GDA
Green Digital Accessibility

Digital design for the planet... and people!

Tom Greenwood, co-founder of Wholegrain Digital and author of the book, Sustainable Web Design
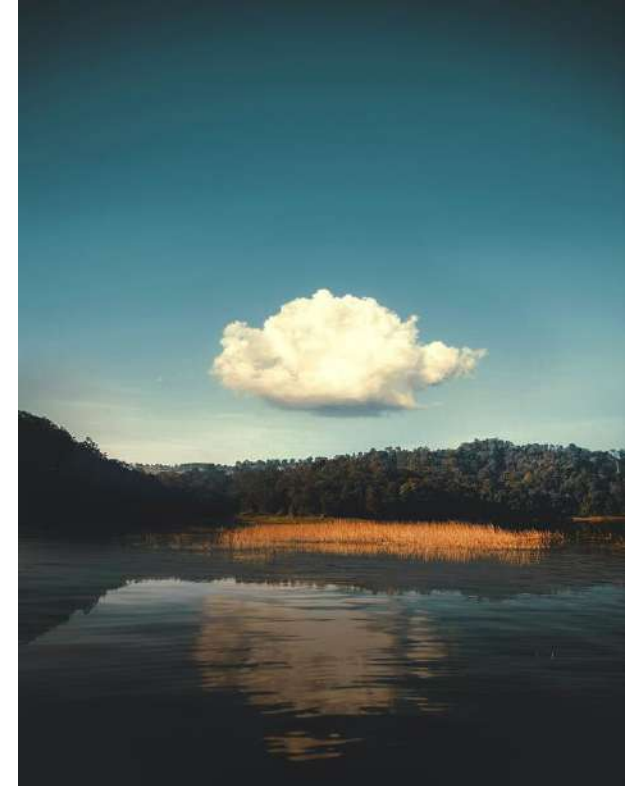
TRANS MEDIA CATALONIA

GREEN SCENT
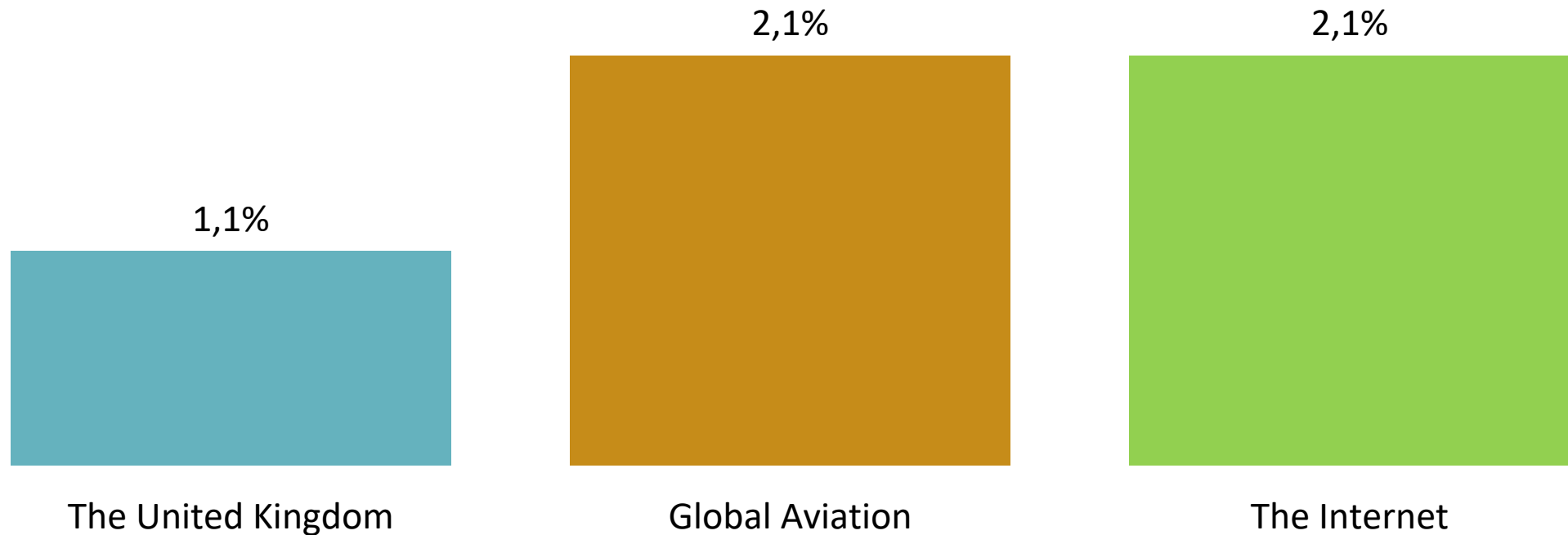SMART CITIZEN EDUCATION FOR A GREEN FUTURE

Is digital technology real?

- We say it is in the **cloud**

- We say it is **virtual**

- Could it impact the environment?

The Internet is the world's largest machine

Percentage of total global greenhouse gas emissions

The United Kingdom	Global Aviation	The Internet
1,1%	2,1%	2,1%

Data centers

- 200 TWh of electricity annually
- Equivalent to Spain!

Telecoms networks

- Fibre optic cables could go to the moon and back three times!
- 3G, 4G, 5G
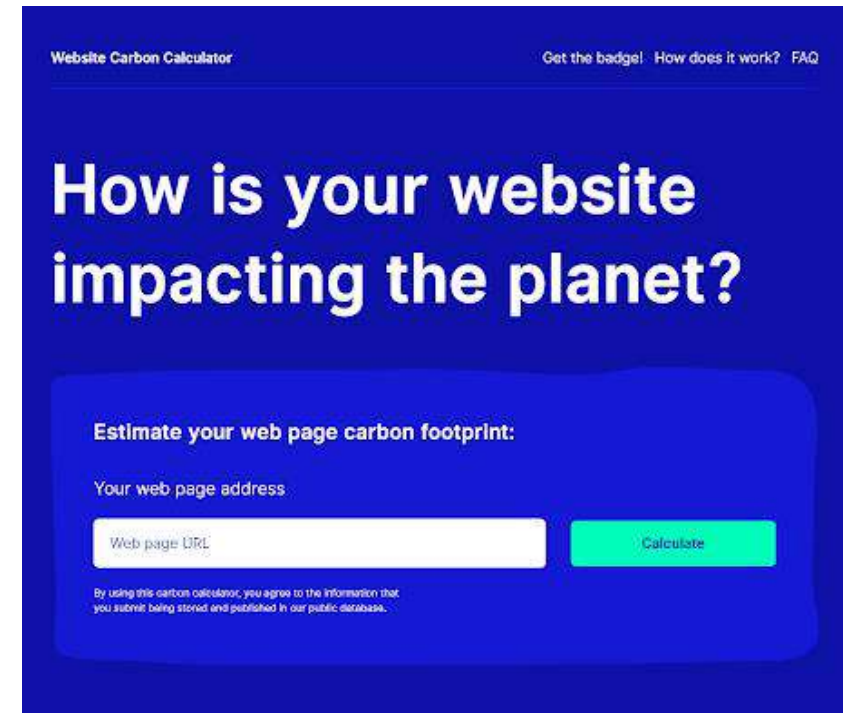- Global repeater stations
- Satellites in space

End user devices

- Smart phones, computers, smart TV's, games consoles, VR, Internet of Things

- Billions of devices globally, always connected

Calculating website energy and emissions

- Developed methodology
- Include production, data center, telecom network and end user energy
- Launched the Website Carbon Calculator
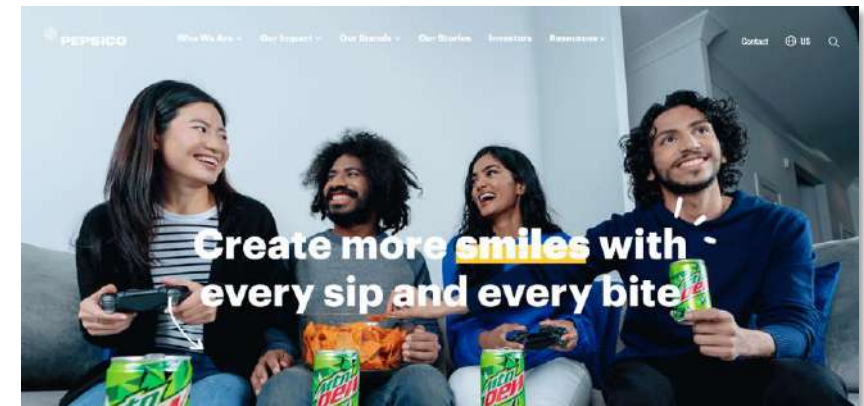- Aim to raise awareness

Early learnings

- Wide range of emissions

- Old websites are least polluting

- New websites are most polluting

Berkshire Hathaway – 0.02 grams CO2e per page view

Pepsi – 5.52 grams CO2e per page view

A contradiction

- Computers and networks are getting faster and *more efficient*
- Software is getting *less efficient*

- Average web page sizes have more than quadrupled since 2010
- Average page load times have not improved

Impacts on the planet

- Data uses energy in storage, transmission and processing
- More data = more energy

Impacts on people

- Slow user experience
- Financially impacts the poor
- Inability to load content
- Reduced readability

"

Large pages are taxes on the poor

Gerry McGovern, author of World Wide Waste

Variation in global internet speeds

Lichtenstein has the world's faster internet, 276 times faster than South Sudan, which has the world's slowest internet

Variation in devices

- The Motorola Moto E6 represents the average performance of mobile devices globally

- $150

- 2GB of RAM and 1.4Ghz CPU

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When we construct the digital world to the limits of the best devices, we build a less usable one for 80+% of the world's users.

Alex Russell, Microsoft Engineer

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How do we solve it?

- We can use the environment as a lens to help us think differently
- Prioritising efficiency *and* accessibility is a win-win

Remove unnecessary images

- Users ignore images that don't convey useful information

- Less visual clutter
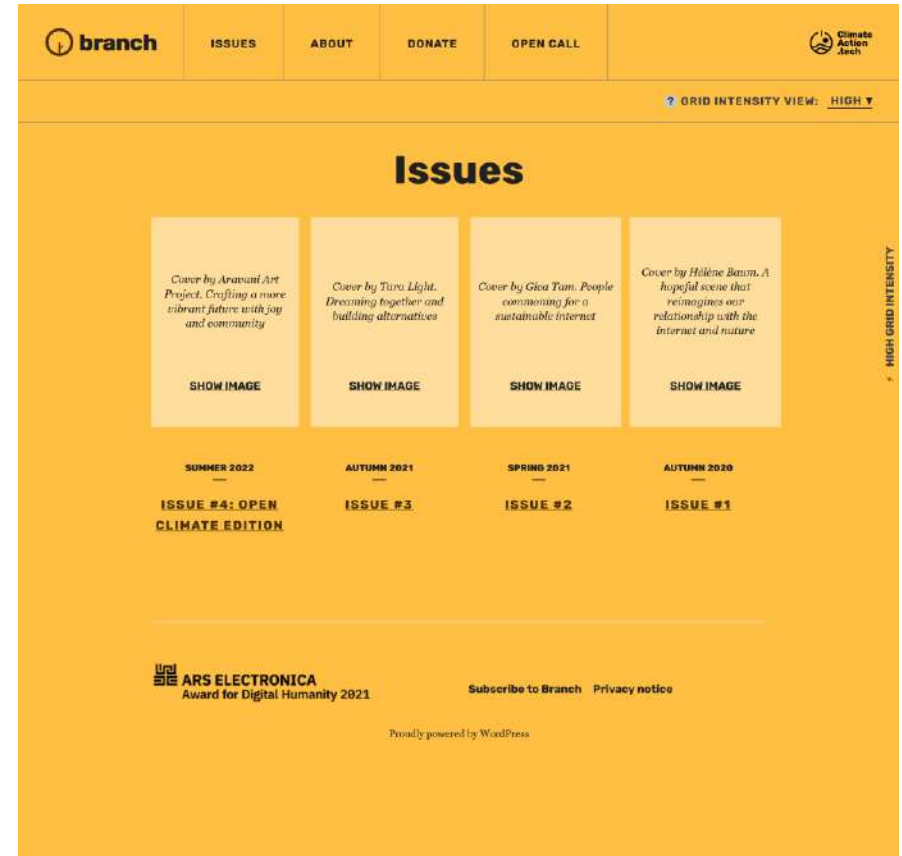
- Less energy consumption
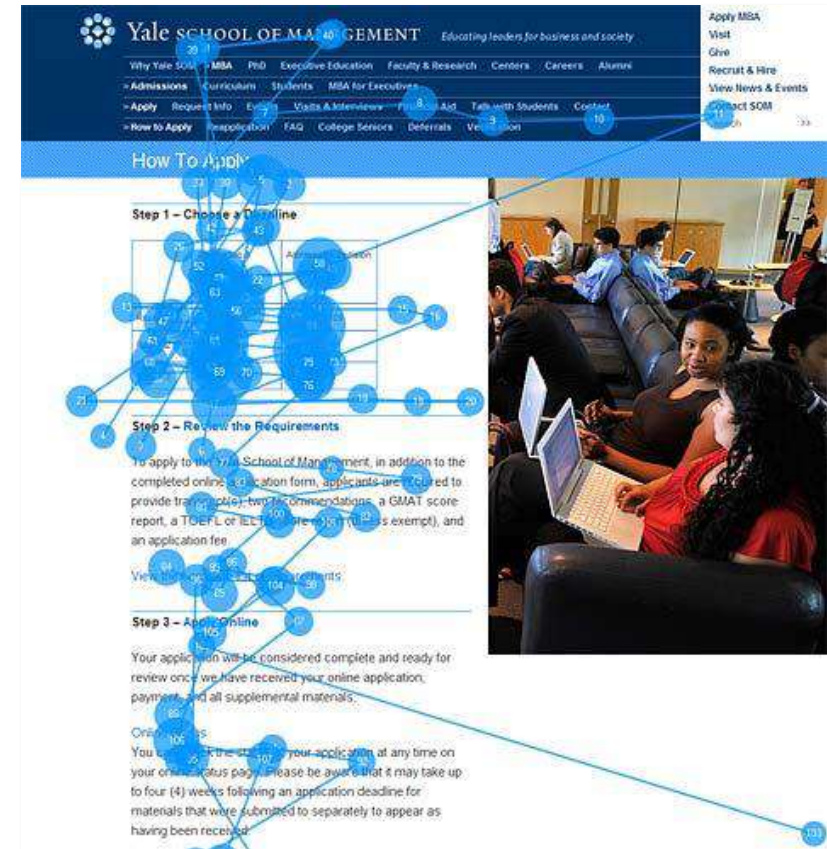
Optimise images

- Design with smaller images
- Reduce image detail (simple and clear)
- Load images at correct size
- Use latest image formats (WebP, AVIF)
- Compress images
- Include text alternatives
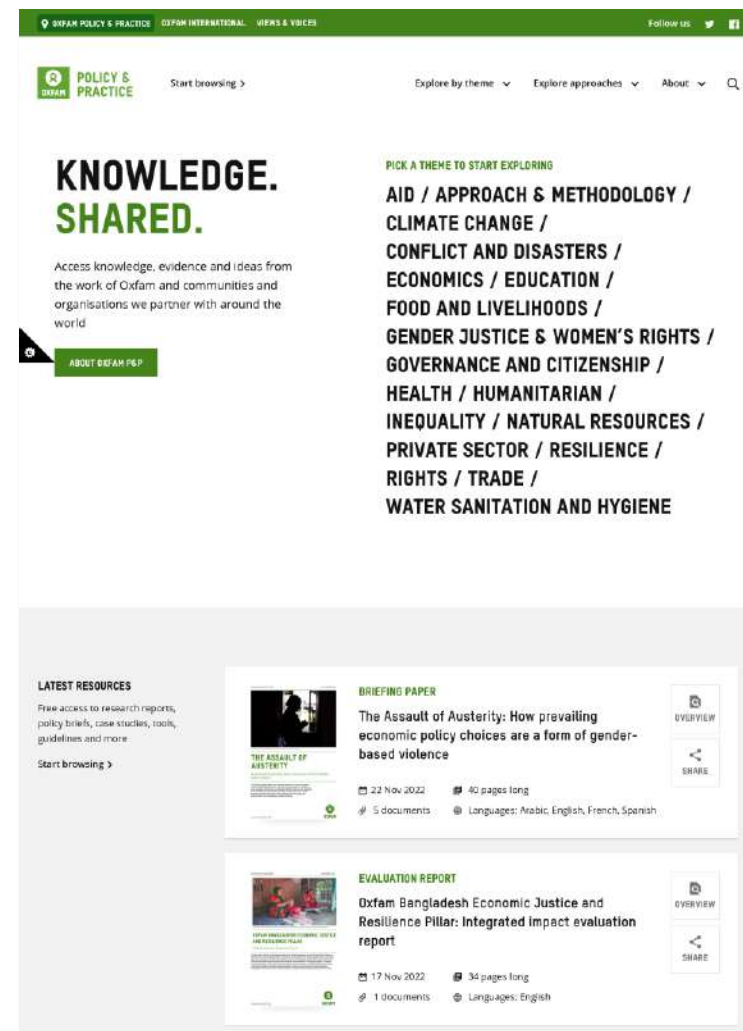
Carbon aware images

- Branch Magazine doesn't load images when energy grid is high carbon
- This encourages editors to write better alt text

Mindful use of video

- Avoid autoplay video

- Delay loading of video player code

- Default to lower resolution

- Keep videos short

- Provide text alternative (e.g. transcript)

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Autoplay videos demand your attention while burning through your data plan and sucking up your batteries

Brian C Chen, The New York Times

Accessible SVG animation

- Alternative to video
- Low data
- Accessible text
- Keyboard navigation
- Control over timeline
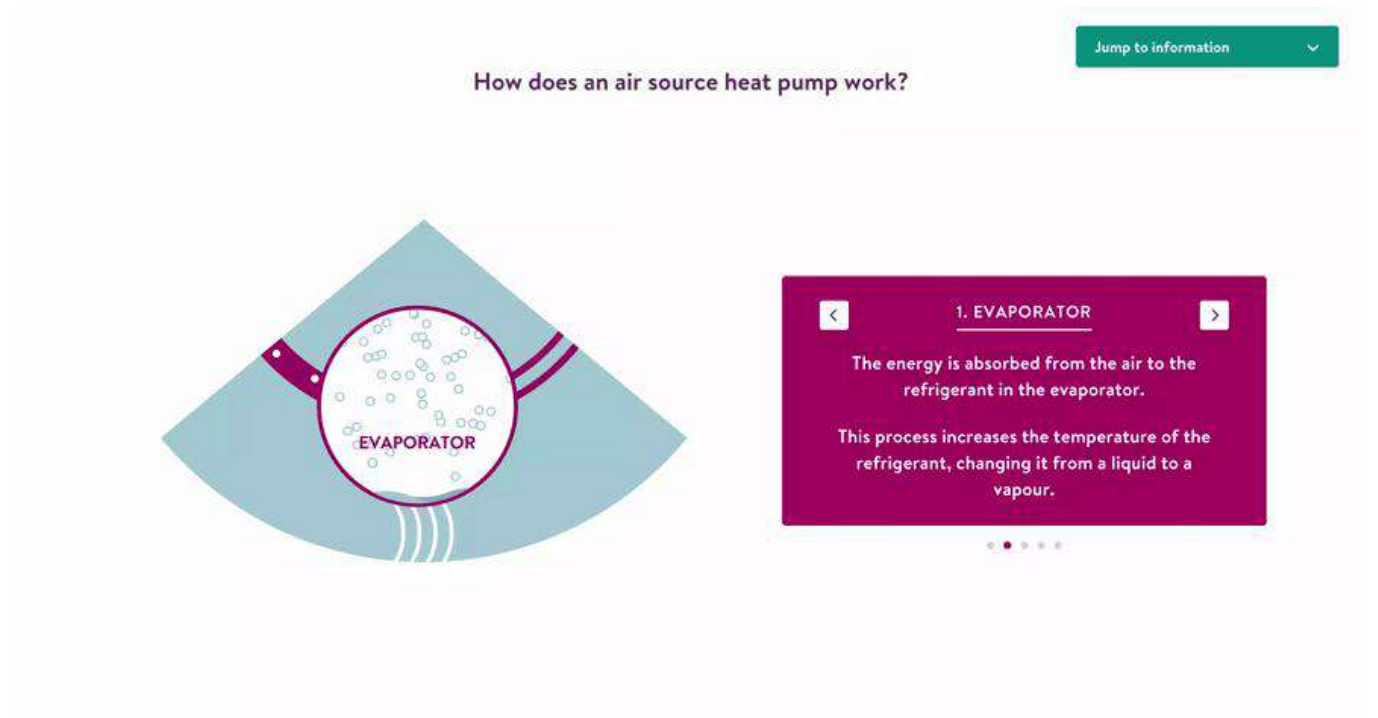
Efficient typography

- Use system fonts (e.g. Arial, Times New Roman, Helvetica, Roboto)
- Use fewer font variations
- Subset fonts
- Load in latest formats (WOFF2)

| Inter font (original)	Inter font (optimised)
TTF format	WOFF2 format
2192 characters	98 characters
544kb	**10kb**

Respect privacy

- Tracking scripts consume the users data, energy and money
- Tracking has no benefit to the user
- Cookie banners are an accessibility barrier
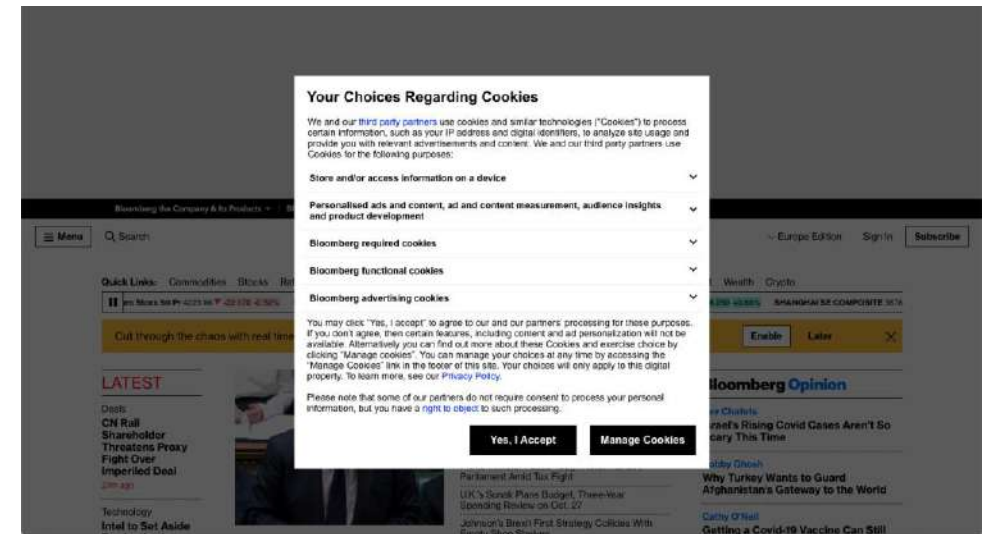
Use darker colours

- Modern OLED screens use more energy to display bright colours
- Screen energy impacts mobile battery life
- Colour can impact readability
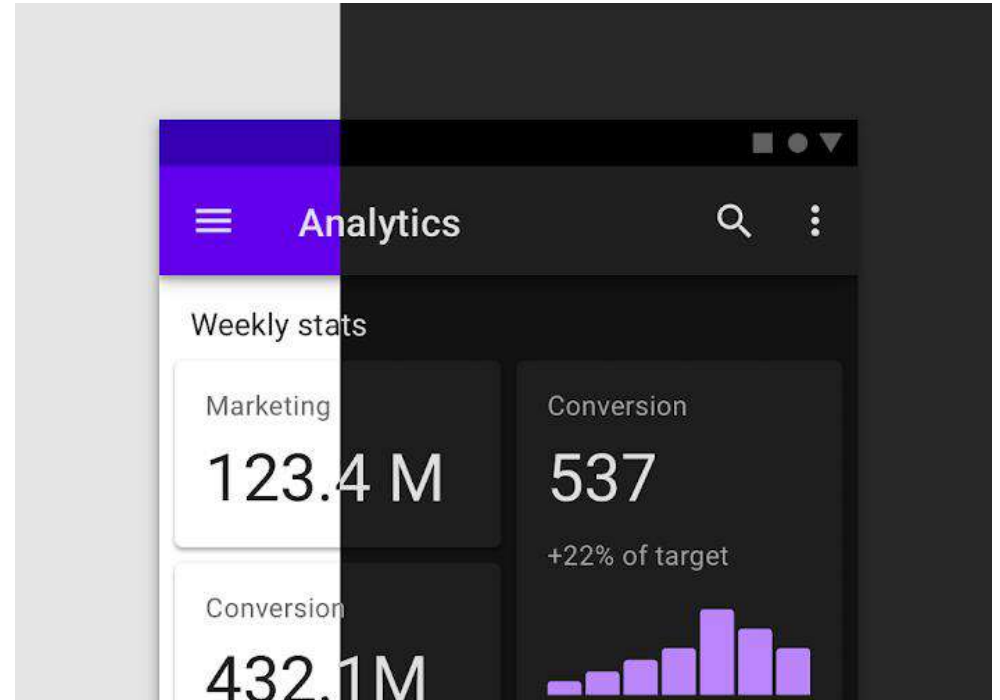
Accessibility settings can impact energy

- **Reduced motion** setting reduces energy consumption

- **Low contrast** reduces energy consumption

- **High contrast** mode *may* increase energy consumption

- **Dark mode** reduces energy consumption

Use a content delivery network (CDN)

- Make content faster to access globally

- Reduce energy transmitting data across the world
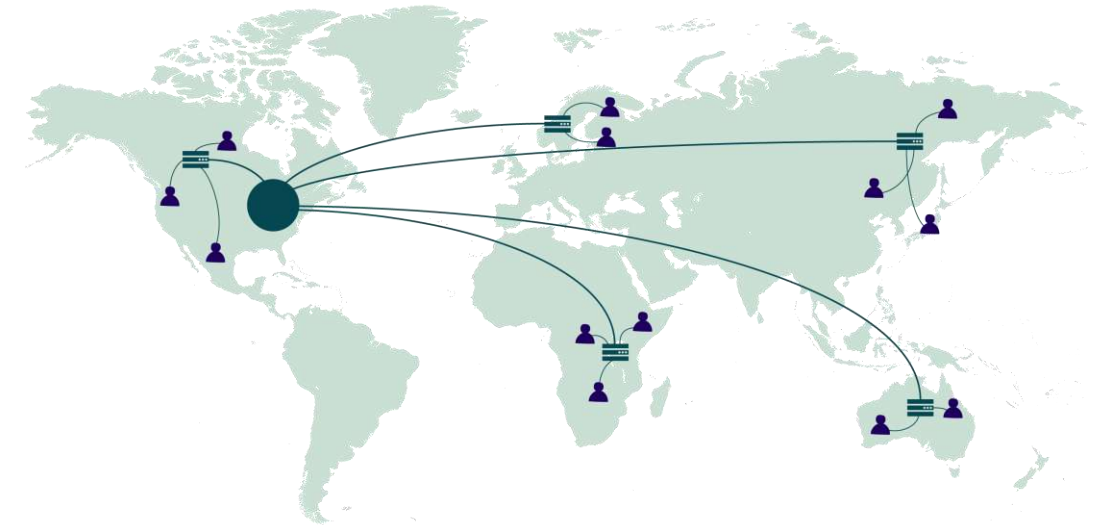
Standards

- Could we have a sustainability equivalent of WCAG?

- Join the W3C Sustainable Web Design Community Group group to help create global best practices

Thank you

Let's create a web that's good for people and the planet!

Tom Greenwood