

# Sustainable Web Design



Social Media & SEO

MA Web Design & Content Planning

# Sustainable Web Design

- Mentimeter survey
- What is Sustainable Web Design?
- Why is Sustainable Web Design important?
- Tools and metrics for assessing Web Sustainability
- Web Sustainability in action: how to improve your website
- B Corps
- Dos and Don'ts
- Web Sustainability Guidelines (WSG)
- Books and resources

# Sustainable Web Design Warm Up ツ

Go to

**www.menti.com**

Enter the code

**3111 8980**



Or use QR code

# What is Sustainable Web Design?

Sustainable Web Design is an approach to designing web services that puts people and planet first. It delivers digital products, services, and data that respect the principles of the [Sustainable Web Manifesto](#): clean, efficient, open, honest, regenerative, and resilient.

— [sustainablewebdesign.org](https://sustainablewebdesign.org)

## Sustainable Web Manifesto

*"If the Internet was a country, it would be the 4th largest polluter".*

Start the Manifesto

### We need a sustainable internet

We all share and use the web, just as we all share and live on this planet. This manifesto is a public declaration of a shared commitment to create a sustainable internet.

The planet is experiencing unprecedented climate change and the Internet is both part of the problem and the solution. From services to infrastructure, the Internet consumes large amounts of electricity to store content, deliver content, and create new content. If the Internet was a country, it would be the 4th largest polluter in the world and is expected to grow considerably by 2025.

If we embrace responsibility for our work, we can create a web that is good for people and planet. By signing this manifesto you declare your commitment to create a greener web.

### Clean

The services we provide and services we use will be powered by renewable energy.

### Efficient

The products and services we provide will use the least amount of energy and material resources possible.

### Open

The products and services we provide will be accessible, allow for the open exchange of information, and allow users to control their data.

### Honest

The products and services we provide will not mislead or exploit users in their design or content.

### Regenerative

The products and services we provide will support an economy that nourishes people and planet.

### Resilient

The products and services we provide will function in the times and places where people need them most.

# Sustainable Web Manifesto

*"If the Internet was a country, it would be the 4th largest polluter" <sup>1</sup>*

[Sign the Manifesto](#)

## We need a sustainable internet

We all share and use the web, just as we all share and live on this planet. This manifesto is a public declaration of a shared commitment to create a sustainable internet.

The planet is experiencing unprecedented climate change and the Internet is both part of the problem and the solution. From websites to cryptocurrencies, the Internet consumes large amounts of electricity in data centres, telecoms networks, and end user devices. If the Internet was a country, it would be the 4th largest polluter in the world and is expected to grow considerably by 2030.

If we embrace sustainability in our work, we can create a web that is good for people and planet. By signing this manifesto you declare your commitment to create a greener web.

01

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# Why is Sustainable Web Design important?

The internet currently produces approximately 3.7% of global carbon emissions, which are rising in line with our hunger to consume more data.

— [sustainablewebdesign.org](https://sustainablewebdesign.org)

“If the Internet was a country,  
it would be the **4th** largest polluter”

— [sustainablewebmanifesto.org](https://sustainablewebmanifesto.org)

[The Internet uses more electricity than...](#)  
[Internet Health Report 2018 - mozilla](#)

# Websites have a carbon footprint )-:

The internet consumes a lot of electricity.

*416.2TWh per year to be precise.*

That's more than the entire United Kingdom!!

TWh - Terawatt hours = unit of energy representing one trillion watt hours



# Websites have a carbon footprint )-:

From data centres to transmission networks to the billions of connected devices that we hold in our hands, it is all consuming electricity, and in turn producing carbon emissions equal to or greater than the global aviation industry.

# THE WORLD'S DIGITAL CARBON FOOTPRINT

Digital transformation is often seen as key to slowing global warming. By using new technology such as artificial intelligence and data analytics, the theory is we can increase efficiency and productivity, thereby reducing emissions. But all this computing power needs to be run by something - and up to now this has predominantly been fossil fuels. And while the industry is working towards reducing emissions, with many companies announcing net-zero emissions targets, the pace of growth in usage means emissions globally look set to keep rising

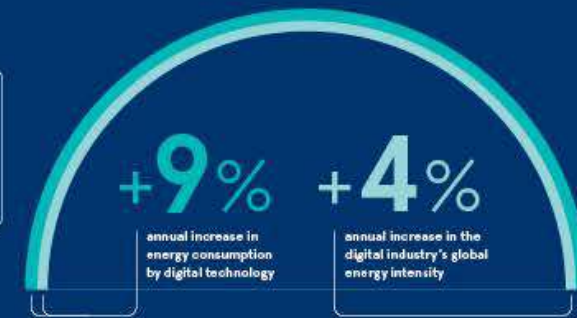
**1.7** billion

tonnes of greenhouse gas emissions caused by the production and running of digital technologies each year

**3.7%**

of total greenhouse gas emissions

The Shift Project, 2021



The Shift Project, 2021

**414**  
kilos

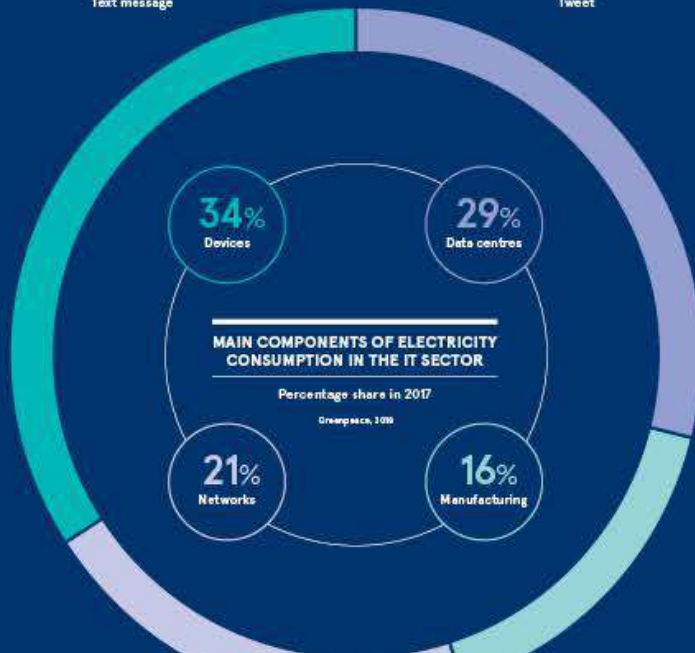
Greenhouse gas emissions caused by each internet user every year

The Shift Project, 2021

## THE CARBON FOOTPRINT OF USING THE INTERNET

Lancaster University, 2010; Google, 2010; Webatcarbon.com, 2021; Carbon Trust, 2020; MetLife, 2021

Measured in grammes of CO<sub>2</sub> equivalent emissions



## THE PREDICTED GROWTH IN ENERGY CONSUMPTION BY DIGITAL TECHNOLOGY

Energy consumption in terawatt hours under four different scenarios

2020 2025

Compound annual growth rate 2020-25

Expected

3,834

6,254

10.2%

Higher growth, higher energy efficiency

3,622

5,716

9.5%

Superior growth, peaked energy efficiency

3,622

7,096

14.5%

'Sobriety' (efforts taken to reduce use)

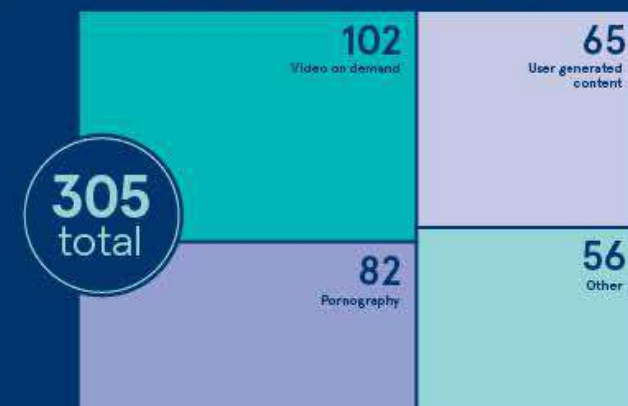
3,622

3,000

1.6%

## ONLINE VIDEO IS A KEY SOURCE OF GREENHOUSE GAS EMISSIONS FROM DIGITAL TECHNOLOGY

Emissions by different types of online video, in millions of tons of CO<sub>2</sub> per year



**96%**

reduction in CO<sub>2</sub> emissions if the user turns off their video

# Whose problem is this?

## Consumer VS Web Designer VS Government

[Sustainable Web Design](#) by Tom Greenwood

# Web Development VS Energy Consumption

The correlation of web development and environmental impact comes from the energy and resources consumed throughout the lifecycle of a website. Web development practices directly influence the environmental impact of websites.

— [sustainablewebmanifesto.org](https://sustainablewebmanifesto.org)

# Web Development VS Energy Consumption

By adopting sustainable development practices, such as optimising code, utilising renewable energy hosting, and minimising data transfer, developers can reduce the environmental footprint of websites and contribute to a more sustainable digital ecosystem.

— [sustainablewebmanifesto.org](https://sustainablewebmanifesto.org)

# Web sustainability



# Optimise images and multimedia



use image compression tools  
and techniques to reduce the file size



Uploading high-resolution images directly from a  
camera to a website without resizing or  
compressing them



# Use efficient code and technologies



utilise efficient coding practices and lightweight technologies to improve website performance and reduce energy consumption.



include unused or redundant code in your website's files as it can increase file sizes and impact performance negatively.

# Use renewable energy hosting



consider hosting your website on servers powered by renewable energy sources to minimise carbon emissions associated with hosting. I.e. [Clook](#).



host your website on servers powered by non-renewable energy sources, as it contributes to carbon emissions and environmental degradation.

# Minimise HTTP requests



minimise the number of HTTP requests by combining files, utilizing CSS sprites, and reducing unnecessary resources to improve website speed and efficiency.



don't use an excessive number of third-party scripts or plugins on your website, as they can increase page load times and energy consumption.

What can we do?

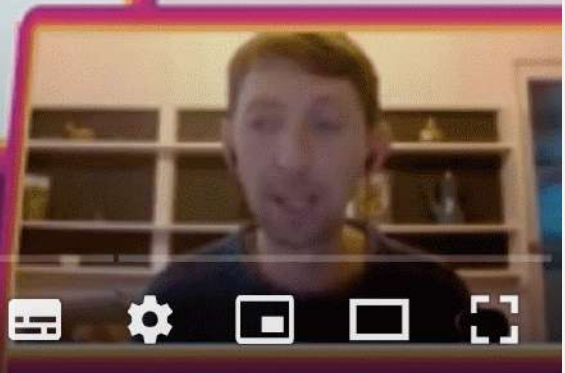
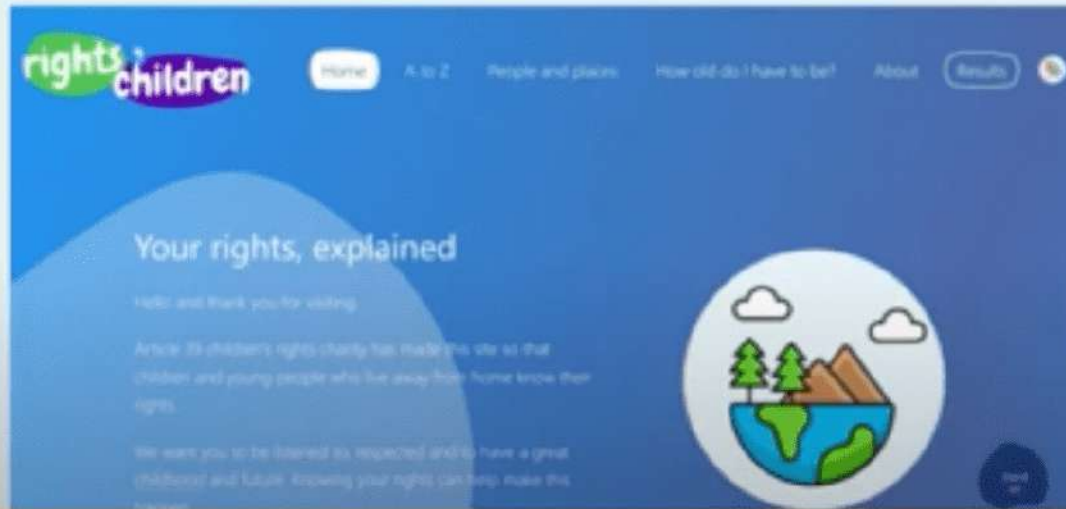
# Optimise images

- Consider if you really need an image
- Crop the image for the intended size
- Use image compression tools like **TinyPNG** or **JPEGmini** to reduce the file size of images without significantly compromising quality.
- Use image formats more performant such as **WebP** or **AVIF**

— [All about images – Explainers for Devs](#)

# Efficient Images

- Use less images
- Use vectors and CSS instead of photos
- Design the smallest version of your photos



[Tom Greenwood: A sustainable web for everyone](#)

# Optimise videos

- Avoid auto-play
- `<video src="dog.mp4" autoplay="none"/>`
- Avoid preload
- `<video src="dog.mp4" preload="none"/>`
- Compress video file with tools like [Handbrake](#)
- Stream at a lower definition
- Reduce time
- Avoid embedding from YouTube

[using video considerately on sustainable websites](#)



# Fonts

- Use [system fonts](#) where possible
- When using a custom font prefer the format **WOFF2**
- Use less font variations (subset)
- If you need to use different font variations use a [variable font](#) instead

Inter UI (default)	Inter UI (optimised)
TTF file	WOFF2 file
2192 characters	98 characters
300kb	7kb

[On Web Typography – Jason Santa Maria](#)

# Low energy colors

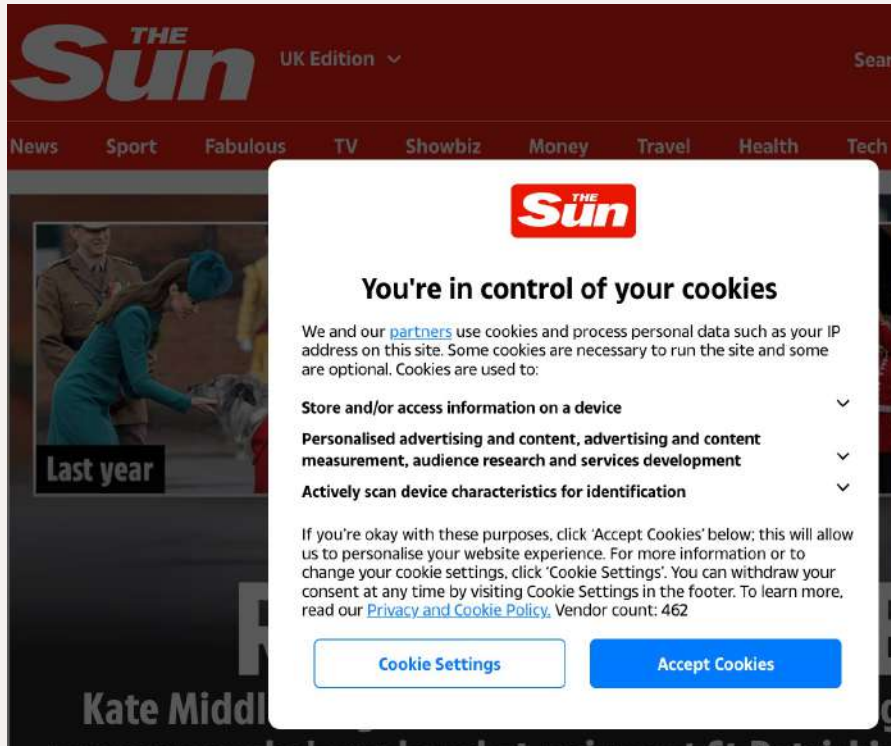
Darker colors require less energy to illuminate, with black being the lowest energy color and white being the most energy intensive.

*Only relevant on OLED screens*



energy efficiency when making color choices

# Track less



The screenshot shows the top of The Sun website with a dark red header. The 'THE Sun' logo is on the left, followed by 'UK Edition' and a search bar. Navigation links for News, Sport, Fabulous, TV, Showbiz, Money, Travel, Health, and Tech are visible. A large image of a woman in a blue coat is on the left with the text 'Last year'. A white cookie consent modal is centered over the page. The modal has the Sun logo at the top, followed by the heading 'You're in control of your cookies'. Below this is a paragraph explaining cookie usage. A list of three purposes for cookies is shown with expandable arrows: 'Store and/or access information on a device', 'Personalised advertising and content, advertising and content measurement, audience research and services development', and 'Actively scan device characteristics for identification'. At the bottom of the modal, there is a paragraph about accepting cookies and two buttons: 'Cookie Settings' and 'Accept Cookies'.

**THE Sun** UK Edition

News Sport Fabulous TV Showbiz Money Travel Health Tech

**You're in control of your cookies**

We and our [partners](#) use cookies and process personal data such as your IP address on this site. Some cookies are necessary to run the site and some are optional. Cookies are used to:

- Store and/or access information on a device
- Personalised advertising and content, advertising and content measurement, audience research and services development
- Actively scan device characteristics for identification

If you're okay with these purposes, click 'Accept Cookies' below; this will allow us to personalise your website experience. For more information or to change your cookie settings, click 'Cookie Settings'. You can withdraw your consent at any time by visiting Cookie Settings in the footer. To learn more, read our [Privacy and Cookie Policy](#). Vendor count: 462

[Cookie Settings](#) [Accept Cookies](#)

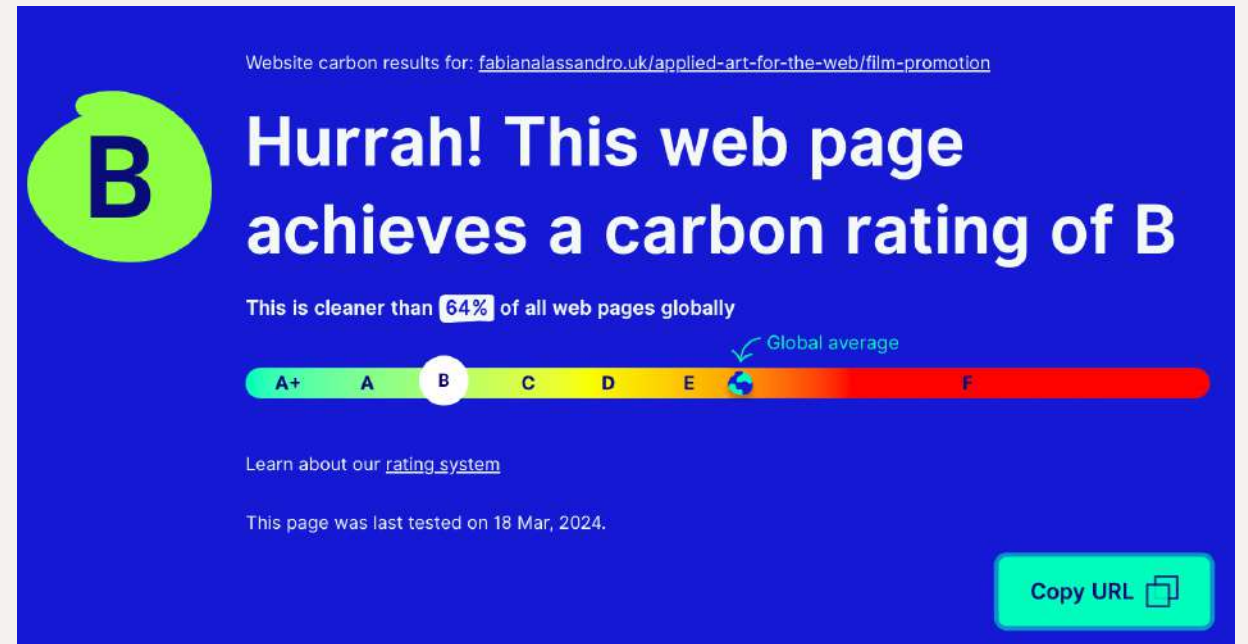
Platform	Size	Cookies?
Google Analytics	17KB	Yes
GA with GTM	75KB	Yes
Matomo	40KB	Yes
Minimal GA	1.5KB	Yes
Fathom	1.2KB	No
Plausible	<1KB	No

# Testing Tools and Techniques

# Website Carbon Calculator

Website Carbon Calculator the energy and emission of a web page we use the following data points:


- Data transfer over the wire
- Energy intensity of web data
- Energy source used by the data centre
- Carbon intensity of electricity
- Website traffic



# Beacon

- Digital Beacon is a useful tool for website analysis. It shows CO2 emissions, page size and many useful tips.
- It calculates the environmental impact of a web page, shows the breakdown and helps understand what measures can be taken to improve it.

[digitalbeacon.co](https://digitalbeacon.co)



<https://fabianalassandro.uk/applied-art-for-the-web/film-promotion/>

First visit

CO2 0.463g SIZE 1.46 MB

Return visit

CO2 0.026g SIZE 83.18 KB

Overall this web page has been graded C when it comes to its carbon footprint

This website is hosted using renewable energy or carbon offsets.

PAGE BREAKDOWN			
TYPE	REQUESTS	SIZE	CO2
Document	2	40.57 KB	0.013g
Script	7	1.06 MB	0.338g
Stylesheet	4	52.21 KB	0.016g
Image	6	198.16 KB	0.061g
Font	5	69.67 KB	0.022g
XHR	4	42.6 KB	0.013g
Preflight	2	1.03 KB	0.000g
Total		1.46 MB	0.463g

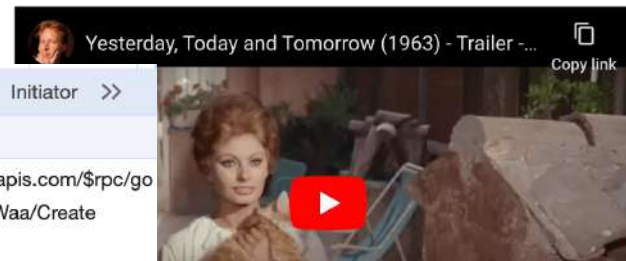


# DevTools Network

To check how many resources our webpage download every time we request the page we can use the DevTools Network tab.



WATCH THE TRAILER



Name	Headers	Payload	Preview	Response	Initiator	>>
Create	▼ General					
XsJ9LRbjUf4?rel=0&showinfo=0	Request URL: https://jnn-pa.googleapis.com/\$rpc/google.internal.waa.v1.Waa/Create					
log?format=json&hasfast=true&authuser=0	Request Method: POST					
log?format=json&hasfast=true&authuser=0	Status Code: 200 OK					
log?format=json&hasfast=true&authuser=0	Remote Address: 172.217.16.234:443					
log?format=json&hasfast=true&authuser=0	Referrer Policy: strict-origin-when-cross-origin					
GenerateIT	▼ Response Headers					
collect?v=1&_v=j101&a=454823344&t=pa...	Access-Control-Allow-Origin: https://www.youtube-nocookie.com					
log_event?alt=json&key=AlzaSyAO_FJ2SI...						
log_event?alt=json&key=AlzaSyAO_FJ2SI...						
log_event?alt=json&key=AlzaSyAO_FJ2SI...						

Name	Status	Type	Initiator	Size	Time	Waterfall
Create	200	xhr	base.js:8074	41.9 kB	45 ms	
XsJ9LRbjUf4?rel=0&s...	200	docu...	film-promoti...	38.1 kB	76 ms	
log?format=json&hasf...	200	xhr	base.js:8074	152 B	48 ms	
log?format=json&hasf...	200	xhr	base.js:8074	152 B	49 ms	
log?format=json&hasf...	200	xhr	base.js:8074	152 B	52 ms	
GenerateIT	200	xhr	base.js:8074	133 B	107 ms	
collect?v=1&_v=j101&...	200	gif	analytics.js:22	55 B	9 ms	
log_event?alt=json&ke...	200	xhr	base.js:1978	50 B	47 ms	
log_event?alt=json&ke...	200	xhr	www-embe...	50 B	41 ms	
log_event?alt=json&ke...	200	xhr	base.js:1978	50 B	35 ms	
log_event?alt=json&ke...	200	xhr	base.js:1978	50 B	40 ms	
log_event?alt=json&ke...	200	xhr	www-embe...	50 B	105 ms	
collect?v=2&tid=G-1L...	204	ping	js?id=G-1L...	17 B	15 ms	
generate_204?d8xiGA	204	text/p...	VM1254:1	10 B	8 ms	
atr?ns=yt&el=embedd...	204	xhr	base.js:1978	0 B	Pending	

35 / 46 requests 80.9 kB / 169 kB transferred 4.3 MB / 4.6 MB resources Finish: 6.3 min



# PageSpeed Insights

PageSpeed Insights help us showing what are the resources that slow down our website and provide also practical solutions to improve the performance and therefore the carbon footprint of our webpages.



Performance



Accessibility



Best Practices



SEO



Performance

Values are estimated and may vary. The [performance score is calculated](#) directly from these metrics. [See calculator.](#)

▲ 0–49    ■ 50–89    ● 90–100

## METRICS

■ First Contentful Paint

2.5 s

▲ Total Blocking Time

2,180 ms

▲ Speed Index

6.3 s

■ Largest Contentful Paint

2.9 s

■ Cumulative Layout Shift

0.235



Metric Example

# In-class exercise

# Test and Improve your website: in-class exercise

Test and improve your film promotion website.

Use the tools and techniques we learned together to improve the performance of your website and make it more sustainable.

# Guidelines and Certificates

# Web Sustainability Guidelines (WSG)

The Web Sustainability Guidelines (WSG) 1.0, developed by W3C, offer a wide array of **recommendations** to design and develop websites and digital products more eco-friendly.

While still a work in progress and **not yet a formal standard**, it's a valuable resource for web professionals seeking to improve their website's efficiency and sustainability.

[Web Sustainability Guidelines \(WSG\) 1.0](#)

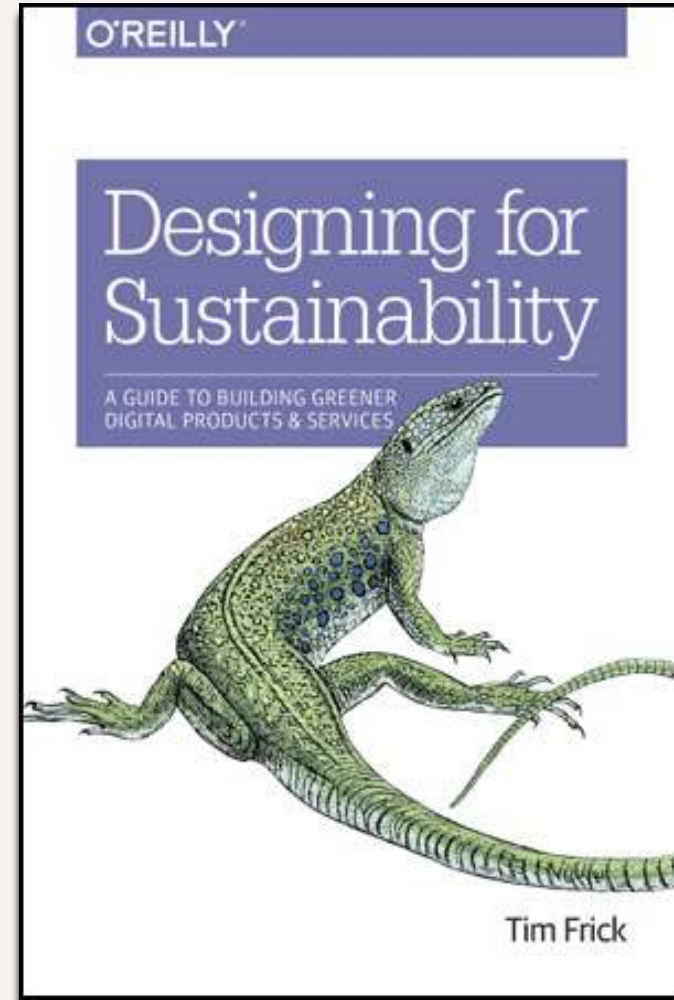
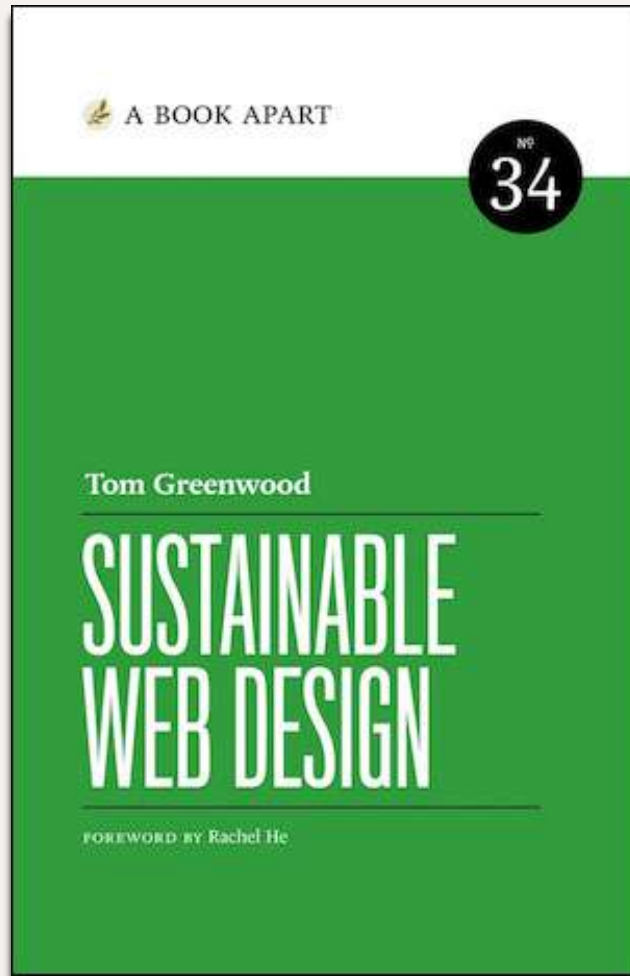
# B Corps

Certified B Corporations, or B Corps, are companies verified by B Lab to meet high standards of social and environmental performance, transparency, and accountability.



[What does the B Corp certification mean?](#)

# Books





# Resources

- [Sustainable Web Development Strategies Within An Organization](#), *Michelle Barker* – Smashing Magazine
- [20 ways to make your website more energy efficient](#) , *Tom Greenwood* – Wholegrain digital
- [A sustainable web for everyone](#), *Tom Greenwood* – State of the Browser [video]
- [Michelle Barker – Building a greener web](#) – All Day Hey! 2023 [video]
- [Understanding Sustainable Design](#), *Tim Frick* [video]

