

Connect, not collect

Making digital sustainability
standards discoverable with
carbon.txt

GREENWEB.ORG

Chris Adams

14.11.2025



Hello, I'm Chris!

My background:

Loco2 - Low CO2 Travel in Europe by train

A.M.E.E (Avoid Mass Extinction Engine) - CO2 calculation as an API

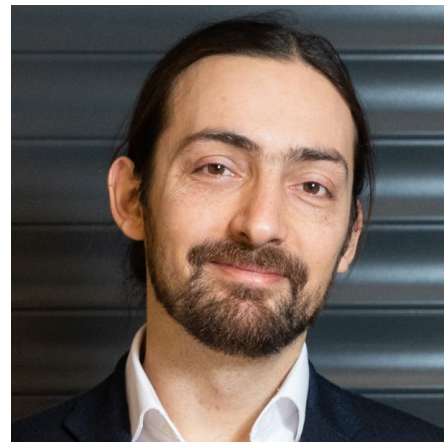
Green Software Foundation - policy working group co-chair, leading the new SCI-Web standard

Branch Magazine - contributor, co-founding editor

ClimateAction.tech - community organiser since 2018

Environment Variables podcast - host since 2022

Green Web Foundation - director of tech and policy (my day job)



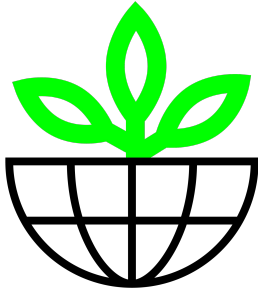
The Green Web Foundation is working towards a fossil-free internet by 2030.

The internet should be a global public good, and a tool for liberation. Healthy for the planet and for the people who use it.



What we'll cover

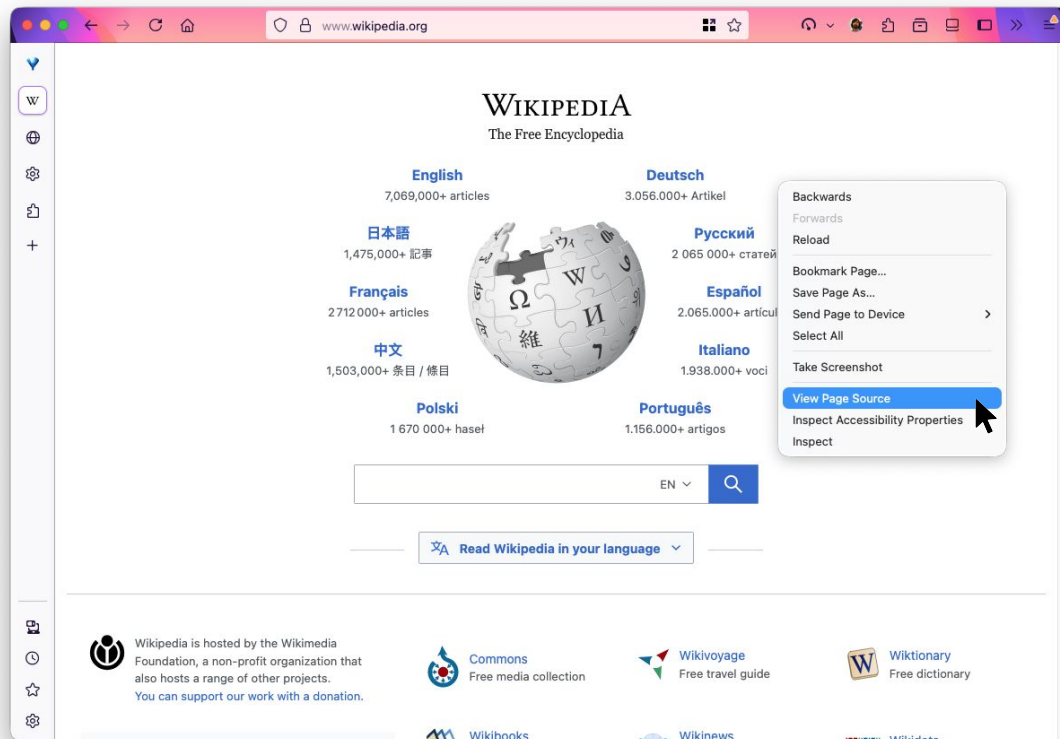
1. A key idea of the web - view source, and why I love it
2. What webby claims are
3. Applying webby claims to digital sustainability
4. The big idea behind our project, carbon.txt
5. Wrapping up



View source, and why I love the web

1

Have you ever done this?



*Every single web page you visited
contained the code showing you how it
was created. The entire internet became
a library of how-to guides on
programming*

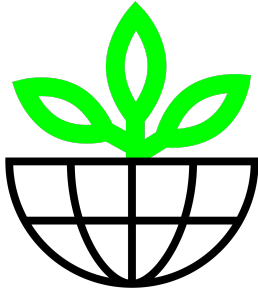
From Coders, by Clive Thompson



When you render the page, you demonstrate that your code is behaving the way you said it would.

You're backing up your claim.





Webby claims, and what they are

2

Security and HTTPS connections

Look for the padlock

Highlights that the connection is secure between your browser and the server you're connecting to.

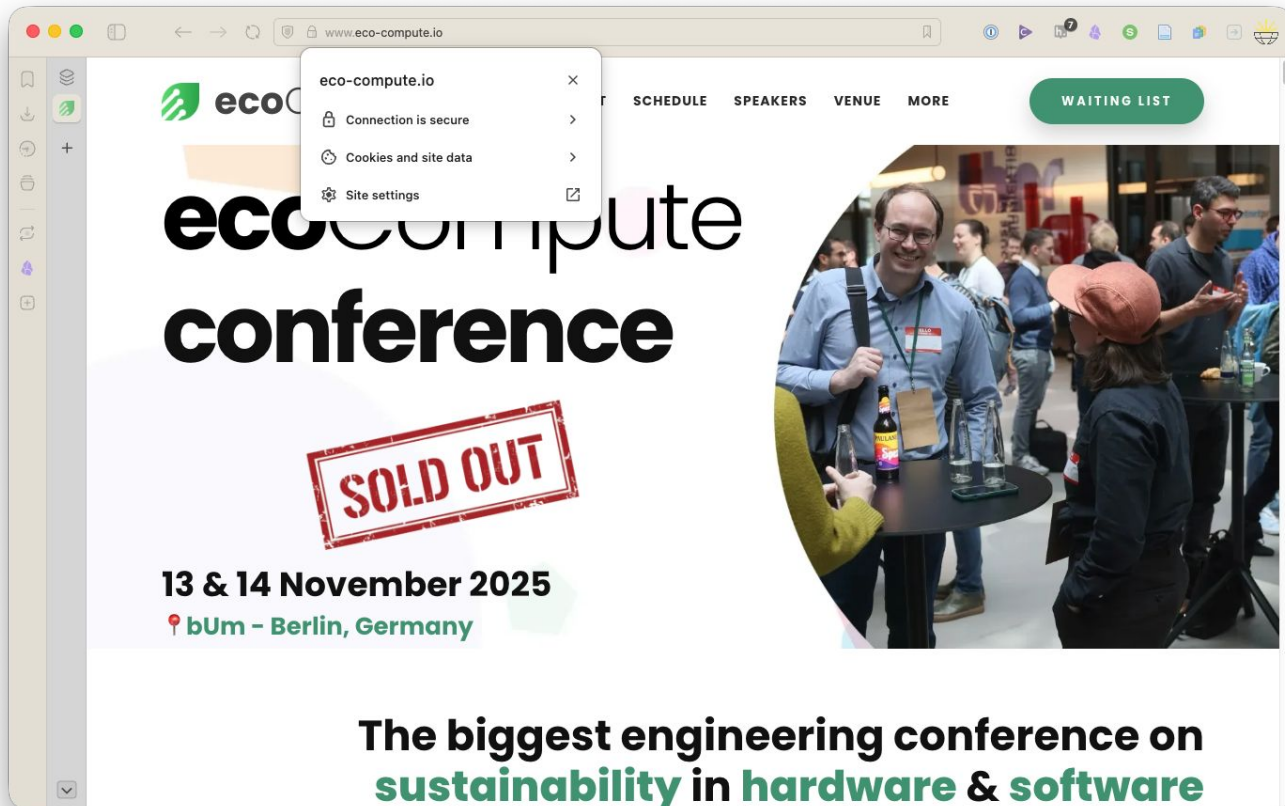
The claim:

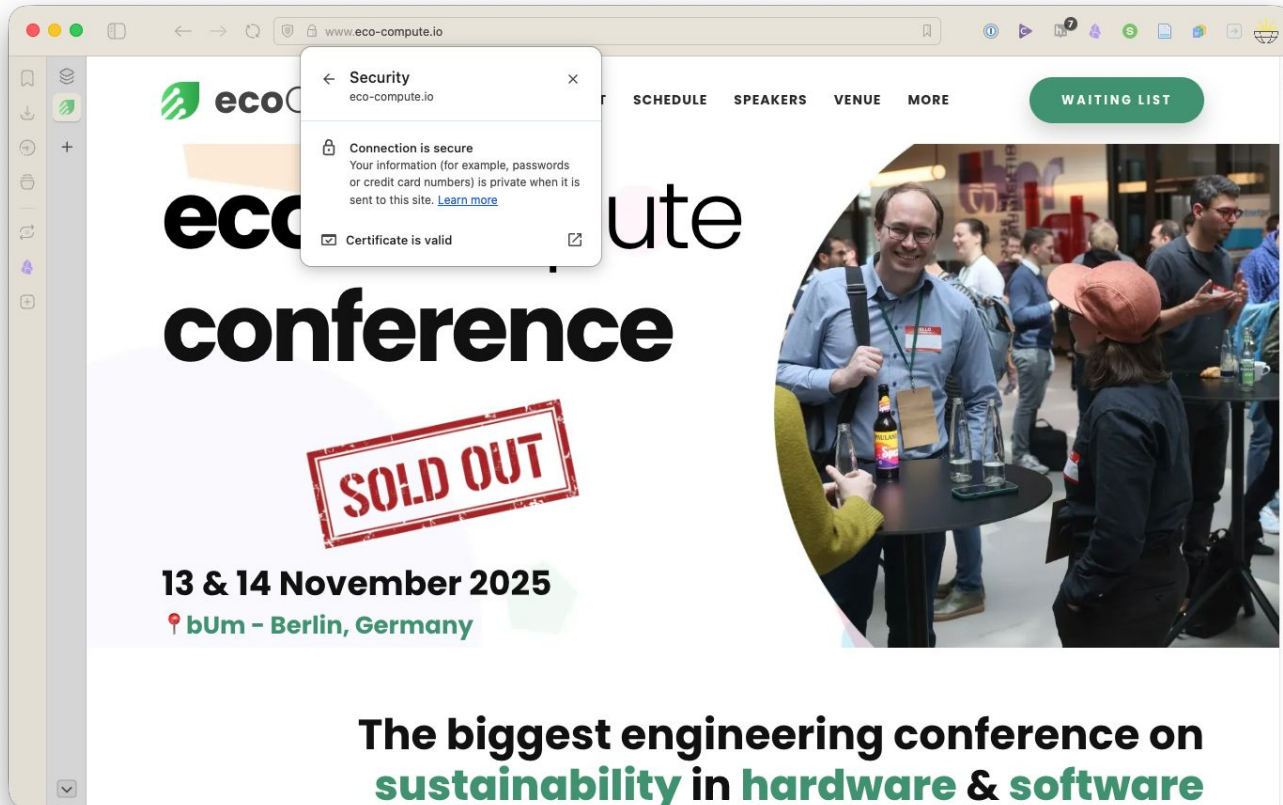
“The connection between your browser and this site is secure”

Backing it up:

Checking the padlock, and where the linked certificate comes from*

* yes, it's more complicated than this, but if there's no padlock, you're not connecting over HTTPS





ecoComp

ecoC confe

SO

13 & 14 Novem

bUm - Berlin, Ger

**The biggest engineering conference on
sustainability in hardware & software**

Certificate Viewer: www.eco-compute.io

General Details

Issued To

Common Name (CN)	www.eco-compute.io
Organisation (O)	<Not part of certificate>
Organisational Unit (OU)	<Not part of certificate>

Issued By

Common Name (CN)	R13
Organisation (O)	Let's Encrypt
Organisational Unit (OU)	<Not part of certificate>

Validity Period

Issued On	Tuesday 23 September 2025 at 16:16:08
Expires On	Monday 22 December 2025 at 15:16:07

SHA-256 Fingerprints

Certificate	f46b5fa43f44a3d140d1679ad656779d0a87149de5ddf2640f1d6325dd4993b7
Public key	0d073b9b73b4b0ee16e3f580e521c7b6c7aa20a48a764a758e1b31dff5043d90

MORE

WAITING LIST



Web Performance

Various metrics are now used to track performance of a website.

Examples:

First Contentful Paint - when the first element on a page is rendered

Total Blocking Time - broadly, how long a page spends loading before it can respond to user input

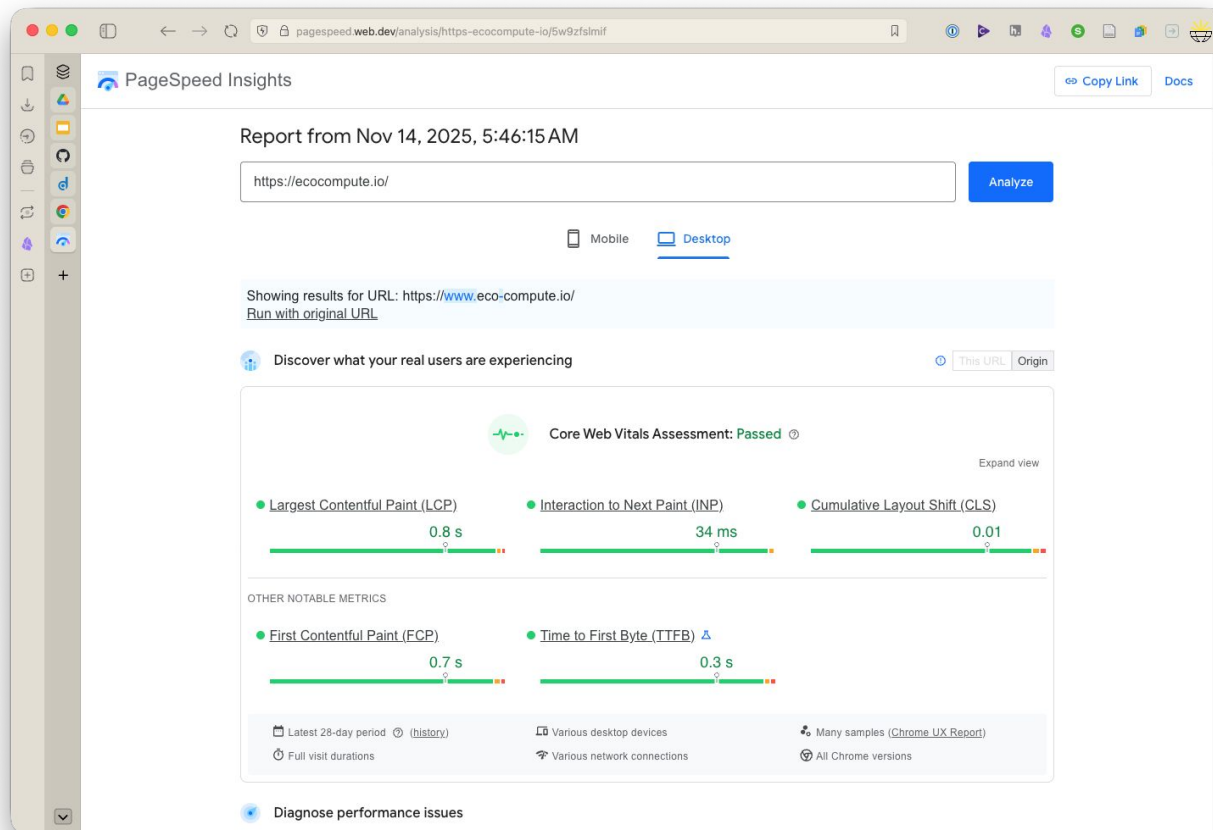
Speed Index - how quickly the layout is visually displayed

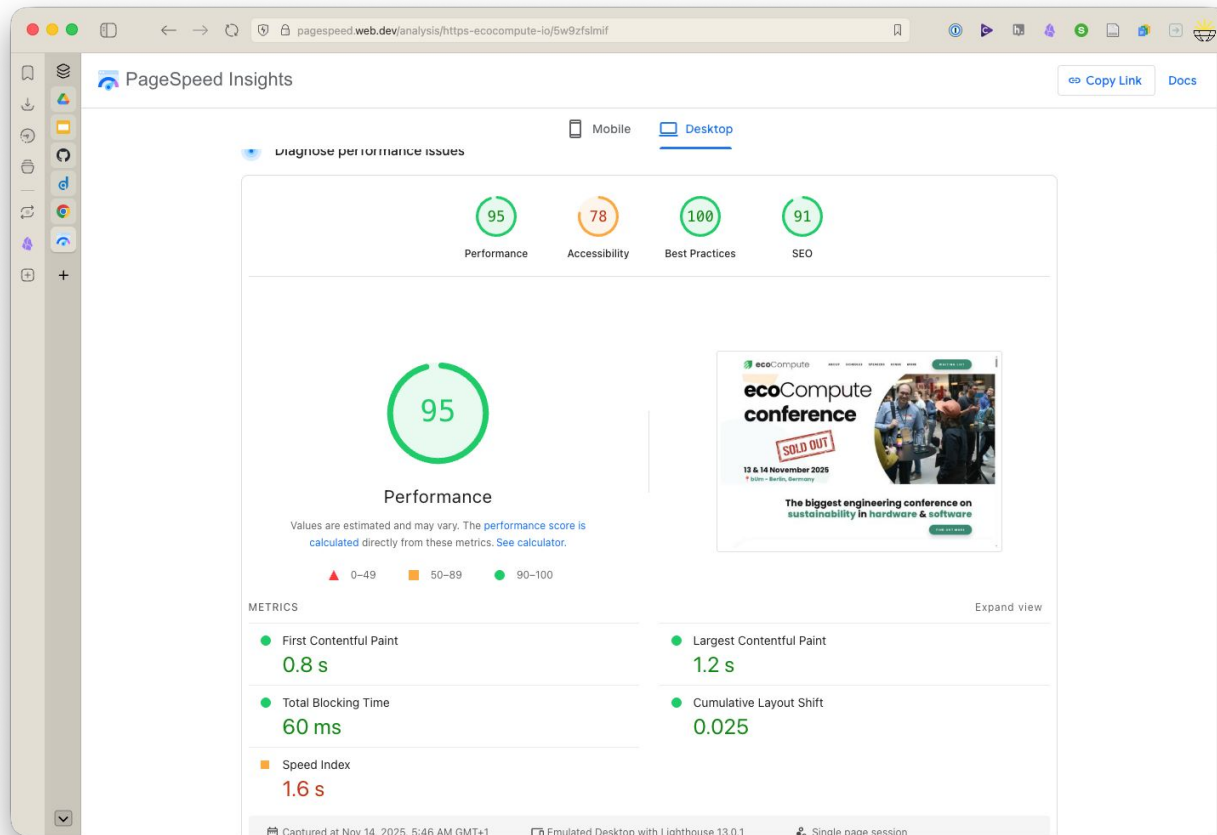
The claim:

“My site is fast loading.”

Backing it up:

Lighthouse score of at least 90, across 5 metrics.





Web accessibility

W3C Web Content Accessibility Guidelines - **WCAG**

A set of recommendations for people building websites to make them available to people with accessibility needs.

Public sector websites** in many countries now require an ***accessibility statement*** stating the level of accessibility they target, and how to report problems.

** the European Accessibility Act came into effect in June this year. You might need this for your site too now.

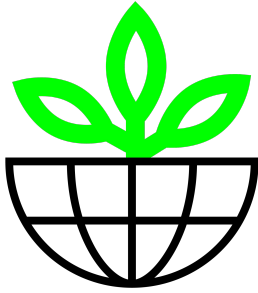
The claim:

“My site is wholly compliant
with Web Content
Accessibility Guidelines
version 2.2 AA standard”

Backing it up:

Site does *not fail** with accessibility
checking tools, like Deque’s AXE, the
Lighthouse checks we saw before, or
built-in browser checkers, etc

* it is more complicated than this, but if a site doesn’t
pass these automated checks, the claim *definitely* isn’t
in true



Applying webby claims to digital sustainability

3

The claim:

“Our websites run on green energy”*

* green is a loaded term. You can still be green and evil. We mean *annually matched with renewable energy certificates* for the most part. See our blog for more.

Backing it up:

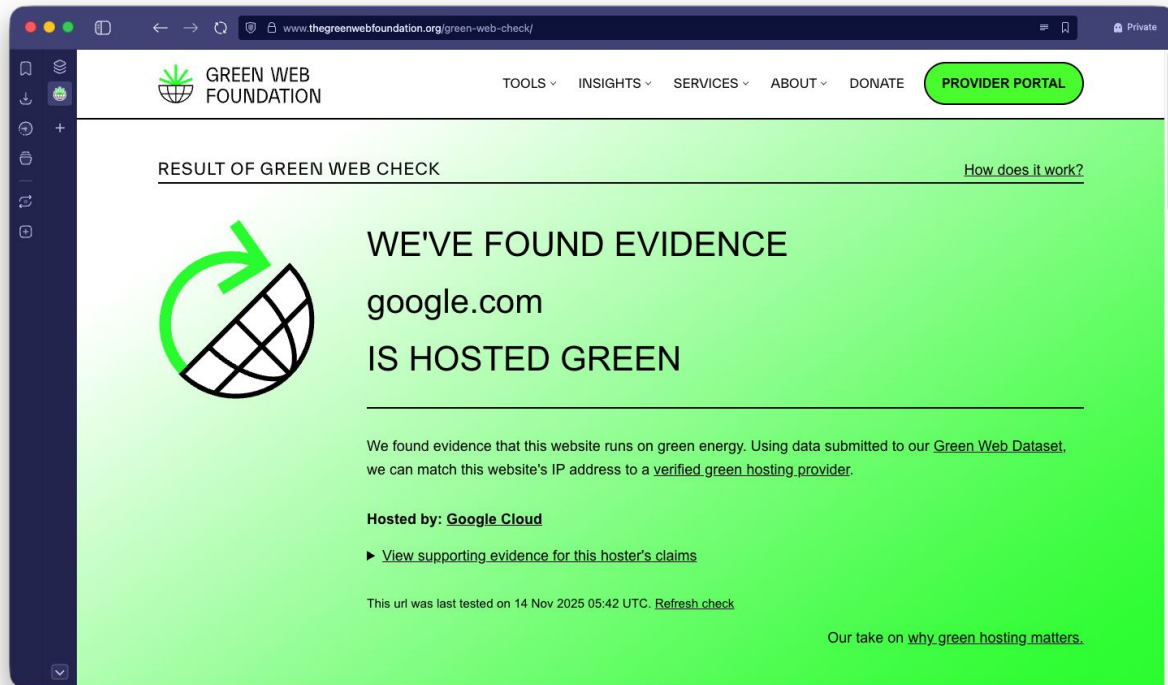
Finding out where the server is run.

Seeing what evidence the operator has shared.

Linking to evidence in the public domain.

This is broadly
how our Green
Web check
works.

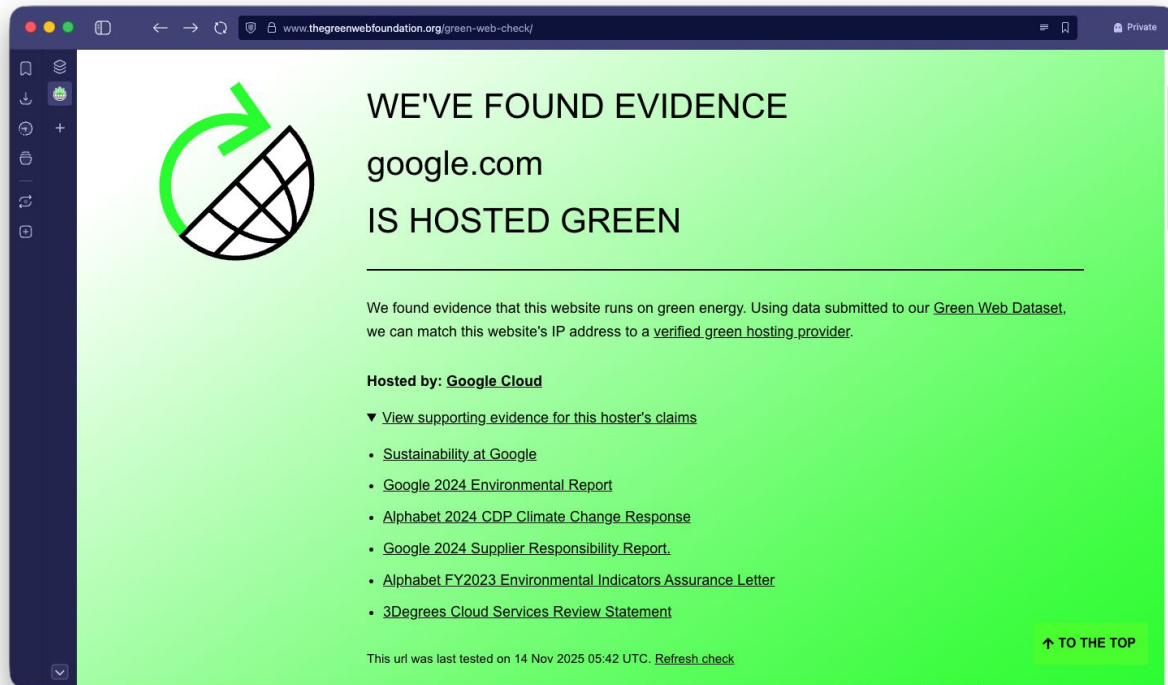
We link domains
to reporting
entities and the
public info they
share with us



Why do you have to trust us though?

Can the data be disclosed to make your own decisions?

We'll come back to this with carbon.txt



Did you see
Frank from
Nextcloud's talk
about Green
Gates and
energy
disclosure
earlier today?



The claim:

“Our software meets the
Blue Angel Standard for
transparency and
sustainability”

Backing it up:

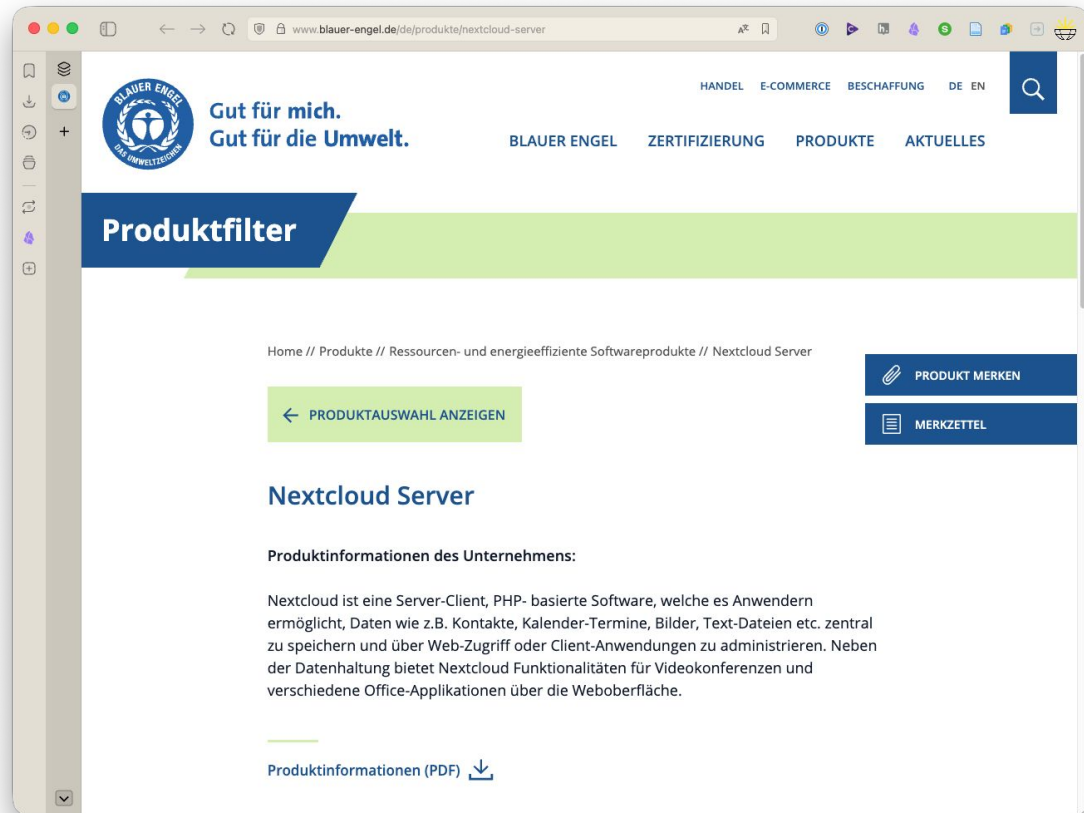
Pulling out the key claims and user
journeys.

Linking to the certification published
on Blauer Angel.

Linking to the CI?

The underlying details for Nextcloud's sustainability claims does exist.

But you need to know to look for it.



The claim:

“Our software has a
Software Carbon intensity
rating of 0.5g CO2 for the
most common user journey
of buying a widget”

Backing it up:

Making clear what the user journey
actually is.

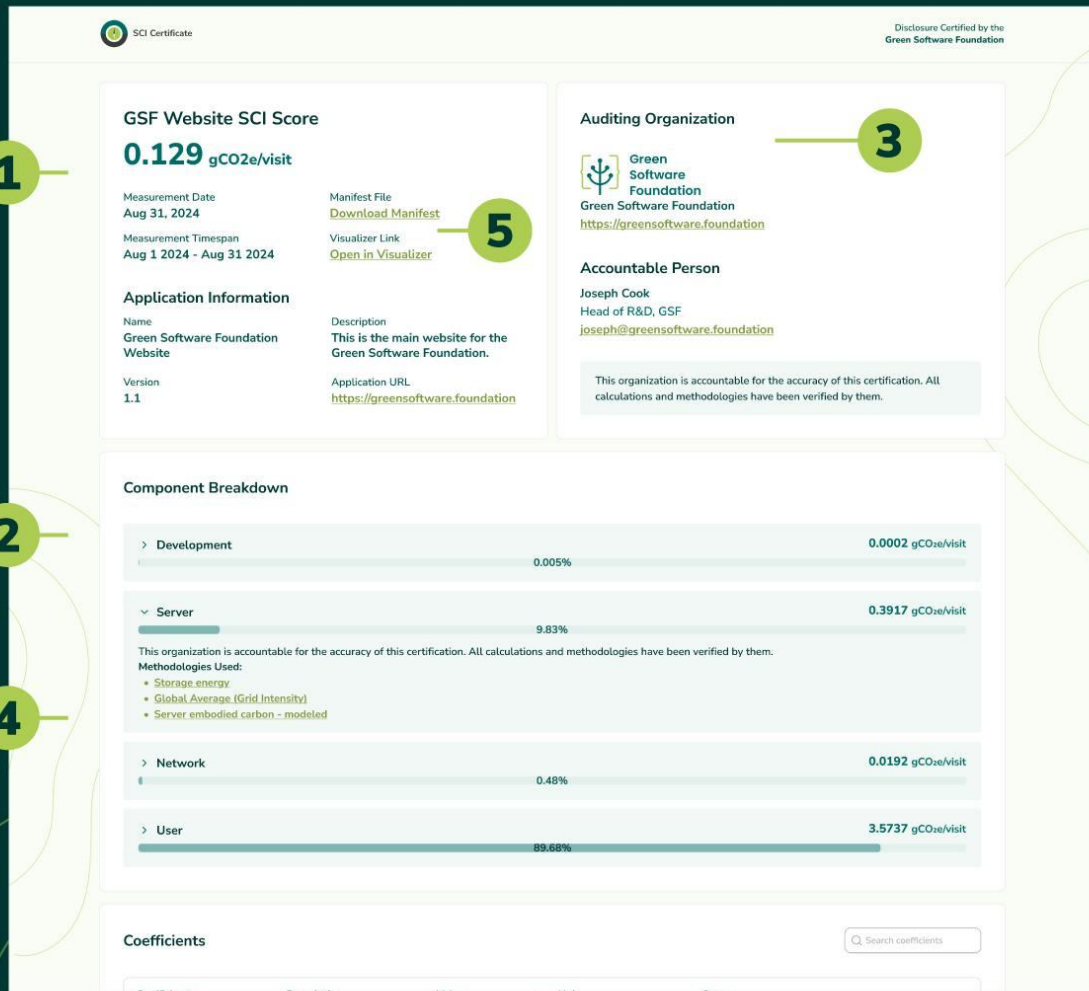
Linking to your work, available in the
public domain.

Linking to a hash if you can't share all
the data, so the original data can be
audited

SCI Certificate of Disclosure

Key sections:

1. Overall SCI score
2. Component breakdown
3. Auditing organization details
4. Methodology information
5. Impact Framework Manifest file download



The claim:

“Our software runs in green,
sustainable datacentres”

Backing it up:

Linking to a completed E.E.D submission
in Europe. For Germany, the EnEfG
(Energy Efficiency Law in Germany)



Top tip: Differentiate from your
competitors by *actually following the law*
- you're supposed to do this anyway if
you run a data centre above a certain
size.

Article 12(1) on data centres

Owners and operators of data centres on EU territory with an installed IT power demand of at least 500kW to *make publicly available*:



Name of the data centre, owner and operators
date of entry into operation and the municipality where
the data centre is based



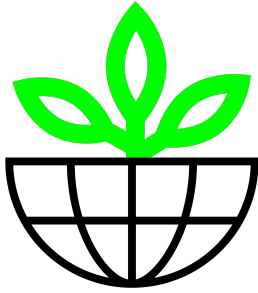
Floor area of data centre, installed power, annual
incoming and outgoing data traffic, amount of data
stored and processed



The performance of the data centre during the last full
calendar year (energy consumption, power utilisation,
temperature set points, waste heat utilisation, water
usage and use of renewable energy)

(except information subject to national and EU laws protecting
trade and business secrets and confidentiality)





The big idea behind carbon.txt

4

The core idea

`/carbon.txt*` is a single place to look on any domain for machine-readable sustainability claims and data for that organisation.



`https://greenweb.org/carbon.txt`



Inspired by existing concepts like `/robots.txt`

* Yes, we support `.well-known/carbon.txt` too

Extendable syntax, linked validation

- Started with a base validator, and plugin architecture from the start.
- First plugin was for parsing annual CSRD disclosures 🦴
- We rely on data following the ESRS taxonomy (i.e. European Sustainability Reporting Standards), in reports formatted as ESEF files (xhtml files, basically)
- All open source (Apache 2), written in Python, works as a HTTP server, a python library and a CLI, for use in data pipelines and your own systems.
- Docs and more on <https://developers.greenweb.org/carbon-txt/>

Tools to play with

Find at: <https://carbontxt.org/tools>



File Builder

Create a carbon.txt file for your organisation.



Validator

Check the syntax of a carbon.txt file and view its content in a human-readable format.

Why start with the CSRD? Part of a trend.

“Show us you track emissions, and share this info with society”



Corporate Sustainability Reporting Directive (CSRD)

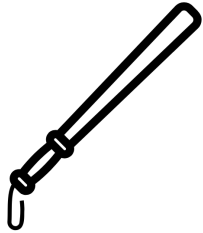


Climate Corporate Data Accountability Act (CCDAA)

CSRD: Carrots AND sticks

Argument

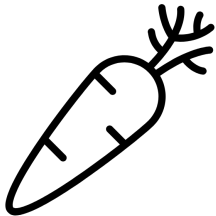
Consequences



Created by Darwin Mulya
from Noun Project

**Report because
it's the law.**

Large fines, and jail time if
you don't play ball, or say
untrue things.



Created by Cherry
from Noun Project

**Report to help
raise money.**

Missing out on cheap
green finance to grow
your business.

Companies share shiny ESG reports all the time.

What if they had actually useful, linked, comparable information in them?

Inline Viewer YFOY5B0IB8SM0ZFG9G81-2024-12-31-T01

Document summary

Fact Summary

Hidden facts 0
Total facts 768

Tag Summary

Namespace	Concepts	Dimensions	Members	Total
uk-aurep	3 (1 %)	0 (0 %)	0 (0 %)	3 (1 %)
avi	30 (12 %)	0 (0 %)	3 (13 %)	33 (11 %)
uk-bus	10 (4 %)	4 (36 %)	4 (17 %)	18 (6 %)
uk-core	8 (3 %)	0 (0 %)	0 (0 %)	8 (3 %)
uk-direp	28 (11 %)	4 (36 %)	9 (38 %)	41 (14 %)
ifrs-full	181 (70 %)	3 (27 %)	8 (33 %)	192 (65 %)
Total	260 (100 %)	11 (100 %)	24 (100 %)	295 (100 %)

File Summary

Inline Documents

- YFOY5B0IB8SM0ZFG9G81-2024-12-31-
filings.xbrl.org 1.4.58

It takes Aviva

Aviva plc
Annual Report and
Accounts 2024

Linking
straight to a
disclosed
datapoint:

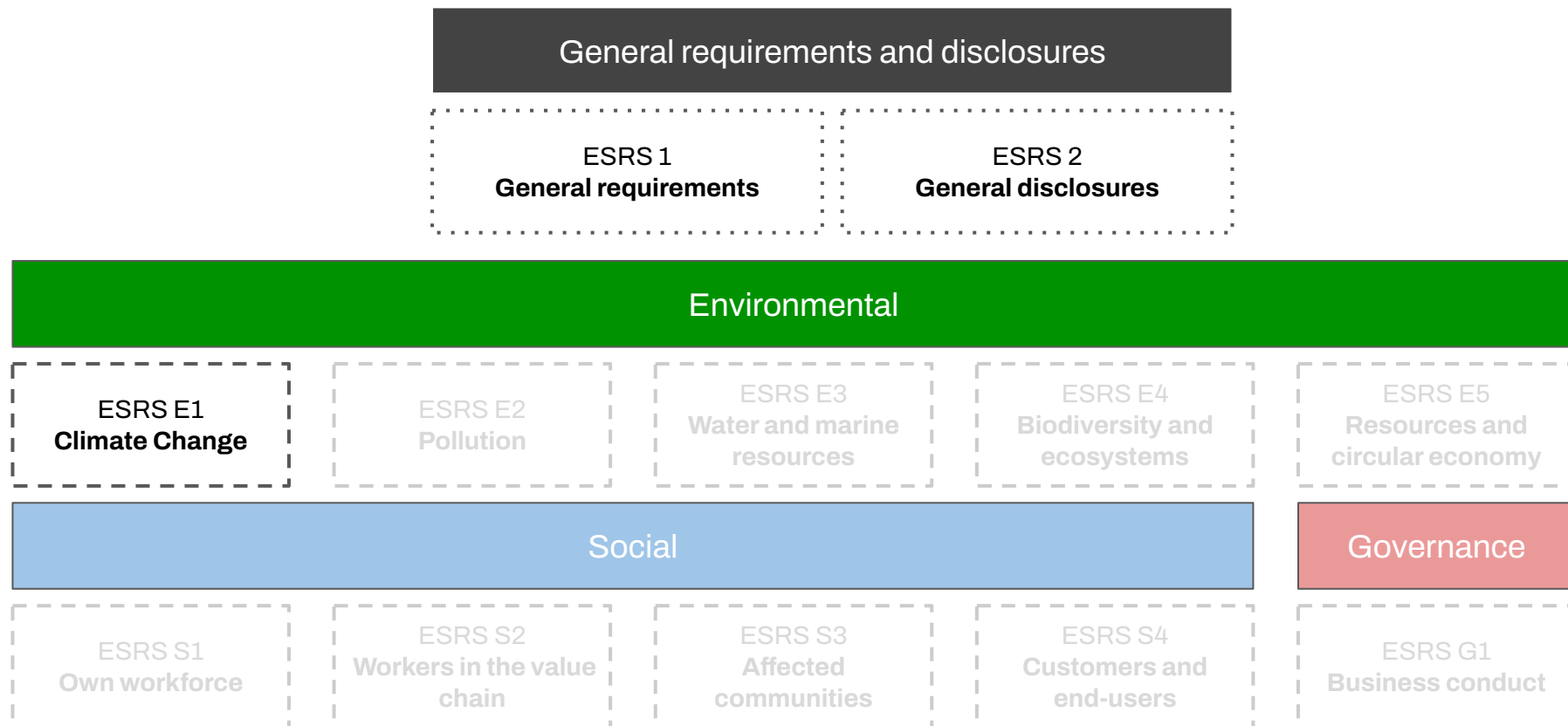
scope 2
carbon
emissions

Operational emissions		UK	Overseas as reported	2024 ⁽¹⁾	Total	UK	Overseas as reported	2024 ⁽¹⁾	Total
Emissions (market-based)									
Scope 1 (tCO ₂ e) ⁽²⁾		6,090	1,347	7,437	6,082	1,421	7,503		
Scope 2 (tCO ₂ e) ⁽³⁾		—	413	413	—	429	429		
Scope 3 (tCO ₂ e) ⁽⁴⁾		6,711	3,980	10,691	6,045	3,409	9,454		
Total market-based emissions (tCO₂e)		12,801	5,740	18,541	12,127	5,259	17,386		
Carbon offsets for which credits have been purchased and retired during the year (tCO₂e)		(2,801)	(5,740)	(8,541)	(12,127)	(5,259)	(17,386)		
Total net market-based emissions (tCO₂e)		—	—	—	—	—	—		
Intensity ratios (market-based)									
Scope 1 and 2 - market-based emissions (tCO₂e) / £ million Total Income⁽⁵⁾		0.36	0.33	0.35	0.41	0.37	0.40		
Total market-based emissions (tCO₂e) / £ million Total Income		0.76	1.09	0.84	0.82	1.06	0.88		
Total market-based emissions (tCO₂e) / employee		0.61	0.69	0.64	0.62	0.62	0.62		
Emissions (location-based)									
Scope 1 (tCO ₂ e) ⁽²⁾		6,090	1,347	7,437	6,082	1,421	7,503		
Scope 2 (tCO ₂ e) ⁽³⁾		4,839	2,521	7,360	5,204	2,669	7,873		
Scope 3 (tCO ₂ e) ⁽⁴⁾		6,711	3,980	10,691	6,045	3,409	9,454		
Total location-based (tCO₂e)		17,640	7,848	25,488	17,331	7,499	24,830		
Intensity ratios (location-based)									
Scope 1 and 2 - location-based emissions (tCO₂e) / £ million Total Income⁽⁵⁾		0.65	0.74	0.67	0.76	0.83	0.78		
Total location-based emissions (tCO₂e) / £ million Total Income		1.04	1.49	1.15	1.17	1.52	1.26		
Total location-based emissions (tCO₂e) / employee		0.85	0.95	0.88	0.89	0.89	0.89		
Energy consumption									
Energy consumption (MWh)		53,583	12,712	66,295	55,146	13,199	68,345		

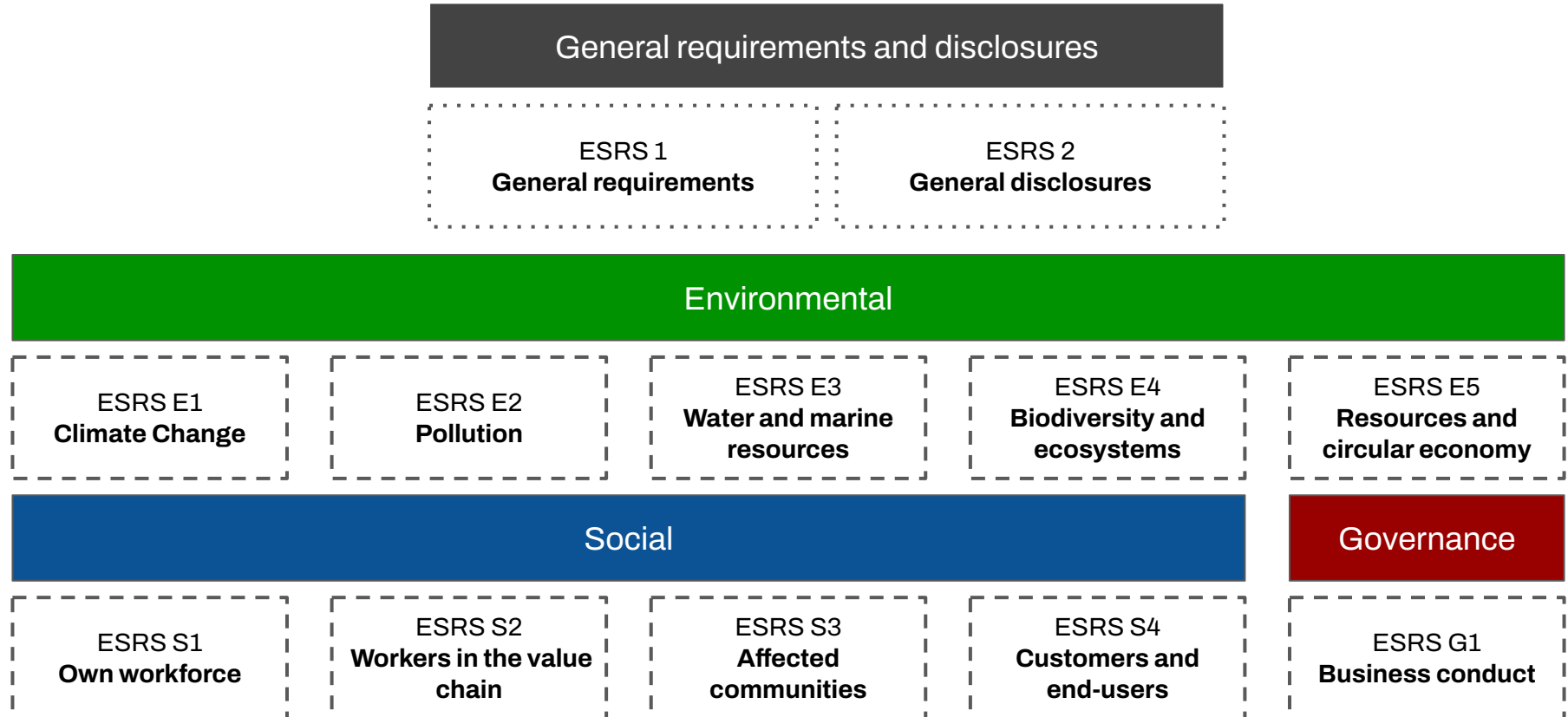
Footnotes:

- Market-based: A market-based method reflects emissions from electricity that companies have purposefully chosen.
- Scope 1: Natural gas, fugitive emissions (leakage of gases from air conditioning and refrigeration systems), oil, and company-owned cars.
- Scope 2: Electricity (location-based), district heating (location-based), district cooling (location-based and district cooling (location-based, market-based).
- Scope 3: Includes certain Scope 3 categories for fuel and energy-related activities (category 3), business travel (category 4) and grey fleet (private cars used for business) (category 4). Waste (category 5). Scope 3 emissions have increased compared to 2023 principally as a result of business travel increasing.
- All residual emissions have been offset. Since 2023 we have offset our residual carbon emissions from our Scope 2 market-based total at this takes account of the reduced emissions from our use of electricity from renewable sources. As at 1 February 2025, the 10,691 tonnes purchased in relation to the 2024 market-based emissions footprint were retired.
- Location-based: A location-based method reflects the average emissions intensity of grids on which energy consumption occurs.
- Includes Scopes 1 and 2 energy MWh within our occupied buildings.
- Partial reporting under employee commuting reflects homeworking emissions. These are reported separately from our Greenfield Energy and Carbon Reporting.
- This metric was subject to external independent reasonable assurance by DV in 2024 and PwC in 2023, where indicated. For the results of that assurance in 2024, see Aviva plc Climate-related Financial Disclosure 2024 Independent Assurance section and Aviva plc 2024 Reporting Criteria Independent Assurance section.

ESRS - European Sustainability Reporting Standards



ESRS - European Sustainability Reporting Standards



Omnibusification

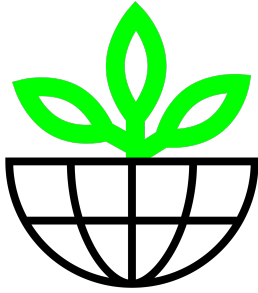
Noun:

When transparency in a sector is placed into limbo for years because of ~~regulatory capture by entrenched players~~ “*efficiency and competitiveness*”



What if we're not able to rely on the CSRD? Help us figure out a plan B.





Wrapping up

5

Key things I want you take away

- The web lets us make ***specific claims and link to data to back it up***. We should design with that in mind!
- **BUT** it's not enough to just disclose the data to back up these claims. Claims and data need to be ***discoverable***, to people and to robots.
- We are looking for people to work with on ***extending carbon.txt validation*** to support new claims in the field of digital sustainability. **Talk to us!**

Thanks!

This deck is online, with links and more

<https://thegreenweb.org/events/ecocompute-2025/>



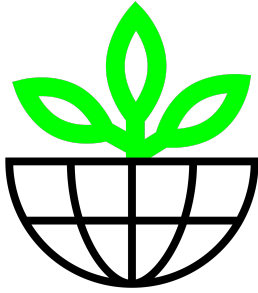
chris@greenweb.org

www.linkedin.com/in/mrchrisadams

mastodon.social/@mrchrisadams

<https://carbontxt.org>

P.S. Come to my table at the Innovation Cafe after lunch! I'm there for 3 hours 😊

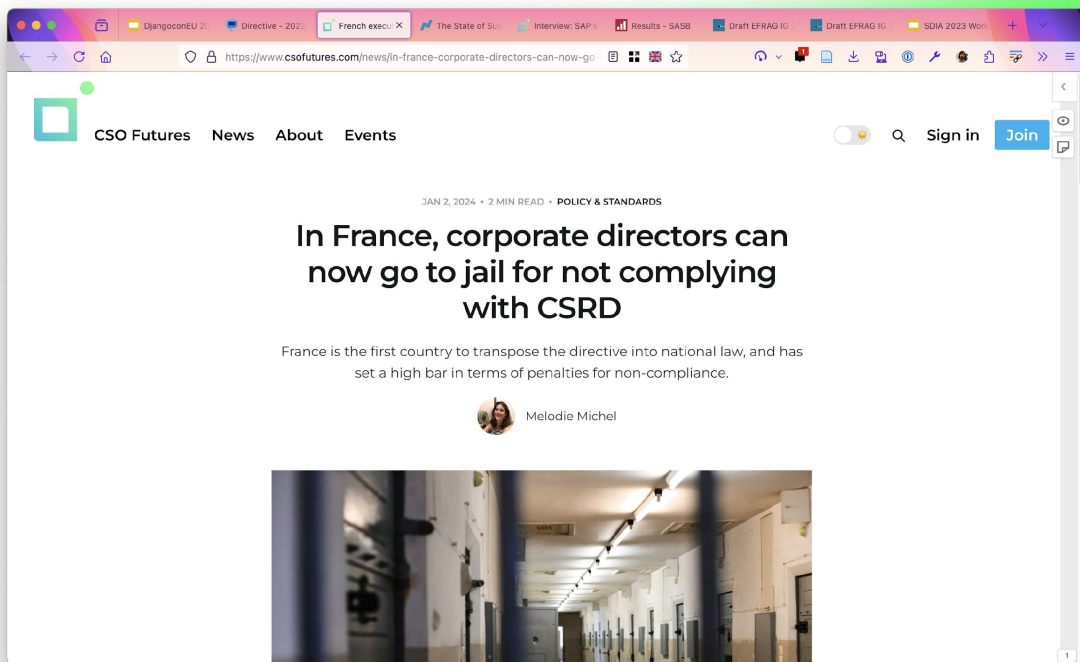


Appendix

Dropped slides

6

liberté égalité CSRDé



Jargon soup in the CSRD

CSRD reporting uses the same **XBRL** language as other structured filings by companies.

It uses a **XBRL Taxonomy** - a restricted catalogue of terms to refer to the kinds of data required.

For the **CSRD**, there is an **ESRS** (European Sustainability Reporting Standards) **taxonomy**.

Annual reporting in the should follow the **ESEF** (European Single Electronic Reporting File format),

The fancy ESEF thing is really just HTML in a trenchcoat

The European Single Electronic Reporting (ESEF) format is in reality an existing format called **iXBRL**.

XML

XML - extensible markup language. A common format designed for exchanging data

XBRL

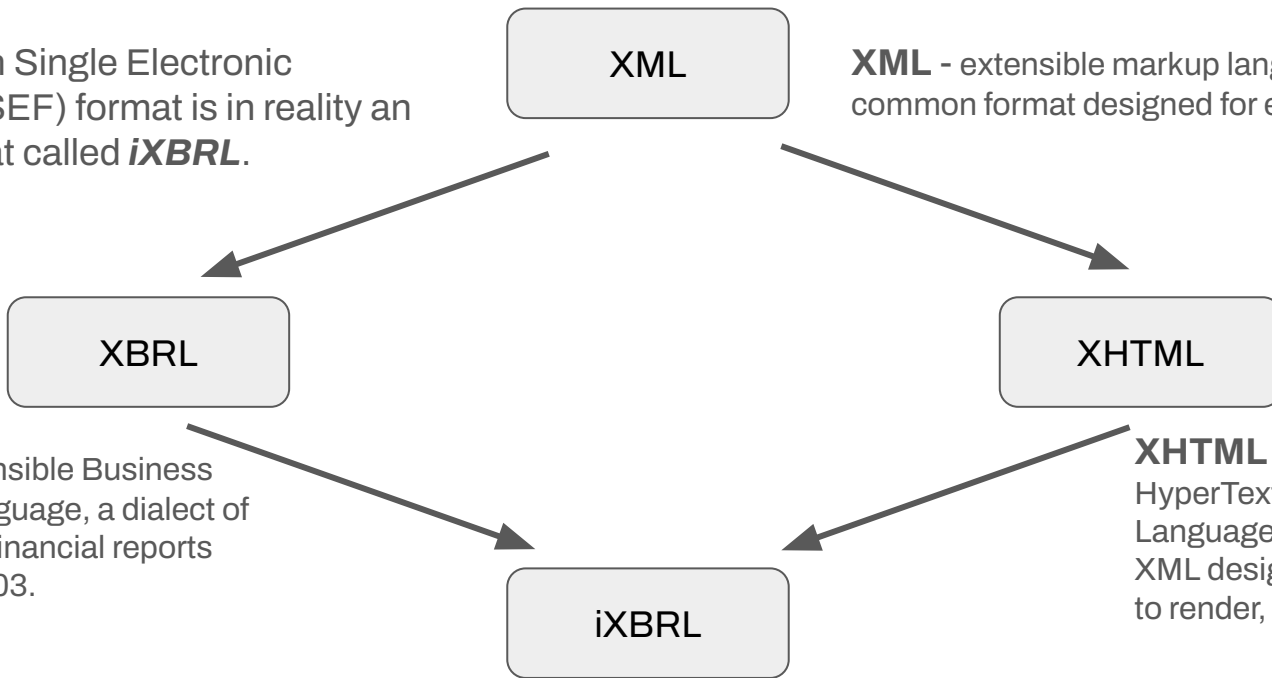
XBRL - Extensible Business Reporting Language, a dialect of XML used for financial reports released in 2003.

XHTML

XHTML - Extensible HyperText Markup Language - a dialect of XML designed for browsers to render, released in 2001.

iXBRL

iXBRL - inline XBRL. An XHTML document with XBRL metadata embedded. Widespread use from 2010, by the UK, EU and USA.



The SEC database in the USA, EDGAR, also uses this XBRL thing.

It has an official validator and renderer, with guidance on how to navigate errors. As soon as your submission is validated, it goes into a public RSS feed of all filings.

The screenshot shows the 'XBRL Validation and Rendering' page on the SEC.gov website. The browser's address bar displays 'https://www.sec.gov/data-research/xbrl-validation-rendering'. The page header includes the SEC logo, the text 'U.S. Securities and Exchange Commission', and navigation links for 'Newsroom', 'Investors', 'Small Businesses', and 'Whistleblowers'. A search bar is located on the right. Below the header, a navigation menu lists 'Search Filings', 'Submit Filings', 'Data & Research', 'Rules, Enforcement, & Compliance', 'Securities Topics', and 'About'. A 'Submit a Tip or Complaint' button is also present. The left sidebar contains a list of links under the 'DATA & RESEARCH' heading, with 'XBRL Validation and Rendering' highlighted in green. The main content area features the title 'XBRL Validation and Rendering' and a 'Copy Link' button. The text explains that the EDGAR® Renderer/Previewer is used for validating XBRL submissions and creating human-readable renderings. It mentions that the version of the EDGAR Renderer/Previewer used by the SEC is freely available as an open source standalone program. A section titled 'The executable and source code are available for download here:' lists 'EDGAR Renderer and Inline XBRL Viewer' as an external website. Below this, it states that the Renderer/Previewer shows how an XBRL submission will appear on the SEC's website once submitted via EDGAR, and displays any error and warning messages. It also provides a link to 'Question A.3' for details about the effect of XBRL errors and warnings on submission acceptance. A section titled 'A complete list of the errors and warnings are available here:' lists 'Validation Errors' and 'Validation Warnings'. The page footer indicates 'Last Reviewed or Updated: July 2, 2024'.

SEC.gov | XBRL Validation and Rendering

https://www.sec.gov/data-research/xbrl-validation-rendering

An official website of the United States government [Here's how you know](#)

U.S. Securities and Exchange Commission

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DATA & RESEARCH

Data Research and Reports

Data Resources

Data Visualizations

Final Data Quality Assurance Guidelines

Financial Statement and Notes Data Sets

IFRS - XBRL Custom Tags Trend for 2021-2023

Inline XBRL

Interactive Data Public Test Suite

SEC & Markets Data

Structured Data

Structured Disclosure RSS Feeds

Taxonomies

U.S. GAAP - XBRL Custom Tags Trend for 2021-2023

XBRL Glossary of Terms

XBRL Validation and Rendering

Investment Management Data

Home / Data and Research / XBRL Validation and Rendering

Copy Link

XBRL Validation and Rendering

The EDGAR® Renderer/Previewer is used to both validate XBRL submissions to EDGAR and to create human-readable renderings of XBRL data that can be viewed on the EDGAR website.

To assist filers and other users of XBRL data, the version of the EDGAR Renderer/Previewer used by the SEC is freely available as an open source standalone program and may be included within other software packages.

The executable and source code are available for download here:

- EDGAR Renderer and Inline XBRL Viewer (external website)

The Renderer/Previewer shows how an XBRL submission will appear on the SEC's website once submitted via EDGAR, and it displays any error and warning messages that will be seen when filing in EDGAR.

For details about the effect of XBRL errors and warnings on submission acceptance, please see [Question A.3](#).

A complete list of the errors and warnings are available here:

- [Validation Errors](#)
- [Validation Warnings](#)

Last Reviewed or Updated: July 2, 2024