Sustainable digital services – how can *you* respond?

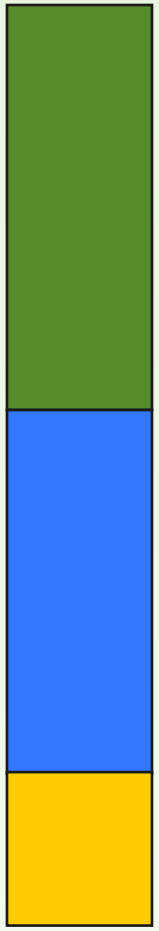
27th September 2022

Hannah Smith @hanopcan

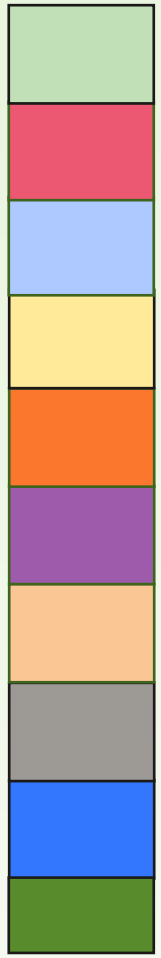
THE GREEN WEB FOUNDATION

Making sustainable digital services is not a tool or code problem – it requires us to human better

What people think building a sustainable internet involves



What it's more about



What people think building a sustainable internet involves vs what it might actually be, by Hannah Smith

A little about Hannah Smith (me!)

Training and Ops Mgr, The Green Web Foundation

Co-founder of the Green Tech South West meet-up

Founder of #LetsGreenTheWeb run with ClimateAction.tech

Computer Science BSc and freelance web developer

THE GREEN WEB FOUNDATION

Something is very wrong

Signals are coming from everywhere

Our ways are not sustainable

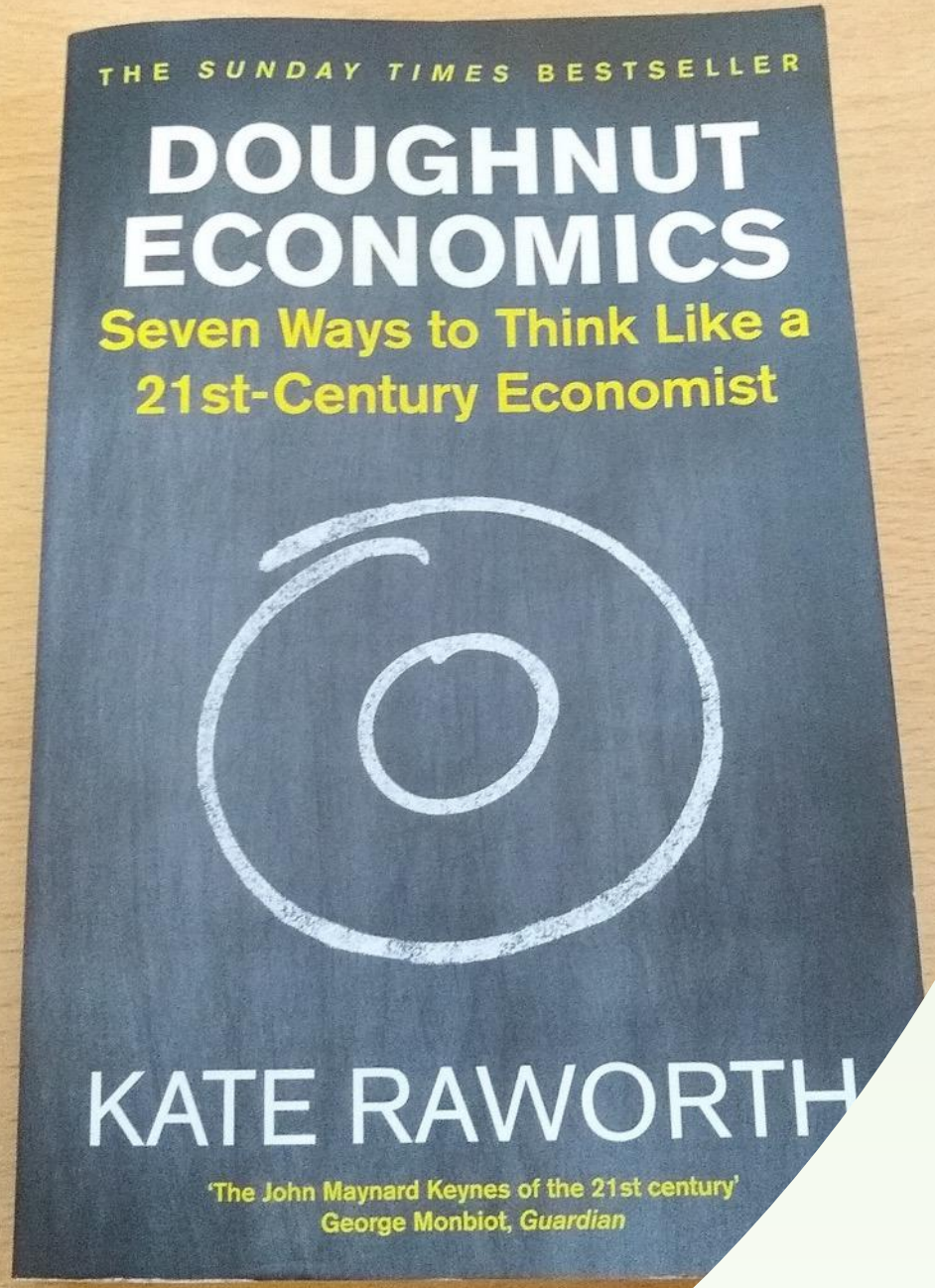
– we must change

How are we getting it so wrong?

What led us into this mess?

THE GREEN WEB FOUNDATION

Understanding sustainability



Kate Raworth

Sustainability comprises of three key pillars

- 🌍 Environmental
- 🫂 Social
- 💷 Economic / governance

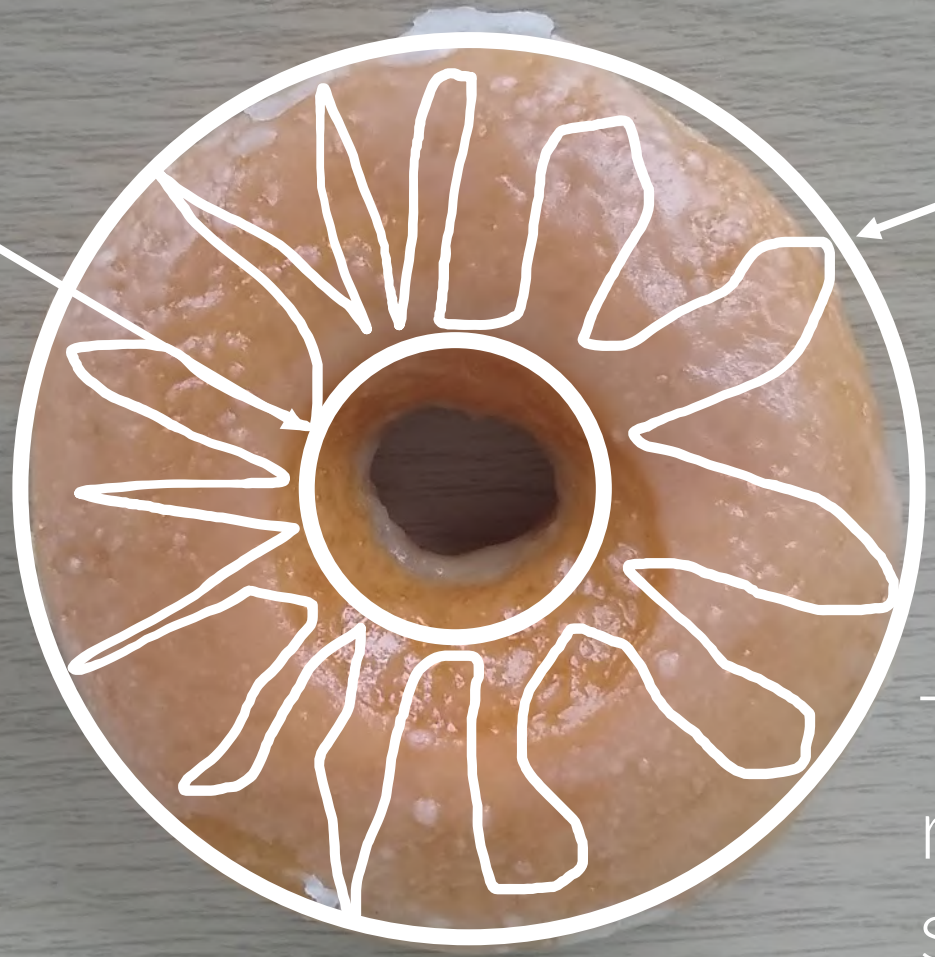
These are all deeply intertwined

Source: Doughnut Economics Action Lab

THE GREEN WEB FOUNDATION

The social foundation

The ecological ceiling



The glaze is how we govern ourselves

The doughnut represents the sweet spot in which all of humanity can thrive, now and tomorrow

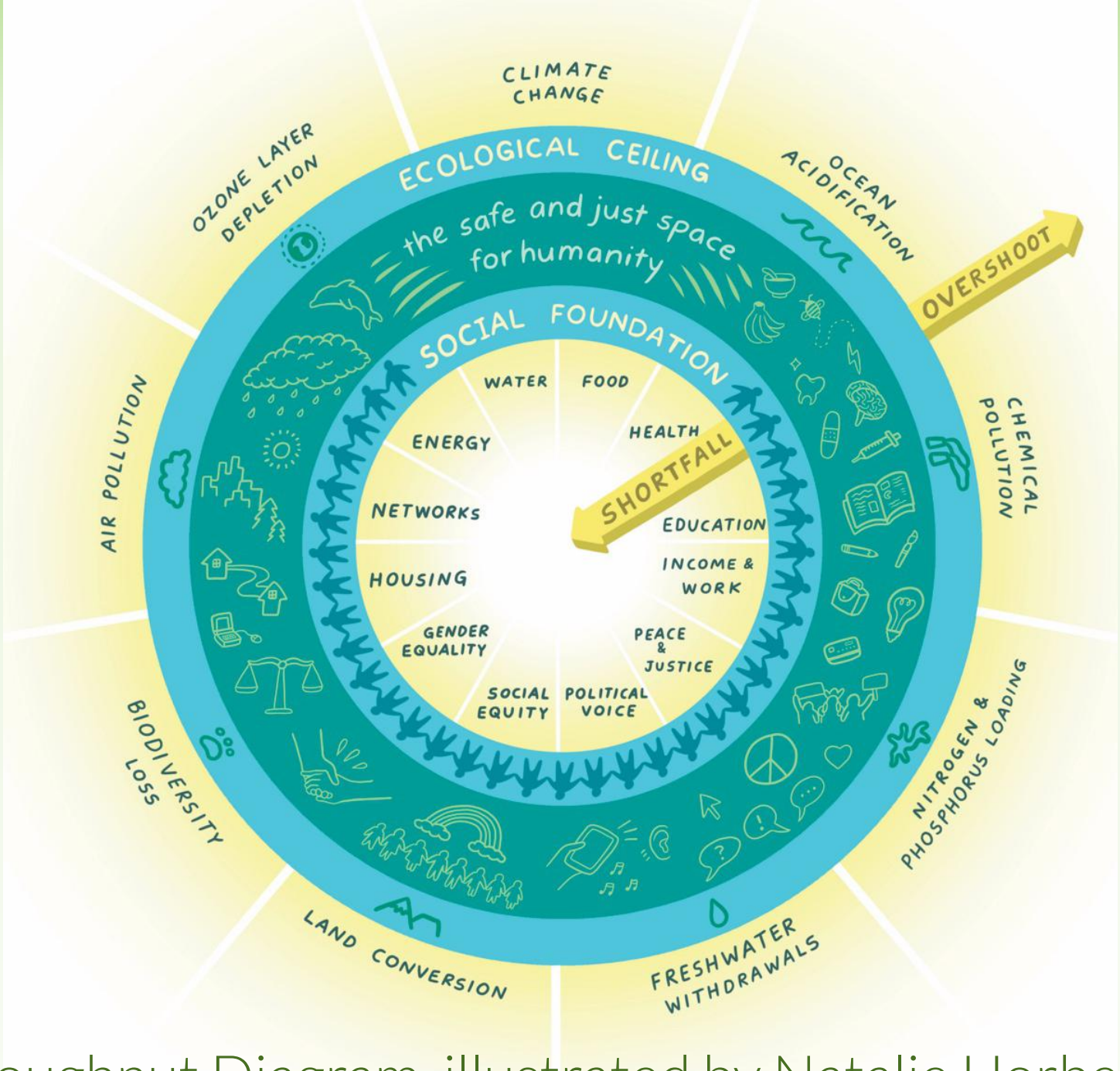
Quick quiz — can you list the dimensions? 12 social, 9 ecological

SOCIAL

1. Education
2. Energy
3. Food
4. Gender equality
5. Health
6. Housing
7. Income & work
8. Networks
9. Peace & justice
10. Political voice
11. Social equity
12. Water

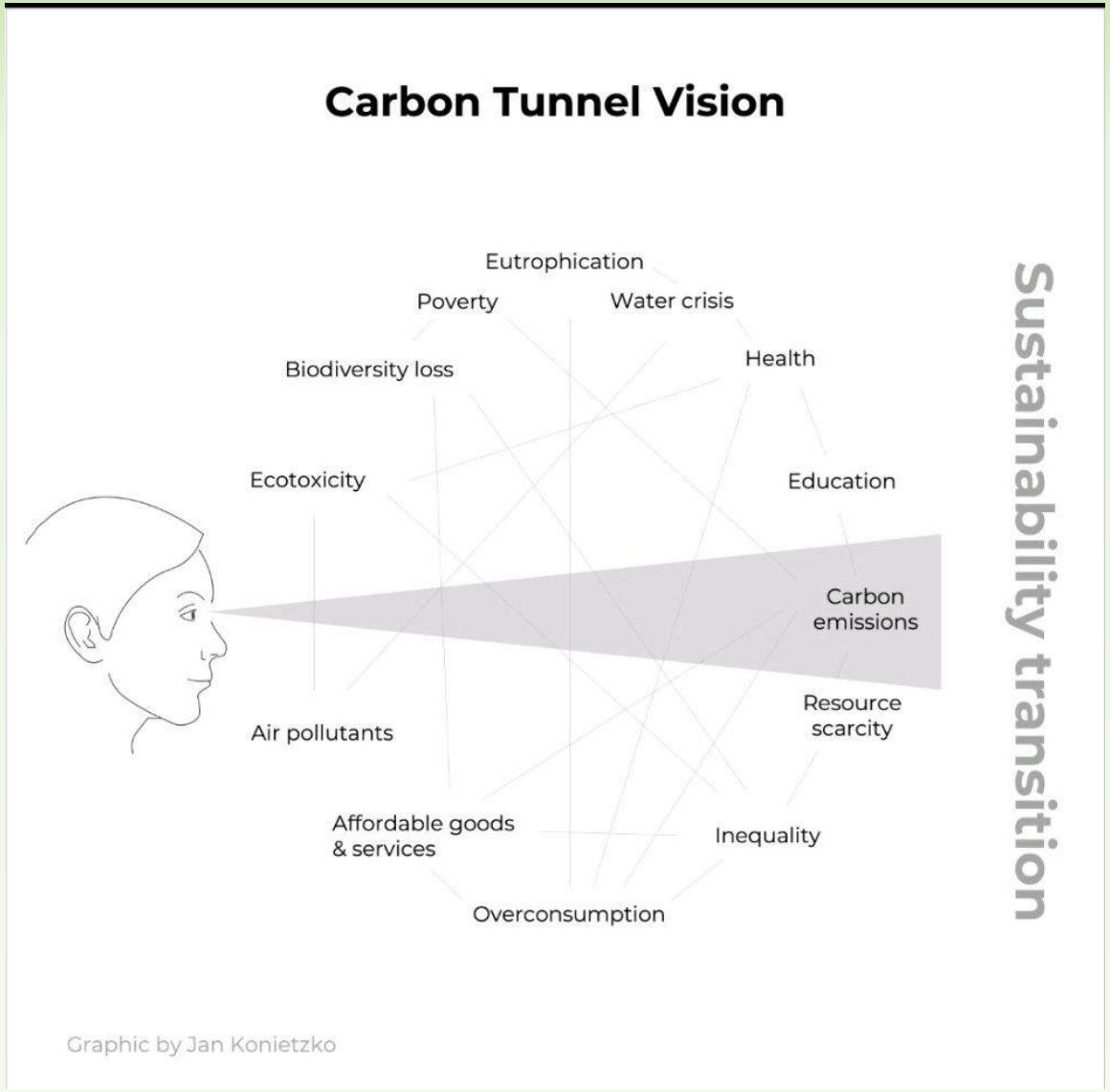
ECOLOGICAL

1. Air pollution
2. Biodiversity loss
3. Chemical pollution
4. Climate Change
5. Freshwater withdrawals
6. Ocean acidification
7. Ozone layer depletion
8. Land conversion
9. Nitrogen and phosphorus loading



Doughnut Diagram, illustrated by Natalie Horberg

Image credit: Jan Konietzko



It's way more than just carbon emissions

Why the focus on digital?

All industries need to change, digital is no exception

Adaption is especially crucial in societies and sectors that rely heavily on digital systems

The impact of digital on the world around us is not yet well understood, socially or ecologically, but that doesn't mean it's not real

thegreenwebfoundation.org/publications/report-fog-of-enactment/

THE GREEN WEB FOUNDATION

A bit of audience participation

Ecological boundaries eg

🔌 Electricity production

Fossil fuels / sun / wind / nuclear

Digital tech uses energy to run, no energy production is impact free

🖥️ Physical hardware

Rare raw minerals eg cobalt and lithium

These have to be extracted from the earth, and this is destructive

Social foundations eg

🏭 Data centres

Land & water from communities

The Politics of Data Centers

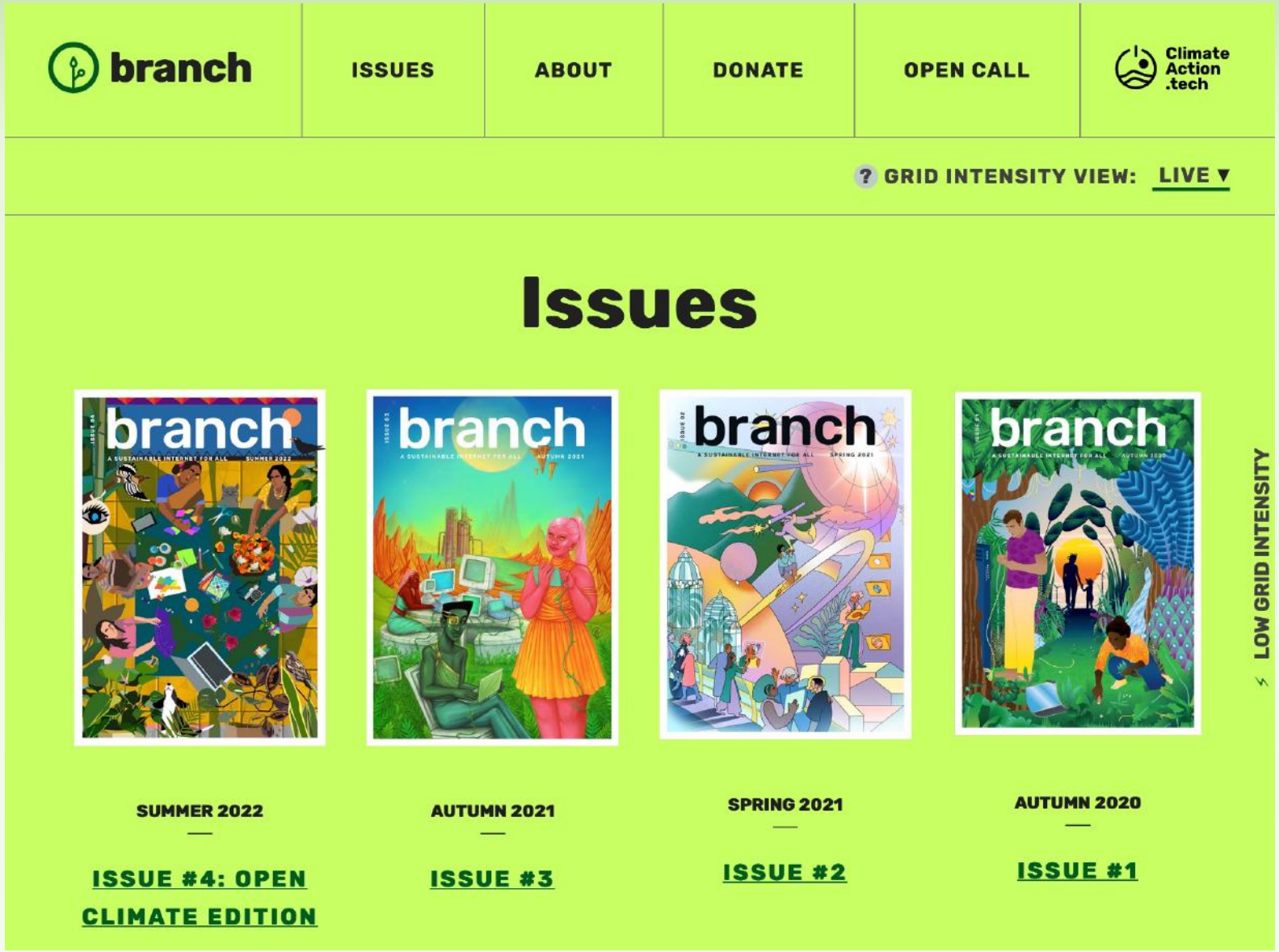
⚖️ Social equity

The haves & have-nots

How far do people fall behind when they don't have the internet?

THE GREEN WEB FOUNDATION

We cannot solve our problems with the same thinking we used when we created them



Branch magazine

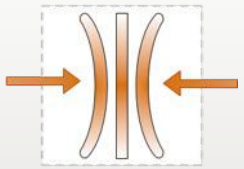
THE
GREEN WEB
FOUNDATION

Welcome to a fossil-free internet by 2030

Fossil-free internet responses – ready to embark on your own journey?

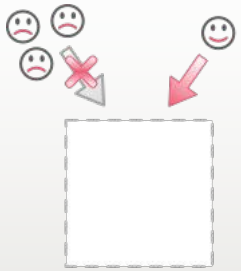
What can I do? A mental model that might help

Consumption



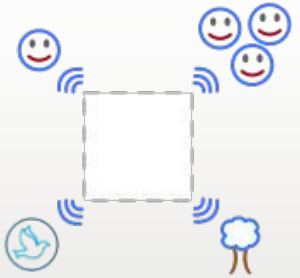
Can I change how much digital tech I use?

Intensity



Can we make digital tech in a less harmful way?

Direction



Can I change what digital tech is used to accelerate?

https://www.thegreenwebfoundation.org/news/three-levers-for-change-as-a-technologist-consumption-intensity-and-direction/

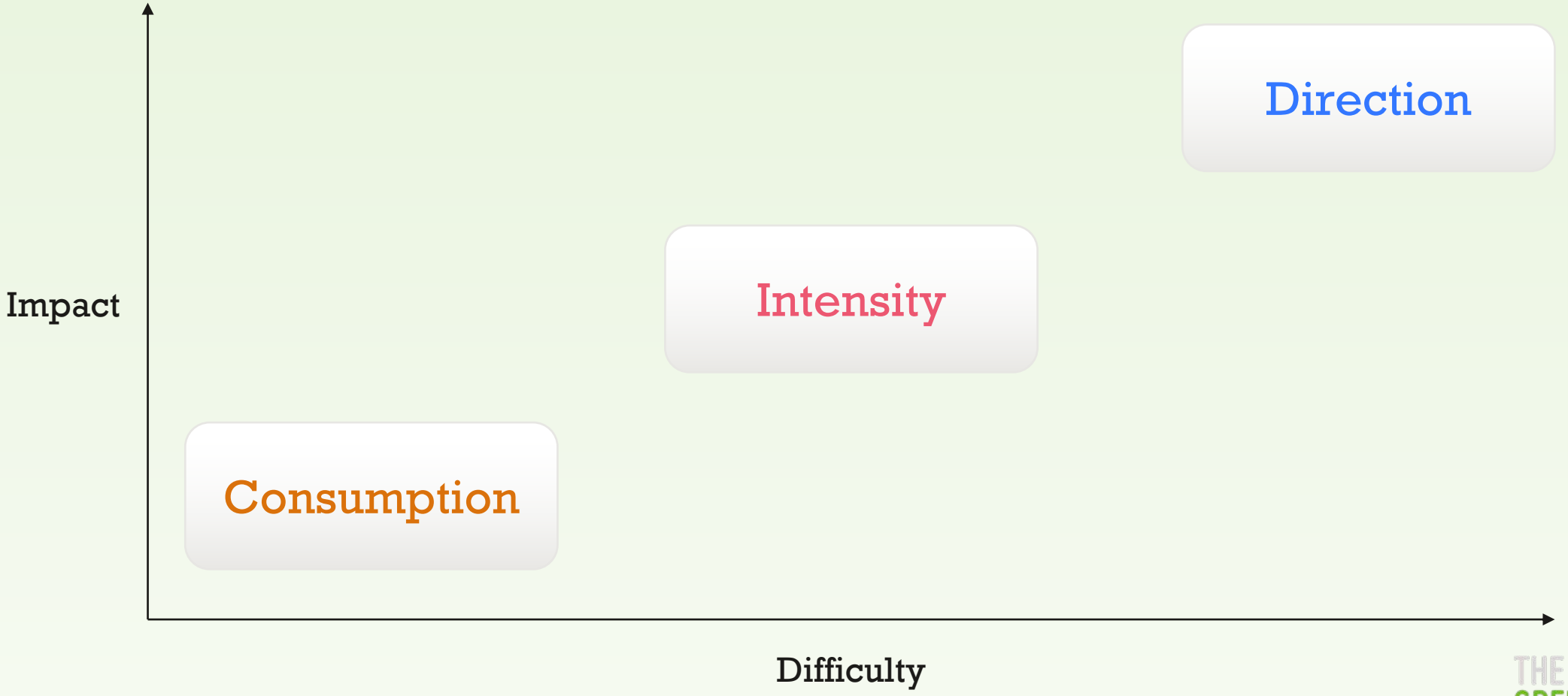
THE GREEN WEB FOUNDATION

“Possibly the most common error of a smart engineer is to optimize a thing that should not exist.”

Elon Musk

Interesting reads: Jevons Paradox and the Rebound Effect

Impact vs difficulty



THE GREEN WEB FOUNDATION

Consumption

(Check out our tool: CO2.js)

Measure and improve performance

Switch things off when they're not needed

Can I change how much digital tech I use?

Avoid using over-powered devices

Generate and store less data

Pool resources

Put unused equipment back into circulation

Repair equipment

THE GREEN WEB FOUNDATION

Intensity

(Check out our tools: green web checker and hosting directory)

(Check out our tool: grid intensity CLI)

Switch to services powered with renewables

Run things when carbon intensity is low

Can we make digital tech in a less harmful way?

Champion the commons, open source and public good

Buy reused hardware: phones, laptops, servers etc

Cease planned obsolescence

Review and improve supply chain (favour BCorps, non-profits and employee-owned suppliers)

Define metrics other than growth

THE GREEN WEB FOUNDATION

Direction

Contribute to collective choices eg get political

Raise awareness / educate others

Can I change what digital tech is used to accelerate?

Change your job

Apply tech carefully to problems that should be solved through behaviour or system change

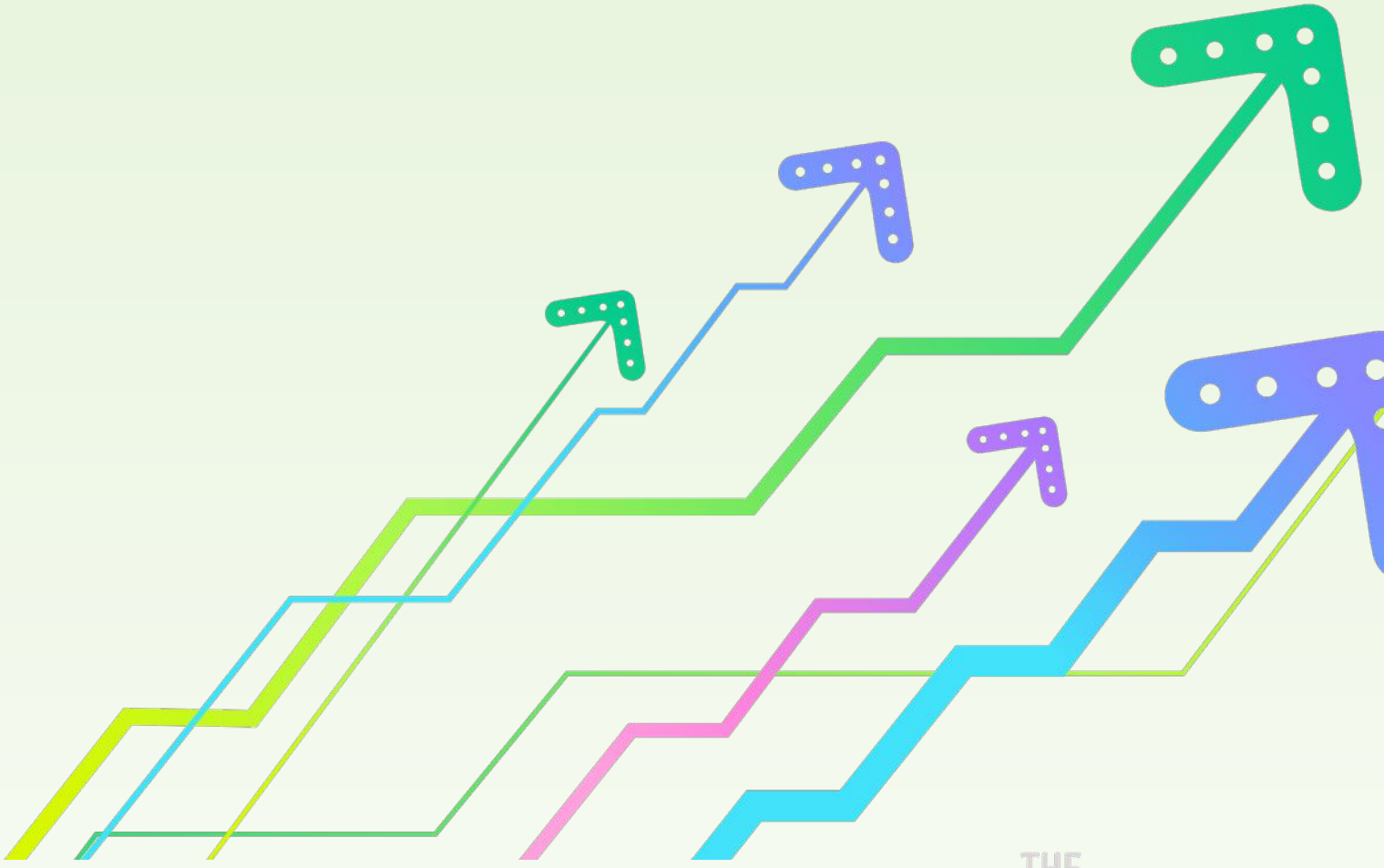
Commit to treaties and manifestos

Change who you provide services to

THE GREEN WEB FOUNDATION

What are we building and using digital for?

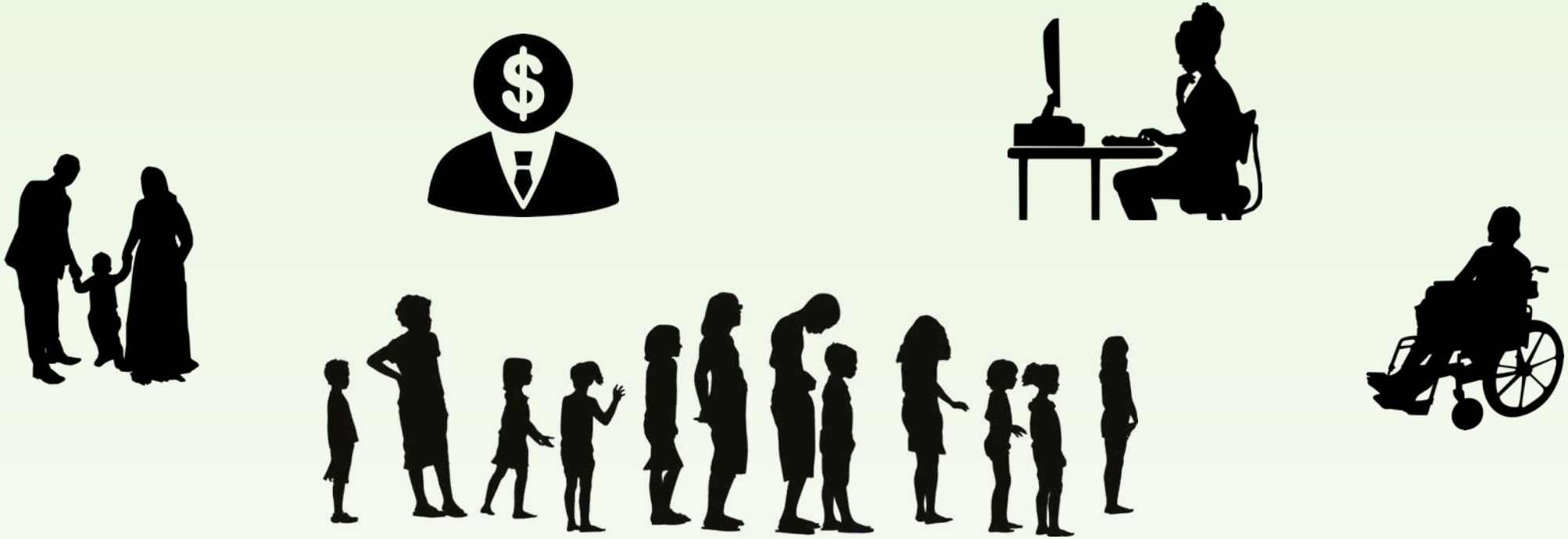
What are we choosing
to accelerate?



Interesting read: #Tech4Bad: When Do We Say No?

THE GREEN WEB FOUNDATION

And more importantly for whom?



Design Justice Principles | Tarot cards of tech

THE GREEN WEB FOUNDATION

Summing up

Is it possible I can make a difference?

YES!

Practical tips

- Recognise the complexity of the task
  - If you are uncomfortable you're probably doing it right

- Be transparent, work in the open
  - It's ok if you don't have all the answers, no-one does
  - It's valuable to share the questions you're exploring and what you learn
  - We know there are gaps in our maps

THE GREEN WEB FOUNDATION

Greenwashy traps

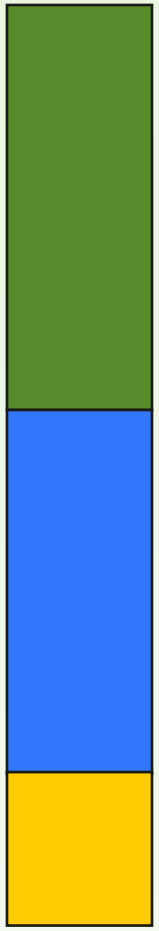
These things alone do not make you sustainable:

- Only optimizing code / infrastructure
- Your main supplier uses green energy
- Planting trees or buy offsets

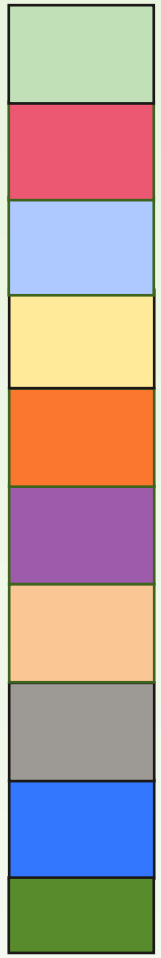
(They do indicate you are making some effort)

THE GREEN WEB FOUNDATION

What people think building a sustainable internet involves



What it's more about



What people think building a sustainable internet involves vs what it might actually be, by Hannah Smith

Making sustainable digital services is not a tool or code problem

– it requires us to human better and do less

Thank you!

Slides – check out my Twitter for a link to the slides

The Green Web Foundation offers training for teams and individuals

Stay in touch:

- Twitter - @hanopcan
- LinkedIn – https://www.linkedin.com/in/hanopcan/

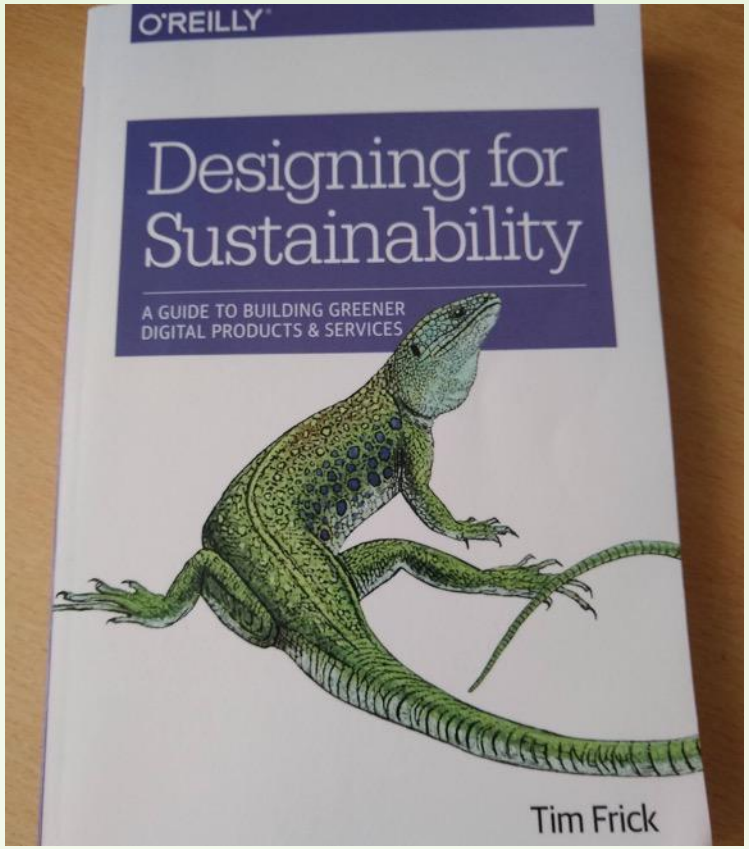
THE GREEN WEB FOUNDATION

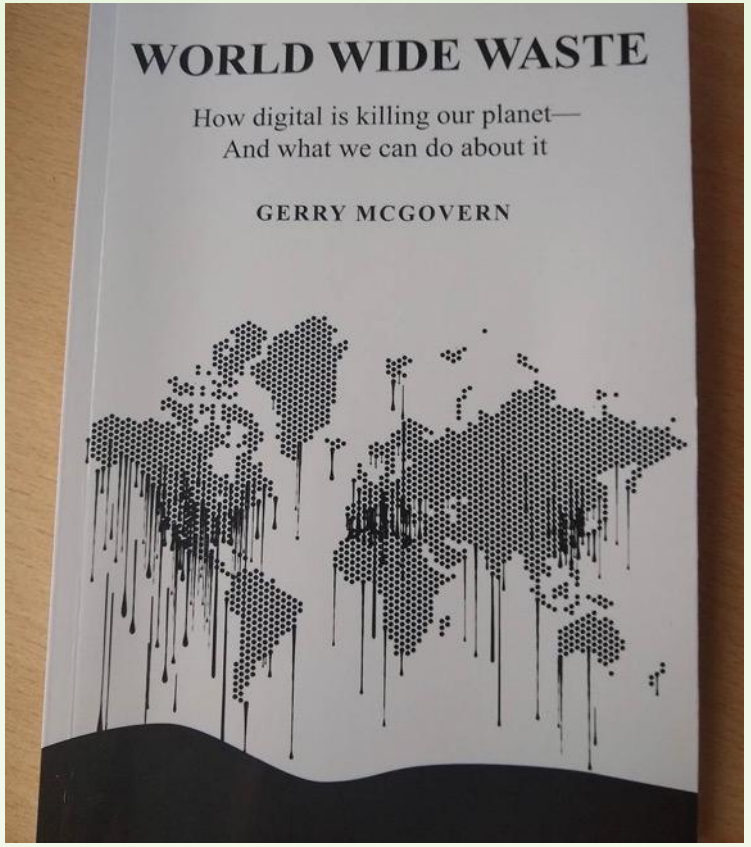
Questions?

More helpful resources

- Our fellowship notebook
- Sustainable Digital Infrastructure Alliance
- ClimateAction.tech
- Switching software
- greensoftware.foundation
- DoingTheDoughnut.tech
- Wholegrain Digital's sustainable web blog
- Ecosia
- Open Sustainable Technology
- Framing Climate Justice

THE GREEN WEB FOUNDATION





And a few more...

sustainablewebdesign.org | www.climatedesigners.org | lowwwcarbon.com

THE
GREEN WEB
FOUNDATION

A fossil-free internet by 2030

What we mean by:

‘Fossil-free’ and ‘the internet’

‘The internet’

– our Site to Sun map

Who

User

Makers

In-house digital teams

OSS / tech communities

Operators

Big tech

Infrastructure providers

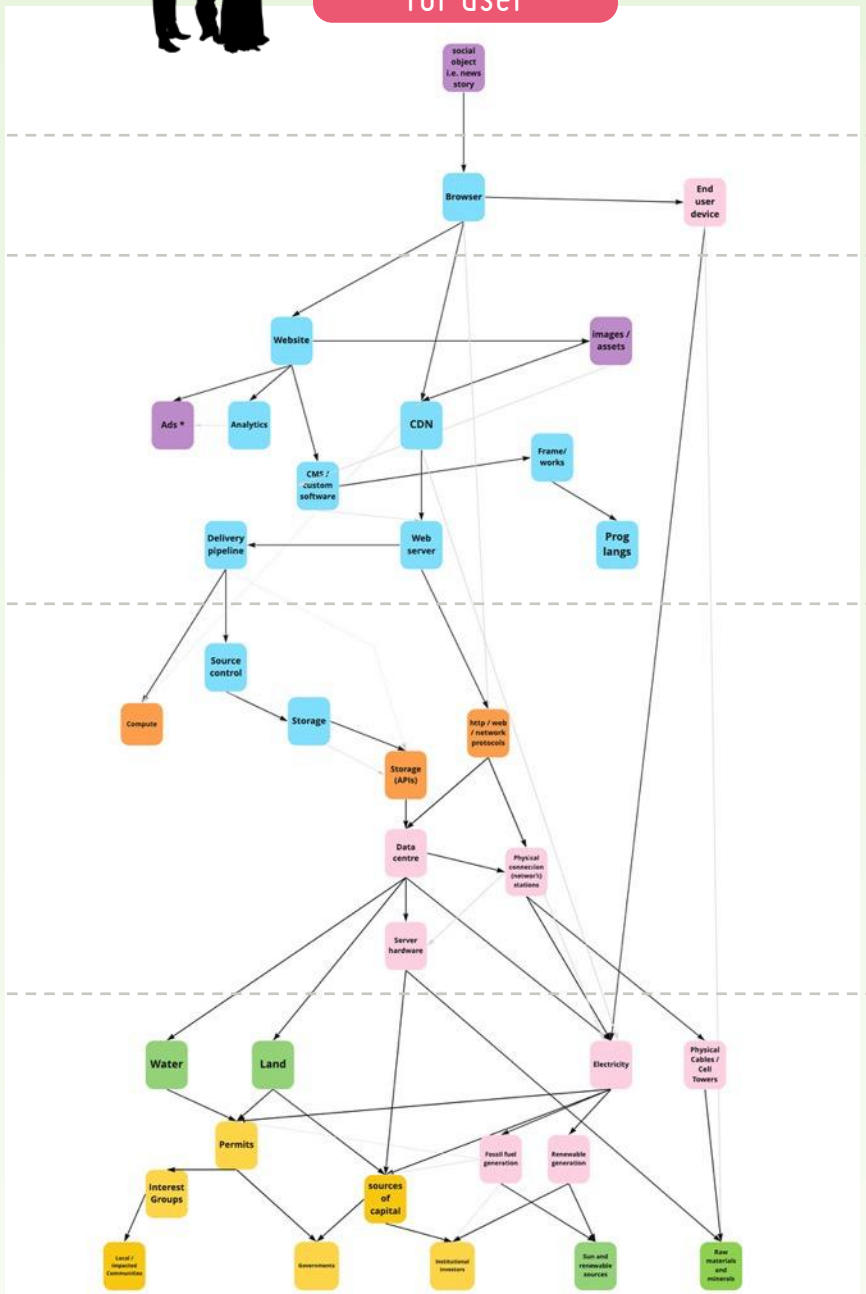
Standards and working groups

World outside of digital tech

Visible

Invisible

Internet service for user



What

- Content
- Software / application
- Standards and protocols
- Physical infra and hardware
- Social and communities
- Natural resources

We need to see changes in all parts of this chain

‘Fossil-free’

Decarbonised internet

+

Social foundation

=

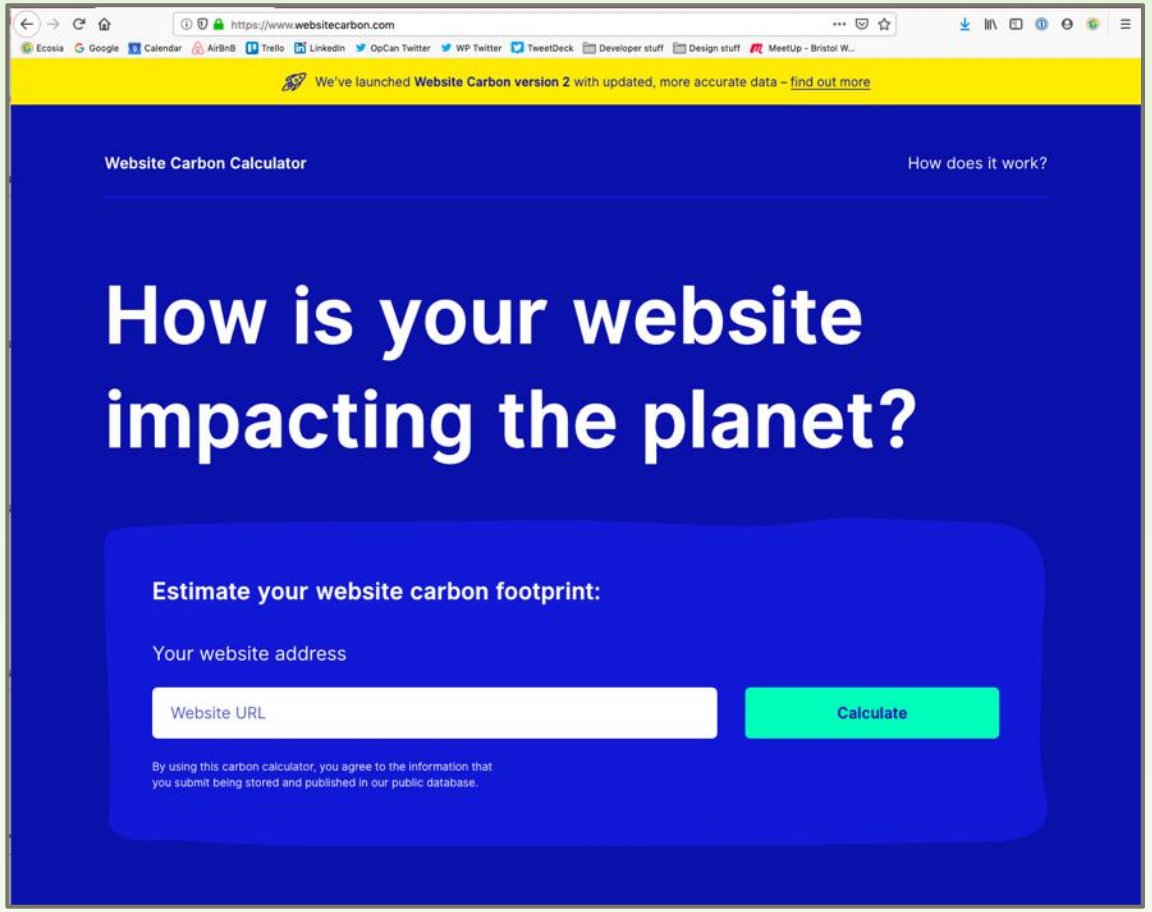
Fossil-free internet

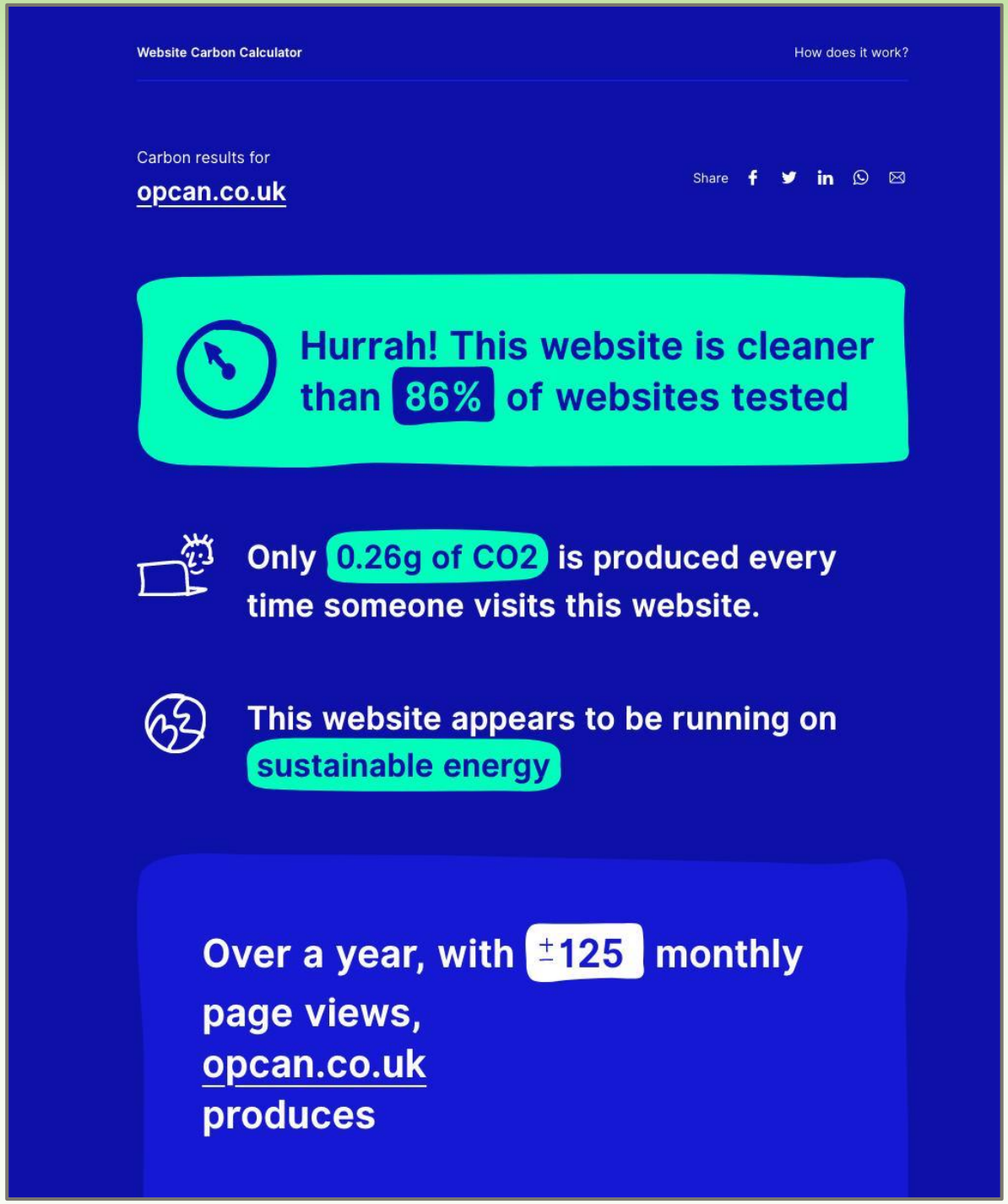
For every unit of energy used to build and run the internet, we can point to **one unit less coming from fossil fuels globally**

The systems and power-structures that control the internet are visible to all and hard-coded to **respect and empower the rights of all humans to thrive**, whether they are users of the internet or not.

	Decarbonised internet	Social foundation
Content	The carbon emissions of any type of content can be perceived in a human-readable and machine-readable way	Content comes from and benefits a diverse cross-section of the global population
Software / application	Software is designed to respect our finite global carbon budgets	Diverse groups steer the creation and use of software to serve their own local needs
Standards and protocols	All technical protocols and standards include carbon, and favour implementation over precision	Standards are developed by diverse cross-sections of society to equitably share burdens and benefits
Physical infra and hardware	Full transparency - lifecycle emissions data easily available	Ownership is diverse and visible
Social and communities	Consumers make choices about the tech they use based on their decarbonisation commitments	There is clear, well resourced access to justice and recourse for impacted communities
Natural resources	Energy for making and running the internet infrastructure mainly comes from non-fossil sources	We build the internet to actively support regenerative and circular usage patterns

Useful tools for calculating digital emissions

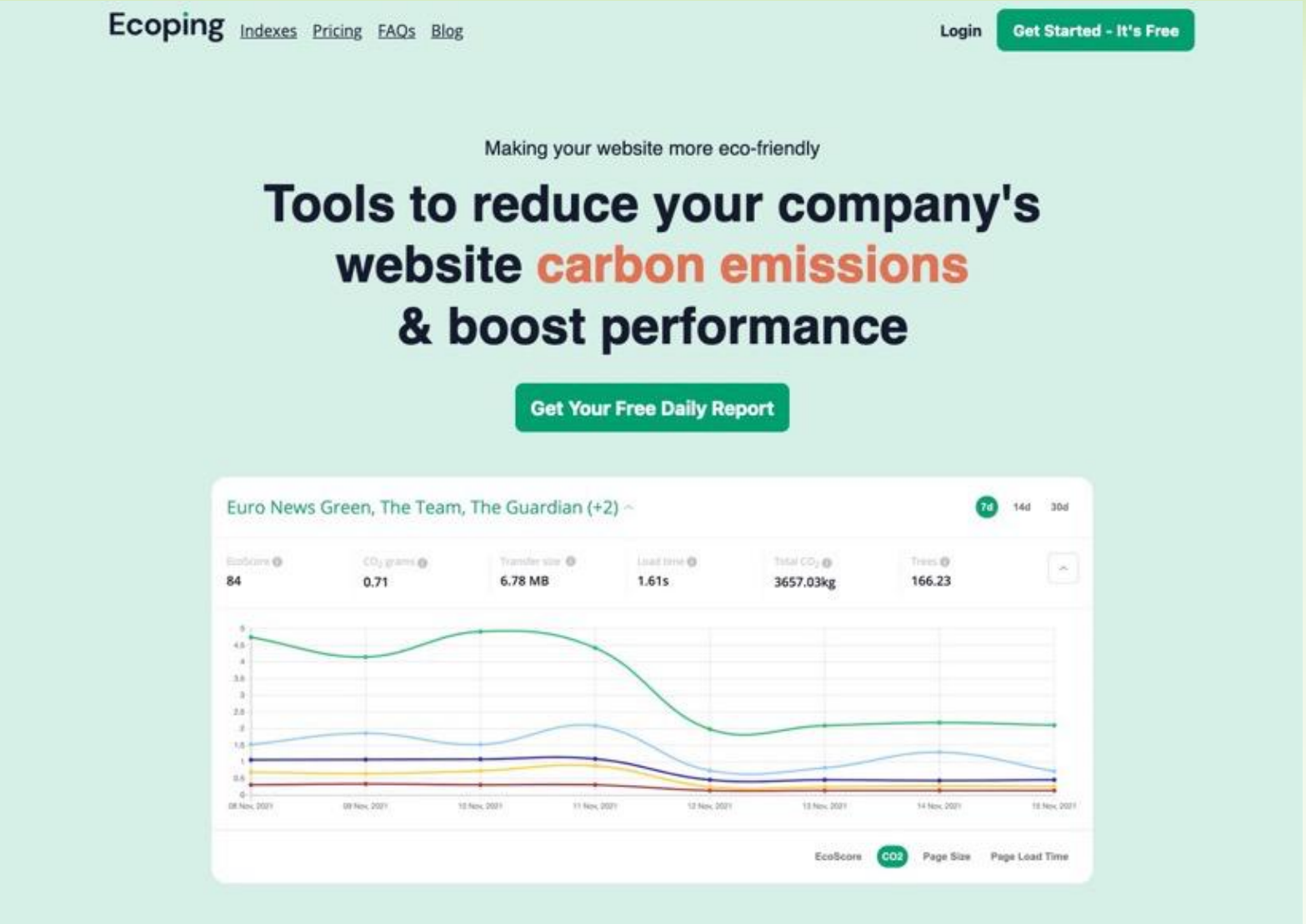




Website carbon calculator


Ecograder
Ecograder Score for https://opcan.co.uk/
Overall Score:
97
out of 100
This page scores 97 out of a possible 100 points.
Nicely done. While there's always room to improve any page, this one is pretty good. Ecograder prioritizes a holistic approach to digital sustainability reporting. Each report includes quantifiable metrics to help you reduce emissions and improve performance. We also share best-in-class web design practices that aren't as easy to quantify from an ecological perspective. Read on to learn specific action items you can take to improve this page and your website overall.
This page emits an estimated 0.1001g of carbon dioxide equivalent (CO2e) every time someone views it.
With the traffic numbers you selected, this page could emit up to 100.08 grams of CO2e per month.
That's equivalent to burning up to 0.01 gallons of gas.
And that's just a single page on your site.
Based on < 1k pageviews per month.
Change

Ecograder


Ecoping
Indexes
Pricing
FAQs
Blog
Login
Get Started - It's Free
Making your website more eco-friendly
Tools to reduce your company's website carbon emissions & boost performance
Get Your Free Daily Report
Euro News Green, The Team, The Guardian (+2)
7d
14d
30d
84
0.71
6.78 MB
1.61s
3657.03kg
166.23
EcoScore
CO2
Page Size
Page Load Time

Ecoping

Beacon

https://opcan.co.uk

CO2 0.247g SIZE 333.76 KB

Total

Overall this website is amazing when it comes to its carbon footprint

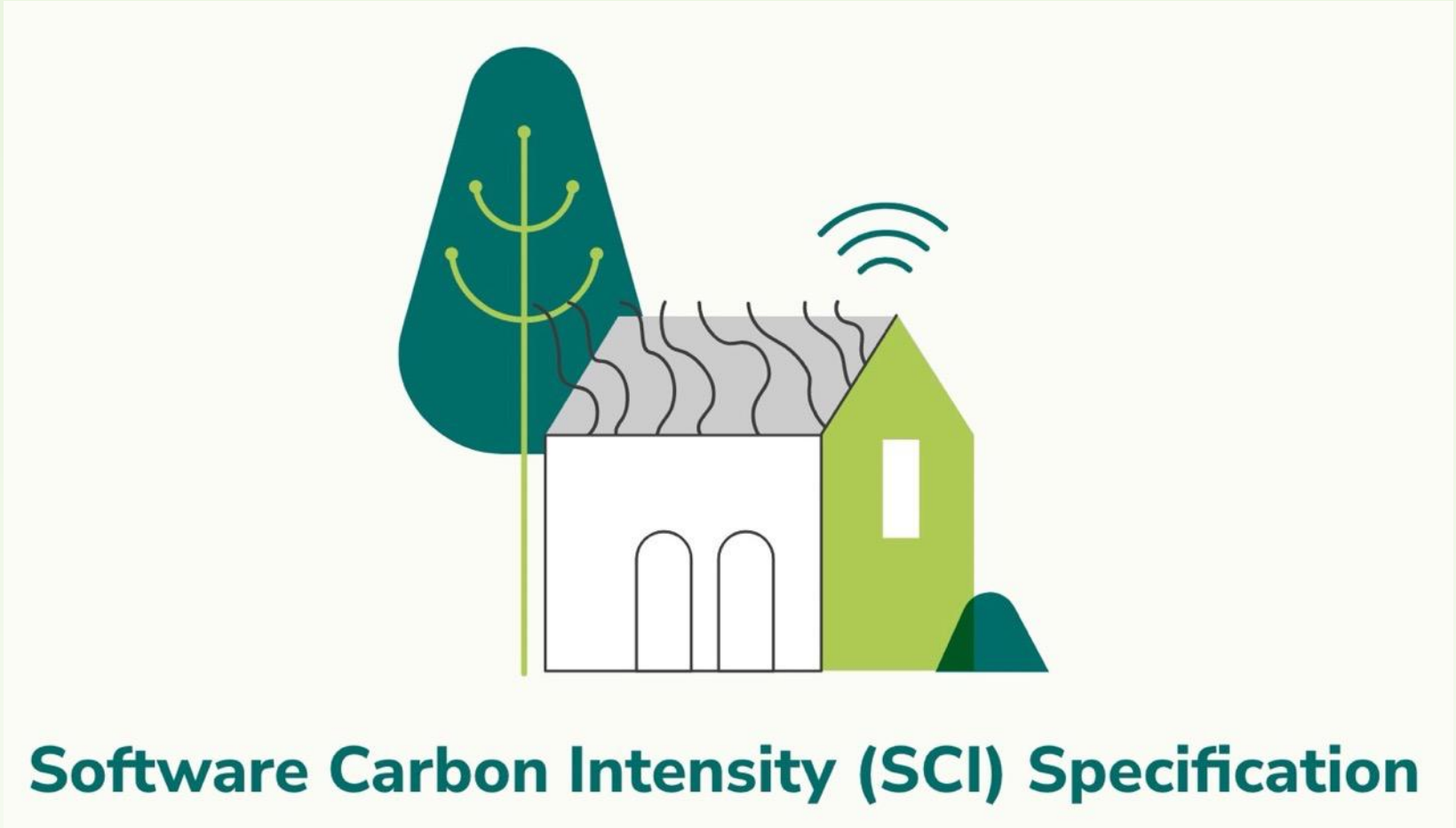
BREAKDOWN

TYPE	REQUESTS	SIZE	CO2
Image	10	180.11 KB	0.133g
Script	4	65.61 KB	0.049g
Font	4	56.37 KB	0.042g
Stylesheet	2	22.91 KB	0.017g
Document	1	6.01 KB	0.004g
Other	3	2.73 KB	0.002g
Total		333.76 KB	0.247g
Third Party*	8	35.14 KB	0.026g

[Digital Beacon]

Cloud Carbon footprint

Green Software Foundation



Green Software Foundation

Reduce data demand by

Reduce data transfer by...

- Only creating and storing data you actually need
  - Reduce backups / archives and logs
  - Reduce analytics data
  - Remove plugins / 3rd party services no longer needed
- Transferring media content on demand
  - Don't auto-play video
  - Lazy load images and video – Google Developers article

THE GREEN WEB FOUNDATION

Reduce data transfer by...

- Paying attention to images
  - Use the right format for the right image type
  - Compress .jpgs
  - Display images of the right dimensions
  - Use `<img srcset>` or `<picture>` to serve images responsively
- Disabling unneeded code like plugins or dequeuing scripts

What devices are being used?

Manufacturing costs the earth

- Majority of total pollution from digital devices comes from manufacture
    - Smart phones are the worst
- Devices use rare raw materials, which are hard to find and currently hard to recycle

Source 1: Lean ICT Report from the Shift Project

Source 2: Examining the carbon footprint of devices

Source 3: The global impact of 10 years of Smartphones, Greenpeace 2017

Source 4: Digital's hidden cost to the earth is in its manufacturing, Gerry McGovern

THE GREEN WEB FOUNDATION

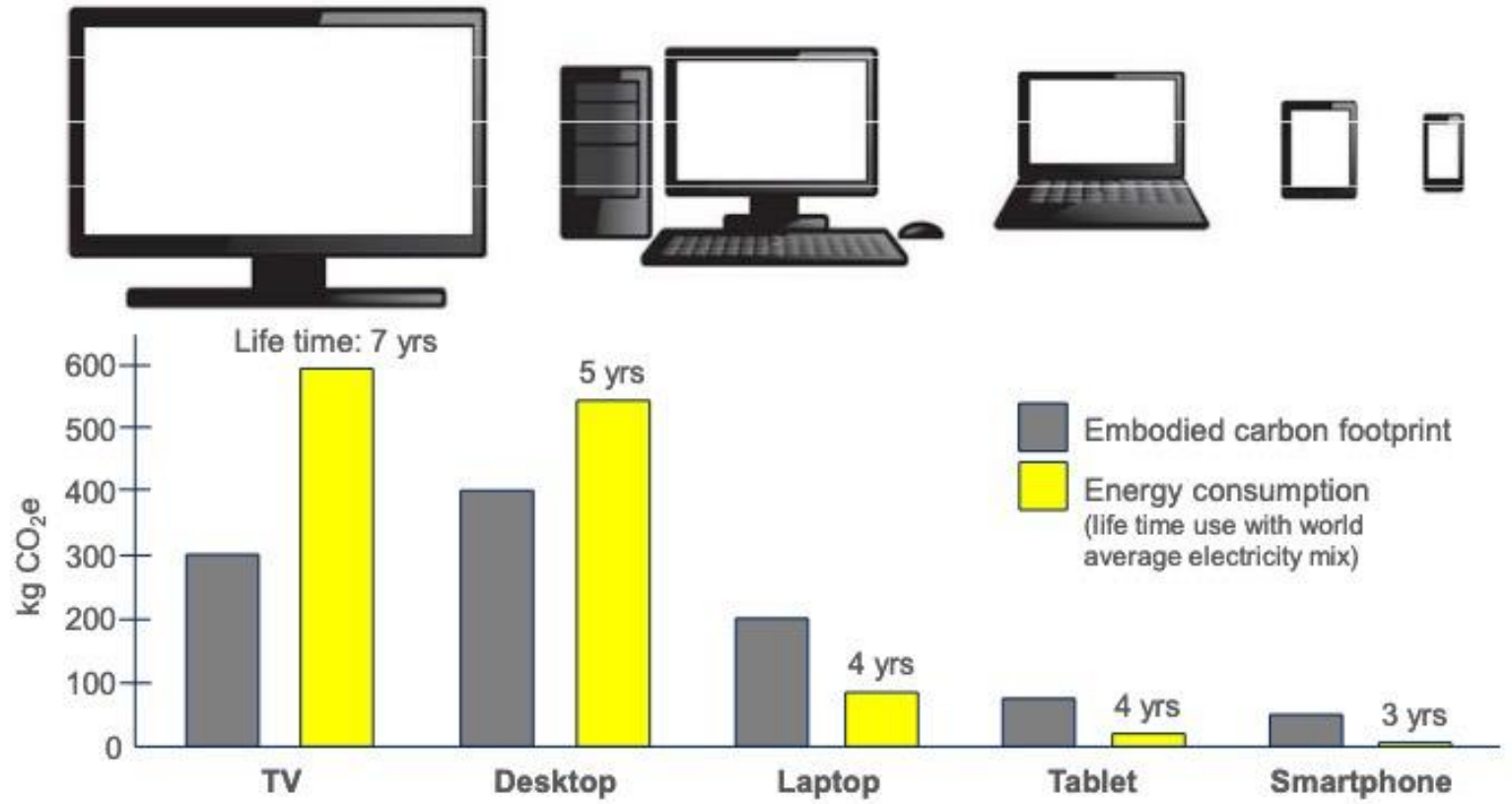


Figure 10. The estimated embodied carbon footprint and use (active life time) carbon footprint for some key user devices. Note that desktop PCs include an LCD monitor and standard peripherals, but laptop PCs do not.

Source: The Energy and Carbon Footprint of the Global ICT and E&M Sectors 2010–2015, 2018

Reframe how you value your devices: they're precious, not disposable

- Do you really **need** to upgrade to the latest device, or is it just effective marketing making us desire more?

- Could you **repair or upgrade** a broken device?
  - Right to repair movement

- Could you get **refurbed** or **second hand devices?**

- Could you buy **ethically made** devices?
  - Ethical Consumer or FairPhone

THE GREEN WEB FOUNDATION

You Retweeted

Kate Raworth
@KateRaworth

Right. When my iPhone 5s finally packs in (but not yet) I'm going to get one of these. Kudos to @Fairphone for making phones the way all phones should be made.

Fairphone 3+ review: ethical smartphone gets camera upgrades
Dutch smartphone maker launches camera upgrade for older handsets, also available as new device
theguardian.com

6:16 PM · Sep 26, 2020 · Twitter Web App

108 Retweets **16** Quote Tweets **618** Likes

Source: https://twitter.com/KateRaworth/status/1309904591119618048

Kate is the originator of the Doughnut Economics concept

E-waste

- In 2019 50m tons of e-waste is being produced each year
- The UN estimates that in about 2016 only 20% of e-waste is recycled globally
- The EU parliament estimate that obsolete cables generated more than 51,000 tonnes of e-waste per year

- Source: Electronic waste on Wikipedia

THE GREEN WEB FOUNDATION

Where does our e-waste end up and who pays?

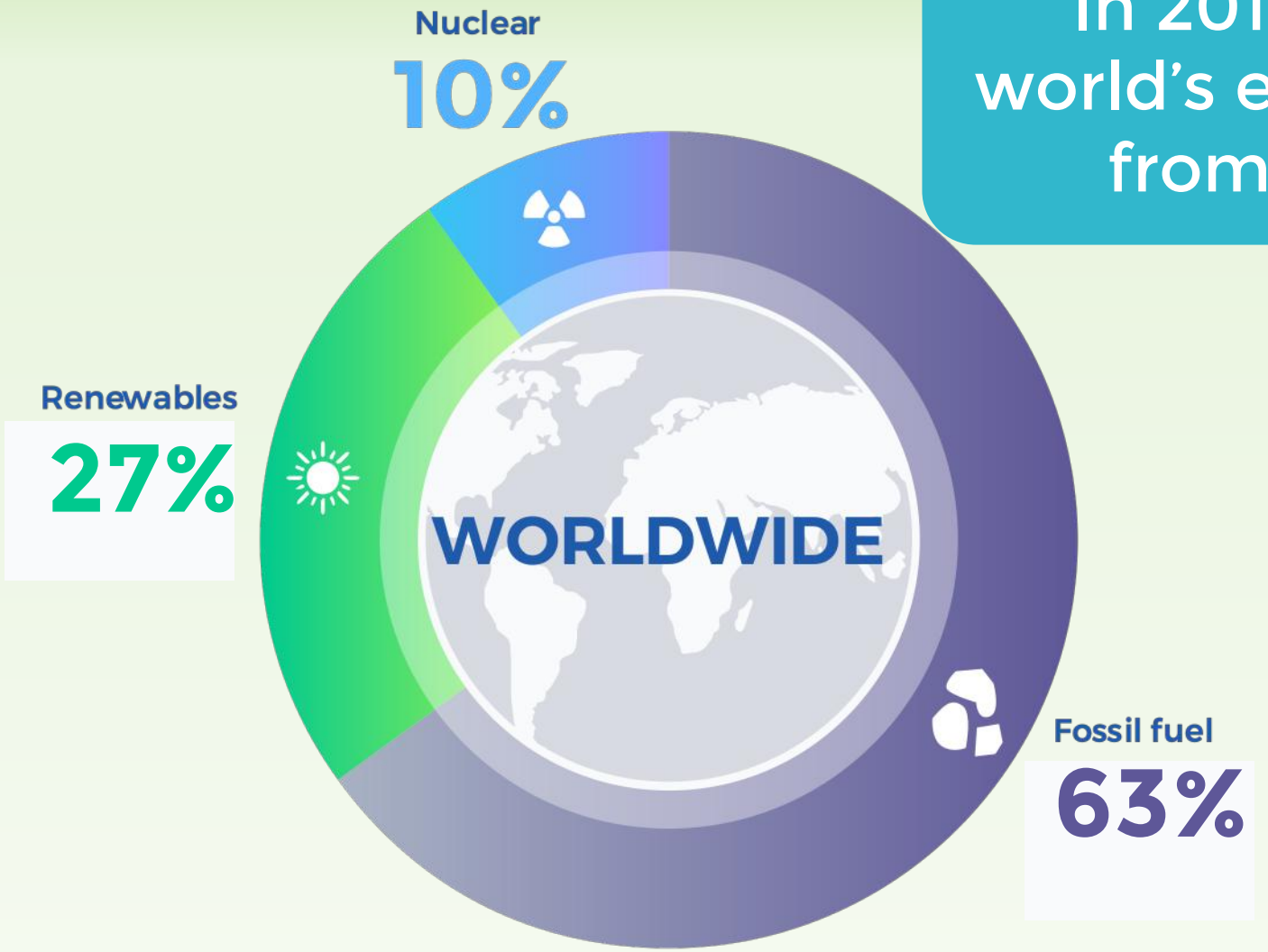
Photo source: https://citinewsroom.com/2019/04/agbogbloshie-dump-to-remain-open-as-epa-targets-e-waste-recycling-facility/

E-waste from Europe poisions Ghana's food chain, Guardian newspaper

For insightful reporting about Agbogbloshie: Agbogbloshie demolition: the end of an era or an injustice, by Muntaka Chasant

Where does electricity come from?

In 2019 63% of the world's electricity came from fossil fuels



- Source: IEA, World gross electricity production by source 2019

Renewable energy isn't a panacea

- Creating renewable energy still requires natural resources
  - But it is less than fossil fuels
- First, we should **REDUCE** the overall amount of energy needed by addressing consumption / efficiency
- Then, ensure the energy needed has the lowest impact possible

80%

The estimated reduction of ICT sector's carbon footprint if all electricity consumed came from renewable energy sources

- Source: Ericsson Quick guide to your Digital Footprint report

Switch your hosting to one that runs on renewables

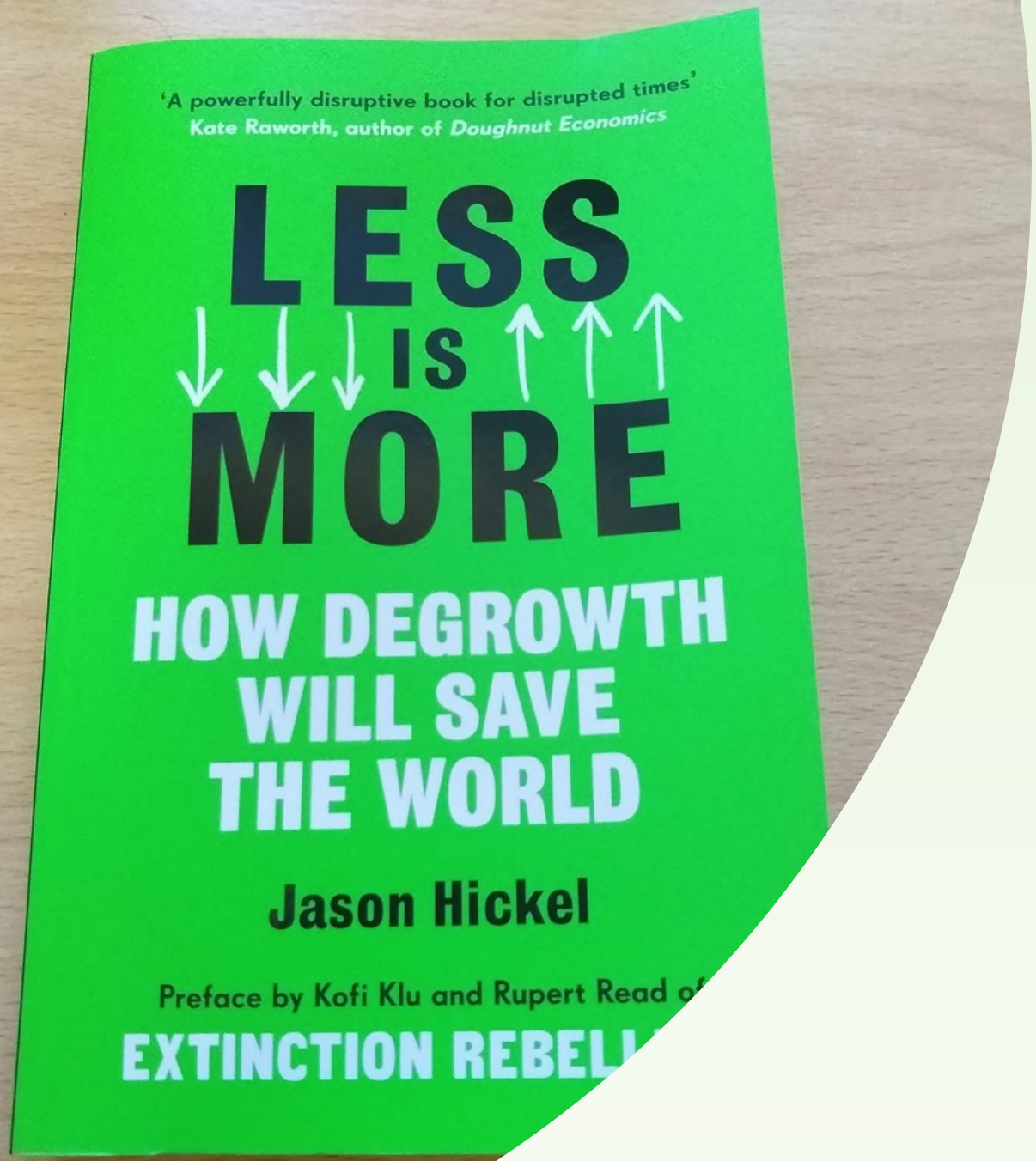
- The Green Web Foundation is a fantastic resource for understanding what energy sources hosts / servers are using
- PUE – power usage effectiveness
  - Determines how energy efficient data centres are eg how much energy is used by the computing equipment, in contrast to cooling and other overheads
  - PUE = 1.2 then it's considered very efficient

THE GREEN WEB FOUNDATION

Other interesting resources

[Challenging the systems - Doughnut Economics Action Lab]

Digital declutter toolkit



Less is More

by Jason Hickel