other resins	 7 OTHER	 07 0

Figure 2.5 (Greener Package, 2013)

plastic products inform recycling plants of what plastic has been used and allow for more efficient sorting. This system stops cross contamination of plastics which is crucial when trying to effectively reclaim plastics for reuse.

When recycling a mobile phone, it is important to note that not all are made in the same way or with the same materials. Each phone differs in hardware, screens, cameras, enclosing etc, requiring a large variety of materials to produce. *RecycleNow*, a UK government funded recycling campaign, states that “up to 80 per cent of a phone is recyclable” (Recyclenow, n.d.), to which they emphasize in their advertising to influence consumers to submit their devices to collection sites. Different phones will have differing amounts of recyclability as they can have a diverse set of components and enclosings. While it is beneficial to have higher percentages of recyclability in each device, the targeted outcome is for these devices to be fully recyclable. If these devices cannot be broken down to their base materials, there will be wasted resources that can never be

reclaimed once a mobile phone has been manufactured. Some materials used in mobile phones are toxic, so improper recycling can be hazardous. The toxic materials contained in phones is especially problematic once a device has been sent to landfill, as the contamination from other products and the sorting required to find recyclable devices necessitates an immense amount of resources. To put to perspective the amount that can be reclaimed from mobile phones, the *United States Environmental Protection Agency* states “for every million cell phones we recycle, 35 thousand pounds of copper, 772 pounds of silver, 75 pounds of gold and 33 pounds of palladium can be recovered.” (US EPA, n.d.).

In order to solve this problem, mobile phones need to be recycled before they reach landfill and not after. The true goal is to have a circular economy, where all materials can be reused in future products and waste is used efficiently. For these devices to be completely recyclable the companies designing them would have to be put under further scrutiny when it comes to the manufacturing and the materials being used. What companies can potentially do to alleviate these issues will be further explored in the solutions chapter.

On the contrary kettles use fewer precious metals in their manufacture. Most kettles in 2019 are comprised of steel, iron, aluminum, plastic and on some occasions silver (Madehow, n.d.). Electrical kettles feature designs where the materials are easy to separate in recycling plants. The metals can be broken down and/or melted to be

reclaimed and reused in another product. The plastics in kettles are most often used for buttons or handles, so they are used in small amounts. These plastics in kettles can be ground down and used again in new products.

While government run recycling schemes are the most common way of recycling WEEE, companies can also provide their own methods to recycle their products. In 2018, *Apple* announced their recycling robot named Daisy. The machine is capable of stripping apart “200 iPhones in a given hour” (Heater, 2018), an impressive feat that allows speedy and accurate deconstruction of their mobile devices. The benefit of having the developer of the product recycle their product is that they can then design their products to be more efficient for this recycling process, allowing greater amounts of reclaimed material. While this is a step in the right direction, some critics state that this can hinder the recyclability of products as recycling plants would have to use the company’s recycling machine to deconstruct the product fully (Urry, 2016). Another mobile phone manufacturer, *Samsung*, provide a different method to encourage customers to recycle their old phones called *SamsungRecycle* (Samsung Recycle, n.d.). Samsung are offering to buy their customers old phones so that they can process them appropriately. Offering monetary compensation is likely to encourage engagement in this scheme as it would reduce the feeling of additional effort to post the device to the company. This method, rather than attempting to deal with the task of recycling their devices themselves, encourages their userbase to send their phones back to them where they then will likely be sent to recycling plants to be processed or resold if the phone is still desirable.

Unfortunately for recycling organizations, some companies order their products to be destroyed rather than recycled. This occurs when a company disallows recycling plants the right to recycle their product, and instead destroys them to a point where only a small amount is reclaimable (Koebler, 2017). A common reason for doing so is that they do not want their technology being reclaimed from their devices and used in other products. Another reason companies would want their product destroyed is if they go to recycling plants other than their own. This way the company would be able to accurately record how much of their product is being recycled and through which method.

Once the materials from a product have been reclaimed, the next step is finding a use for them. There are two categories when it comes to reusing recycled material in new products. These are named closed loop and open loop recycling (General Kinematics, 2018). Closed loop recycling is where the materials broken down from the recycled product are used to manufacture a similar product. One of the most common examples of this type of recycling is aluminum cans. It is also commonly used in products that use rare materials which can be expensive to purchase new. Open loop recycling is the opposite, the recycled materials often end up into completely different industries. Most of the AATFs that the data was collected from in figure 2.1 apply open loop recycling systems. Open loop recycling methods are often criticized for being more wasteful or reducing the quality of the materials being recycled.

The final step for these recycled materials is then finding companies willing to utilize them in their products. This can be an issue as recycled materials have to compete against virgin materials. Virgin materials are materials that have not been used in a product or used in manufacturing previously (Wieser, 2016). The problem occurs as many manufacturers see recycled materials as being of lesser quality than virgin materials and believe it could impact the build quality of the product (Huysveld et al., 2017). Another criticism of recycled materials is that they can be hard to market to an audience when trying to sell a premium, or industrial quality product. Which is why most recycled materials sees use in cheaper consumer goods, such as packaging or canned drinks. The belief of reduction of quality does have some merit, however, as plastic that has been recycled and reused is often weaker and, if it has not been properly recycled, can feature different types of polymers in one mix (Madehow, n.d.).

4.3 Solutions to Make Annually Bought Products More Sustainable

One of the major issues that is impacting recyclability across the globe is how many stages each product must go through in order to be recycled. If these stages could become more streamlined, if more WEEE could be collected within the first stage of disposal and if more of each product could be broken down to their raw materials then the UK would be better able to reach their goal of being a waste neutral country. This could be done by providing easier means for customers to hand in their unwanted

devices. As evidenced, the current methods of collection do not generate above 50% total EEE collection a year.

To specifically reduce the amount of mobile phones being sent to landfill sites, the UK and EU will have to work with the manufacturing and design companies to: Create further regulations on planned obsolescence that function similarly to the law by the EU set in place on the 1st October 2019, but for mobile phones (Harrabin, 2019). Produce more incentives for customers to give in their old phones to official recycling channels to ensure they are properly processed. Produce devices that are easier to recycle in recycling plants to ensure the maximum amount of materials in the phone can be reclaimed. The issue with changing how companies manufacture and sell their yearly products is the economical damage it would do to them. Many companies currently rely on this method of retailing, so it is hard to argue the benefits of reducing waste against a potential economical crash.

Solutions for electric kettles are similar in that there needs to be an increase in repairability in kettles. This could be done by setting a determined time from the kettle's release that they must have spare parts available for consumers to purchase. Additionally, they must also be accessible to repair by consumers and professionals alike. Like the law set for large household appliances by the EU, there needs to be additional legislation in place to stop on purpose failure being set by the manufacturers. The biggest problem stopping these legislations being put in place is liability and

regulation of repairs. If a consumer gets injured during the repair of a product, there is the problem of identifying who is to blame.

5.1 Conclusion

Annually purchases products have a clear and direct influence on the United Kingdom's waste stream. With companies having more data on their consumer base than ever before, they can impact how many sales they get yearly more than ever often with little input into how their products are recycled in their end-of-life. It can be said that companies are using some consumers' addictive tendencies to get them to continually purchase their products. Offering affordable and easy-to-setup contracts also increase the amount of EEE introduced into the UK's waste stream as it allows consumers to frequently upgrade their products. This is visible in the bi-yearly spikes identified in the data from the United Kingdom's recycling plants.

The issues caused by annually bought products are multiplied by the current issues with recycling and companies' attitudes towards it. Most products still cannot be completely recycled to where the amount of materials put in can be completely regained. After a product gets recycled, there is then the problem of finding a company willing to use second-hand materials to produce their products. Due to electrical products often expensive price, companies do not want to make their product seem cheap as it often connotes with bad build quality or low expertise from the manufacturers. It is also

problematic that some companies wish not to take part in recycling schemes, wanting their products to be destroyed and be disposed of in landfill sites. These are the types attitudes that must be changed for any progress in furthering the amount of WEEE recycled to be made.

However, the waste problem expands further from just annually released products. The total amount of EEE being placed on the UK market is increasingly out pacing the amount of WEEE that is being collected, suggesting that most electrical and electronic waste is going to landfill sites. With how difficult it is to reclaim electrical goods from landfill sites, it is important to get them to suitable recycling plants where they can be processed.

The question yet unanswered is who is to blame for this issue. Is it the consumers fault for wanting and purchasing similar products yearly, or the companies for producing and providing consumers the ability to do so?

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