Tackling the E-waste Crisis Through Circularity

Taking action for the environment has never been more important for businesses. ChromeOS can help your business accelerate its sustainability journey.
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>In brief</td>
<td>2</td>
</tr>
<tr>
<td>It’s time for business leaders to face sustainability head on</td>
<td>4</td>
</tr>
<tr>
<td>The growing e-waste crisis &amp; how circularity can help</td>
<td>6</td>
</tr>
<tr>
<td>How Google can help your business reduce e-waste through circularity</td>
<td>10</td>
</tr>
<tr>
<td>How to get started</td>
<td>14</td>
</tr>
<tr>
<td>Sources</td>
<td>16</td>
</tr>
</tbody>
</table>
In brief

→ Business leaders are embracing sustainability with growing urgency. At the heart of this effort is an attempt to curb the growing crisis of electronic waste (e-waste).

→ Business leaders can step up to the plate to tackle e-waste, starting with embedding circularity into workforce technology. For businesses that equip their workforce with devices such as laptops, one of the most important ways to reduce e-waste contribution through circularity is to prevent existing devices from entering landfills by extending their useful life.

→ Google ChromeOS offers businesses an opportunity to reduce their e-waste contributions with a simple change to workforce technology. By allowing businesses to give their existing devices a new life and increasing the efficiency of devices in use, ChromeOS Flex can offer cost-savings of up to 96%, emissions reductions of 83%, and an e-waste reduction of 100% - all in the first year.

→ Read on to learn more about the mounting sustainability challenges that businesses face, and how ChromeOS can help your business limit e-waste, reduce your carbon footprint, and drive cost savings.

Transitioning 10,000 devices to ChromeOS Flex can amount to savings of...

- **9.3M**
  - fossil fuel miles’ worth of emissions

- **40**
  - years’ worth of household power

- **167**
  - couches’ weight of e-waste prevented
This report was developed with Accenture’s support and 50+ primary and secondary sources to explore critical themes in sustainability that are increasingly at the heart of business decisions.
It’s time for business leaders to face sustainability head on
It’s time for business leaders to face sustainability head on

Sustainability is at the top of business leaders’ agendas - and it should be.

“Climate change is the biggest challenge we face...and it’s one that will affect all of us in deeply personal ways”

- Google CEO, Sundar Pichai, 2021

Heightened urgency from environmental challenges and increasing regulations are driving leaders to redefine business models with a new lens toward sustainability. According to research done by the United Nations in partnership with Accenture, 63% of business leaders are launching new product and service offerings aimed at driving sustainability.²

Embedding sustainability into business models doesn’t just drive environmental benefits - it’s also been shown to impact the bottom line. Sustainable businesses perform better financially, with the EBITDA margin of top quartile companies reporting 21% higher (+3.4 percentage points) than the bottom quartile.³

Feeling the sustainability buzz? You’re not alone. This emphasis on sustainability has led more than a third of global business leaders to commit to net zero targets by 2050. However, despite articulating plans to shift to more sustainable business models and practices, leaders are still struggling when it comes to translating commitments into action. In fact, 93% of leaders are facing significant barriers when it comes to implementing sustainable changes.²

These barriers often arise from businesses’ connection to their broader supply chain and ecosystem. In a survey of 1,000+ leading CEOs, “extending strategy throughout the supply chain”, or ensuring that partners and ecosystem players have the same sustainability mindset, was the #1 barrier for CEOs of enterprises with revenue higher than $25M.⁴

However, supply chain and partner struggles don’t have to keep your business from meeting sustainability goals. While you may not have control over the actions of your ecosystem partners, you can choose to engage with companies like Google that match your business’s dedication to sustainability. And there’s no better time to start than now.

This paper will help you make progress on your sustainability ambitions by outlining not only the environmental benefits but also the cost savings that can be achieved through ChromeOS Flex.
The growing e-waste crisis & how circularity can help
The growing e-waste crisis & how circularity can help

One of the easiest ways to get started with sustainability is to evaluate, and mitigate, your business’s contribution to the growing e-waste crisis. The scale of the global e-waste crisis is staggering, with **61.3 Million Tons** (Mt) of e-waste to be discarded by the end of 2023. If no action is taken, e-waste is projected to rise **22%** to 74.7 Mt by 2030, making it the world’s fastest-growing waste stream.⁵

What is e-waste? E-waste refers to old, end-of-life or prematurely discarded electrical and electronic equipment that is not recycled, reused, or repurposed. It can encompass anything from broken refrigerators that end up in a landfill to prematurely discarded laptops, thrown out with household waste to make room for the latest model. By weight, laptops and similar devices account for more than **10%** (6.7 Mt) of global e-waste. And this is no small number. In the US alone, **41M** computers end up in landfills each year. And many of these devices didn’t need to become e-waste in the first place; every year, devices are prematurely thrown away that could have otherwise remained in use if software updates were supported or repair was readily available.⁵

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**DID YOU KNOW?**

The amount of e-waste generated in 2023 (61.3 Million Tons) is equivalent to the weight of **168 Empire State buildings.**⁵

**DID YOU KNOW?**

In the US alone, more than **41M computers** end up in landfills each year.⁵
E-waste generation is predicted to grow by +22% by 2030 (74.7 Mt)

Overconsumption, inadequate disposal infrastructure, and lax enforcement are all drivers of the escalating problem of e-waste. In the US, the average number of devices per household surged to 25 in 2021, up nearly 130% from just 11 devices in 2019. Despite global e-waste regulations covering 71% of the world's population, only 17.4% of would-be e-waste was properly recycled worldwide in 2019. Through the responsible management of enterprise devices, businesses can play their part in increasing the percentage of e-waste recycled and taking other steps to mitigate the crisis.\textsuperscript{5,6}

**DID YOU KNOW?**

**Around 20%**

of e-waste from high-income countries (e.g., the US) is exported to low-income countries in regions such as Africa and Southeast Asia, where

**over 90%**

of it is informally processed through dangerous methods such as open-dumping, burning, leaching, and melting, posing a grave environmental and health concern.\textsuperscript{5}
As the problem grows, one thing is clear: circularity will be one of the most critical tools in the battle against e-waste

Circularity is a full-scale mindset shift that requires a pivot from a linear ‘take-make-waste’ approach to a restorative process that reduces waste. Circular economy is an economic model, regenerative by design, that aims to keep products and materials in the economy for as long as possible, maximizing their useful life while minimizing the extraction of new raw materials and the generation of waste. Put simply, instead of producing more and more stuff that is destined to end up in a landfill, circularity focuses on prioritizing products that are meant to last and keeping them in use as long as possible.

The benefits of circularity are multifold. From a purely environmental perspective, 80% of the annual volume of plastics in our oceans can be mitigated through circularity. It might be counterintuitive, but nearly a fifth of e-waste is plastic. Societally, the adoption of circular business models is projected to result in the development of 6M new jobs by 2030. Finally, the economic benefits should not be ignored. Circular economy presents a $4.5 trillion global opportunity by 2030 through models including sharing platforms, products-as-a-service, product life extension, circular supply chains, and recovery and recycling infrastructure. This amounts to an opportunity larger than the GDP of Germany, the 4th largest economy.78

Figure 2: Circularity presents a fundamental shift in how organizations operate
How Google can help your business reduce e-waste through circularity
How Google can help your business reduce e-waste through circularity

The concept of circularity sounds great, but how can you move from idea to execution with your business’s workforce technology? No matter where you are on your sustainability journey, ChromeOS Flex can make a difference - leveraging ChromeOS Flex is a simple, easy-to-implement change that will allow you to make progress toward sustainability goals without significant changes to company operations.

One of the easiest ways to prevent e-waste from heading to landfills too soon is to ensure you are making the most of the devices you already own. The goal for any existing technology in your workforce should be to extend its useful life as much as possible.

ChromeOS Flex is a cloud-first, easy-to-manage, and fast operating system for PCs and Macs that will allow you to accomplish that goal. You may find that aging hardware in your workforce’s technology fleet is often rendered unusable from software bloat or security vulnerabilities, leading it to be discarded with still-functioning hardware. Your software may be struggling, but your hardware might still have plenty of life in it. This is where ChromeOS Flex comes in. Instead of sending devices to a landfill as they age, ChromeOS Flex will allow you to breathe extended life into your workforce’s devices with the following benefits:

**Ongoing support for updates at faster speed**

Devices don’t slow down over time and won’t get impacted by lack of support for software updates. Background updates reduce device downtime and improve productivity.

**Proactive, innovative security**

Rather than a firewall, blocked executables and sandboxing technology eliminate the need for antivirus software, ensuring your employee’s devices are safe from growing cybersecurity threats.

**Fast deployment & easy management**

ChromeOS Flex can be rapidly deployed via USB or through your company network, and Chrome Enterprise Upgrade makes it easy to manage apps and policies across your workforce.
Besides convenience, implementing ChromeOS Flex can have a significant impact on your bottom line and your business’s progress toward sustainability goals. First off, transitioning to ChromeOS Flex gives your aging, tired devices a new lease on life and reduces the need to buy new devices. Not only is this beneficial for the environment by reducing (1) harmful CO₂ emissions and (2) the release of toxic chemicals from e-waste, but it also provides savings where it matters most for your business – on your bottom line. Switching to ChromeOS Flex can offer cost-savings of up to 96% (inclusive of avoided new device spend, subscription cost savings, and energy cost savings) as well as emissions reductions of 83% (resulting from avoided lifecycle emissions of purchasing a new device and running a more efficient OS) and e-waste reductions of 100% (from limiting new device purchases) in Year 1 alone. The cherry on top? Devices that run ChromeOS Flex are 19% more energy efficient on average than other devices, slashing energy use, cutting costs, and supporting sustainability goals!¹⁰

### ChromeOS Flex Total Savings⁹

<table>
<thead>
<tr>
<th>Size of Business</th>
<th>Cost Savings ($)</th>
<th>Emissions Savings (kgCO₂e)</th>
<th>Energy Use Savings (kWh)</th>
<th>E-waste Savings (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100 employees</td>
<td>$2K - $200K</td>
<td>380 - 40K</td>
<td>43 - 4K</td>
<td>5 - 500</td>
</tr>
<tr>
<td>101 - 500 employees</td>
<td>$200K - $800K</td>
<td>40K - 190K</td>
<td>4K - 20K</td>
<td>500 - 3K</td>
</tr>
<tr>
<td>500 - 1,000 employees</td>
<td>$800K - $2M</td>
<td>190K - 400K</td>
<td>20K - 45K</td>
<td>3K - 5K</td>
</tr>
<tr>
<td>1,001 - 25,000 employees</td>
<td>$2M - $45M</td>
<td>400K - 10M</td>
<td>45K - 1M</td>
<td>5K - 125K</td>
</tr>
<tr>
<td>25,001 - 50,000 employees</td>
<td>$45 - $80M</td>
<td>10M - 20M</td>
<td>1M - 2M</td>
<td>125K - 250K</td>
</tr>
<tr>
<td>50,001 - 75,000 employees</td>
<td>$80M - $125M</td>
<td>20M - 30M</td>
<td>2M - 3M</td>
<td>250K - 400K</td>
</tr>
<tr>
<td>75,001 - 100,000 employees</td>
<td>$125M - $200M</td>
<td>30M - 40M</td>
<td>3M - 4M</td>
<td>400K - 500K</td>
</tr>
</tbody>
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*Note: Savings assume 1 device per employee*

### ChromeOS Flex vs. Purchasing a New Device: Cost, Emissions & E-waste Comparison

<table>
<thead>
<tr>
<th>Avg. Cost ($)</th>
<th>96% Savings</th>
<th>$1,722</th>
<th>Loading ChromeOS Flex on existing device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Emissions (kgCO₂e)</td>
<td>83% Savings</td>
<td>458kg</td>
<td>Purchasing a new Windows device</td>
</tr>
<tr>
<td>Avg. E-waste (lb)</td>
<td>100% Savings</td>
<td>5lb</td>
<td></td>
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</table>

*Figure 3: Comparison of cost, emissions, and e-waste between loading ChromeOS Flex on an existing device and purchasing a new device*
What do these savings consist of?

As **ChromeOS Flex** can delay the need to purchase a new device and runs more efficiently (by up to 19%) significant cost and environmental savings can be realized⁹,¹⁰:

### Cost
Avoided purchase of new devices, energy savings from increased efficiency, subscription cost savings

### Emissions
Avoided emissions from production of a new device, reduced emissions from increased efficiency

### E-waste
Avoided e-waste generation from giving devices a second life

### Energy Use
Reduced energy use from increased efficiency

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**DID YOU KNOW?**

In the first year, **transitioning 10,000 devices to ChromeOS Flex** instead of buying new devices⁹:

- Reduces CO2 emissions equivalent to **9.3M fossil fuel car miles**
- Cuts as much e-waste as the weight of **167 couches**
- Saves enough energy to **power the average American household for 40 years**
How to get started
How to get started

It’s important to act now to rethink your enterprise technology strategy in light of the growing e-waste crisis. And it doesn’t take a big leap – ChromeOS Flex allows you to make mindful changes to your workforce’s technology strategy that have a major impact.

To get started with ChromeOS Flex today, you should be thinking through 4 main steps:

01 Evaluate your current enterprise tech stack and opportunities to embed circularity in your workforce’s technology

How many new laptops are you retiring each year that could be revitalized with the use of ChromeOS Flex?

02 Contact a Chrome Enterprise representative to discuss options for your business

a. Understand how ChromeOS Flex could be beneficial for your business.

b. Try it out for yourself! All you need is a USB drive to install ChromeOS Flex on your device, or simply boot and run from the USB to try it out before deciding to install it on your device.

c. Discuss next steps for installation and management across your workforce, as applicable.

03 Determine socialization and change management for your workforce

How can you socialize the environmental savings (e.g., emissions) with your workforce and customers as you drive these changes?

04 Continue to think ahead to both future hardware investments as well as ultimate device end-of-life

a. Considerations for circularity begin when devices are initially purchased. When purchasing additional hardware for your workforce, prioritize devices that are durable and easy to repair to keep your hardware functioning for as long as possible.

b. When devices reach their end of life due to hardware constraints and require disposal, ensure your enterprise is taking the steps to properly dispose of, recycle and reuse e-waste. E-waste cannot be disposed of in regular waste bins, so a plan must be made according to local protocols and regulations to ensure toxic waste and hazardous byproducts aren’t leached into the environment. For more information on e-waste disposal and region-specific resources, check out Google’s recycling program and recycling resources by region.
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