POPULATION MATTERS™

iCon

Apple, consumption, and the future of the planet

A Population Matters Report

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INTRODUCTION

We think we know what corporate environmental villains look like: companies that pump pollutants into rivers, decimate orangutan habitats to plant monocultures, ravage soil and sea for fossil fuel extraction, and more. We picture too, the sinister influencers deploying their power and influence to keep governments and regulations out of their way. And we're right.

But there is another kind of corporate activity, which is almost universal, and ultimately even more destructive: one which pushes us to buy things we don't need, which come at a cost to the environment we don't see.

At its heart, our environmental crisis is driven not by the bad actions of bad actors, however harmful and reprehensible those may be, but by the demands humanity places on the Earth. That means, first, demand for renewable and non-renewable resources, from oil and sand to trees and fresh water; and second, the demands on natural ecosystems to manage and absorb the waste we create, from pesticide residues to greenhouse gas emissions. The way in which we extract, process and use natural resources is of course, critical, but however we may choose to ameliorate those effects, the more we take, the greater the harm.

As we live today, and as we can expect to live for the foreseeable future, our demands will never come without negative impacts. If we want to fix our planet, we haven't the time to wait until our actions are without consequences – we must reduce the scale of our demands.

Companies which push us to buy more and more can no longer hide behind the profit principle or by promoting environmental policies which give with one hand, while marketing takes with the other. Apple, for instance, creates demand and then meets it, not the other way around. While it has demonstrated a commitment to reducing the impact of its products, each will still come with a cost, and the goal to perpetuate their consumption remains. What drives consumption, drives destruction. When our demands unremittingly exceed the Earth's capacity to meet them, damage and breakdown are inevitable.

Apple is neither the most destructive nor the most cynical company out there – not by a long way. But their narrow approach to corporate responsibility and commitment to ever more products and ever more purchases is emblematic of a problem we must confront if we are ever to steer our ship away from the rocks.

EXECUTIVE SUMMARY

Current aggregate levels of global consumption are driving our climate and biodiversity crises and are leading us to transgress the "safe operating space" for humanity on this planet.

Unsustainable consumption is not divided equally across the global population but overwhelmingly driven by high levels of per capita consumption among the wealthiest. Our growing global population and the necessity for economic growth in low-income countries means that reduced consumption by the affluent is essential.

Commercial companies are not just beneficiaries of an innate drive to consume, but through their actions foster increased and destructive consumption.

Apple's cycle of model upgrades and its marketing power promote the repeated purchase of new Apple products which offer marginal benefits to consumers. In so doing, it also promotes a culture of unsustainable consumption.

Notwithstanding Apple's policies intended to reduce its negative environmental impact, extraction and distribution of raw materials, assembly and production, marketing, distribution and sale of its products is environmentally destructive. Increased sales volume exacerbates that impact and reduced volume of sales will mitigate it.

As one of the world's largest companies and consumer brands, Apple can and should show leadership by adopting a business model based on lower material consumption and footprint, rather than merely taking measures to mitigate some of the negative impacts arising from its drive for a greater volume of sales.

As consumers and citizens, our choices in regard to consumption can directly mitigate negative environmental effects, and we should make those choices accordingly. In addition, we can and should apply positive pressure on companies and policymakers to take action to reverse the catastrophic trajectory of growing and unsustainable consumption.

Selected findings

- More than six billion people use smartphones, over 80% of the global population.
- An estimated five billion phones are discarded each year.
- Apple ships more than a million iPhones every two days.
- Since 2007, Apple has released 13 generations of iPhone with almost 40 different models.
- Apple has faced repeated complaints and legal claims regarding "planned obsolescence".
- Apple's carbon footprint is equivalent to Croatia's, and greater than that of 70 nation states.
- Less than 20% of the materials in Apple's product range is from recycled or renewable sources.
- Apple's brand value is ten times the Gross Domestic Product of Zimbabwe.
- The cost of a new iPhone could buy 200 long-lasting mosquito nets to protect children from malaria, or pay the salary of a midwife in Bangladesh for four months.
- Apple's estimated 2021 marketing spend was $2.7bn. The same sum could meet the water needs for sanitation and hygiene of people in 46 least-developed countries, or protect 80% of the Brazilian Amazon for a year.

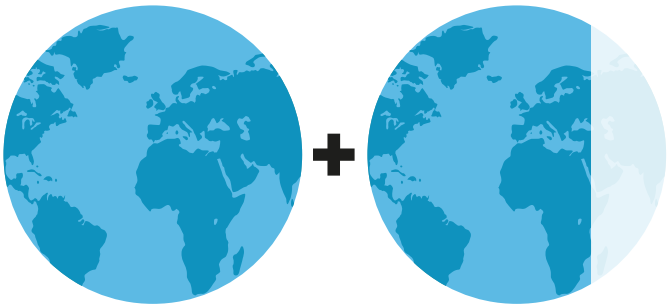
PART ONE

SPEND, SPEND, SPEND

"Exploding human consumption is the driving force behind the unprecedented planetary change we are witnessing, through the increased demand for energy, land and water."

WWF, The Living Planet Report, 2018[1]

As things are, we are consuming too much. The Global Footprint Network (GFN) is a highly respected research organisation which works with governments and major environmental organisations. It assesses and quantifies the balance between what we demand of the Earth and what it is able to give. Its work focuses on renewable resources rather than non-renewables such as coal and oil, which we know we will exhaust. Renewable resources are things like forests, soil and clean air. With renewable resources, there is a risk of us believing there are always more fish in the sea.



GFN's conclusions are stark: every year since 1970, we have used more than the Earth can provide, we currently need 1.75 Earths to supply our needs, and every decade we demand *more* from an Earth that is less able to supply than the decade before.[2] Another quantifiable truth is that some of us, mostly but not always in the Global North, take much more than others.[3] The material footprint – how much stuff we take - of people in high-income countries is, on average, 13 times that of people in low-income countries.[4]

"Globally, Gross Domestic Product (GDP) per capita and population growth remained the strongest drivers of CO_2 emissions from fossil fuel combustion in the last decade."[5]

Intergovernmental Panel on Climate Change

This truth is applicable to greenhouse gas emissions too. Recent inequality studies broadly agree that the top 1% of the population by income (wherever they live) is responsible for more than double the emissions of the bottom 50% (according to one of the most authoritative studies, 16% to 7%).[6] Contributions to climate change are best measured by consumption emissions – those arising from the things we buy and use – rather than territorial emissions, which are those produced in the countries we live in. Measured by consumption emissions, an average person in the UK will produce almost 7 tonnes of CO_2 (tCO_2), while an average Bangladeshi will produce less than $1tCO_2$.[7] Of those two individuals, however, one is almost unimaginably more vulnerable to the effects of climate change than the other.

It would, however, be mistaken to see the issue as simply one of the ultra-rich high consumers driving our crisis. The same research found that about half of all emissions were attributable to people earning more than just $38,000 per year (2015 values). The rich are not someone else. The rich are us.

"Lowering total consumption and waste is essential to the overall approach of 'bending the curve' of biodiversity loss."

Global Biodiversity Outlook 2020[8]

The climate crisis is not our only environmental crisis. More than one million species are thought to be at risk of extinction,[9] with extinction rates today estimated to be 1,000 or more times higher than they would be without human impact.[10] Just as with emissions, what we consume drives what we lose. The Global Biodiversity Framework is the

international agreement intended to protect and restore biodiversity. Agreed in December 2022 by 196 nations, it includes the following vital target:

"by 2030, reduce the global footprint of consumption in an equitable manner ... significantly reducing overconsumption and substantially reducing waste generation." [11]

An authoritative model for considering the health of our planet and our future is the planetary boundaries principle established by the Stockholm Resilience Center (SRI).[12] This framework identifies natural processes upon which the planet depends for the environmental stability on which we rely. They have been described as providing the "safe operating limits for [our] survival". Nine planetary processes are are identified where we must remain inside those limits, including climate change, freshwater use, land system change and ocean acidification. Current calculations show we are already exceeding four of the nine. To be clear, this does not mean that so long as the majority are alright, we're alright. Breaching any one of those boundaries in the long term is sufficient to destabilise the planet, and endanger, not to put too fine a point on it, the future of human civilisation. And why are we breaching them? According to SRI,

"The main drivers of change are the demand for food, water, and natural resources, causing severe biodiversity loss and leading to changes in ecosystem services. These drivers are either steady, showing no evidence of declining over time, or are increasing in intensity."[13]

The scale of the imbalance between the demands of 8 billion humans and what the Earth can provide can also be looked at in another way. Researchers have tried to quantify the challenge of achieving a decent quality of life for everyone on Earth, whilst holding within our planet's ecological, sustainable boundaries. One study suggests sustainability would only be feasible with a maximum world GDP of $70 trillion, which if spread equally among our current population would mean less than $9,000 per person.[14] Global average per capita GDP stands at around $12,000, with UK citizens averaging about $46,000 and citizens of Tuvalu, less than $6,000.[15] By 2030, it's predicted that the number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of high-level consumers will have increased to over 5 billion people.[16]

"Sustainable" consumption

The importance of consumption is recognised in the UN's Sustainable Development Goals (SDGs), the global targets intended to provide a decent quality of life for all on a healthy planet by 2030. Unfortunately, Goal 12, "Responsible consumption and production" is largely unwilling to grasp the nettle of addressing demand, and is more focussed on supply solutions such as "increased resource efficiency, circularity measures and overall efforts to de-materialize economic growth."[17] Even on these measures, progress towards achieving the goal in the richest countries is almost impossible to detect. Not a single one of the 38 member states of the Organization for Economic Co-operation and Development (OECD) achieved a green ranking in the 2022 SDG progress report's traffic light system – among the reds were Australia, France, Germany and the US.[18] The 2022 report notes:

"All [High-Income Countries] and OECD countries generate significant negative socioeconomic and environmental impacts outside their borders (spillovers) through trade and consumption, hampering other countries' efforts to achieve the SDGs. Historically these countries are also responsible for the bulk of greenhouse gas emissions and climate change and hence bear a special responsibility to take actions at the national and international level."

The consequences of unsustainable consumption by the affluent fall first and hardest on the poorest. Ultimately, we will all pay.

PART TWO

BUY, BUY, BUY!

The commercial world

The notion that companies should play a significant role in reducing consumption appears oxymoronic. Surely, it is their job to make us buy more stuff.

While specific environmental legislation regulates companies' actions across a range of practices, beyond these specific limitations company law obliges directors to put a company and its shareholders' interests – primarily profit – above all else, regardless of nominal wider responsibilities. However, wider interpretations of those legal responsibilities are now taking hold, which leave companies vulnerable to complaints and litigation over actions which harm the environment and communities that aren't covered under specific rules.[19] In the UK, a campaign for a "Better Business Act" is intended to ensure that companies' legal responsibilities to communities and the environment are unambiguous and can no longer be trumped by short term commercial interests.[20]

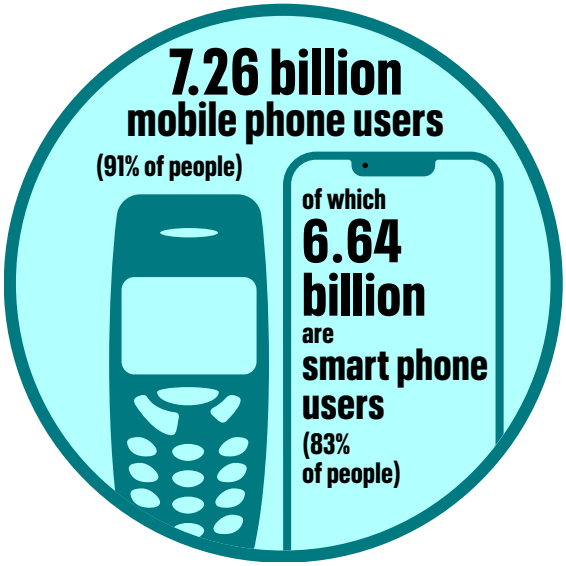
As noted on p5, nearly 200 governments have committed to action on consumption through their adoption of the Global Framework on Biodiversity (GBF) in December 2022. Sadly, the GBF has stopped short of committing governments to legislative action over companies' actions to promote consumption. It is nevertheless pretty clear about what it would *like*, mandating that people should be "encouraged and enabled to make sustainable consumption choices" (Target 16). As to the role of companies like Apple, it is direct:

"*large and transnational companies and financial institutions [should] ... transparently disclose their risks, dependencies and impacts on biodiversity [and] provide information needed to consumers to promote sustainable consumption patterns.*" (Target 15)

Apple's 2022, 128-page, environment report contains the word biodiversity just four times.

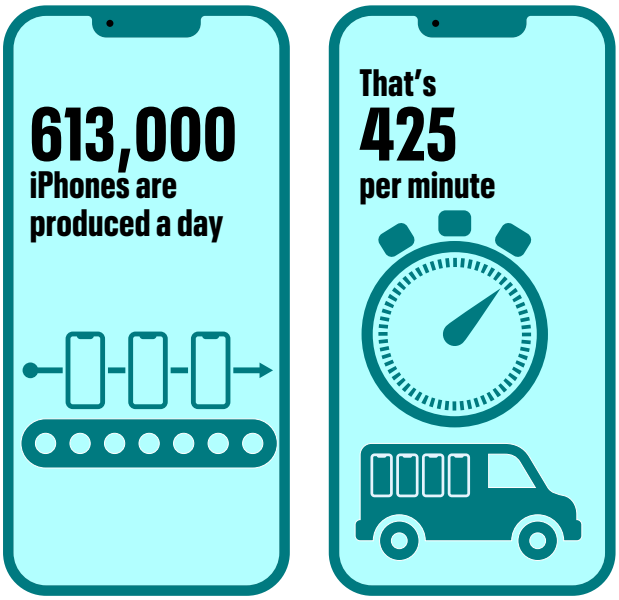
Smartphones

Above and beyond the basic requirements for living, such as food, water, shelter and energy, few items have greater ubiquity than the phone. With our population at 8 billion people, there are 6.64 billion smartphone users, which means 83% of the world's population owns one.[21] Sales took a hit in 2022 due to the global recession, but still about 1.2 billion were sold.[22] The number of users grew by nearly 50% in just the five years between 2017 and 2022. [23] Global E-Waste Monitor estimates a total global stock of mobile phones (in use and hoarded) of 16 billion – two, on average, for every person on the planet, and about ten times the number of cars.[24] An estimated 5.3 billion phones (both mobile and smartphone) were estimated to be discarded in 2022 alone. [25]



As with all consumption, the distribution is deeply unequal. In 2023, 80% of Americans and nearly 80% of UK adults own a smartphone: in Brazil, just over half of people own one, in India a third and in Nigeria, just a fifth.[26]

The smartphone market is dominated by relatively few players, with Apple and Samsung constantly vying for and swapping places in the top spot. Together they account for more than



half of the total market.[27] After the two giants, Chinese companies Oppo, Vivo, Xiaomi and Huawei collectively account for about a third, mainly due to their popularity in their enormous domestic market.[28]

While a smartphone may lack the obvious hallmarks of environmental harm that a petrol car or an intensively reared beef steak might have, each one of those 16 billion items carries a cost to our planet. The information and communications technology sector overall is estimated to be responsible for between 2.1% and 3.9% of climate change emissions, for instance (though its environmental impact is far from limited to emissions).[29] As this report explores in depth, *relatively* benign, does not mean benign.

The Big Apple

With a market capitalisation of US$2.4 trillion and nearly $400 billion in revenues in 2022,[30] Apple is, at the time of writing, the most valuable company in the world.[31] Its reign relies mostly on iPhones, which generate over half of its revenue.[32] Eight out of ten of the world's best-selling smartphones in 2022 were Apple products.[33] More than half of all smartphones used in the US are iPhones[34] and more than 1.5 billion people use them worldwide.[35]

An estimated 2.2bn iPhones have been sold, with almost a quarter of a billion (224m), shipped in 2022.[36] That is about 613,000 a day, or 425 units per minute. [37]

Apple is more than a manufacturer. It is – because it has sought to be – an icon. Few businesses have managed to curate a corporate identity with the penetration and resonance of Apple's. From its classic logo through Steve Jobs' nerd chic turtlenecks to the white headphones of the noughties and endorsement of Harry Styles today, Apple has sought to define aspiration. In 2022, it was, literally, the most valuable brand in the world, but has now slipped due to a downturn in the phone market – to merely the second most valuable brand in the world (after Amazon).[38]

One way in which it has secured its primacy is through its development and mastery of the upgrade – the constantly replenished temptation of new models, intended to persuade us to buy again, and again, and again. Since October 2020 alone, Apple has released the iPhones 12, SE, 13 and 14.[39] Samsung has kept pace, with annual releases of the Galaxy model since 2009.[40]

iPhone release dates

June 2007	iPhone
July 2008	3G
June 2009	3GS
June 2010	4
October 2011	4S
September 2012	5
September 2013	5S & 5C
September 2014	6 & 6 Plus
September 2015	6S & 6S Plus
March 2016	SE
September 2016	7 & 7 Plus
September 2017	8 & 8 Plus
November 2017	X
September 2018	XS, XS Max
October 2018	XR
September 2019	11, Pro, Pro Max
November 2020	12, Mini, Pro, Pro Max
September 2021	13, Mini, Pro, Pro Max
March 2022	SE 3 (2022)
September 2022	14, Pro, Pro Max
October 2022	14 Plus

Source: Turner, 2022[41]

At the same time, and increasingly relevant to Apple's presented identity, it has sought to characterise itself as a company committed to good: to supporting people and protecting our planet. In this it is far from alone – Samsung's ESG report[42] is no less attractive and packed with persuasive statistics than Apple's – but there is a particular resonance in a company which is defined by its marketing of materialistic happiness claiming the environmental high ground.

That is not to say that Apple is not, in its way sincere, nor that it is not making meaningful changes. This is not just greenwashing. Indeed, Apple's progress in minimising its impact and apparently genuine commitment to doing so makes it all the more valuable as a case study of the limited horizons of corporate environmental responsibility, and the way that can obscure deeper problems and deeper solutions. We must acknowledge what Apple doesn't: a constant cycle of new products, demanding resources and fostering hyper-consumption is counterproductive, regardless of their best efforts to reduce the impact of each one.

Mad men

The more adverts we see, the more stuff we buy, the more stuff gets made and more emissions are generated. Everything has an associated carbon footprint.

Purpose Disruptors[43]

At the basic level, advertising comes at a very direct environmental cost. It's surprisingly hard to find a quantification of the impact of production, transport and disposal of physical ads on, for instance, billboards, but digital advertising is coming under increasing scrutiny. According to recent research, one ad campaign from a single advertiser can generate more than 320tCO_2e, enough for 130 transatlantic flights.[44] Imagine that multiplied for every campaign you see.

Industry experts have identified three main components: the impacts of creating ads (including those trips to picturesque Barcelona or the Scottish Highlands), media broadcasting, and the invisible algorithm alchemy of targeting those advertisements at you. The automated system of generating personalised online advertisements alone – tailored to billions of individual consumers from millions of potential advertisers – is a major global emitter due to the energy requirements of the vast data centres required to process the algorithms.[45]

"*In 2016 it was estimated that 1% of total energy consumption on this planet is used just to serve online ads. Since global ad spend has increased by 258% since 2016, we can safely assume that the planetary impact of digital advertising has also skyrocketed.*"[46]

The greater cost, however, arises from what advertising does.

Research by Purpose Disruptors has come to a very clear conclusion:

"*[There is] a very strong correlation between the amount of advertising a citizen sees (ad spend per capita) and the citizen's carbon footprint.*" [47]

Astonishingly, Purpose Disruptors calculates that advertising for the tech sector drives emissions with bigger climate emissions than advertising for the travel and tourism industry.[48]

It is sometimes argued that all advertising does is move existing demand from one brand or product to another. It doesn't create demand, it just satisfies it. This question has been studied in depth and there is abundant evidence to the contrary. For instance, a US Department of Health study concluded that "the total weight of evidence … demonstrates a causal relationship between tobacco advertising and promotion and increased tobacco use."[49] As a 2011 report on the ethics of advertising put it, "the academic evidence on tobacco advertising suggests that advertisers have historically been major engineers of cultural change."[50]

The World Federation of Advertising actually quantifies its 'benefits' in terms of expanded consumption:

"1 Euro of advertising spend generates 7 Euros for the economy, representing 4.6% of the overall EU GDP. This means that the EUR 92 billion spent on advertising in 2014 in the EU is estimated to have contributed EUR 643 billion to GDP." [51]

Given that growing GDP has been identified as the largest single driver of climate change, as well as a driver of biodiversity loss, this is hardly a claim to boast about.

The magic of marketing

"The truth none of us wants to admit is that the advertisers know our minds better than we do."

Clive Hamilton, Centre for Applied Philosophy and Public Ethics[52]

Marketing strategies start with emotion. According to professor of neuroscience and author of *Descartes Error,* Antonio Damasio, our emotions deeply inform our decision-making processes, especially our purchases.[53] Functional MRI tests show that, when evaluating businesses, consumers use the parts of their brain associated with memories, feelings and emotions rather than facts. In the words of Robert Heath from the University of Bath and Paul Feldwick, a former advertising man, "most advertising influences behaviour not through the conscious processing of verbal or factual messages, but by mediating relationships between the consumer and the brand—and it does this using types of communication that are not necessarily processed with conscious attention."[54]

According to Dr. Jonah Berger's study, content that evokes high arousal emotions is more likely to go viral than content that doesn't provoke a response. Content that inspires joy and awe are the most viral.[55]

Brand, brand, brand

There are few companies with a greater mastery of marketing than Apple. As of 2023, it has a brand value of US$297 billion, equivalent to the total GDP of Finland and 10 times the GDP of Zimbabwe.[56] [57] Its estimated annual advertising spend in 2021 of US$2.7bn puts it in the top ten advertisers globally, ahead of Google, Coca-Cola and McDonald's.[58] In 2020, it spent nearly US$65m on those environmentally costly paid search advertisements alone.[59] It has now been the winner of the CMO Survey Award for Marketing Excellence consecutively for fourteen years.[60] Steve Jobs reportedly said that customers "don't know what they want until we've shown them". Apple creates demand and meets it.[61]

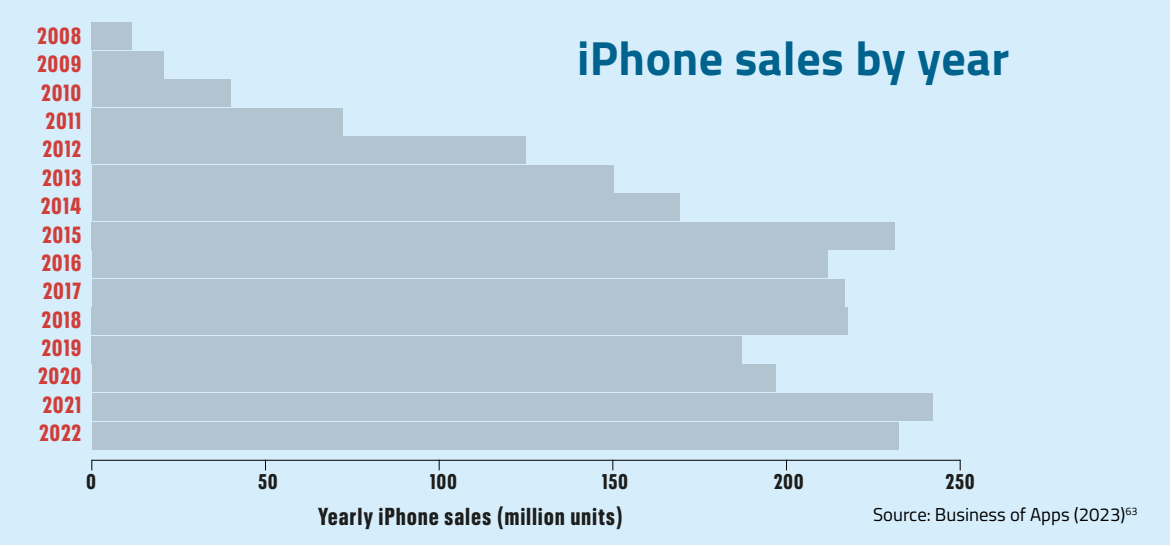
Apple's approach reflects, unsurprisingly, all the best insights on how to influence us. It employs the 4P elements[62]: products, price, place and promotions. The product mix includes products, services, and digital content distribution. Apple maintains its prices and does not use them to compete, as they highlight their unique value proposition.

It has certainly curated something beyond the product - the Apple Experience, which sells us the buying process, not just what we buy. Apple Stores are spacious, designed with warm lighting, monochromatic colour schemes, and large front windows for anyone looking in – staff from all walks of life are not necessarily selected for their technical savvy, but for the differences that facilitate connection with customers.

Rather than focusing on specifications and features in its marketing, Apple focuses on how their product can enhance your life. It has created and nurtured a brand personality and appealed to and secured its fan base with a minimalist design, copy that's simple, and a direct appeal to current and prospective customers. It largely does away with technical jargon and uses language and imagery that is digestible and relatable, and this is consistent in the sense of community they generate as well as in their stores.

Patience, patience

Indeed, Apple does not need to trumpet its features, because an entire surrounding ecosystem of unpaid online marketeers does it for them. iPhones, as we describe below, are released once a year, usually in September. Almost immediately, speculation about the next iteration begins, and



ramps up very quickly, generating anticipation months ahead of the release of the next model.

In the words of one impatient outlet, "It's been more than four months since the iPhone 14 range was released, so naturally we're now eagerly awaiting news of the iPhone 15".[64] A Google news search for "iPhone 15" conducted in early February 2023, eight months before its expected release date, yields 26 pages of results in 2023 alone.* The tone of these stories is simultaneously breathless and dull:

"Stunning iPhone 15 Ultra concept imagines those glorious curved edges"[65]

"Game-changing graphics"[66]

"rumors are running wild!"[67]

"the iPhone 15 Pro lineup could have thinner bezels and curved edges... And you know what? I'm all for it."[68]

Beyond advertising

It's not just the geeks and fanboys and girls who keep the wheels turning. In 2020, Apple rediscovered its dormant TikTok channel and released videos promoting the iPhone12 with influencers Jessica Wang (5 million followers in 2023), Kevin B Parry (2.3m), Zach King (73m), and Julian Bass (a lowly 1.7m).[69] Since 2021, its following has grown from 378,000 followers and 350,000 thousand likes to 2.7m followers and 7.3m likes. While it largely eschews fuddy-duddy Facebook, Apple reportedly spends $100m a year on Twitter advertising[70] and its Instagram boasts 29 million likes.

Instagram, alongside YouTube and TikTok, is a platform for yet another spontaneous – and free to Apple - marketing opportunity: the unboxing video. This, to many of us inexplicable, form of content has an astonishing reach, boasting more than one billion views on YouTube alone. In 2021, E-commerce expert Sondutta Singh reported that "at least 60 million hours have been spent watching other people open things".[71] According to a Google survey, 62% of those spending those hours are doing so because they are looking for a particular product.[72]

The 8.6m views and quarter-of-a-million likes of Marques Brownlee's iPhone 13 unboxing video on YouTube,[73] to give just one example, thus offer a gift to Apple. Not that they aren't soliciting that kind of gift in their own way. Walter Isaacson from Apple's packaging division said, "Steve [Jobs] and I spent a lot of time on the packaging. I love the process of unpacking something. You design a ritual of unpacking to make the product feel special. Packaging can be theatre, it can create a story."[74]

Rather higher up the status ladder of marketing is celebrity endorsement. In 2019, singer Selena Gomez released a music video for *Lose You to Love Me*. In 2023, in the little panel on YouTube which tells you that the song has 424m views is

* Not that speculation is limited to just the next model. In January 2023, *Notebook Check* reported the highly detailed rumour that "Apple's Dynamic Island is set to undergo an evolution starting with the iPhone 16 Pro models. Instead of a dual cutout design as seen on the iPhone 14 Pro and iPhone 14 Pro Max, Apple is set to move Face ID hardware underneath the display, essentially leaving the selfie camera as the sole display cutout." What *could* the source of such a rumour be?

the discreet tag, *#shotoniphone*.[75] Harry Styles' engagement with the brand was somewhat less subtle when Apple revived their "iconic" earbuds ad in 2022 with a video featuring him performing his song *Music for a Sushi Restaurant* in colourful silhouette (currently clocking in at 16m views on YouTube).[76]

At the top of the status ladder comes product placement. When a cool character opens a laptop on the big, small or iPhone screen, the chances of it bearing the Apple logo seem unusually high. Phil Schiller, Apple's Senior Vice-President of Global Marketing, confirms its employees work closely with Hollywood so its devices are placed in show and film productions.[77] While product placement is as old as the hills, Apple also has its own twist on that: according to *Knives Out* director Rian Johnson, "Apple... let you use iPhones in movies but – and this is very pivotal if you're ever watching a mystery movie – bad guys cannot have iPhones on camera."[78]

Obsolescence – Is it all in the mind?

The purpose of marketing is to get us to buy more stuff. As most people will have only one phone, persuading existing customers to buy phones more often is critical to achieving that. According to Apple, an iPhone's lifespan is around three[79] to four years.[80] That does not mean, however, that the actual working life of a mobile phone and in particular how long it stays in an individual customer's hands is something that can't be determined, influenced or manipulated by its manufacturer.

Planned obsolescence is a business strategy in which products are designed with certain frailties or limitations that would lead to their inevitable and early obsolescence, therefore necessitating the purchase of a replacement product.

Ever-changing hardware and software make obsolescence inevitable.[81] Software updates are one factor limiting the lifespan of a smartphone. The latest software update, iOS16, is only supported by iPhone 8 and generations after.[82] The iPhone 7, released just six years ago, is no longer supported. Likewise, repair services only support newer generations (12, 13 and 14).

Apple has long been called out for planned obsolescence[83] and hit with complaints,[84] investigations,[85] and lawsuits.[86,87] In May 2020 an Italian court confirmed the penalty of 10 million Euros, imposed in 2019 by the Italian Antitrust Authority against Apple for unfair and aggressive commercial practices in relation to updating the iOS operating system.[88] In March 2020, Apple settled out of court on similar accusations in the US.[89]

Chastened by such accusations and activities, Apple places increasing emphasis in its environmental report on durability and longevity, including measures to make iPhones more repairable. Being compelled to buy by product failure is not the only reason people upgrade, however.

Perceived obsolescence is a marketing strategy in which a consumer is encouraged to purchase a new phone, for example, while their current phone is still functional. Newer products boast features and functionalities that older items may not have or be able to support, therefore priming consumers to buy into the notion that newer is better.

In a fast-developing field like consumer electronics, efficiency improvements come rapidly and consumers will expect to benefit from them. "Innovation", however, is something a little different. While Apple's overall marketing strategy is based on brand, it is well aware that people need a reason (or a pretext) to buy new products when their old ones still work. The usual mix of aspirational advertising and celebrity and influencer endorsement is central, but Apple's reputation for innovation also serves a marketing role.

For those who are interested, Apple's marketing doesn't stint on explaining how the latest version is superior to those before. For example, iPhone 14 Pro boasts 6.7″ or 6.1″ Super Retina XDR display ProMotion technology Always-On display while the iPhone 13 merely has a 6.1″ or 5.4″ Super Retina XDR display.

While this may seem disorienting or overwhelming in text, Apple creates sleek, minimalistic imagery to facilitate comparison between iPhone models. With diagrams, interactive graphics, and iPhone generations positioned side by side, newer generations are put on a pedestal as a potential consumer is given the chance to compare functionalities. The differences in aperture, design and features are subtle, but clearly marked.

That doesn't mean it isn't noticed that improvements from one model to the next are very often marginal. As one reviewer, describing the iPhone 14 as "decidedly 'meh'", put it, "erm, well, give me a minute and I might think of a new feature".[90] In the blunt words of another, "some people can't even tell the difference between an iPhone 12 Pro and an iPhone 13 Pro."[91]

Such differences as there are may not amount to much. A reviewer comparing photos taken using an iPhone 14 with those from an older model noted, for instance "The iPhone SE ... at first glance, takes better photos. The cake has a deeper brown color, the chocolate looks richer, and the plate is less starkly white in the SE (2022)'s image."[92] Even for those who care about such things, as one trade platform noted, what the technology does and what we see are not the same thing:

"Modern smartphone cameras are already powerful enough for you to build a vibrant library of memories. That's not to mention that your favorite social media platforms tend to compress your uploaded photos and videos. And then there is the fact that people viewing that content may not be viewing it on ideal displays either. Additionally, even if you're viewing the full-quality, local copies, you likely won't be able to tell the difference between slightly different resolutions." [93]

Nor are many of Apple's "innovations" all that innovative, with new generations of iPhones repeatedly being greeted with the observation that new features were already available on Android phones[94] (a dynamic that works in the opposite direction too, of course).

At the time of launch, reviews of most of the models in the iPhone 14 range were described as "stellar".[95] At the time of writing, five months later, the consensus on the iPhone 14 - whose saturation marketing was unavoidable online in autumn 2022 - is pretty clear: one commentator summed it up in concluding his list of the six "most disappointing" iPhones by identifying it as "the most disappointing yet".[96]

The pleasure principle

What helps to compensate for such reservations is that, like all marketers, Apple also relies on a critical but commonplace insight. We like to buy. As psychologist Dr Vikki Barnes explains:

"Feeling good isn't really about buying things, it's about the happiness chemicals and reward systems in our brains. The pickle we've got ourselves into is that buying things is an easy fix, so we've convinced ourselves that it's one of the best ways to feel good. In reality, whilst buying does activate the reward circuitry, it doesn't last long. It's something called 'hedonic pleasure'. Because it doesn't last, and because we habituate to how that pleasure feels, we need to buy more and more in order to feel the same level of happiness." [97]

Price comparison

As of March 2023, the cost of a new iPhone 14 bought direct from Apple was £849.[104] That is fifteen times the average UK charitable donation.[105]

It could:

- Buy nearly 200 insecticide-treated mosquito nets to protect children from malaria[106]; or
- Provide 250 people in Mozambique with clean water; or [107]
- Plant 210 trees in the UK[108] or
- Pay the salary of a midwife in Bangladesh for four months[109]

Apple's $2.7bn marketing budget could:

- Meet all water needs for sanitation and hygiene in all 46 of the UN-designated least-developed countries[110] or
- End female genital mutilation in 31 countries[111] or
- Preserve 80% of the Amazon rainforest for a year[112]

Socket to 'em

An iPhone isn't worth much on its own. You'll need a charger and, if you like to listen to music or podcasts or make hands free calls, a way of connecting earphones. Apple has its own proprietary system for both of those. The lightning cable has always obliged customers to buy Apple (or Apple-licensed) cables and wall sockets, so that anyone changing from Android to iPhone must buy new equipment. After a long tussle, the European Parliament finally passed a law in 2023 obliging all phone companies to use a standard USB-C charging format,

that was already employed by Android phones.[113] Having lost that battle, it is now reported that Apple will be using a proprietary, and exclusive, version of the USB-C system for its iPhone15. In the words of *Forbes*, "Not the most environmentally friendly option for anyone who already has a drawer full of USB-C cables."[114]

Meanwhile, its decision to remove the headphone socket when introducing the iPhone 7 in 2016 – in favour of Bluetooth – at best "encouraged" customers to buy hardware they hadn't until that point, needed. *Apple Insider* puts it directly:

"It may be easy to forget that Apple didn't sneakily kill off the headphone jack to sell wireless headphones – it did so openly. During its September 2016 keynote, Apple's announcement of the headphone jack's removal was immediately preceded by the debut of AirPods."[115]

Indeed, some research has suggested that when it comes to upgrades, we're very adept at persuading ourselves they're what we want. It suggests we are less likely to care for our phone or even look for it if we lose it when an upgraded product is another option.[98]

"And what if there was a crack on your phone? Our research shows that you'd consider the damage to be much more serious if an upgrade is available on the market than if it is not."

The hard sell

Apple promotes the upgrade culture far more directly than through marketing alone. Its iPhone Upgrade Programme assures customers that "getting the latest iPhone has never been easier" and that they "no longer need to wait for your network contract to end to change your phone". After just 11 payments, it goes on, "you're eligible to upgrade to a new iPhone."[99] The Samsung Upgrade Programme is no less direct, offering an interest-free finance agreement which allows customers to "purchase the latest Galaxy phone and then upgrade every year".[100]

Nor is it just manufacturers like Apple and Samsung who promote or profit from the upgrade culture. Phone purchases are heavily mediated by retailers and mobile networks, who use upgrade deals to promote customer loyalty. Almost all UK retailers offer some kind of variation on Vodaphone's 2020 "Annual Upgrade Promise" allowing customers to upgrade to newer models without paying a fee.[101]

Next!

With mixed reviews, a difficult market and afflicted by supplier problems in China, Apple's expectations for iPhone 14 sales took a blow. Nevertheless, upgrade fever contributed to an estimated 78 million sales in the three months between its launch and the end of 2022.[102]

Senior CNET tech editor Sareena Dayaram reminds us of how narrow the perspective of the average Global North smartphone customer can be:

"In India, the average person needs to save two months' salary to buy the cheapest available smartphone, according to a survey published by the Alliance for Affordable Internet last August. From my perspective, the trend of routinely upgrading a phone every two years when it doesn't change that much is a privilege, one that reminds me of the stark income equality gap as well as the ever-increasing digital divide globally." [103]

PART THREE

PAYING THE PRICE

Apple is in the business of getting us to buy more stuff, and it deploys the very best tools to get us to do so. But how much does it matter? After all, it's not getting us to buy rhino horn or Hummers.

Apple is unquestionably taking measures to reduce its environmental impact. Its 128-page *Environmental Progress Report*[116] establishes its intentions across almost every aspect of its environmental footprint, reports good progress in a number of areas and includes commendable goals, of which the most striking is carbon neutrality across all its activities, as we examine below.* It also serves, however, as a guide to what Apple *hasn't* chosen or been able to do, and so to the environmental impact of producing and selling even such apparently innocuous products as computers, tablets and phones.

Taking what we don't give back

The total demands for living and nonliving materials increased six-fold from 1970 to 2010, while the demand for materials used in construction and industry quadrupled during that time.

IPBES Global assessment, 2019

Our iPhones and smartphones of today are and will become the techno fossils of tomorrow. Everything those devices are comprised of was, at some point, in some form, extracted from the Earth.[117] That is never a benign process. It can result in loss of biodiversity, habitats, and food for locals and wildlife; contamination of surface and groundwater, often poisoning communities; air pollution due to the release of carbon dioxide, carbon monoxide, sulphur dioxide, and other gases; the removal of native vegetation, soil erosion, noise pollution, and the formation of sinkholes. Land covers from forests to wetlands, and from deserts to coral reefs are often seriously and irreversibly degraded.[118]

In its 2022 environment report, Apple proudly announces that the total amount of recycled or renewable material in its product range is now 18%. Recycling is no magic bullet for environmental impact, as we shall see below, but this certainly represents progress. The key message here, though, is that more than 80% of what's in the hundreds of millions of Apple products sold each year is still taken from the Earth. To mine, trace, recycle, recover, test, and transport the raw ingredients of manufactured products will always come at a cost.

Mining utilizes under 1% of global land but its negative impact on biodiversity, availability and quality of water, and human health may be larger than from agriculture.[119]

IPBES Global assessment, 2019

More than 30 metals may be used to produce a smartphone.[120] Those include conflict minerals, principally the "3TG" ores which provide Apple with the tin, tantalum, tungsten and gold used in their products. These are procured from over 250 smelters in over 75 countries, including the Democratic Republic of the Congo and across the African Great Lakes region.[121] While some minerals are acquired from different countries, there is much overlap, so the countries where multiple minerals are extracted are more intensely depleted. Hundreds of tons of waste are created for every tonnes of desirable metal produced. This is what miners call "strip ratio": strip the earth, get the metal.[122]

Producing electronics is both energy and material intensive. During an audit, manufacturing company, Seagate, discovered that "the volume of chemicals not incorporated into the products is conservatively estimated to be four times that

* Where statements about Apple's environmental performance are not referenced in this report, they will be taken directly from the 2022 report.

of product chemistries" - that's quadruple the amount of chemicals in the devices themselves.[123]

Moreover, what Apple and other smartphone manufacturers are using, others can't. The group of substances known as rare earth elements, plus others such as lithium, are predicted to become increasingly important in green technology – so important that the International Energy Authority warns that limited supply may threaten climate targets.[124]

Apple is far from unconscious of the consequences of its impact, and its environmental report documents consistent and laudable measures to address it. The reality remains, nevertheless: more iPhones, more materials.

Tin

While 30% of Apple's tin came from certified recycled sources in FY 2021,[125] 70% was still extracted and smelted, from countries such as Belgium, Bolivia, China, Indonesia, Malaysia, Peru, Poland, Rwanda, Thailand, and the US.[126]

Tantalum

Tantalum is used in high quantities in Apple products, but achieving 100% recycled content at the quality required for capacitors is not yet possible.[127] Apple sources tantalum from countries as widely dispersed as Thailand, Kazakhstan and Brazil.[128]

Aluminium

Recycled aluminium has 1/40th of the carbon footprint as aluminium from primary sources. Despite progress, only 59% used by Apple at present is from certified recycled sources.[129] Aluminium is extracted in an ore called bauxite which, when extracted, removes native vegetation and results in soil erosion and both food and habitat loss for local and wildlife. Greenhouse gases are emitted. Aluminium cannot be replaced or naturally replenished. [130]

Copper

The iPhone contains about 6 grams of copper and about 80% of its extraction is from sulfide sources. Copper is not renewable, and local biodiversity, surface water and groundwater are often adversely impacted by its extraction. Land covers from forests to wetlands, and from deserts to coral reefs are often seriously and irreversibly degraded.[131]

Glass

While recycled glass is used in multiple components of iPhone 12 and iPhone 13, it is rare to use secondary sources due to the quality required for durability.[132]

Iron and steel

Iron is extracted from an iron ore and does not naturally reproduce. Due to the size of chemical plants needed, iron extraction results in landscape loss, noise pollution, and air pollution due to the release of carbon dioxide, carbon monoxide, and sulfur dioxide. Steel production is an extremely energy-intensive process and the iron and steel industry is responsible for a tenth of global CO2 emissions.[133]

Lithium

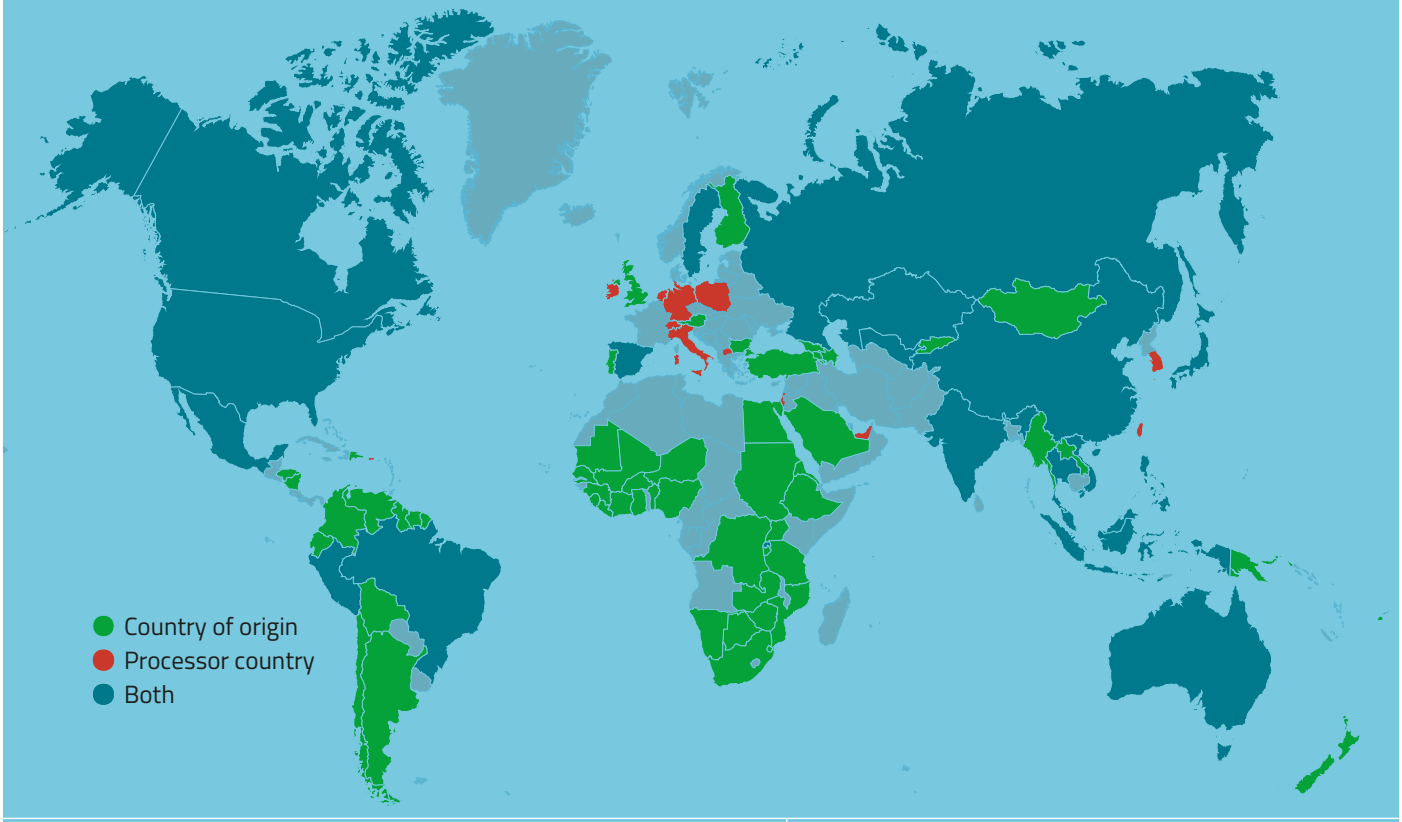
Lithium batteries charge faster and last longer.[134] Lithium-containing brine is extracted from underground and pools and concentrated by solar evaporation. This results in water pollution, tainting local water supplies and potentially poisoning communities; and air pollution and soil erosion.[135]

Plastic

In FY 2021, Apple introduced over 100 parts with an average of 45% recycled plastic, each with different performance requirements and in hundreds of unique components. Currently, 15 components use plastics made with bio-based content instead of fossil fuels and Apple is still working to switch to recycled or renewable sources of plastic.[136] Biofuels also have impacts, however, including on biodiversity and water, and consume land and resources that could be devoted to food.[137]

We shall examine recycling in more depth below, but, commendable as Apple's steps are, recycling materials and components for manufacturing of complex, precision products is not like turning old plastic bottles into new plastic bottles. While Apple is working toward developing circular supply chains, there are barriers for it and every company to overcome. Those include simple availability – finding enough scrap to recycle – and technical properties such as purity, which may be relatively easy to achieve with virgin materials, but much harder with recycled materials.[138] Sadly, those challenges are also regulatory, with restrictions on the movement of materials across borders putting suitable materials beyond reach in some circumstances. Apple is itself lobbying to have the US Government ratify the Basel Convention, the global framework for international movement of waste for sustainable recycling, recovery, and disposal.[139]

Where does Apple source 3TG minerals?



Extraction	Processing facilities: smelters and refineries
Argentina, Armenia, Australia, Austria, Azerbaijan, Benin, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Canada, Chile, China, Colombia, Cote D'Ivoire, Democratic Republic of the Congo, Dominican Republic, Ecuador, Egypt, Eritrea, Eswatini, Ethiopia, Fiji, Finland, French Guiana, Georgia, Ghana, Guinea, Guyana, Honduras, India, Indonesia, Japan, Kazakhstan, Kyrgyzstan, Laos, Liberia, Malaysia, Mali, Mauritania, Mexico, Mongolia, Mozambique, Myanmar, Namibia, New Zealand, Nicaragua, Niger, Nigeria, Papua New Guinea, Peru, Philippines, Portugal, Russia, Rwanda, Saudi Arabia, Senegal, Sierra Leone, South Africa, Spain, Sudan, Suriname, Sweden, Tanzania, Thailand, Turkey, Uganda, United Kingdom, United States, Uzbekistan, Venezuela, Vietnam, Zambia, Zimbabwe	Austria, Belgium, Bolivia, Brazil, Canada China, Estonia, Germany, India, Indonesia, Italy, Japan, Kazakhstan, Malaysia, Mexico, North Macedonia, Peru, Philippines, Poland, Russian Federation, Rwanda, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, United Arab Emirates, U.S., Uzbekistan, Vietnam

Source: Apple Conflict minerals report 2021

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Pulling it together

Apple employs over 200 suppliers across the world to make components and assemble its products.[140] While it is looking to diversify where assembly takes place, iPhones are primarily assembled in China and now in India. Apple has distribution centres that are globally spread out, and its national distribution centre is in Zhanghai, China, which can hold up to 36,000 iPhones.[141]

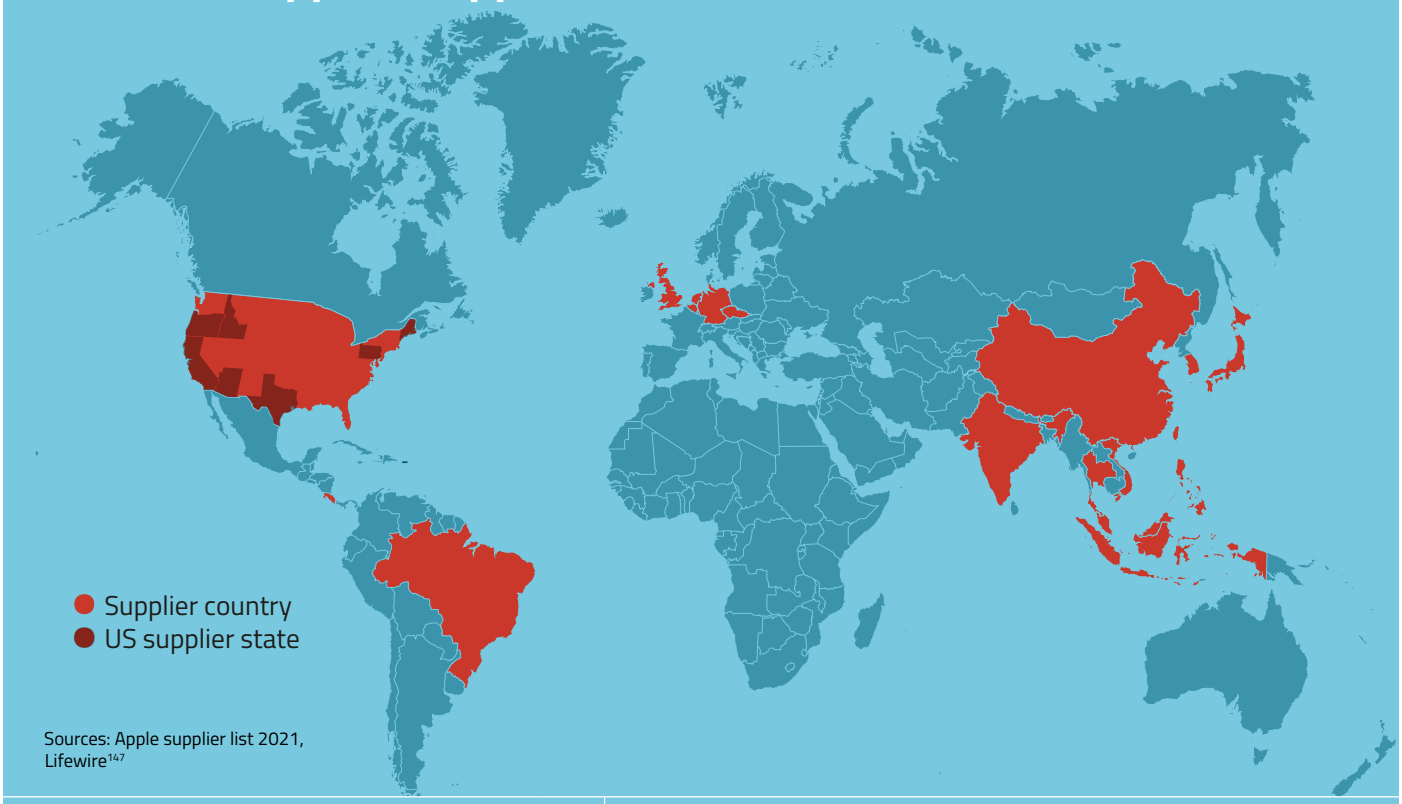
Both airborne and seaborne transportation of goods and people has risen dramatically, causing both increased pollution and a significant rise in invasive alien species
IPBES, 2019

Once raw materials have been extracted, processed (often in a different country) and made into components (often in a third country), they are distributed to factories for final assembly. Parts are shipped back and forth depending on their stage in the process. Apple has cut transport emissions across its product range by shifting the mode of transport and reducing product weight, but with its suppliers potentially thousands of miles from their raw materials and then thousands of miles from where products are assembled, a single iPhone could represent journeys totalling hundreds of thousands of miles.

It takes about 400 steps to assemble the iPhone, including drilling, fitting screws, polishing and soldering.[142] The largest manufacturer is FoxConn, the world's biggest electronics contractor, and owner of the largest iPhone factory.[143] About half of iPhones are manufactured in the central Chinese city, Zhengzhou, where there are 94 production lines.[144]

Setting aside the energy usage, the 5.6 square kilometre Zhengzhou plant and all the surrounding infrastructure has its own environmental impact, including from the transport infrastructure serving it to land use change, water consumption, air and light pollution and waste. That impact is multiplied across factories and suppliers globally.

Where are Apple's suppliers?



Sources: Apple supplier list 2021, Lifewire[147]

Selected components	Country
Charger cables	China, India, Japan, Singapore, South Korea, Taiwan, United States
Glass screen/screen protector	Belgium, China, Hong Kong Japan, Singapore, South Korea, Taiwan, Thailand, United States, Vietnam
Anti-glare	China, Japan, Singapore, South Korea, United States
Acoustic components	China, Ireland, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, USA
Integrated circuits like memory, micro processors, networking applications, programmable logic devices, circuit board, semi-conductors, motherboard, flexible printed circuits (fpcs), printed circuit boards (pcbs)	China, Germany, Japan, Philippines, South Korea, Taiwan, UK, USA
5g modem chips, wifi, bluetooth	China, Israel, Japan, Singapore, South Korea, Taiwan, Vietnam, USA
Camera parts, multi-spectral sensor, electric and fiber optic connectors	Austria, China, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, USA
Thermal products	China
Magnetic components	China
Metal casings	China, Taiwan
Sim card trays	China

Once assembled, the phone still has to make it to the customer. A recent report claims that Apple has hired private planes to ensure timely distribution of its products, especially in regard to commercially important product launches. Boeing 747s can carry 150,000 iPhones tucked into aluminium canisters. While some products are shipped via cargo ships, more time-sensitive products like iPhones are given priority on aeroplanes. In 2016, when the iPhone 7 was launched, three private jets were hired to get handsets into stores – by 2020, according to the report, 200 were used.[145] In the third quarter of last year, Apple increased ocean freight for older model iPhones to free up air cargo spaces for newer iPhone generations.[146]

Currently, Apple reports, transportation of its products and their materials and components is responsible for 1,750,000 tCO_2e.

Energy

The most eye-catching environmental pledge that Apple has made is to be carbon-neutral "across its value chain" by 2030. This is unambiguously a very good thing, but that does not mean there is nothing else to see here.

First, let's remind ourselves of the current scale of Apple's current carbon footprint. At 23.2 million tonnes of CO2-equivalent, according to their latest environment report, it is equivalent to the entire footprint of Croatia, and greater than more than 70 nation states.[148]

Offsetting

Carbon neutral is a significant goal and Apple's ambition, and progress is commendable, but that is not the same as emissions-free. At present, carbon offsetting plays only a very small part in Apple's climate change programme, but by 2030, Apple expects it to account for about half of its activity to achieve carbon neutrality. Offsetting, however, while widely recognised as a necessary component to managing climate change, is no magic wand. In Greenpeace's words:

"Any scheme claiming to be generating carbon savings by protecting a forest has an awful lot to prove. It needs to show that those savings wouldn't happen anyway even if the scheme didn't exist; that deforestation has not simply been pushed over into a nearby area; and that the project will last long enough for the carbon to be reabsorbed."[149]

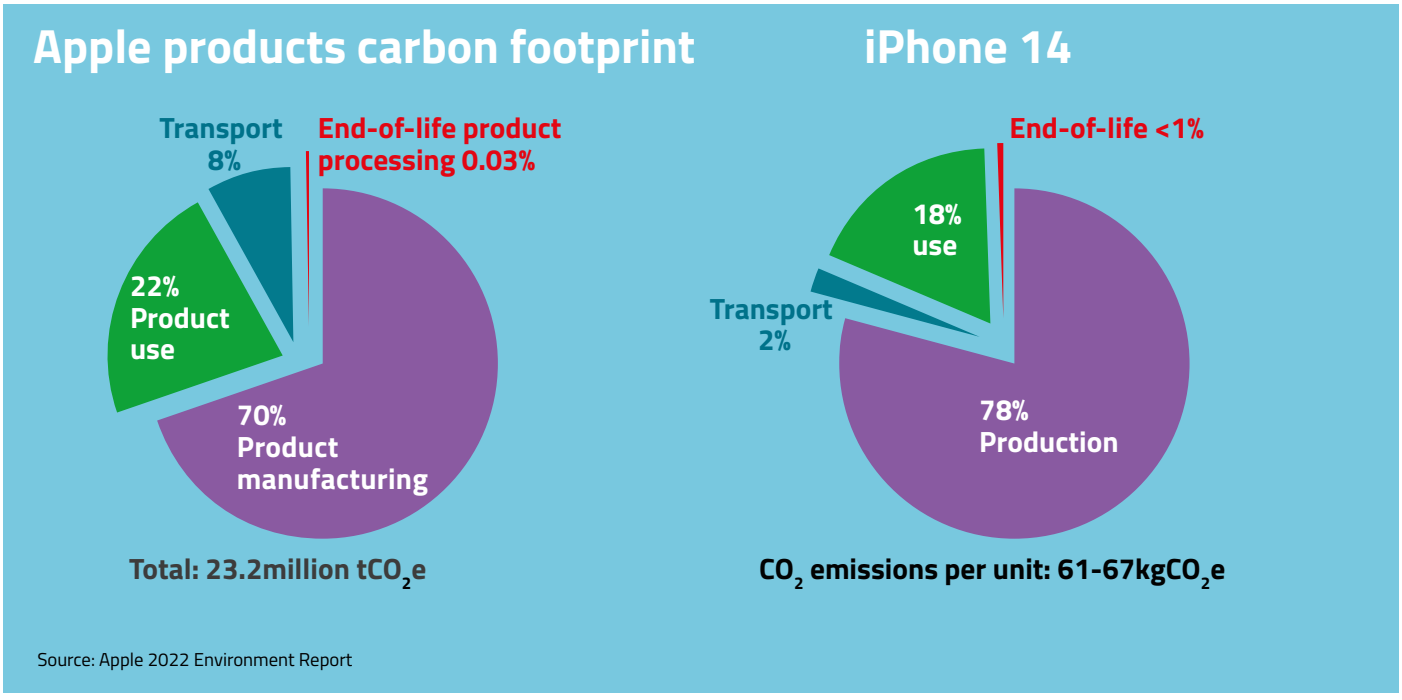
Concerns about overestimation of CO2 "saved" and knock-on effects on biodiversity, food supplies and indigenous people and local communities have also been repeatedly raised in regard to carbon offsetting.[150] Perhaps the most potent criticism is that offsetting can "allow" companies to continue to produce CO2 emissions that they could otherwise save. Apple's carbon neutral pledge is more ambitious than most, but it *could*, very effectively, save more emissions more quickly by simply making and selling less stuff.

Green energy – better than fossil fuels, but...

Apple's transition from fossil fuel supply is admirable and will bring significant climate benefits. Renewable energy only solves one problem, however: fossil fuel use. Zero carbon does not mean zero impact.

Challenges arising from renewable energy, according to a comprehensive 2022 study in *Renewable and Sustainable Energy Reviews*, include,

"but are not limited to human health, noise, pollution, greenhouse gas emission, ozone layer depletion, toxification, flooding, impact on inhabitants, eutrophication, dried up rivers, and deforestation." [151]



For instance, materials required in alternative energy supply may require invasive or damaging sourcing, including rare earth elements such as cadmium and tellurium, and lithium for batteries, which are needed to deal with fluctuating output due to changing weather conditions.[152] According to one report, for instance, about 2.2 million litres of water are needed to produce just a single tonne of lithium.[153]

Elsewhere, wind turbines are responsible for killing millions of birds and bats worldwide[154] and hydropower can have a significant effect on biodiversity. In fact, the reservoirs behind dams can produce CO2 and methane emissions which *exceed* the savings arising from the switch away from fossil fuels.[155] While intense debate surrounds the role of nuclear energy as a non-fossil fuel source, governments worldwide are nonetheless investing in it. Its well-documented risks around waste disposal, contamination and safety remain.[156]

Of course, even renewable energy is not zero carbon – every wind farm or solar array demands resource extraction, materials, component assembly, manufacture, distribution and all the associated infrastructure. Offshore wind turbines are not carried to their locations on solar-powered boats.

Moreover, while the proportion of electricity supplied by renewables globally is increasing significantly, growth in demand is currently outstripping it. [157] While it is widely thought achievable that renewables could meet projected global energy demands by 2050,[158] in the critical decade leading up to 2030, cutting emissions is essential. Apple's approach to renewables is ambitious and far-sighted, but, of course, with rising demand but limited supply of alternative energy, keeping its hands clean will mean other consumers being pushed into fossil fuel use. This is not Apple's fault, but it demonstrates how reducing demand for energy is, and always will be, the most effective mitigation measure.

Water

Despite progress in reducing water use, Apple facilities alone nevertheless used 1.4 billion gallons of water in 2021/22, of which almost 90% is freshwater, primarily from municipal sources. Its 2022 environment report notes, however, that its supply chain accounts for 99% of its water footprint, implying that its total footprint is 140 billion gallons. The report records water saved in the supply chain over time, but doesn't indicate a total baseline or how water consumption has changed over time. As it has increased significantly for corporate use – from a billion to 1.4 billion since 2017 – it appears very likely that supply chain demand has also increased significantly.

According to its own reporting, more than a third of Apple's water use occurs in locations which are at high water risk. Water supply is always a local issue with differing options for mitigating impact: reducing demand will always be an effective mitigation.

End of the line

It has been calculated that if Apple stopped selling hardware in 2021, about 80% of it would become obsolete and therefore discarded as 200,000 metric tonnes of waste.[159] According to a UN report, electronic waste (e-waste) is the fastest growing form of domestic waste globally.[160] The United Nations' Global E-waste Monitor 2020 reveals that 53.6 million metric tonnes of e-waste was generated worldwide in 2019, that's a 21% increase in five years.[161] If estimates are correct, people will be discarding about 110 million tonnes of electronics between the years 2033 and 2042.[162]

Apple's response to this challenge is to work towards a circular product and supply chain, with as much material recycled as possible. It facilitates the recycling of its products by providing recycling opportunities at its stores and other location in 99% of the countries where their products are sold and 25 countries have a trade-in programme. Its programmes have allowed it to "direct more than 38,000 tonnes of e-waste to recycling globally in FY2021."[163] Again, a commendable result, but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its reporting does not state what proportion of its e-waste that figure represents.

Such headlines also obscure the reality that recycling itself demands resources, just like any other industrial process. Those include land, water, infrastructure and, not least, energy. In the UK, representatives of the recycling industry have expressed concern that some companies will go to the wall because of increased energy prices in 2022 and 2023.[164] Recycling paper and cardboard is described as "energy-intensive" by the business itself[165] while recycling glass may save only 10-15% of the energy required to make new glass.[166]

The poster boys and girls of Apple's recycling project are Taz, Daisy, Liam and Dave – not star employees but robots.[167] Their marketing-friendly anthropomorphic names may conjure images of amiable humanoids but these are of course, large industrial machines. Liam, for instance, is composed of 29 robots in 21 cells.[168]

For "her" part, Daisy, in the Netherlands, can reportedly disassemble 200 iPhones per hour and recover, among other materials, nearly 2 tonnes of aluminium for every 100,000 iPhones it deconstructs. The impressive 1.2 million iPhones she can handle each year have to get to her first, however.[169] Apple is a global brand with global sales. While it is understandably proud of and happy to publicise what its robots can do, it doesn't report what they don't do: how many iPhones are not recycled and how much material exactly its programmes do not recover are not included in its environmental report.

What the eye doesn't see

While Apple utilises policies and audits to ensure standards at the facilities of its recycling partners, what happens to the Apple products that never make it to them can't be known. E-waste recycling in lower income countries is comprised largely of workers who manually collect, dismantle and burn or melt e-waste. They are instructed to wear personal protective equipment (safety glasses, heat-resistant gloves, a mask, foot protection, and protective clothing) and face hazards like chemical inhalation. Workers must be careful not to drop, damage, puncture, bend or crush batteries in order to prevent the release of noxious fumes.[170] While recycling in theory has its role in waste mitigation and a circular economy, the work done for thousands of devices can still cause harm to workers, who can develop cancer, repetitive stress injury, musculoskeletal disorder symptoms,[171] neurological, liver, kidney, heart and genetic disorders.[172] Local communities are adversely affected from land, water, noise and air pollution. Along with risks to workers residents, skin diseases, respiratory illnesses and hearing loss are common in residents due to constant contact with chemicals which can permeate their soil and food and water supplies.[173]

The only product without an environmental footprint, is no product at all.

CONCLUSION

"The economy is a wholly owned subsidiary of the environment, not the other way round."

Herman Daly, World Bank

Since 2007, Apple has released 13 generations of iPhone with almost 40 different models[174] – that's a new line every year for almost two decades.[175] It actively encourages its customers to buy those new models, through marketing on a pharaonic scale, and through schemes to facilitate annual upgrades. The billions of phones it has sold – and the billions more it intends to sell in future – carry an environmental cost that is no less destructive for being hard to see and easily obscured by policies, propaganda and promises. When considering how much waste Apple has reduced, diverted, and redirected in their production, consumers and policymakers alike must also consider this: how much air, land, noise, and water pollution, disruption of ecosystems, depletion of resources, climate emissions, biodiversity loss, and tonnes of waste occurred because it has chosen not to slow production.

No less corrosive than its individual impact as a company, Apple is symptomatic, and a driver of, a literally insatiable compulsion to acquire and consume. That compulsion is heedless of the grotesque inequities of our world and the impact on those whose basic needs have yet to be met. (Our spending does not lift them out of poverty: just 5% of the income generated from growth in global GDP goes to the world's poorest 60% of people.[176]) That drive to consume is also, world of 8 billion people and growing, incompatible with a healthy planet and lives of dignity and sufficiency for all, now and in the future.

Apple is not in the business of despoiling our planet for profit – despoiling our planet is just collateral damage. That means it can change. In 2011, clothing manufacturer Patagonia released an advertisement saying "Don't buy this jacket", highlighting the environmental benefits of choosing *not* to purchase. What Patagonia had the courage to do in 2011, Apple could certainly do now, and use the unparalleled power of it brand, marketing and global presence to ignite a conversation going far beyond the usual boundaries of ESG (environmental, social and governance reporting, as corporate social responsibility has now been rebranded). Actions speak louder than words, however, and the market leader could show true leadership in committing to simply making, advertising and selling less stuff.

There is no reason we should not expect corporations to take transformative action to protect our planet and future. It's what we all must do – but it is harder to place that expectation upon them if we continue to buy what we're asking them not to sell.

It would be a serious mistake to lay responsibility for fixing our environmental crisis at the door of the individual consumer. Our options are always limited by the economic framework – or cage – in which we live, and our attitudes and behaviour shaped by far bigger forces than individual preference, from marketing to politics to social convention. Our consumption choices make a material difference nevertheless and making them can transform us from accomplices in the destruction of our only home to its defenders. Importantly, those choices also have an effect beyond ourselves. They tell the companies and the politicians that we care enough about the future of our planet and our species to change *our* behaviour, and that means they need not be frightened of changing theirs.

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Just as with our individual choices, the behaviour of companies is necessary but not sufficient to change our world. We cannot rely on enlightened decisions in boardrooms and corporate offices to reconcile our demands with what the Earth can provide. Unless those in power change the systems and challenge the forces that sustain destruction, we haven't a prayer. Work is already being done to model a better way and to identify and establish pathways to a sustainable future.[177] There are no excuses.

Those mechanisms are beyond the scope of this report. Its purpose is very simple: to show that what Apple does causes harm. That also means that when we – as consumers and global citizens – support, enable and indulge what Apple and companies like it do, we are causing harm too.

The good news is that changing that isn't hard at all.

RECOMMENDATIONS

Consumers

Do not upgrade annually. Only replace your smartphone when it is no longer working properly.

Use repair services wherever available.

Explore your options. Consider sourcing new handsets from companies with high environmental standards which don't have an annual upgrade scheme.

At end-of-life, ensure that your phone is properly recycled.

Demand more accessible and simple information from manufacturers, allowing you to make informed choices regarding the environmental impact of products.

Demand governmental policies on consumption and sustainability matching or exceeding obligations under environmental agreements such as the Global Biodiversity Framework.

Buy less stuff.

Apple and other smartphone companies

End the annual upgrade cycle: commit to a new model every three years at minimum.

End upgrade finance schemes which encourage people to upgrade when their existing product is entirely functional.

Devote research and development resources to maximising working life of products, and developing environmentally beneficial technological upgrades.

Establish a consistent, transparent framework for reporting and quantifying all environmental impacts, not just progress or good news stories.

Provide accessible, consistent information about environmental impact at point of sale.

Inform customers of the environmental benefits of not buying your products.

Sell less stuff.

Policymakers

Regulation of consumer product businesses

Amend company law to ensure directors have legal responsibility for environmental impacts of their business, beyond compliance with specific legislation.

Mandate consistent and accessible frameworks and indicators for environmental reporting, to permit evaluation and comparison of companies' performance by consumers and all stakeholders.

Provide clear, comprehensive and accessible guidance to consumers regarding the environmental impact of different kinds of products and services.

Wider policy

Fully implement measures required to meet and exceed the individual targets of Sustainable Development Goal 12, Sustainable Production and Consumption.

Comply fully with requirements of Global Biodiversity Framework in regard to consumption (Targets 15 and 16).

Re-orientate economic policy to prioritise wellbeing and environmental sustainability goals, ensuring that any such policies do not negatively impact those goals in other countries or globally.

Endnotes

1 WWF (2018) *Living Planet Report* 2018 https://www.worldwildlife.org/pages/living-planet-report-2018
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ABOUT POPULATION MATTERS

Population Matters is a UK-based charity which campaigns to achieve a sustainable human population, to protect the natural world and improve people's lives. We promote positive, practical, ethical solutions – encouraging smaller families, inspiring people to consume sustainably, and helping us all to live within our planet's natural limits. We believe everyone should have the freedom and ability to choose a smaller family. We support human rights, women's empowerment and global justice.

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