

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

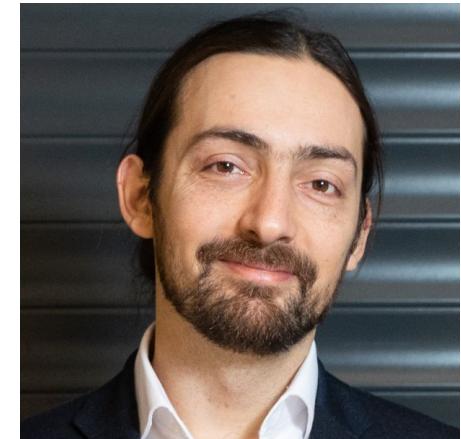
Green Software Foundation - policy working group co-chair, leading the new SCI-Web standard

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)



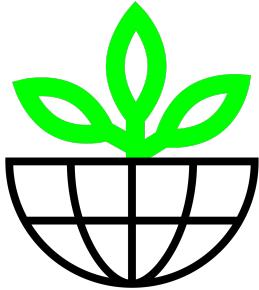
The Green Web Foundation is working towards a fossil-free internet by 2030.

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

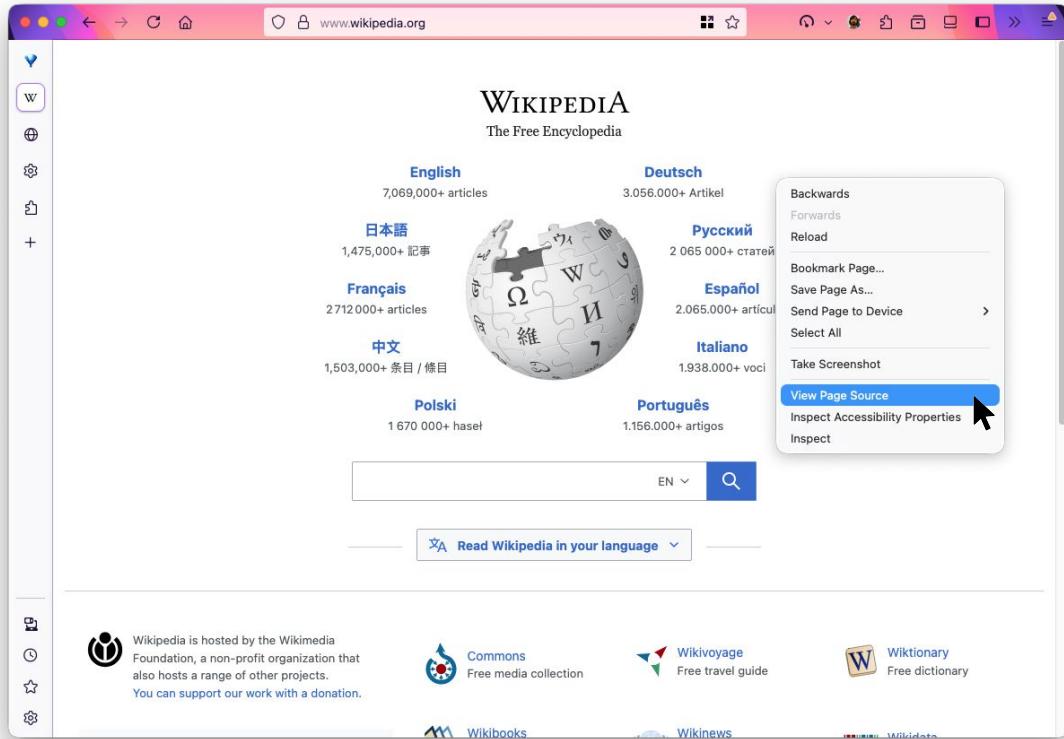
1. A key idea of the web - view source, and why I love it
 2. What webby claims are
 3. Applying webby claims to digital sustainability
 4. The big idea behind our project, carbon.txt
 5. Wrapping up
-



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

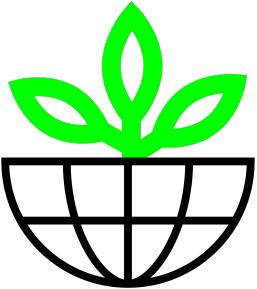
From Coders, by Clive Thompson



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

The screenshot shows a web browser window for the eco-compute conference website (www.eco-compute.io). A security lock icon and the text "Connection is secure" are visible in the top left corner of the browser's address bar. The main content area features the eco-compute logo and the text "eco-compute conference". Below this, a large red "SOLD OUT" stamp is overlaid on the text "13 & 14 November 2025" and "bUm - Berlin, Germany". At the bottom, a bold statement reads "The biggest engineering conference on sustainability in hardware & software". A circular inset image in the top right shows several people at a booth, with one man in a blue shirt and glasses smiling. The browser's sidebar on the left contains various icons for file operations like copy, paste, and refresh.

eco-compute conference

SOLD OUT

13 & 14 November 2025

bUm - Berlin, Germany

The biggest engineering conference on sustainability in hardware & software

The screenshot shows a web browser window for the website www.eco-compute.io. A security certificate dialog box is open, stating "Connection is secure" and "Certificate is valid". The main page features a large "ecocompute conference" logo and a prominent red "SOLD OUT" stamp. Below the stamp, the event details are listed: "13 & 14 November 2025" and "bUm - Berlin, Germany". A circular inset image shows attendees at a networking event. At the bottom, a bold statement reads: "The biggest engineering conference on sustainability in hardware & software".

ecocompute conference

SOLD OUT

13 & 14 November 2025

bUm - Berlin, Germany

The biggest engineering conference on sustainability in hardware & software

The screenshot shows a web browser window with the URL www.eco-compute.io. A certificate viewer overlay is displayed over the main content. The main page features the ecoCompute logo, a large 'ecoC' and 'conf' text, a red stamp-like graphic with 'SO', and event details: '13 & 14 November' and 'bUm - Berlin, Germany'. The certificate viewer has tabs for 'General' and 'Details'. The 'General' tab shows:

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	f46b5fa43f44a3d140d1679ad656779d0a87149de5ddf2640f1d6 325dd4993b7
Public key	0d073b9b73b4b0ee16e3f580e521c7b6c7aa20a48a764a758e1b 31dff5043d90

MORE **WAITING LIST**

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

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.

Report from Nov 14, 2025, 5:46:15 AM

Showing results for URL: <https://www.eco-compute.io/>
[Run with original URL](#)

Discover what your real users are experiencing

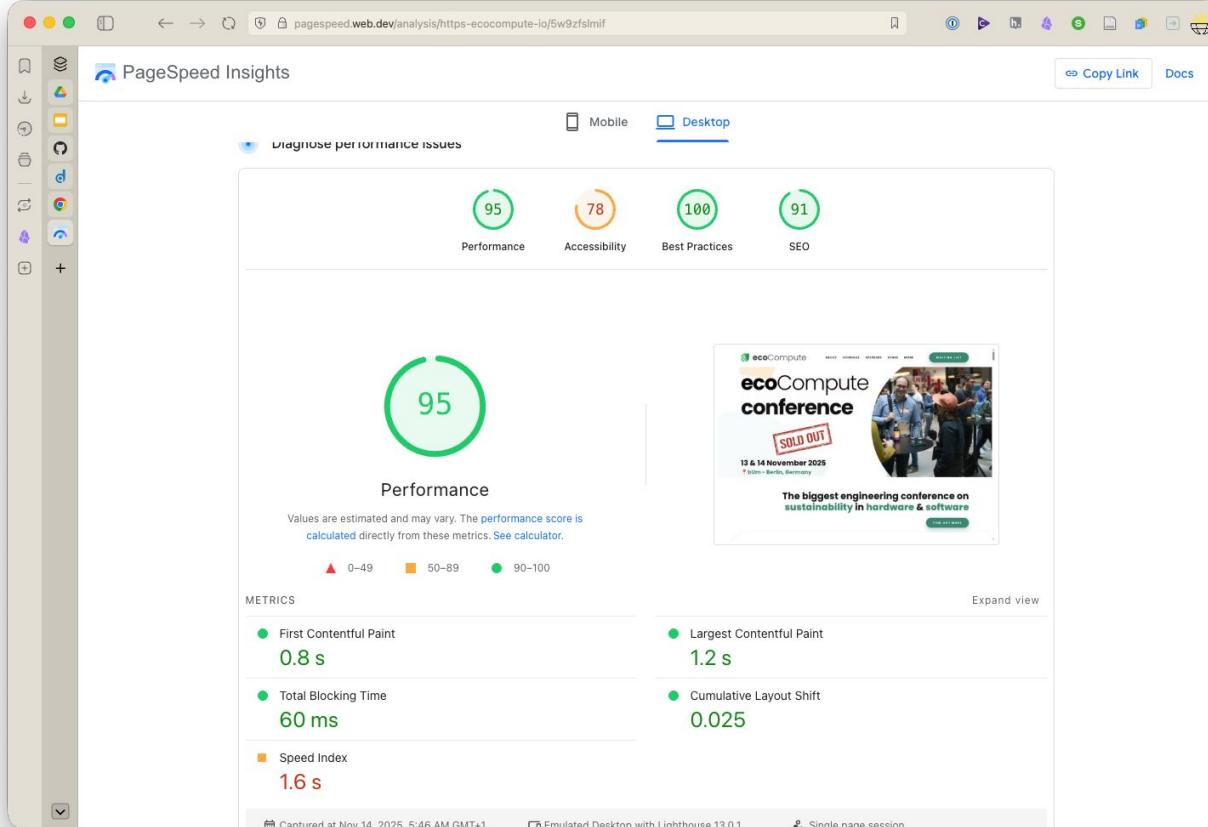
Core Web Vitals Assessment: Passed

Metric	Value
Largest Contentful Paint (LCP)	0.8 s
Interaction to Next Paint (INP)	34 ms
Cumulative Layout Shift (CLS)	0.01

OTHER NOTABLE METRICS

Metric	Value
First Contentful Paint (FCP)	0.7 s
Time to First Byte (TTFB)	0.3 s

Diagnose performance issues



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

The screenshot shows a web browser window with the URL www.thegreenwebfoundation.org/green-web-check/. The page is titled "RESULT OF GREEN WEB CHECK". It features a large green circular icon with a white globe and a green arrow pointing right. To the right of the icon, the text reads: "WE'VE FOUND EVIDENCE" followed by "google.com" and "IS HOSTED GREEN". Below this, a paragraph states: "We found evidence that this website runs on green energy. Using data submitted to our [Green Web Dataset](#), we can match this website's IP address to a [verified green hosting provider](#)". A section titled "Hosted by: Google Cloud" includes a link "▶ [View supporting evidence for this hoster's claims](#)". At the bottom, it says "This url was last tested on 14 Nov 2025 05:42 UTC. [Refresh check](#)" and "Our take on [why green hosting matters](#)". The top navigation bar includes links for "TOOLS", "INSIGHTS", "SERVICES", "ABOUT", "DONATE", and a "PROVIDER PORTAL" button.

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

WE'VE FOUND EVIDENCE
google.com
IS HOSTED GREEN

We found evidence that this website runs on green energy. Using data submitted to our [Green Web Dataset](#), we can match this website's IP address to a [verified green hosting provider](#).

Hosted by: [Google Cloud](#)

- ▼ [View supporting evidence for this hoster's claims](#)
- [Sustainability at Google](#)
- [Google 2024 Environmental Report](#)
- [Alphabet 2024 CDP Climate Change Response](#)
- [Google 2024 Supplier Responsibility Report](#)
- [Alphabet FY2023 Environmental Indicators Assurance Letter](#)
- [3Degrees Cloud Services Review Statement](#)

This url was last tested on 14 Nov 2025 05:42 UTC. [Refresh check](#)

↑ TO THE TOP

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:

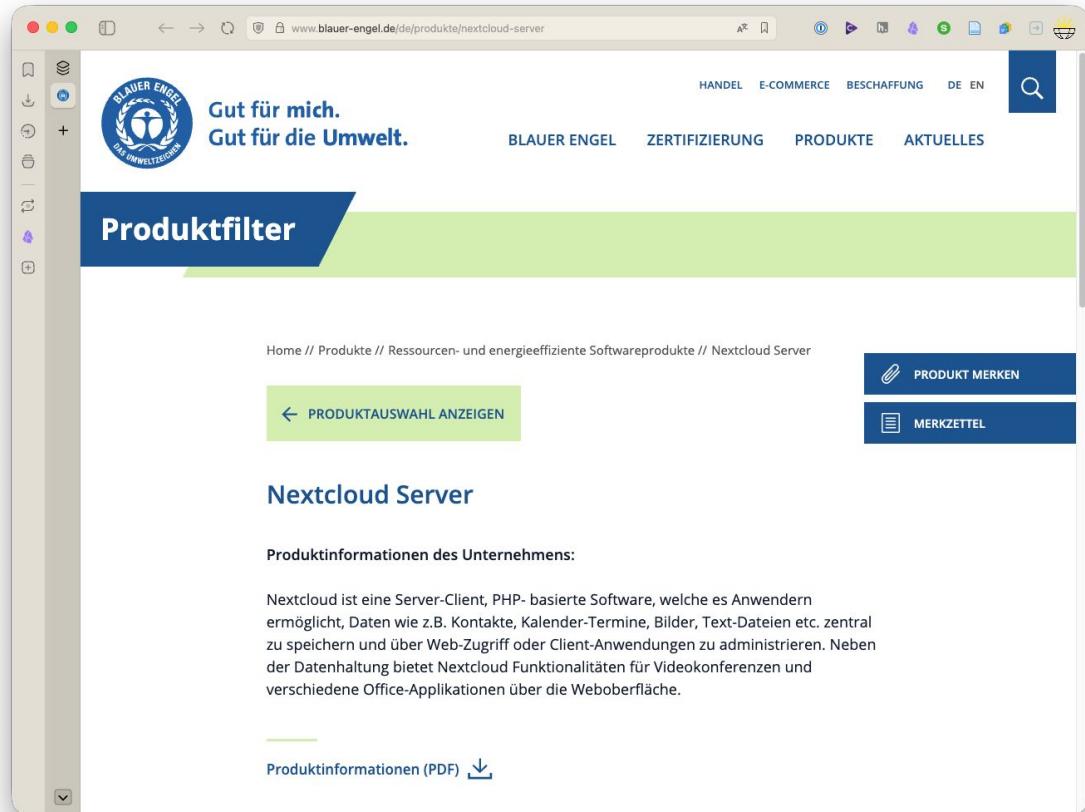
Pulling out the key claims and user journeys.

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.

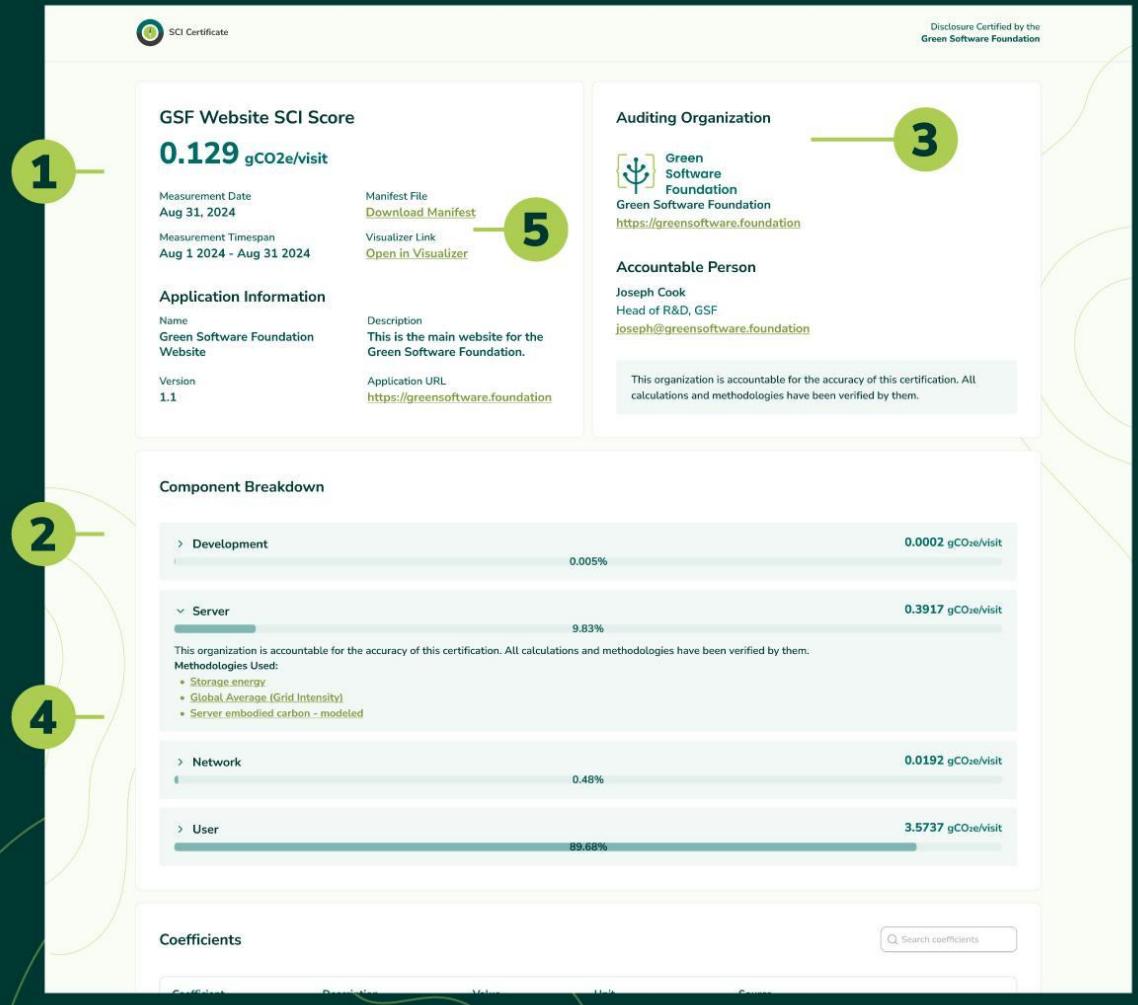
Linking to your work, available in the public domain.

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

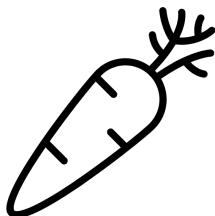


Created by Darwin Mulya
from Noun Project

Consequences

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?

The screenshot shows a web browser window titled "Inline Viewer" displaying the Aviva plc Annual Report and Accounts 2024. The page features a yellow header with the Aviva logo and a large yellow graphic element on the left side containing the text "It takes Aviva". Below this, there is a photograph of two people, a man and a woman, standing outside a restaurant named "GINO'S MODERN ITALIAN KITCHEN". The man is holding a broom. The right side of the screen shows a detailed breakdown of "Hidden facts" and "Total facts" in a table, and a "File Summary" section at the bottom.

Namespace	Concepts	Dimensions	Members	Total
uk-aurep	3 (1 %)	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: YF0Y5B0IB8SM0ZFG9G81-2024-12-31-filings.xbrl.org

Linking straight to a disclosed datapoint: scope 2 carbon emissions

Our Climate-related Financial Disclosures

Operational emissions	Overseas		2024 ^(a)		Overseas		2023 ^(a)	
	UK	Total	UK	Total	UK	Total	UK	Total
Emissions (market-based)								
Scope 1 (tCO ₂)	6,090	1,347	7,437	6,082	1,421	7,503		
Scope 2 (tCO ₂)	—	413	413	—	429	429		
Scope 3 (tCO ₂)	6,711	3,980	10,691	6,045	3,409	9,454		
Total market-based emissions (tCO₂)	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 (tCO₂)								
Total net market-based emissions (tCO₂)	—	—	—	—	—	—		
Intensity ratios (market-based)								
Scope 1 and 2 - market-based emissions (tCO ₂) / £ million Total income ^(c)	0.36	0.33	0.35	0.41	0.37	0.40		
Total market-based emissions (tCO₂) / £ million Total income	0.76	1.09	0.84	0.82	1.06	0.88		
Total market-based emissions (tCO₂) / employee	0.61	0.89	0.64	0.62	0.82	0.62		
Emissions (location-based)								
Scope 1 (tCO ₂)	6,090	1,347	7,437	6,082	1,421	7,503		
Scope 2 (tCO ₂)	4,839	2,521	7,380	5,204	2,669	7,873		
Scope 3 (tCO ₂)	6,711	3,980	10,691	6,045	3,409	9,454		
Total location-based (tCO₂)	17,640	7,848	25,488	17,331	7,499	24,830		
Intensity ratios (location-based)								
Scope 1 and 2 - location-based emissions (tCO ₂) / £ million Total income ^(c)	0.65	0.74	0.67	0.76	0.83	0.78		
Total location-based emissions (tCO₂) / £ million Total income	1.04	1.49	1.15	1.17	1.52	1.25		
Total location-based emissions (tCO₂) / 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:

- 1. Market-based: A market-based method reflects emissions from electricity that consumers have purposefully chosen.
- 2. Scope 1: Natural gas, fugitive emissions, leakage of gases from air conditioning and refrigeration systems, oil, and company-owned cars.
- 3. Scope 2: Electricity (location-based), district heating (location-based, market-based) and district cooling (location-based, market-based).
- 4. Scope 3: Includes certain Scope 3 categories for fuel and energy-related activities (category 9), business travel (category 8) and grey fleet (private cars used for business) (category 6), waste (category 8). Scope 3 emissions have increased compared to 2022 principally as a result of business travel increasing.
- 5. Net purchases of carbon credits purchased in relation to 2022 market-based emissions footprint were nil.
- 6. Location-based: A location-based method reflects the average emissions intensity of grids on which energy consumption occurs.
- 7. Includes Scopes 1 and 2 energy MWh used within our occupied buildings.
- 8. Partial reporting of employee commuting reflects homeworking emissions. These are reported separately from our Streamlined Energy and Carbon Reporting.
- (a) This metric was subject to external independent assurance by EY 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.

Operational and financed emissions

Scope 1 emissions relate to Aviva's operations excluding electricity usage. Scope 2 emissions relate to electricity usage of Aviva's operations. Scope 3 emissions include emissions from purchased goods and services related to categories 3, 5 and 6, as outlined below. For these categories the emissions do not include the counterparties' Scope 3 emissions. For category 15 financed emissions, Scope 1 and Scope 2 emissions are included and do not include investee Scope 3 emissions (Scope 3 of Scops).

Dimensions

- Reporting Region [Dimension]
- UK and Offshore
- Dual reporting type [Dimension]
- Market Based (REGO backed)

Properties

- Date: 1 Jan 2023 to 31 Dec 2023
- Fact Value: 429 t
- Accuracy: 1 ones
- Scale: Unscaled
- Change: No prior fact in this report
- Entity: [UK CRN] 2468666
- Concept: uk-direp:EmissionsInd...
Type: num:massListType

Included in operational carbon emissions

- Category 3 - Fuel and energy-related activities
- Category 5 - Waste generated in operations
- Category 6 - Business travel
- Category 7 - Employee commuting

Aviva does not engage in and distribution activities linked to these categories

- Category 4 - Upstream transport and distribution
- Category 8 - Upstream leased assets
- Category 9 - Downstream transportation and distribution
- Category 10 - Processing of sold goods
- Category 12 - End-of-life treatment of sold products
- Category 13 - Downstream leased assets
- Category 14 - Franchises

Included in Financed emissions

- Category 15 - Investments. Financed emission metrics include investee Scope 1 and Scope 2.

Not yet reported

- Category 1 - Purchased goods and services
- Category 2 - Capital goods
- Category 11 - Use of sold products

Anchoring

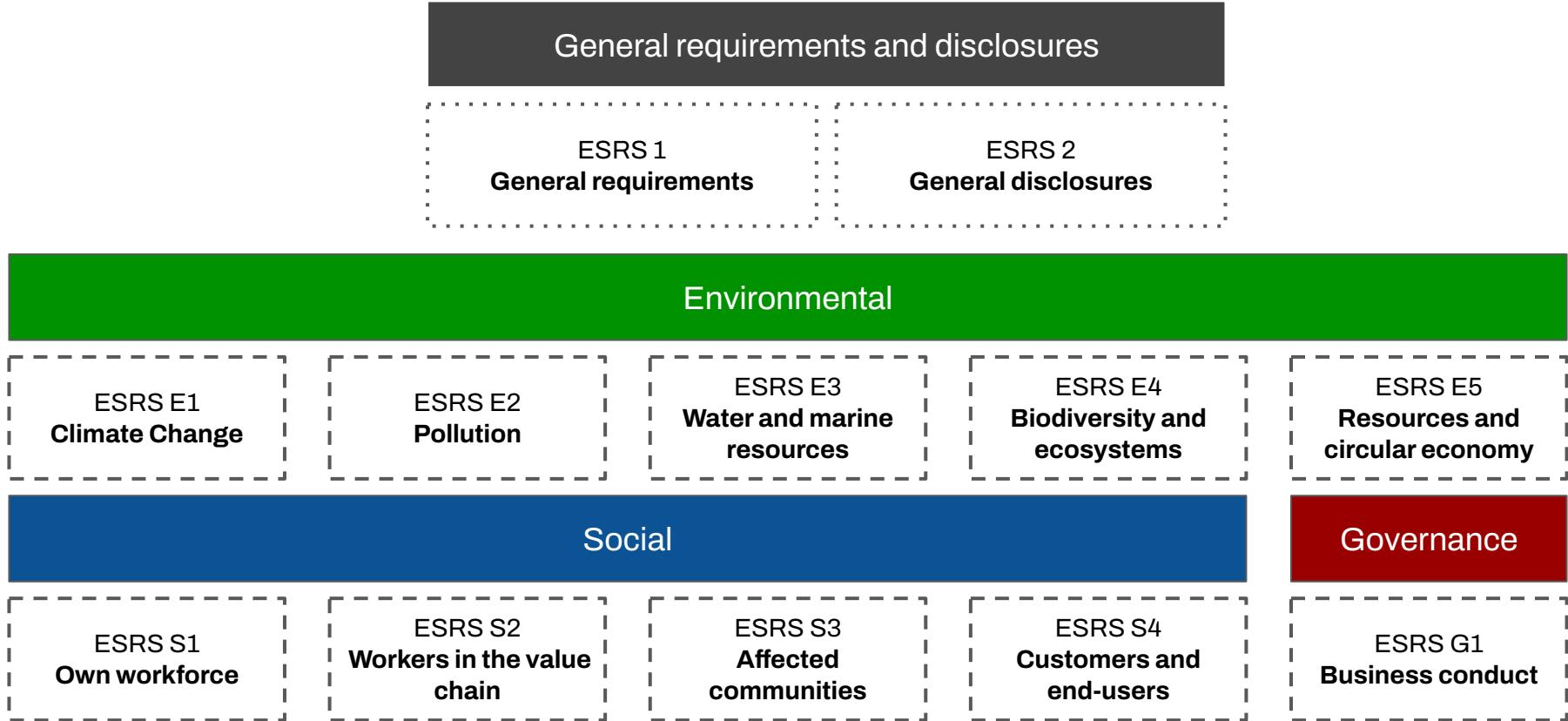
filings.xbrl.org

1.4.58

ESRS - European Sustainability Reporting Standards



ESRS - European Sustainability Reporting Standards



Omnibusification

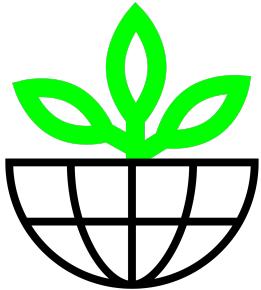
Noun:

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 😊

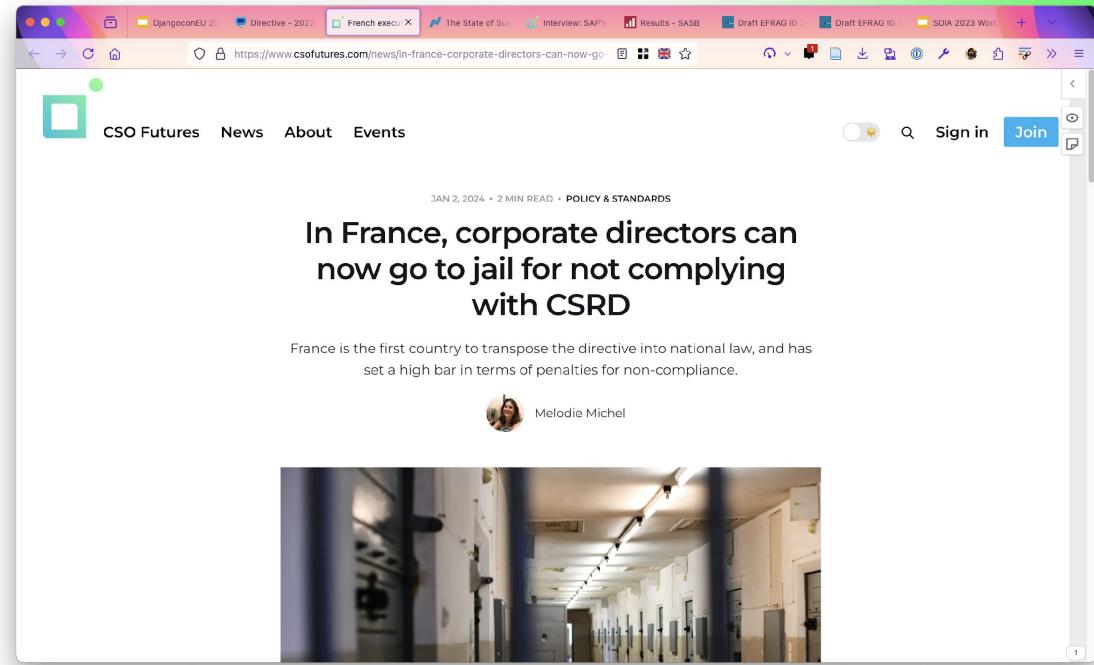


Appendix

Dropped slides

6

liberté
égalité
CSR Dé



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

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 a web browser window for the SEC.gov website. The title bar reads "SEC.gov | XBRL Validation and Rendering". The URL is https://www.sec.gov/data-research/xbrl-validation-rendering. The page header includes the U.S. Securities and Exchange Commission logo, a navigation menu with links to Newsroom, Investors, Small Businesses, Whistleblowers, and a search bar for "Search SEC.gov & EDGAR". The main content area is titled "XBRL Validation and Rendering". It contains a brief description of the EDGAR® Renderer/Previewer, information about the version used by the SEC, and links to executable and source code. It also describes the functionality of the renderer, mentions a public test suite, and provides a link to a question about XBRL errors and warnings. At the bottom, there is a note about last review and a "Copy Link" button.

SEC.gov | XBRL Validation and Rendering

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

U.S. Securities and Exchange Commission

Newsroom | Investors | Small Businesses | Whistleblowers

Search SEC.gov & EDGAR

Search Filings | Submit Filings | Data & Research | Rules, Enforcement, & Compliance | Securities Topics | About | Submit a Tip or Complaint

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

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

Copy Link