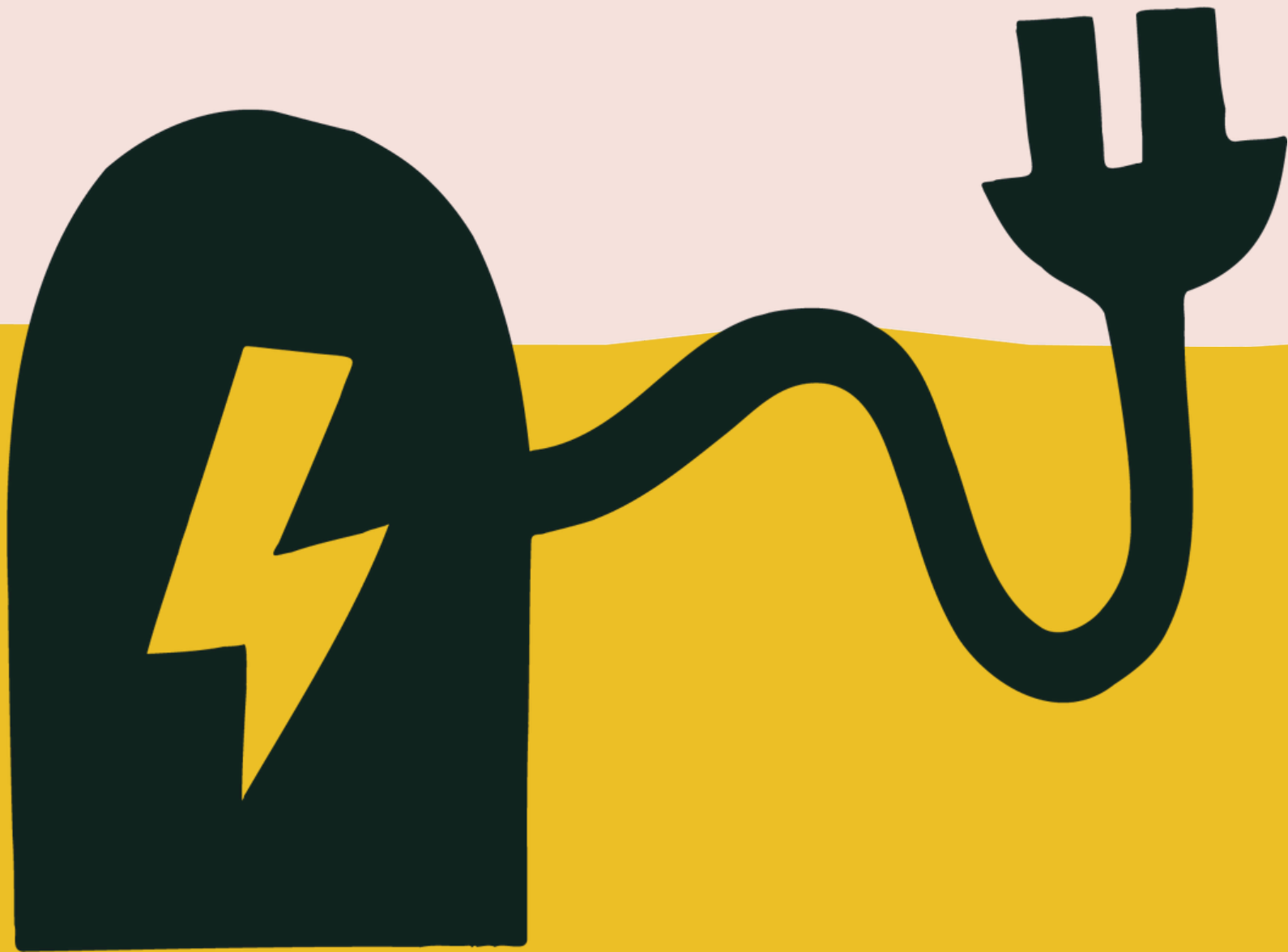




Bristol Climate &
Nature Partnership

CLIMATE ACTION PROGRAMME

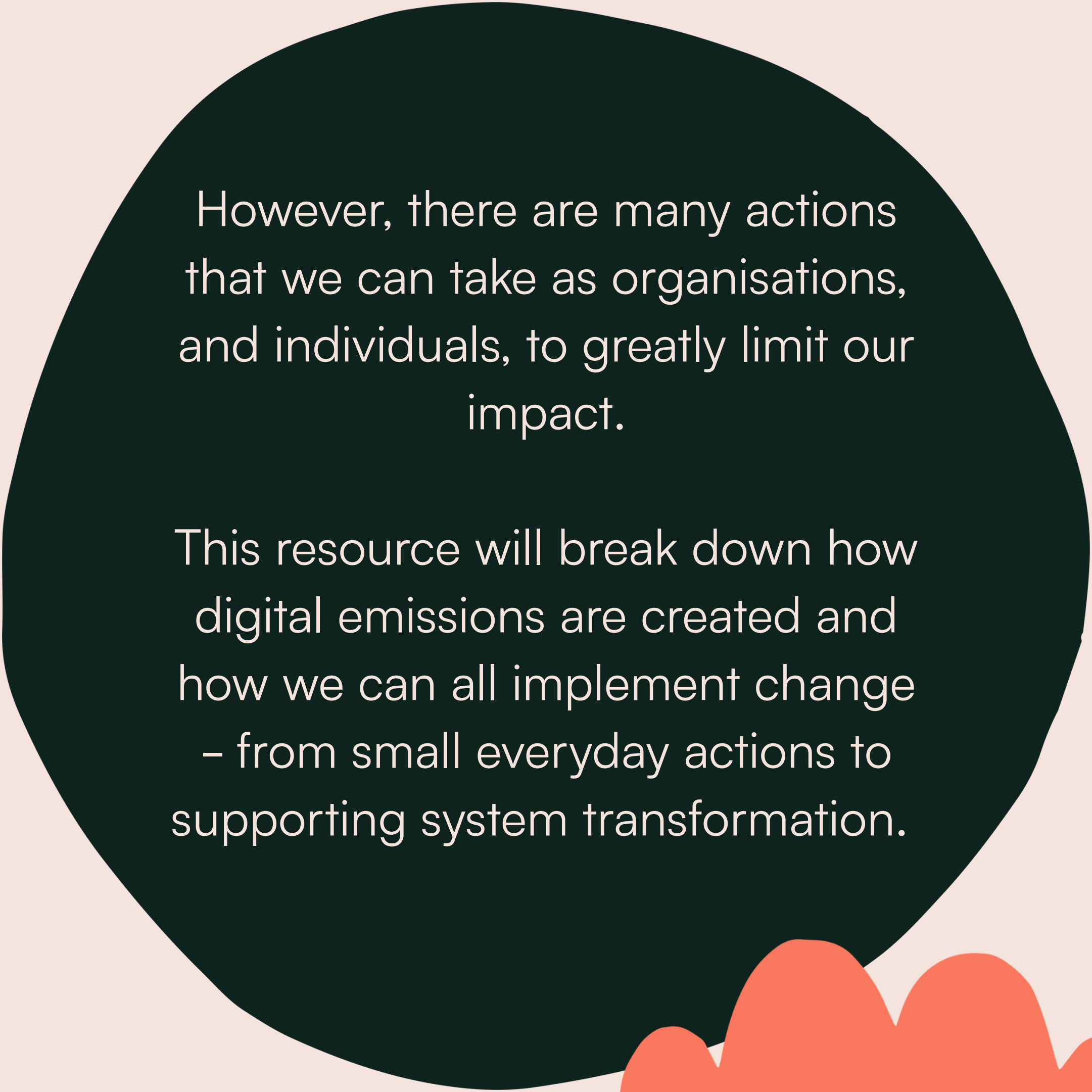
DIGITAL EMISSIONS: A DEEP DIVE





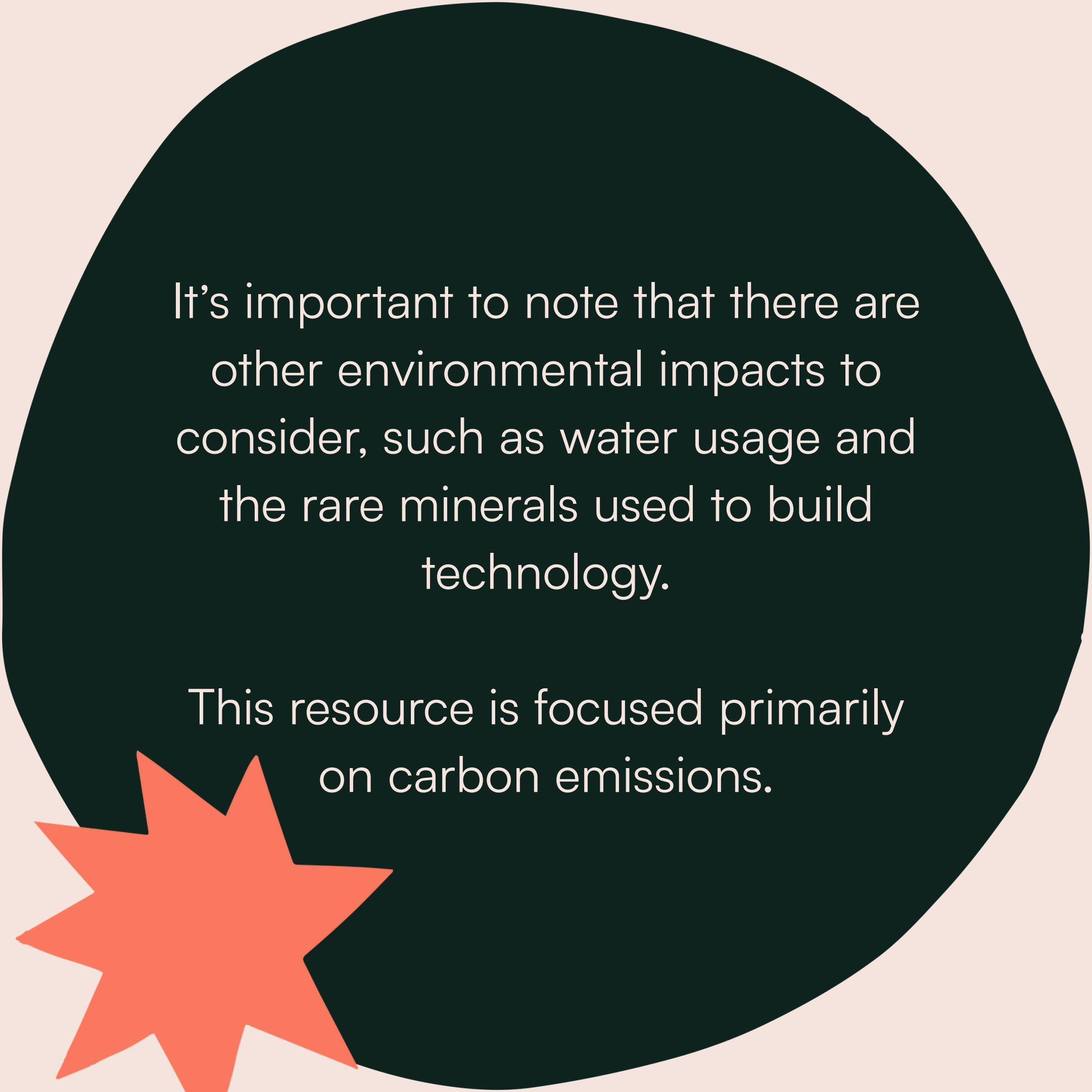
Digital infrastructure has been interwoven into the fabric of our society; it is nearly impossible to avoid using digital tools completely.

Whether you work in tech building digital infrastructure or simply use the basics to keep your operations running, you will be contributing to digital emission's growing carbon footprint.



However, there are many actions that we can take as organisations, and individuals, to greatly limit our impact.

This resource will break down how digital emissions are created and how we can all implement change – from small everyday actions to supporting system transformation.



It's important to note that there are other environmental impacts to consider, such as water usage and the rare minerals used to build technology.

This resource is focused primarily on carbon emissions.

The problem



Digital infrastructure – incorporating hardware, software, digital services such as the internet and data storage – is the world's largest coal-powered machine*, being responsible for 2.1% – 3.9% of global greenhouse gas emissions.

In comparison, aviation and shipping each account for around 2% of global greenhouse gas emissions.



Digital emissions arise from high usage of carbon intensive electricity to power and build technology.

*Energy production, mainly the burning of fossil fuels, accounts for around three-quarters of global greenhouse gas emissions.

How are digital emissions created?

Emissions arise from the energy used to **manufacture** and **use** digital infrastructure and systems.

Use

The energy consumption that arises from using digital systems, includes emissions from:



data centres that host the data



the network that transfers the data



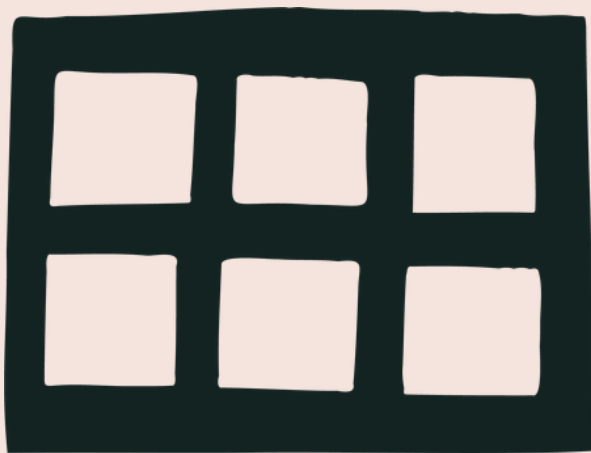
using the device that allows us to interact with the data.

How are digital emissions created?

Manufacture

The energy required for the production of devices and infrastructure (the hardware).

This can also be referred to as the embodied carbon footprint of a device – the total greenhouse gas emissions associated with all stages of a device's lifecycle, including raw material extraction, manufacturing, transportation, assembly and disposal.



Emission comparison

All digital activity will have a carbon footprint; however, some actions will have a greater impact than others. Some carbon estimates based on the use of a device for one year include:

**Audio only
conferencing: 0.08kg**

A 1hr meeting with 2
people for 250 days.

**High def video
conferencing: 1.1kg**

A 1hr meeting with 2
people for 250 days.

**Sending 20 short emails
a day: 1kg**

250 days per year on
phone.

**Sending 5 long emails a
day: 21.25kg**

250 days per year on a
laptop.

Emission comparison

Video streaming for 1 hour: 14.5kg

250 days a year.

Medium traffic website: 60kg

10,000 monthly page views per year.

Large virtual conference: 1,324kg

200 people, Zoom, 6 hours of content.

Holding 1TB of data in the cloud: 2.7kg



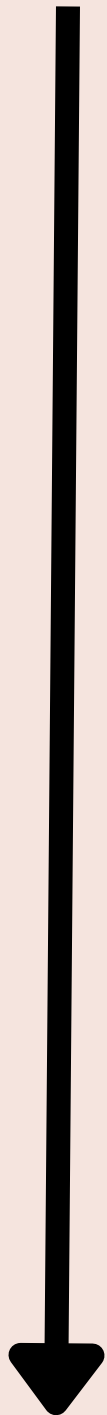
Buying a new Lenovo ThinkPad laptop: 615kg

Buying a new iPhone 128 GB: 61kg

Reduction actions

Actions to reduce digital emissions can be spilt into three categories, all with differing scales of impact.

Greater impact, harder to implement



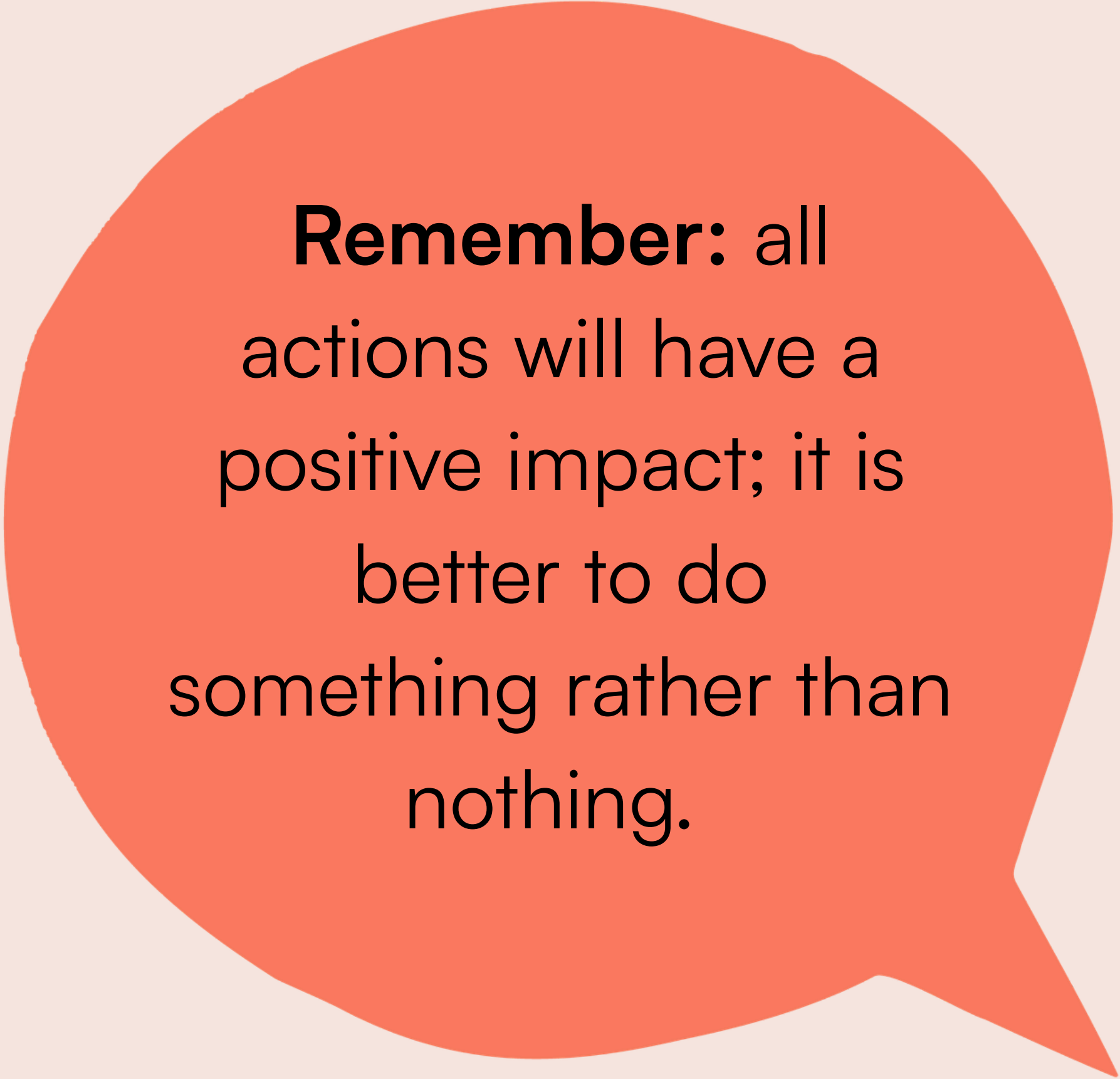
Consumption: can we change how much digital technology we use? Using less resources with less waste. Easy starting actions, but the lowest impact on carbon emissions.

Intensity: can we make digital technology in a less harmful way? Being selective of the suppliers and materials we use, to limit harm. More difficult but more impactful.

Direction: can we change what digital technology is used to accelerate and how it's applied?

Difficult systems change but a massive impact.

Start by looking at consumption but work towards pushing for impact all the way up the system.



Remember: all actions will have a positive impact; it is better to do something rather than nothing.

Consumption actions



Extend the useful life of equipment – only replace when truly required.



Switch things off when not needed. Power down servers during lower peaks of traffic and turn monitors and machines off. Turn the video off during calls.



Avoid using over-powered servers and devices.



Generate and store less data.



Pool resources with other departments.



Measure and improve code performance. Efficient coding reduces the running energy.

Intensity actions



Switch to services powered with renewables.



Buy reused hardware: phones, laptops, servers etc.



Share emissions reporting data openly and transparently.



Champion the commons, by using (and creating) open-source programmes.



Choose sustainable upstream suppliers – i.e. the suppliers that manufacture the digital devices.



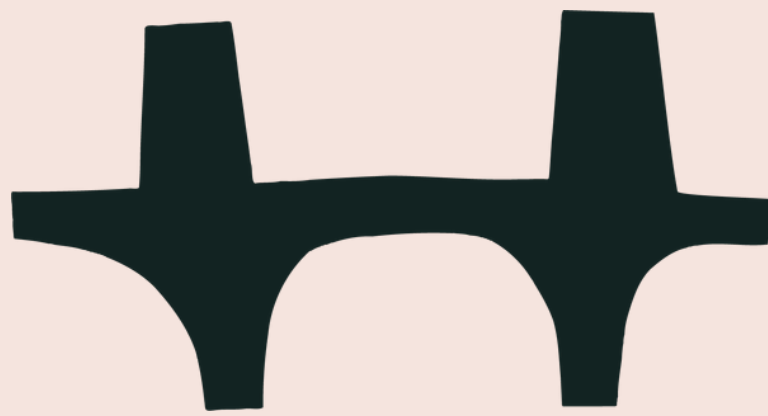
Consider other sustainability trade-offs (such as water and mineral extraction).

Intensity actions



Tackle planned obsolescence by being selective with your suppliers.

Planned obsolescence is the deliberate design of products with a limited lifespan to encourage the purchase of replacements sooner than needed. This can be through both hardware breaking and software no longer being compatible with the device.



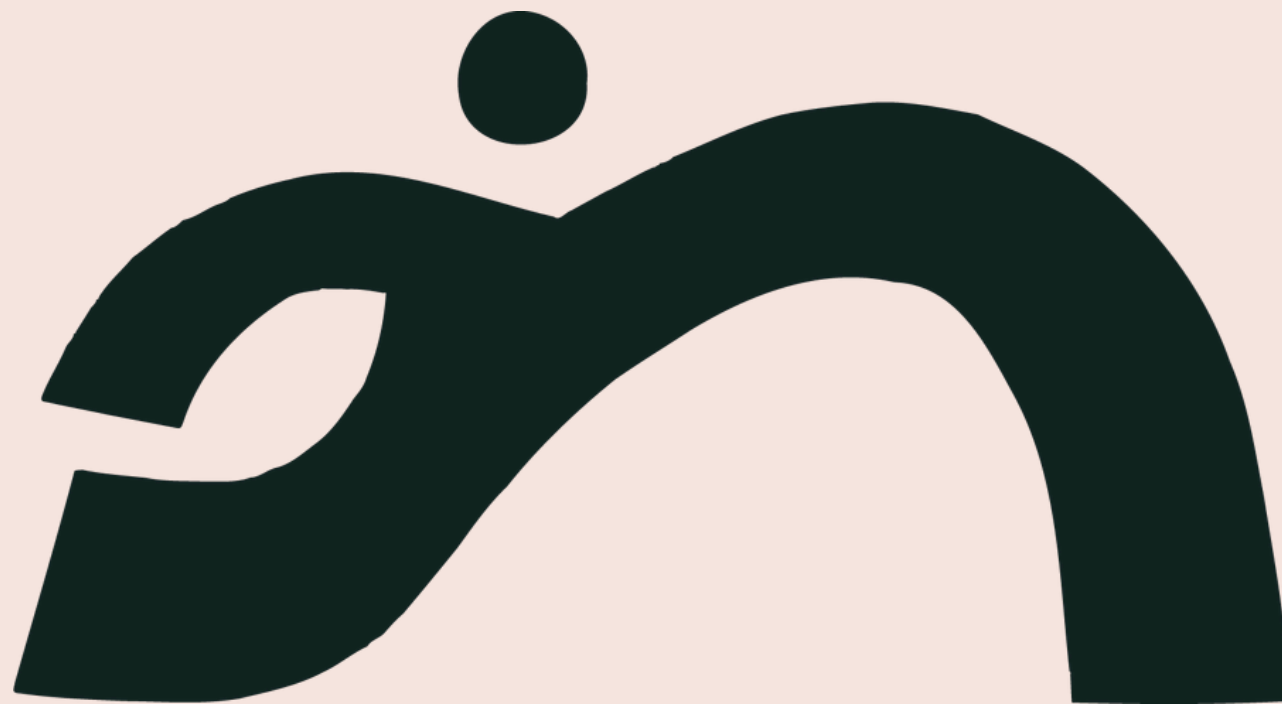
Direction actions

- Support positive legislation change e.g. the Right to Repair, promoting the consumers right to fix their own devices.
- Change how you do your job – consider if digital technology is needed for certain tasks?
- Apply technology carefully to problems that should be solved through behaviour or system change.
- Commit to digital emissions treaties and manifestos.
- If you are creating digital infrastructure, change who you provide your services to e.g. is AI being used to speed up extraction of fossil fuels?
- Raise awareness and educate others. Start small through engaging your team.

Going beyond emissions

Reducing carbon emissions is important, but it's not the only element that we need to consider if we want to work towards positive systemic change.

Everything is connected and it's important to understand the potentially negative impacts improvement in one area can have on another.



Going beyond emissions

If we truly want to build sustainable digital infrastructure, alongside using renewable energy and increasing the efficiency of technology, we need to work towards:

- > Diverse workforces.
- > Regenerative business models.
- > Accessible technology.
- > Caring for communities that shoulder the burden of technology advances.
- > Slowing down and creating less.
- > Proritising the quality of life over growth and profit.



Going beyond emissions



Collective responsibility. Digital emissions aren't just the responsibility of those who work in technology. Everyone has a role to play whether it is:



The office managers who are buying new hardware.



Senior leadership team who are approving budgets.



Employees monitoring their digital activity.



Organisations being transparent with their digital emissions to facilitate comparative decision-making.



Everyone supporting movements to bring about system change.

Resources

Improving your digital footprint

- * The Green Web Foundation's Grid Intensity CLI, a tool to help you surface, monitor and understand the intensity of your code.
- * Estimate the emissions from your apps, websites and software through CO2.JS.
- * Analyse your organisations digital carbon footprint through the Tech Carbon Standard.
- * Share your sustainability data through a carbon.txt file.
- * Discover more actions your organisation can take through our minimising your organisation's digital footprint resource.

Resources

Services powered by renewable energy

- * Check if your website runs on sustainable energy through the [Green Web Checker](#).
- * Explore The Green Web Foundation's directory of [green hosting platforms](#).

Overcoming planned obsolescence

- * Learn more about the Right to Repair through the [Restart Project](#) and [Right to Repair EU](#).
- * The ethical consumer's [guides](#) on ethical technology.
- * This [blog](#) provides a checklist to avoid planned obsolescence in a device.

Resources

Additional resources

- * The Government Digital Sustainability Alliance outlines the steps the government are taking to improve their digital sustainability, including suggested tools and guidance.
- * Explore Defra's approach to digital sustainability.
- * Green Tech South West: a community sharing insights on how technology can heal and harm our planet.
- * Read our Spotlight on AI article to weigh up your use of AI.



For more Climate Action
Programme resources visit:
bit.ly/CAP-Home



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This resource was created by Bristol Climate & Nature
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