

Een duurzamer web voor iedereen

HIDDE DE VRIES & CHARLOTTE BAX
DIGITAL SUMMIT 2026 - AMSTERDAM - APRIL 2026

Charlotte



Hidde

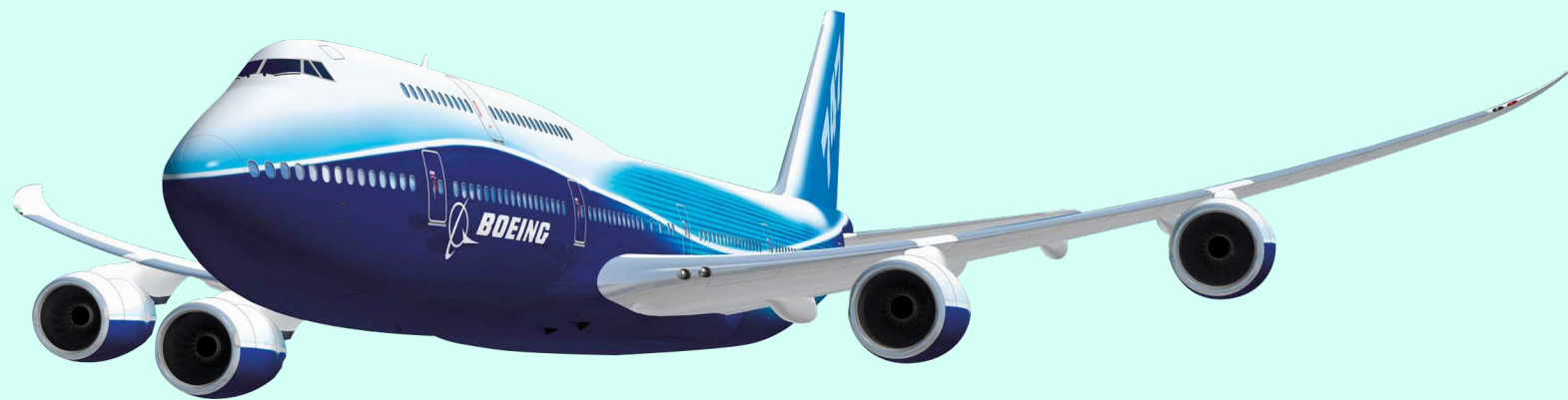




“stijging van de
wereldwijde gemiddelde
temperatuur **ruim onder**
2°C te houden”

Overeenkomst van Parijs, artikel 2a

[https://eur-lex.europa.eu/legal-content/NL/TXT/?uri=CELEX:22016A1019\(01\)](https://eur-lex.europa.eu/legal-content/NL/TXT/?uri=CELEX:22016A1019(01))





Emissies van IT > emissies luchtvaart

“Als het internet
een land was, zou
het op plek 13
staan qua uitstoot
zijn, tussen Mexico
en Brazilië in”

– Sustainable Web Manifesto
(gebaseerd op CO² uitstoot in Our World in
Data versus IT uitstoot van de Green Web
Foundation)





Data centra
Uitstoot van
servers
(productie en
laten draaien)

Waarin zit de footprint van het web?



Netwerk
Downloads/uploads

Je eigen devices
Maken van laptops,
telefoons, tablets en
alles wat het web op
gaat





Product Environmental Report

iPhone 14 Pro

Date introduced
September 7, 2022

Made with better materials

100%

recycled gold in the
wire of all cameras

100%

recycled rare earth
elements in all magnets



Tackling climate change

100%

We're committed to transitioning our entire
manufacturing supply chain to 100 percent
renewable electricity by 2030.

by focusing
renewable
team helped
ation.⁴ Apple
e down

iPhone 14 Pro life cycle carbon emissions

81%	Production
3%	Transport
15%	Use
<1%	End-of-life processing

iPhone 14 Pro life cycle carbon emissions

81% Production

3% Transport

15% Use

<1% End-of-life processing

Zorg dat
jouw website
niet zorgt dat
gebruikers
moeten upgraden

Websites
worden
groter en
groter...

Data:
HTTPArchive



2011
467 kB



2025
2678 kB

“Shaving off 1kB in a file that is loaded on 2 million websites reduces CO² emissions by ~2950 kg per month.”

– Danny van Kooten

“Shaving off 1kB in a file that is loaded on 2 million websites reduces CO² emissions by ~2950 kg per month.”

– Danny van Kooten

~5
vluchten
(AMS-
NYC)

~118 kg
rundvlees

Metrics, schmetrics

Ook “ongeveer” kan richting geven

MAKKELIJK METEN

verplaatste data,
aantal requests,
paginagrootte

– HTTP Archive Web Almanac,
Sustainability.

SOMS GEMIST

berekeningen in een
website. CPU/GPU,
geheugen, wat
gebruiker echt doet.

Soms meet je, soms schat je

The screenshot shows a video player interface. In the top left corner, the logo for 'apidays SINGAPORE' is visible. The main content area features a slide with the title 'Defining what you do' at the top. Below the title is a horizontal line, followed by a vertical line that divides the space into two columns. The left column contains the word 'Estimating' and the right column contains the word 'Measuring'. A small video inset in the bottom left corner shows a man with glasses, identified as 'Fershad Irani'. At the bottom of the slide, the text 'GREEN WEB FOUNDATION' is displayed. The video player controls at the very bottom include a progress bar, a play/pause button, a volume icon, a timestamp of '9:14 / 26:39', and icons for closed captions, settings, and full screen.

– Fershad Irani, The Nuance of Quantifying Digital Carbon Emissions at Green I/O Singapore, 2024.

SWDM

Data transfer
Amount of GB
transferred
when using a
service

Average Emissions per Page View (gCO₂e) = $([(OP_{DC} \times (1 - \text{Green Hosting Factor}) + EM_{DC}) + (OP_N + EM_N) + (OP_{UD} + EM_{UD})] \times \text{New Visitor Ratio}) + ((OP_{DC} \times (1 - \text{Green Hosting Factor}) + EM_{DC}) + (OP_N + EM_N) + (OP_{UD} + EM_{UD})) \times \text{Return Visitor Ratio} \times (1 - \text{Data Cache Ratio}))$

Carbon intensity
Grams of carbon
emitted per kWh
at a given time.

“There is no
magic button
you can press”

– Hannah Smith (The Green Web Foundation)
at Pixel Pioneers 2022

Web Sustainability Guidelines

Web Sustainability Guidelines

Editor's draft

2. User Experience Design

- 2.1 Display any variables that have a negative impact on your project
- 2.2 Understand visitor requirements or constraints, resolving barriers to access
- 2.3 Understand the impact of non-visitors
- 2.4 Consider sustainability throughout the ideation process
- 2.5 Brainstorm ways to resolve any stakeholder issues
- 2.6 Minimize non-essential content, interactions or journeys
- 2.7 Use decorative design with care
- 2.8 Ensure that navigation and way-finding is well-structured
- 2.9 Be attentive rather than distracting

3. Web Development

- 3.1 Set goals based on potential impact considerations
- 3.2 Remove unnecessary or redundant information
- 3.3 Modularize bandwidth-heavy components within projects
- 3.4 Tree shaking should be used to remove unnecessary code
- 3.5 Redundancy and duplication in code should be avoided
- 3.6 Third-party services should be assessed as first parties
- 3.7 Code must follow good semantic practices
- 3.8 Render blocking should be resolved
- 3.9 Information to help understand the usefulness of a page should exist

4. Hosting, Infrastructure and Systems

- 4.1 Choose a sustainable hosting provider
- 4.2 Optimize caching with offline access supported
- 4.3 Compress files where it is beneficial
- 4.4 Setup necessary error pages and redirection links
- 4.5 Unless required, avoid utilizing unnecessary environments
- 4.6 Allow automation but ensure it is tightly regulated
- 4.7 Define the frequency of data refreshes
- 4.8 Backup critical data at routine intervals
- 4.9 Consider the impact and requirements of processing information
- 4.10 CDN use must be proportionate and sustainable
- 4.11 Infrastructure decisions must meet business requirements
- 4.12 Store data according to the needs of your

6 principes

92 richtlijnen

253 successcriteria

100+ mensen

**User
Experience
Design**

**Hosting,
Infrastructure
& Systems**

**Web
Development**

**Business
Strategy &
Product
Management**

“Progress over
perfection”

WSG

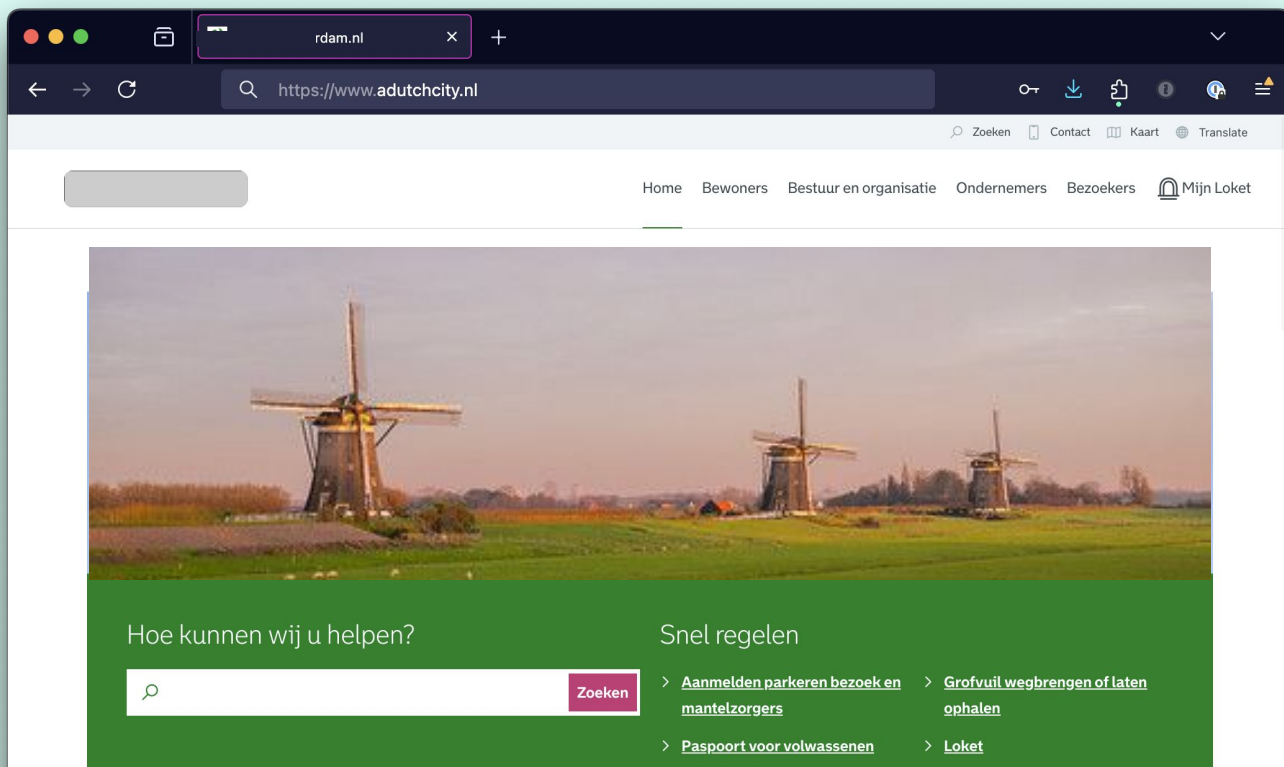
3.1. Set goals based on potential impact considerations

The screenshot shows a web browser window with the URL <https://www.gov.uk/government/publications/greening-government-ict-annual-report>. The page header includes the GOV.UK logo and navigation links: Home > Government > Government efficiency, transparency and accountability > Greening government ICT: annual report 2023 to 2024. The department is identified as the Department for Environment, Food & Rural Affairs. The main content area features a blue banner with the text: 'Corporate report Greening Government Commitments ICT annual report 2023 to 2024 Updated 24 January 2025'. Below the banner, there are links for 'Contents' and 'Introduction', with 'Introduction' being the active page.

CO2e emissions
from government
IT (2022-2024)
-9%

Een stad in Nederland

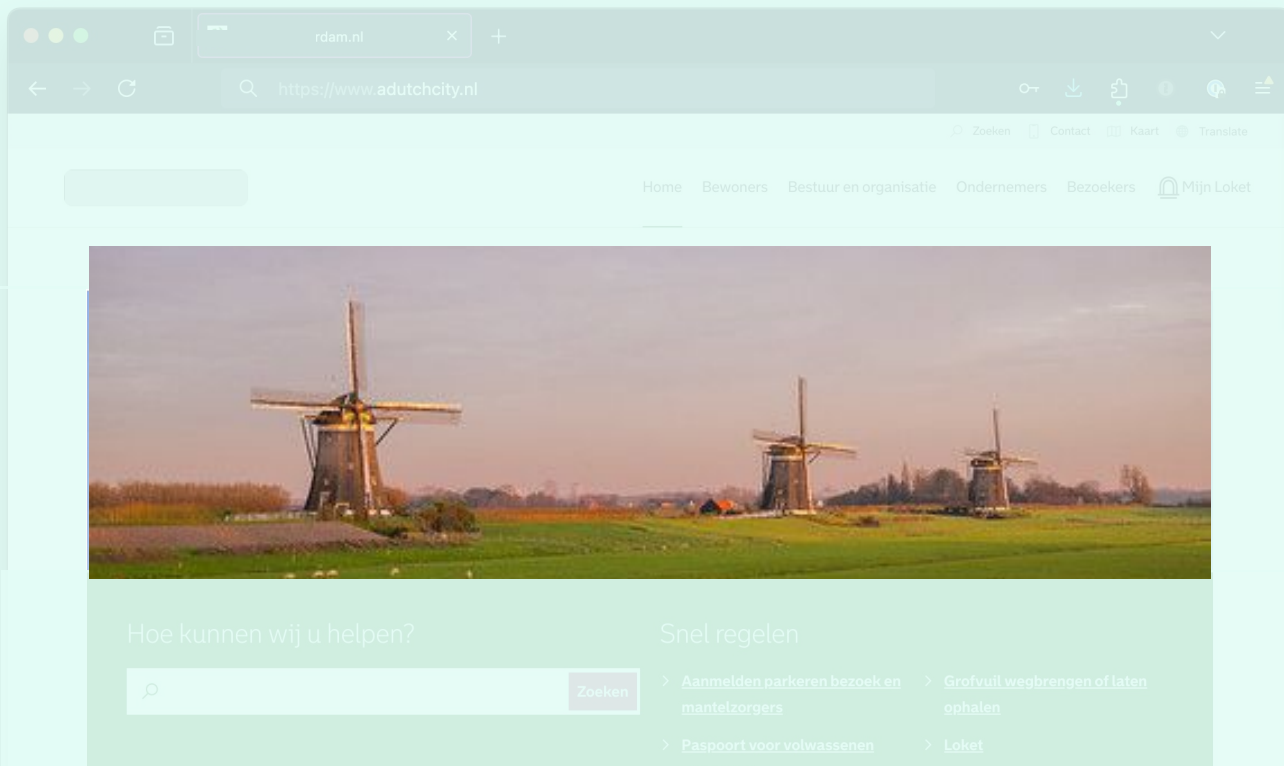
Totale grootte: 1,2 MB



Een stad in Nederland

Totale grootte: 1,2 MB

Hero image: 367 KB (32%)

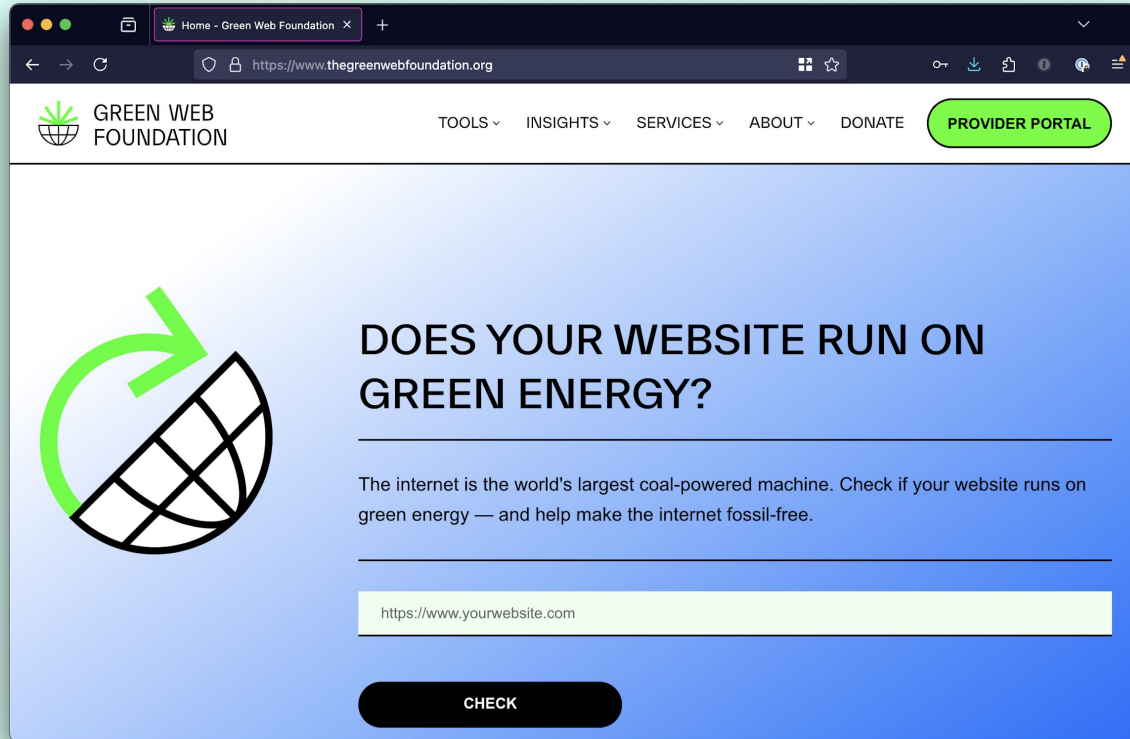


Kiezen
is een
keuze



Kies een groene host

thegreenwebfoundation.org



The screenshot shows a web browser window with the URL <https://www.thegreenwebfoundation.org>. The page features the Green Web Foundation logo and navigation links: TOOLS, INSIGHTS, SERVICES, ABOUT, DONATE, and a prominent green button labeled PROVIDER PORTAL. The main content area has a blue gradient background and includes a graphic of a globe with a green arrow pointing clockwise. The text asks, "DOES YOUR WEBSITE RUN ON GREEN ENERGY?" and provides a brief explanation: "The internet is the world's largest coal-powered machine. Check if your website runs on green energy — and help make the internet fossil-free." Below this is a text input field containing the placeholder URL <https://www.yourwebsite.com> and a black button labeled CHECK.

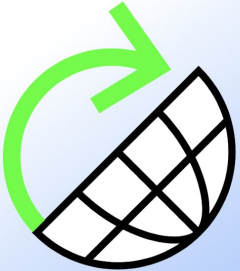
Home - Green Web Foundation

<https://www.thegreenwebfoundation.org>

GREEN WEB FOUNDATION

TOOLS ▾ INSIGHTS ▾ SERVICES ▾ ABOUT ▾ DONATE

PROVIDER PORTAL

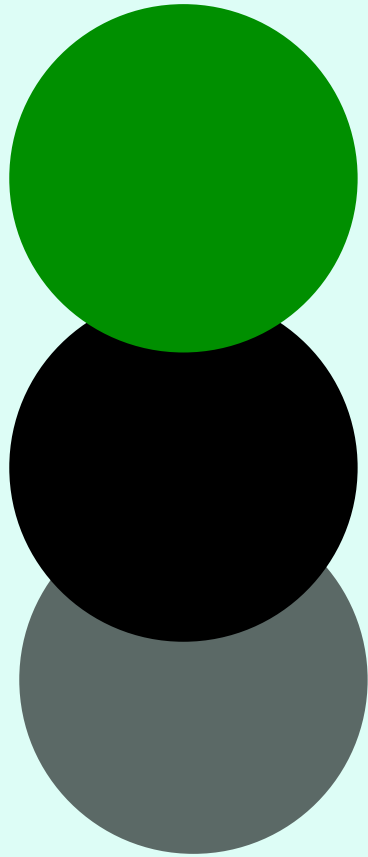


DOES YOUR WEBSITE RUN ON GREEN ENERGY?

The internet is the world's largest coal-powered machine. Check if your website runs on green energy — and help make the internet fossil-free.

<https://www.yourwebsite.com>

CHECK



GWF toont 357
geverifieerde groene
hosting providers in 34
landen.

Progress - Amazon Sustainable: X

https://sustainability.aboutamazon.com/progress

amazon

Progress Focus Areas People Resources 2023 Report Sustainability

Progress

The science is clear. Significant carbon emission reductions are required to avoid the most severe effects of climate change, restore biodiversity, protect vulnerable communities, and ensure a habitable planet for future generations.

Goal Driving climate solutions

Reach net-zero carbon emissions by 2040—10 years ahead of the Paris Agreement

Azure Sustainability—Sustaina: X Emissions Impact Dashboard | X | +

https://azure.microsoft.com/en-us/explore/global-infrastructure/sustainability/#Environ...

Microsoft | Azure Explore Products Solutions More

Learn Support Contact Sales Get started with Azure Sign in

Azure sustainability

Help build a clean-energy future and make progress toward your sustainability and business goals.

Track and reduce your organization's carbon emissions

Sustainability Overview Environmental impact Local impact Energy innovations Resources FAQ

Check out the new Azure sustainability guidance for the Well-Architected Framework >

AI-powered assistant
Created with Copilot Studio

At Azure, we see sustainability and humanity's response to climate change as one of the greatest.

Sustainability | Google Cloud X

https://cloud.google.com/sustainability

Google Cloud

Overview Solutions Products Pricing Resources

Increase business resilience and sustainability with AI

Google Cloud offers organizations a new way to drive impact. We help businesses improve measurement, increase resilience, use energy and resources more efficiently and unlock new growth opportunities. With smarter use of data and AI you can have a more sustainable impact.



The old way is getting old.

1:39

Measure

Organizations can use AI-powered insights to monitor their progress towards sustainability.

Carbon intensity

Hoe schoon is
energie op een
bepaald moment

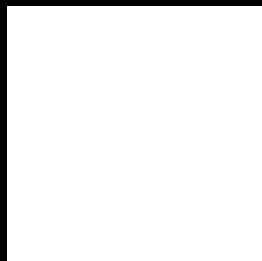
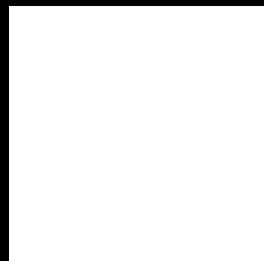
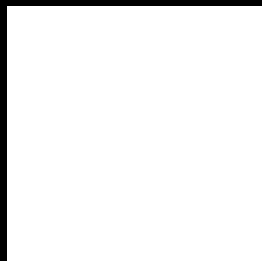
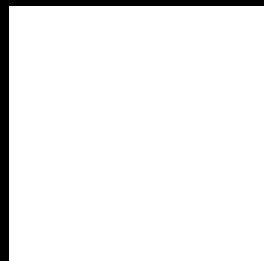
(eg CO^2/kWh)

**Kan je site
carbon-aware
worden?**

Our team



Our team



Our
team

Anna

Mei

Jacob

Ouiam

David

George

[Shop Women](#)[Shop Men](#)[organicbasics](#)[About](#)[Love My Fall Website](#)[English / USD](#)

Organic Sweat

[Shop women](#)[Shop men](#)

Shop Women

Shop Men

organicbasics

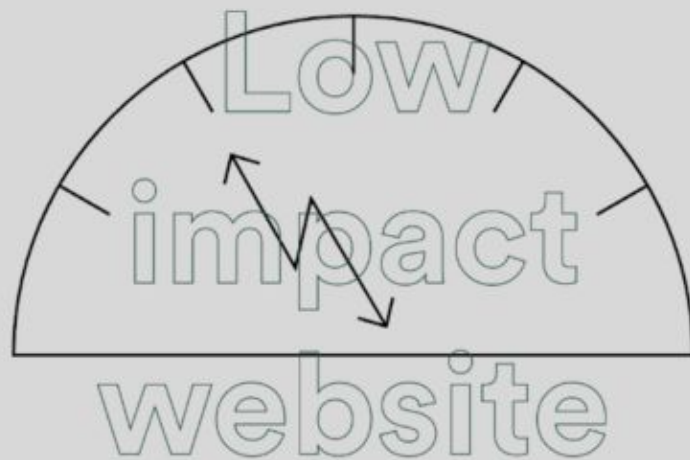
Regular store

Manifesto

EUR



tap to learn
more



Shop women
Shop men

Minder requests

Laad die video pas als je weet dat de gebruiker het wil



groovy house mix in a berlin park

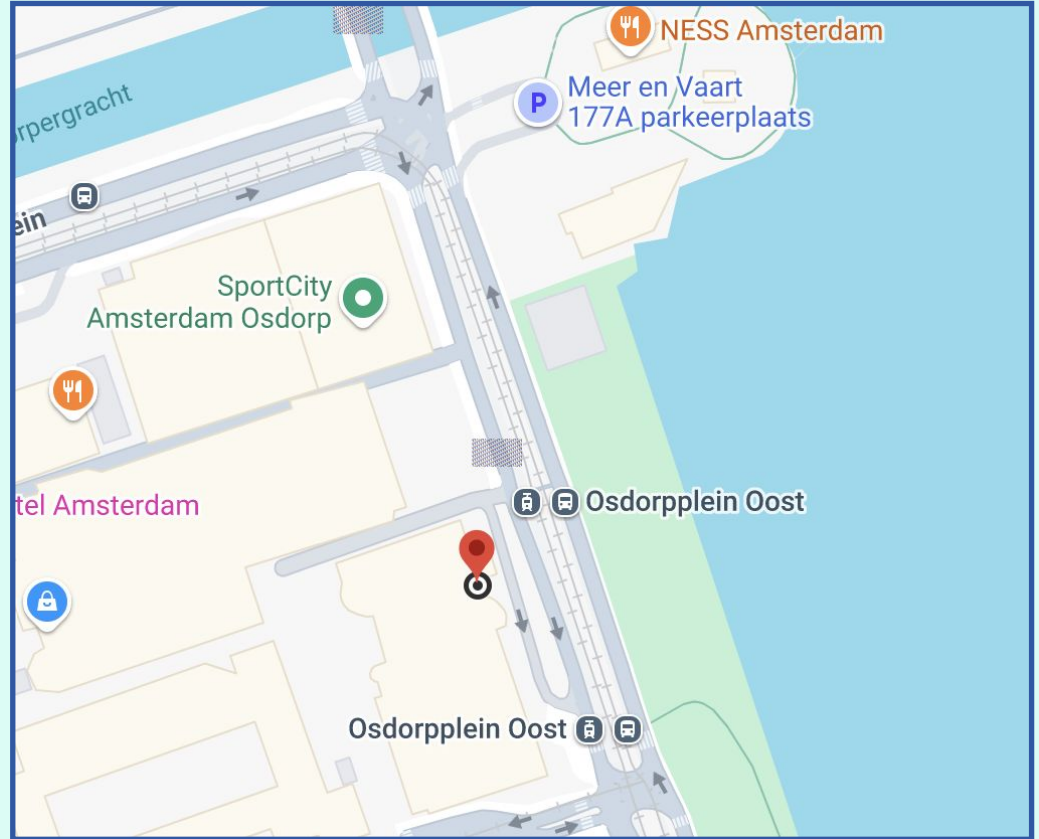
Chris Luno

4.1M views • 3 years ago



Minder requests

Laad de kaart pas als de gebruiker het wil



Wat levert het op?

Kansen

- Transparantie
- Reputatie & imago
- Standardisering
- Verduurzaming

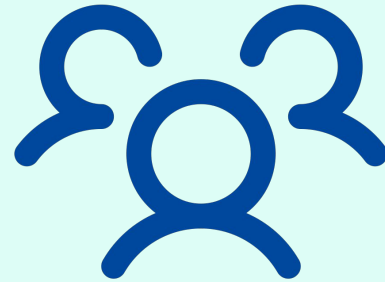
Huidige status

- Nog geen vaste methodologie
- Wel industry standard
- Badges
- Carbon.txt

Methodologie

Sustainable Web Design Model

A+	< 0,095 g
A	0,095 – 0,186 g
B	0,186 – 0,341 g
C	0,341 – 0,493 g
D	0,493 – 0,656 g
E	0,656 – 0,846 g
F	≥ 0,847 g



Design x Bezoekers

Report for openpubliceren.nl

← openpubliceren.nl - 13 Aug 2025



URL A-Z

Average of 4 webpages:

URL	Grade	Size	CO ₂
.../	F	3,610.86 kB	1.290 g CO ₂
.../casestudy-uwv	B	882.00 kB	0.315 g CO ₂
.../over	A	314.81 kB	0.112 g CO ₂
.../start	A	313.38 kB	0.112 g CO ₂

Report for test.openpubliceren.nl

← test.openpubliceren.nl - 19 Mar 2026



URL A-Z

Average of 23 webpages:

URL	Grade	Size	CO ₂
...	A+	150.52 kB	0.054 g CO ₂
.../	A+	292.50 kB	0.073 g CO ₂
.../formaten	A+	148.68 kB	0.053 g CO ₂
.../formaten/csv	A+	148.70 kB	0.052 g CO ₂
.../formaten/epub	A+	146.29 kB	0.052 g CO ₂
.../formaten/html	A+	146.50 kB	0.052 g CO ₂
.../formaten/json	A+	147.14 kB	0.053 g CO ₂
.../formaten/odf	A+	146.58 kB	0.052 g CO ₂
...	A+	147.28 kB	0.053 g CO ₂
...	A+	146.03 kB	0.052 g CO ₂
...	A+	146.97 kB	0.052 g CO ₂
...	A+	146.05 kB	0.052 g CO ₂
...	A+	147.81 kB	0.053 g CO ₂
...	A+	148.05 kB	0.053 g CO ₂
...	A+	146.66 kB	0.052 g CO ₂
.../hardisatie	A+	146.55 kB	0.052 g CO ₂
.../overheid	A+	147.44 kB	0.053 g CO ₂
.../rijk-overheidsinformatie	A+	147.37 kB	0.053 g CO ₂
.../overheid	A+	146.95 kB	0.052 g CO ₂
...	A+	173.36 kB	0.062 g CO ₂
...	A+	148.53 kB	0.053 g CO ₂
...	A+	146.17 kB	0.052 g CO ₂
...	A+	146.24 kB	0.052 g CO ₂
...	A+	146.08 kB	0.052 g CO ₂

Hoeveel is dat op jaarbasis?

0,457 g CO2 per pageview

0,054 g CO2 per pageview

10.000 pageviews per maand = 120.000 pageviews per jaar

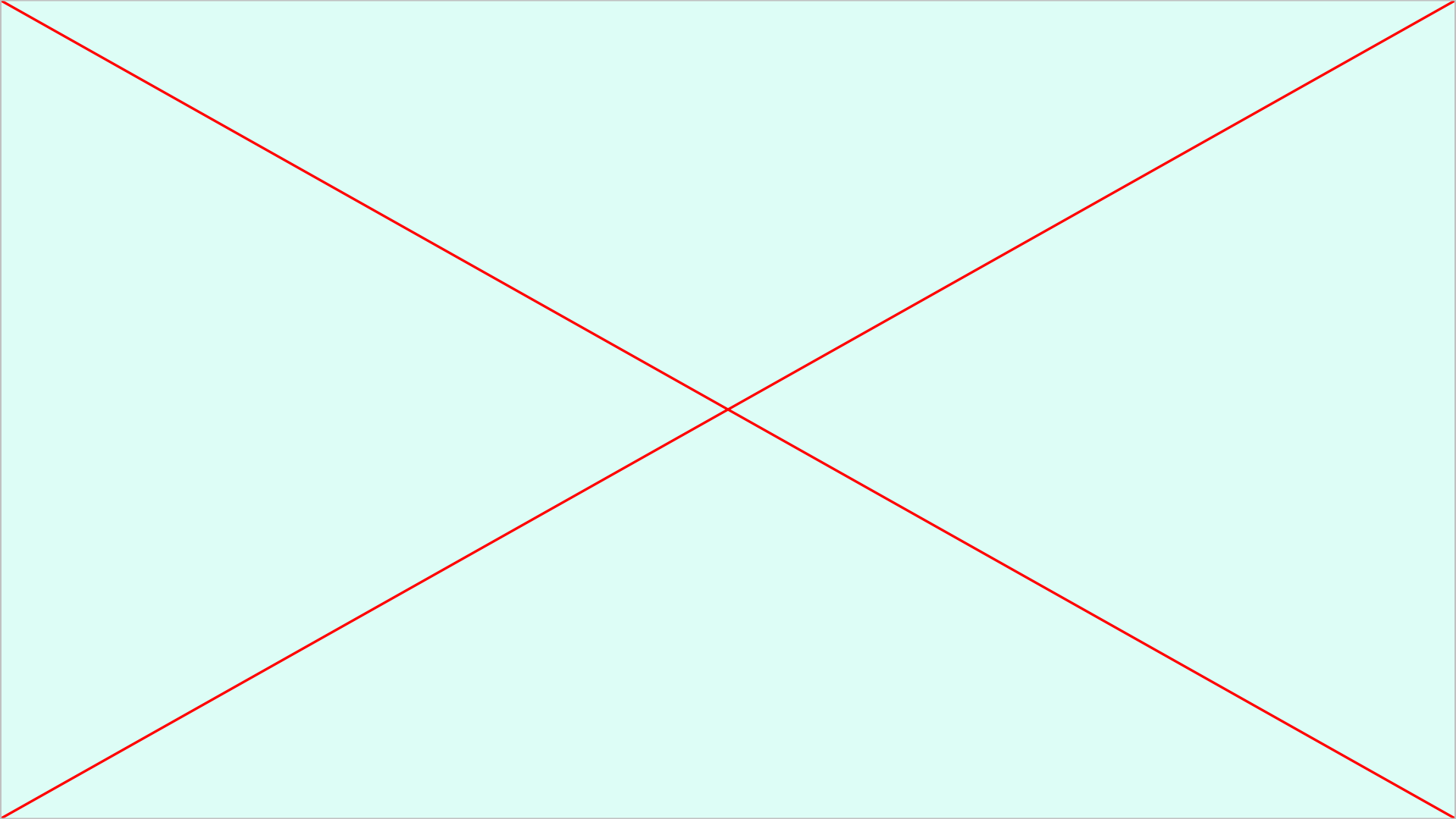
54,840 kg CO2 per jaar

6,480 kg CO2 per jaar

24,17 L benzine

2,86 L benzine

Case study: progressiefnederland.nl



Resultaat (homepage)

1565,74 kB

0,559 g CO₂

A+	< 0,095 g
A	0,095 – 0,186 g
B	0,186 – 0,341 g
C	0,341 – 0,493 g
D	0,493 – 0,656 g
E	0,656 – 0,846 g
F	≥ 0,847 g

Wat doen ze al goed?

- Groene hosting
- Lichtgewicht HTML & CSS
- Lazy loading

Wat kan beter?

Image

https://progressiefnederland.nl/wp-content/uploads/2026/03/422A6173-2.jpg

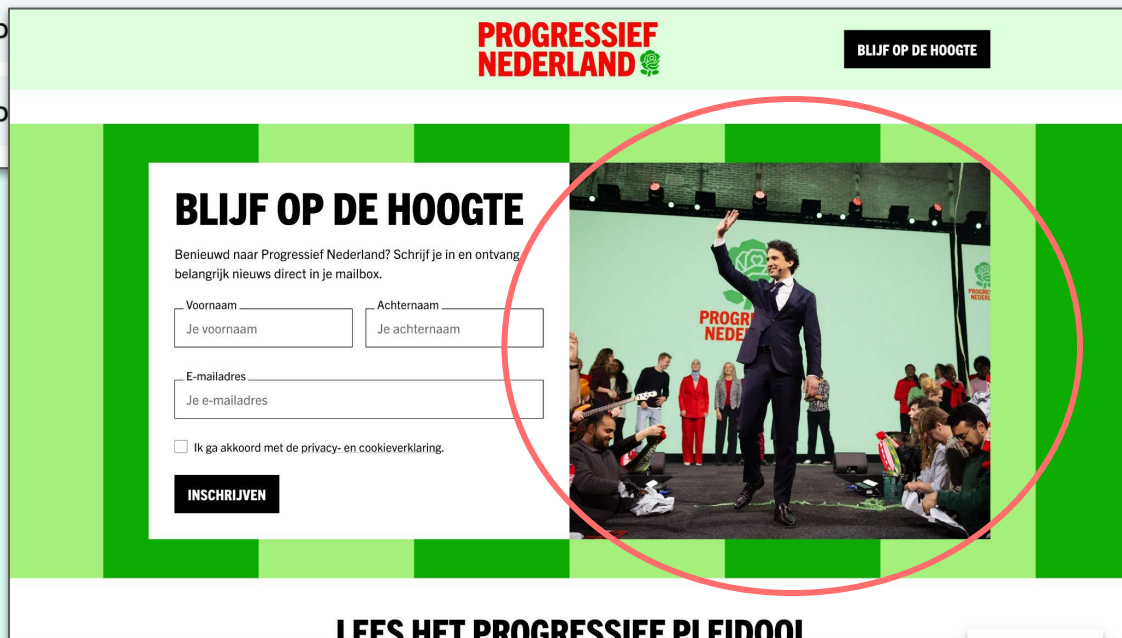
①  676.41 kB 0.242 g CO₂

https://p

①  3.29 kB 0.001 g CO₂











https://p

①  2.25 kB 0.001 g CO₂



The screenshot shows a registration form for 'Progressief Nederland' with a green and white color scheme. At the top, the logo 'PROGRESSIEF NEDERLAND' and a button 'BLIJF OP DE HOOGTE' are visible. The main heading is 'BLIJF OP DE HOOGTE'. Below it, a sub-heading asks if the user is new and offers a newsletter. The form includes fields for 'Voornaam' (Je voornaam) and 'Achternaam' (Je achternaam), and an 'E-mailadres' field (Je e-mailadres). A checkbox for 'Ik ga akkoord met de privacy- en cookieverklaring.' is present, along with an 'INSCHRIJVEN' button. A photograph of a man in a suit on a stage is circled in red. At the bottom, the text 'LEES HET PROGRESSIEF PLATFORM' is partially visible.

Wat kan beter?

Script			481.28 kB	0.172 g CO ₂
https://sst.progressiefnederland.nl/gtag/js?id=G-ZMMM4RE3GV&cx=c&gtm=4e6410h2	③		159.24 kB	0.057 g CO ₂
https://sst.progressiefnederland.nl/bbsseece.js?st=T8Z84SGB	③		136.46 kB	0.049 g CO ₂
https://progressiefnederland.nl/wp-content/cache/min/1/aea4ct014e054d2dac8c779a2b690526.js	①		45.76 kB	0.016 g CO ₂
https://cdn.bureaumax.nl/libs/@fancyapps/ui/dist/fancybox/fancybox.umd.js	③		44.13 kB	0.016 g CO ₂
https://cdn.bureaumax.nl/libs/swiper/swiper-bundle.min.js	③		41.38 kB	0.015 g CO ₂
https://challenges.cloudflare.com/turnstile/v0/g/ea2d291c0fdc/api.js	③		17.96 kB	0.006 g CO ₂
...ps://static.cloudflareinsights.com/beacon.min.js/v8c78df7c7c0f484497ecbca7046644da1771523124516	③		11.57 kB	0.004 g CO ₂
https://kit.fontawesome.com/fa0f23f16c.js	③		6.64 kB	0.002 g CO ₂
https://cdn.bureaumax.nl/libs/aos/dist/aos.js	③		6.42 kB	0.002 g CO ₂
https://cdn.bureaumax.nl/libs/lazysizes/lazysizes.min.js	③		5.21 kB	0.002 g CO ₂

Wat kan beter?

Font

		171.88 kB	0.061 g CO ₂
https://ka-p.fontawesome.com/releases/v7.2.0/webfonts/pro-fa-brands-400-2.woff2	③	42.42 kB	0.015 g CO ₂
https://ka-p.fontawesome.com/releases/v7.2.0/webfonts/pro-fa-brands-400-0.woff2	③	39.07 kB	0.014 g CO ₂
https://ka-p.fontawesome.com/releases/v7.2.0/webfonts/pro-fa-brands-400-1.woff2	③	31.47 kB	0.011 g CO ₂
https://ka-p.fontawesome.com/releases/v7.2.0/webfonts/pro-fa-regular-400-14.woff2	③	23.66 kB	0.008 g CO ₂
https://ka-p.fontawesome.com/releases/v7.2.0/webfonts/pro-fa-regular-400-1.woff2	③	14.09 kB	0.005 g CO ₂

Stylesheet

		110.21 kB	0.039 g CO ₂
https://ka-p.fontawesome.com/assets/fa0f23f16c/58059823/kit.css?token=fa0f23f16c	③	45.49 kB	0.016 g CO ₂
https://progressiefnederland.nl/wp-content/cache/min/1/wp-content/themes/nieuwepartij/style.css?ver=1775132574	①	32.48 kB	0.012 g CO ₂
https://cdn.bureaumax.nl/libs/@fancyapps/ui/dist/fancybox/fancybox.css	③	6.88 kB	0.002 g CO ₂
https://cdn.bureaumax.nl/libs/swiper/swiper-bundle.min.css	③	6.12 kB	0.002 g CO ₂
https://ka-p.fontawesome.com/releases/v7.2.0/css/pro-v4-shims.min.css?token=fa0f23f16c	③	4.91 kB	0.002 g CO ₂
https://cdn.bureaumax.nl/libs/aos/dist/aos.css	③	3.92 kB	0.001 g CO ₂
https://progressiefnederland.nl/wp-content/uploads/complianz/css/banner-1-optin.css?v=43	①	3.87 kB	0.001 g CO ₂
https://ka-p.fontawesome.com/releases/v7.2.0/css/pro-v4-font-face.min.css?token=fa0f23f16c	③	2.68 kB	0.001 g CO ₂
https://progressiefnederland.nl/wp-content/plugins/complianz-gdpr-premium/assets/css/cookieblocker.min.css	①	1.68 kB	0.001 g CO ₂

Other

.../31/?primer=7cdcb44be4a7db8877ffa5c0007b8dd865b3bb

.../31/?primer=7cdcb44be4a7db8877ffa5c0007b8dd865b3bb

.../31/?primer=7cdcb44be4a7db8877ffa5c0007b8dd865b3bb

.../31/?primer=7cdcb44be4a7db8877ffa5c0007b8dd865b3bb

Wat kan beter?

- Video in de header, nu paar MB
- Speelt automatisch af

Wat kan beter?

```
charlotte — -bash — 80x24

[mac:~ charlotte$ dig progressiefnederland.nl ]

; <<>> DiG 9.10.6 <<>> progressiefnederland.nl
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 23294
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1










;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 512
;; QUESTION SECTION:
;progressiefnederland.nl.      IN      A


;; ANSWER SECTION:
progressiefnederland.nl. 300     IN      A      172.66.167.254
progressiefnederland.nl. 300     IN      A      104.20.42.214

;; Query time: 18 msec
;; SERVER: 2a02:a464:2151:0:b2ac:d2ff:fe04:6d2e#53(2a02:a464:2151:0:b2ac:d2ff:fe04:6d2e)
;; WHEN: Sun Apr 05 19:35:05 CEST 2026
;; MSG SIZE rcvd: 84










mac:~ charlotte$
```


Geolocation data from IP2Location Product: DB6, 2026-4-1

 IP ADDRESS: 172.66.167.254	 ISP: CloudFlare Inc.
 COUNTRY: United States 	 ORGANIZATION: Not available
 REGION: California	 LATITUDE: 37.7749
 CITY: San Francisco	 LONGITUDE: -122.4194

Incorrect location? [Contact IP2Location](#)  [view map](#)

Geolocation data from IP2Location Product: DB6, 2026-4-1

 IP ADDRESS: 104.20.42.214	 ISP: CloudFlare Inc.
 COUNTRY: United States 	 ORGANIZATION: Not available
 REGION: California	 LATITUDE: 37.7749
 CITY: San Francisco	 LONGITUDE: -122.4194

Incorrect location? [Contact IP2Location](#)  [view map](#)

Besparing

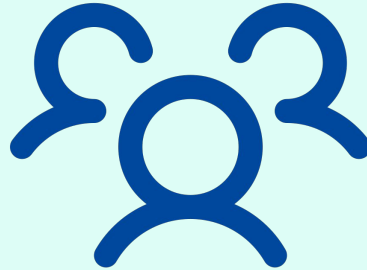
Afbeelding schalen en optimaliseren	-300 kB
GTM vervangen door Matomo	-250 kB
FA libraries vervangen door losse iconen	-215 kB
Totale geschatte besparing	-765 kB

Besparing

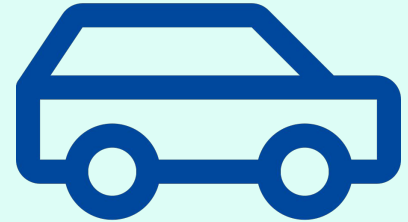
10.000 / maand



0,274 g CO2
Per pageview



32,9 kg CO2
Per jaar



14,5 L benzine

Verduurzamen homepage



A+	< 0,095 g
A	0,095 – 0,186 g
B	0,186 – 0,341 g
C	0,341 – 0,493 g
D	0,493 – 0,656 g
E	0,656 – 0,846 g
F	≥ 0,847 g

The table has seven rows, each with a letter grade and a weight range. The 'B' row is highlighted in yellow. A blue curved arrow starts at the right edge of the 'B' row and points towards the right edge of the 'D' row.



Conclusie

**Je website heeft impact op het
klimaat en daar kun je wat aan doen**

**Even the smallest person can
change the course of the future**

~ Galadriel