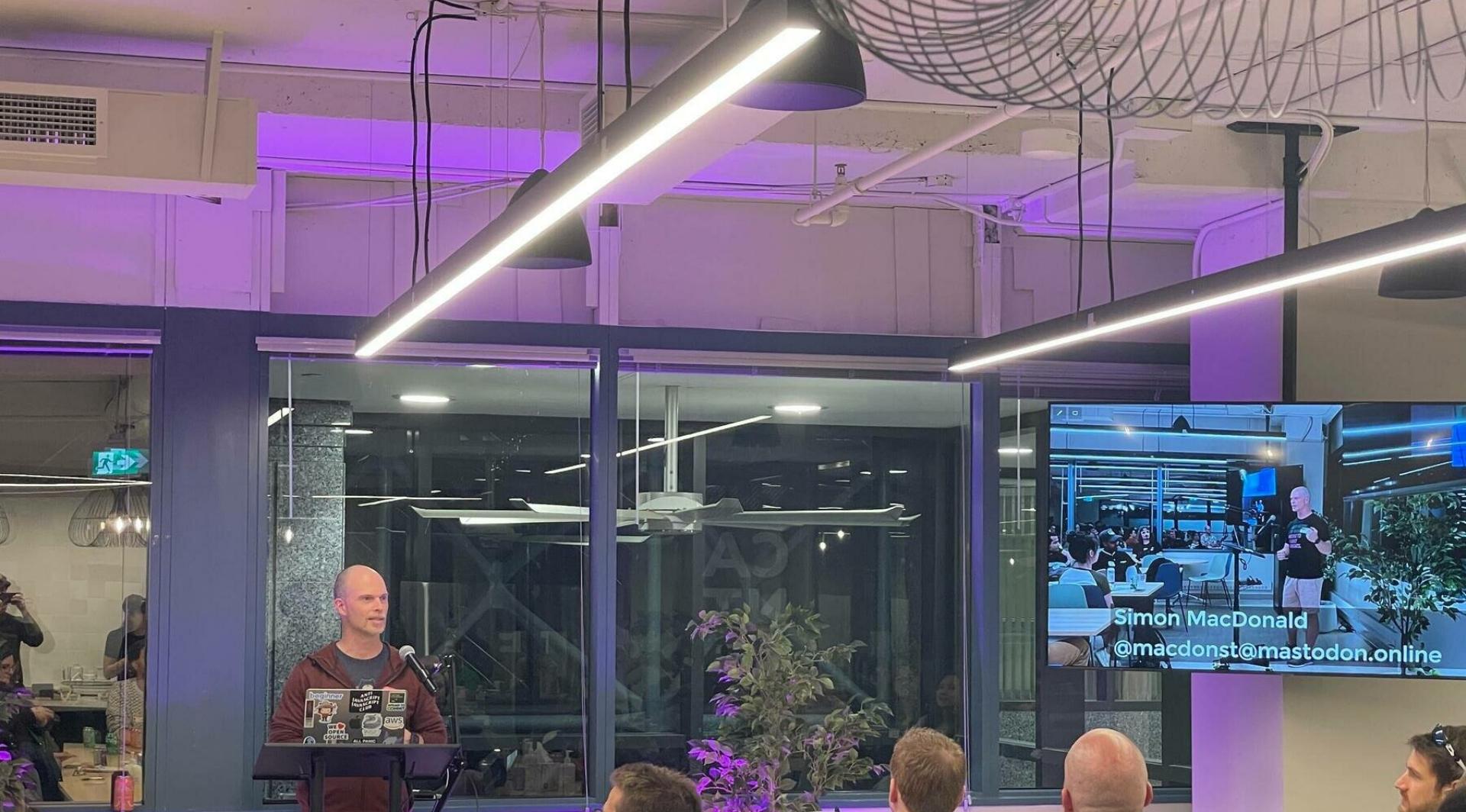


Sustainable Web Development



Simon MacDonald
@macdonst@mastodon.online

Index

Index

- Awareness

Index

- Awareness
- Best Practices

Index

- Awareness
- Best Practices
- Metrics

Index

- Awareness
- Best Practices
- Metrics
- Tools

Index

- Awareness
- Best Practices
- Metrics
- Tools
- Community

Index

- Awareness 
- Best Practices
- Metrics
- Tools
- Community

How much does the
global Internet
contribute to
greenhouse gases?

3-4%

<https://www.bbc.com/future/article/20200305-why-your-internet-habits-are-not-as-clean-as-you-think>

3-4%



<https://www.bbc.com/future/article/20200305-why-your-internet-habits-are-not-as-clean-as-you-think>

3-4%



=



<https://www.bbc.com/future/article/20200305-why-your-internet-habits-are-not-as-clean-as-you-think>

3-4%



=



=



<https://www.bbc.com/future/article/20200305-why-your-internet-habits-are-not-as-clean-as-you-think>

*" We can't recycle
our way out of
climate change*

<https://www.cbc.ca/news/science/one-person-actions-climate-change-1.6642485>

*" We can't recycle
our way out of
climate change*



<https://www.cbc.ca/news/science/one-person-actions-climate-change-1.6642485>

Report: Plastics, Oil Industry Deceived Public on Recycling Use for More Than 50 Years



<https://www.desmog.com/2024/02/15/recycling-plastic-center-for-climate-integrity-report-fraud/>

Good News!

Good News!
Everyone in this room has
an outsized impact

How do you sell
sustainable web
development
internally?

Performance

Look for ways to improve performance while reducing the amount of energy your site uses.

Performance

Look for ways to improve performance while reducing the amount of energy your site uses.

Large sites like Amazon or Walmart have found that each 100ms delay on their sites leads to 1% less sales.

Performance

Look for ways to improve performance while reducing the amount of energy your site uses.

Large sites like Amazon or Walmart have found that each 100ms delay on their sites leads to 1% less sales.

Regulation

Countries are enshrining their climate goals into law. Consequently, in order to do business with these countries, you will need to show your commitment to sustainable practices.

Performance

Look for ways to improve performance while reducing the amount of energy your site uses.

Large sites like Amazon or Walmart have found that each 100ms delay on their sites leads to 1% less sales.

Regulation

Countries are enshrining their climate goals into law. Consequently, in order to do business with these countries, you will need to show your commitment to sustainable practices.

The  Gov already requires this and  Gov has published their strategy.

Certification

Some companies require ISO14001 certification in order to do business with them.

Certification

Some companies require ISO14001 certification in order to do business with them.

Having these environment certifications can give you a competitive advantage when landing deals.

Certification

Some companies require ISO14001 certification in order to do business with them.

Having these environment certifications can give you a competitive advantage when landing deals.

Branding

It's crass but branding works. Otherwise, manufacturers wouldn't slap a "lite" label on all those products in the grocery store.

Certification

Some companies require ISO14001 certification in order to do business with them.

Having these environment certifications can give you a competitive advantage when landing deals.

Branding

It's crass but branding works. Otherwise, manufacturers wouldn't slap a "lite" label on all those products in the grocery store.

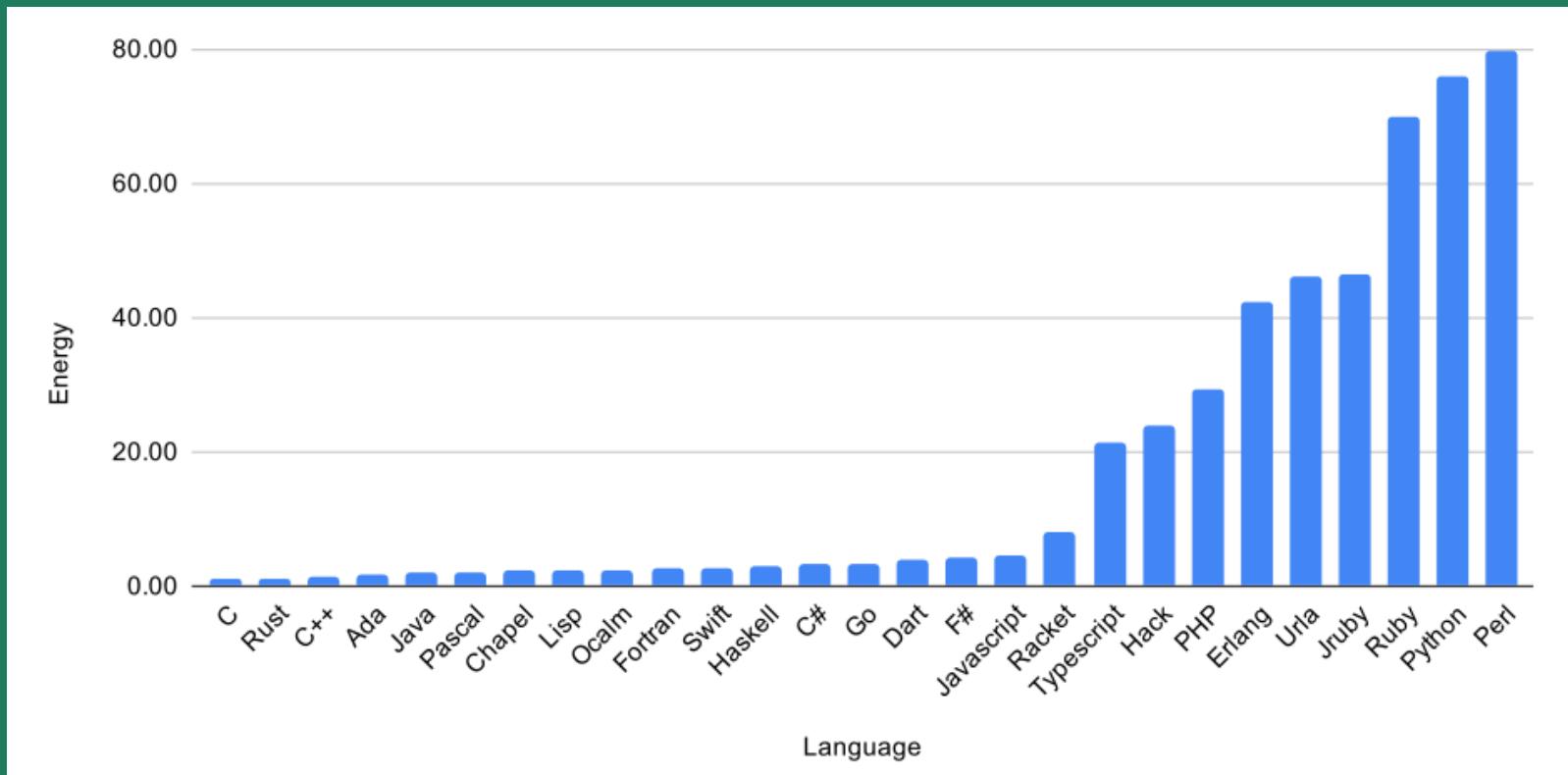
Other studies show "eco friendly" goods are outperforming conventional ones 2 to 1 and have a price premium of 27%

Index

- Awareness
- Best Practices 
- Metrics
- Tools
- Community

Use the right language

Use the right language



”

In programming, the **rule of least power** is a design principle that "suggests choosing the least powerful language suitable for a given purpose".

– W3C TAG Finding 23 Feb 2006

Use
The
Platform

Resist 3rd Party Tracking Scripts

Resist 3rd Party Tracking Scripts

Tracking



www.canadiantire.ca

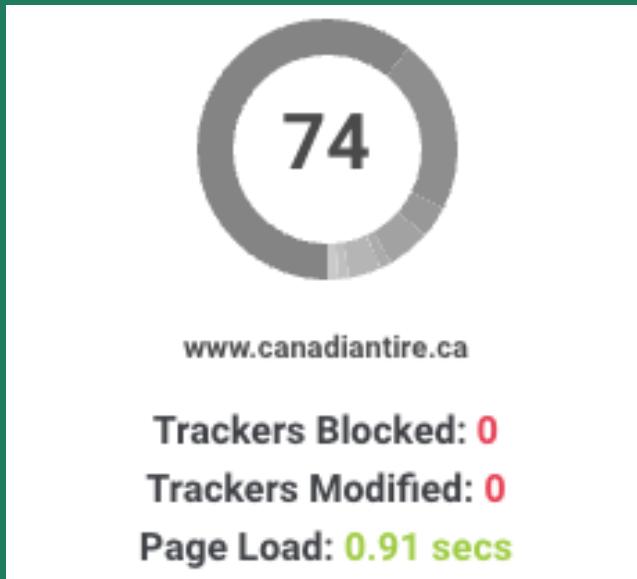
Trackers Blocked: **0**

Trackers Modified: **0**

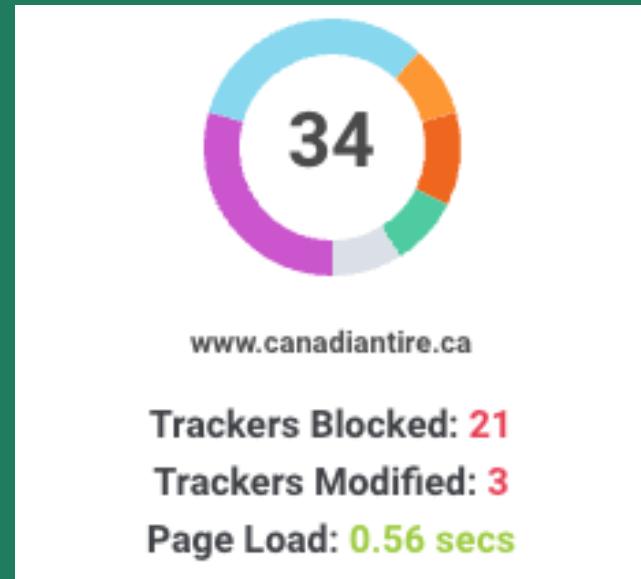
Page Load: **0.91 secs**

Resist 3rd Party Tracking Scripts

Tracking



No Tracking



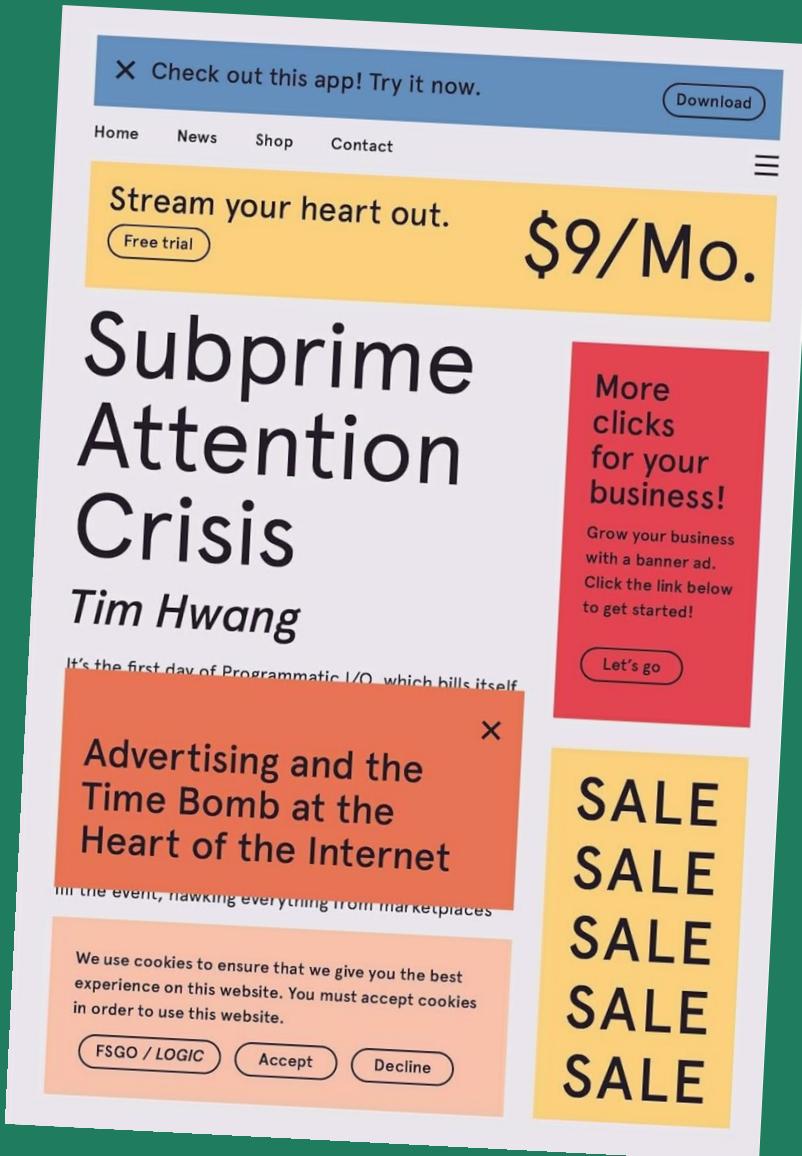
Tracking Alternatives

Tracking Alternatives

- Server Side Analytics

Tracking Alternatives

- Server Side Analytics
- Use a streamlined client side solution
 - Cabin
 - Fathom



Optimize Font Files

Optimize Font Files

- 3 Font Rule

Optimize Font Files

- 3 Font Rule
- WOFF2 not TTF
 - Webfont Generator

Optimize Font Files

- 3 Font Rule
- WOFF2 not TTF
 - Webfont Generator
- Remove unused elements

Cut Down on Image Sizes

Cut Down on Image Sizes

- Use vector images (SVG) over photographs when appropriate

Cut Down on Image Sizes

- Use vector images (SVG) over photographs when appropriate
- Use a tool like [ImageOptim](#) to remove metadata and compress images

Cut Down on Image Sizes

- Use vector images (SVG) over photographs when appropriate
- Use a tool like [ImageOptim](#) to remove metadata and compress images
- Use modern (smaller) image formats like webp

Cut Down on Image Sizes

- Use vector images (SVG) over photographs when appropriate
- Use a tool like [ImageOptim](#) to remove metadata and compress images
- Use modern (smaller) image formats like webp
- Set the "lazyload" attribute on images that are below the fold

Cut Down on Image Sizes

- Use vector images (SVG) over photographs when appropriate
- Use a tool like [ImageOptim](#) to remove metadata and compress images
- Use modern (smaller) image formats like webp
- Set the "lazyload" attribute on images that are below the fold
- Blur the edges of images to reduce file size

Cut Down on Image Sizes

- Use vector images (SVG) over photographs when appropriate
- Use a tool like [ImageOptim](#) to remove metadata and compress images
- Use modern (smaller) image formats like webp
- Set the "lazyload" attribute on images that are below the fold
- Blur the edges of images to reduce file size
- Use the srcset and sizes on the img element to deliver the right sized image to the user

```
1 
```

Reduce JavaScript Usage

Reduce JavaScript Usage

- Stop using JavaScript for things HTML and CSS can do better.

Reduce JavaScript Usage

- Stop using JavaScript for things HTML and CSS can do better.
- Evaluate whether you really need a framework for your site or not.

Reduce JavaScript Usage

- Stop using JavaScript for things HTML and CSS can do better.
- Evaluate whether you really need a framework for your site or not.
- Use dynamic imports
- Compress your code (gzip/brotli)

Cache Aggressively

Cache Aggressively

- Fingerprint your files
- Cache forever

Block the Bots

Block the Bots

- Bots are energy vampires

Block the Bots

- Bots are energy vampires
- Use your providers Web Application Firewall (WAF)

Block the Bots

- Bots are energy vampires
- Use your providers Web Application Firewall (WAF)
- And/or write your own robots.txt

```
1 # Allow all bots
2 User-agent: *
3 Disallow:
4
5 # Except ChatGPT and Bard
6 User-agent: GPTBot
7 Disallow: /
8
9 User-agent: Google-Extended
10 Disallow: /
```

A few words about colour

A few words about colour

- Organic Light Emitting Diode (OLED) screens

A few words about colour

- Organic Light Emitting Diode (OLED) screens
- Black pixels use the least energy

A few words about colour

- Organic Light Emitting Diode (OLED) screens
- Black pixels use the least energy
- White pixels use the most energy

A few words about colour

- Organic Light Emitting Diode (OLED) screens
- Black pixels use the least energy
- White pixels use the most energy
- A general rule of thumb is that darker colours use less energy

A few words about colour

- Organic Light Emitting Diode (OLED) screens
- Black pixels use the least energy
- White pixels use the most energy
- A general rule of thumb is that darker colours use less energy
- The caveat is blue uses more power than red or green

Index

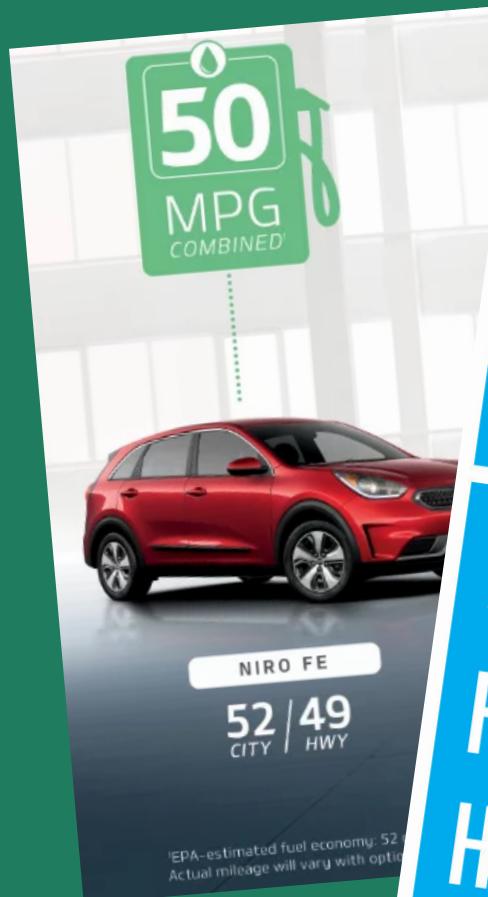
- Awareness
- Best Practices
- Metrics 
- Tools
- Community

Metrics

Metrics



Metrics



Web Metrics

- Largest Contentful Paint (LCP)
- First Input Delay (FID)
- Cumulative Layout Shift (CLS)
- Interaction to Next Paint (INP)

Sustainable Web Metrics

Sustainable Web Metrics

- Data Transfer

Sustainable Web Metrics

- Data Transfer
- Carbon intensity of electricity

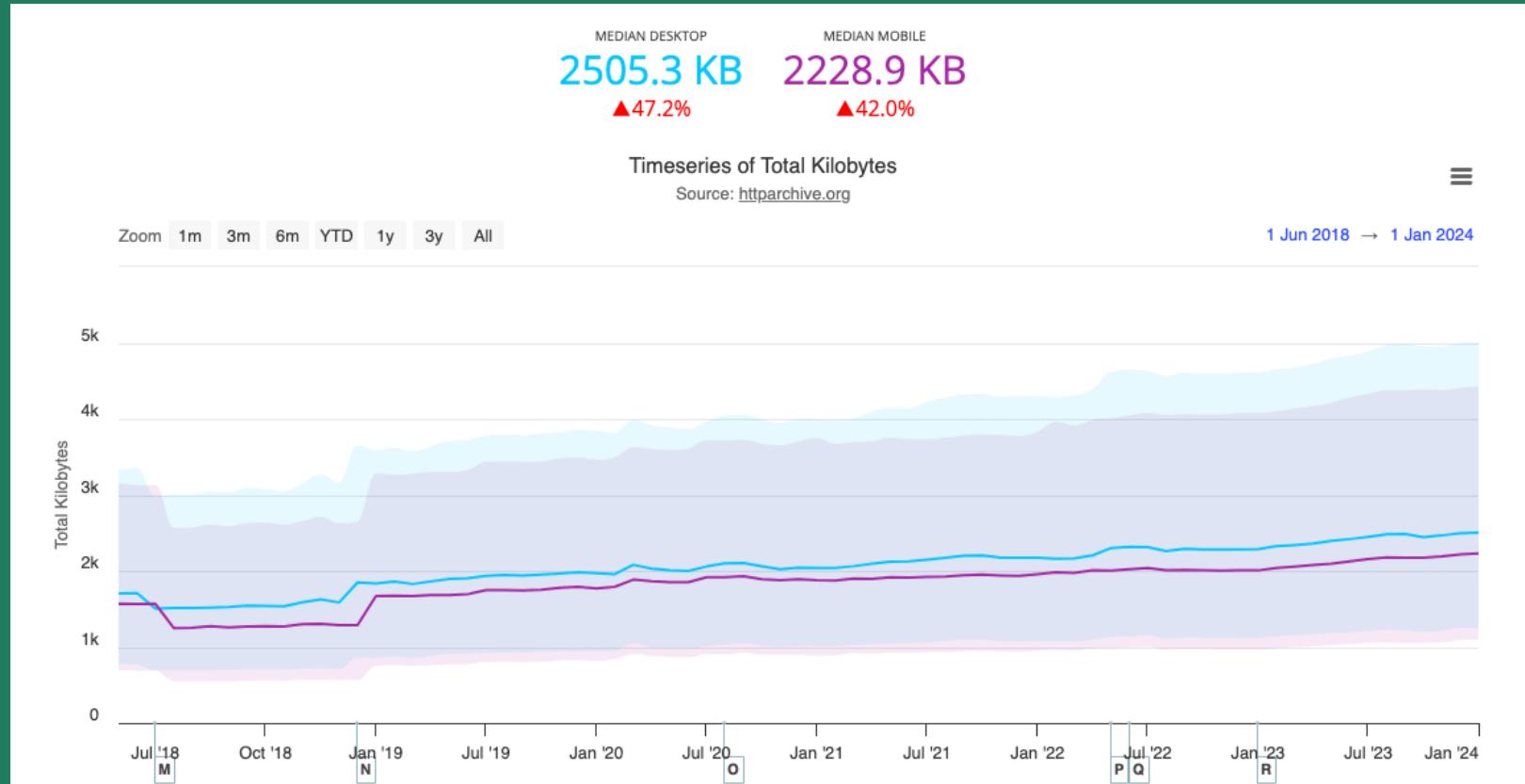
Estimating Data Transfer Emissions with Page Weight

Estimating Data Transfer Emissions with Page Weight

“ Page Weight: the total number of kilobytes the first time someone visits a page.

Page Weight

2018-06-01 to 2024-01-01



<https://httparchive.org/reports/state-of-the-web#bytesTotal>

Page Weight Budgets

Page Weight Budgets

- **Profile** your site to create a benchmark for page weights
 - First visit
 - Subsequent visits

Page Weight Budgets

- **Profile** your site to create a benchmark for page weights
 - First visit
 - Subsequent visits
- **Benchmark** your site against the industry leaders

kWh/GB



>



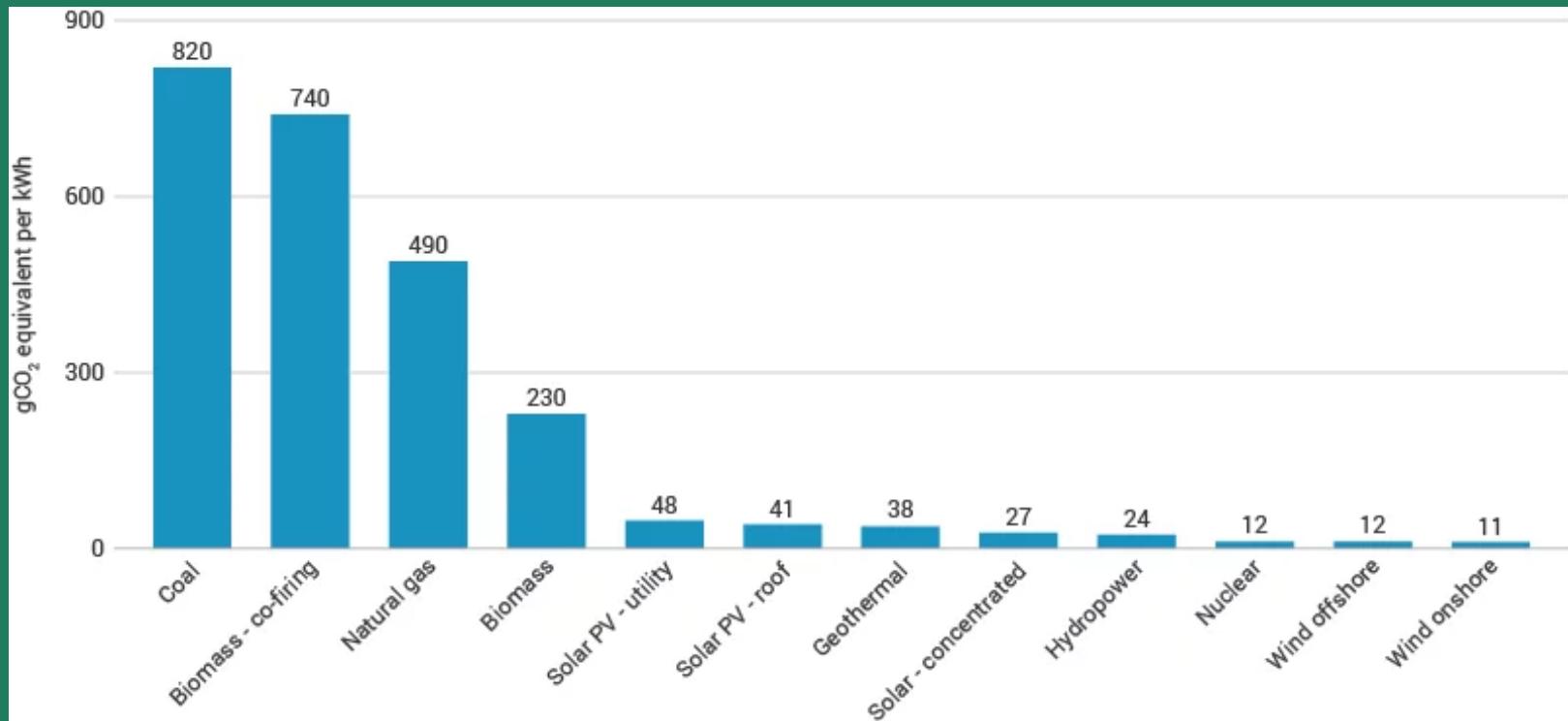
Carbon intensity of electricity

Carbon intensity of electricity

gCO²

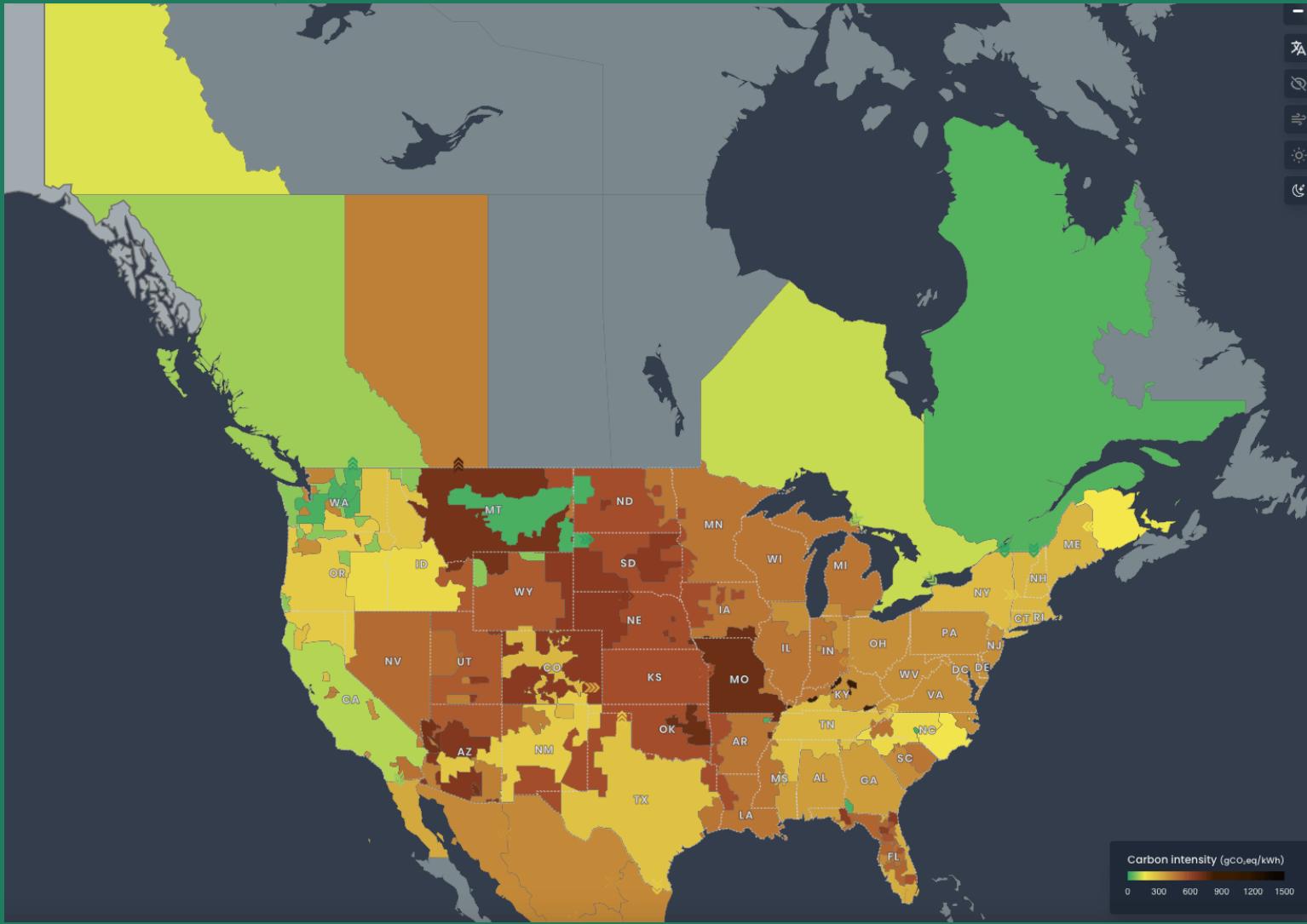
Carbon intensity of
electricity
 gCO^2/kWh

Not all sources are equal



gCO₂/kWh

Intensity of electricity generation by region



Page Weight *
Energy Intensity =
Total amount of CO₂

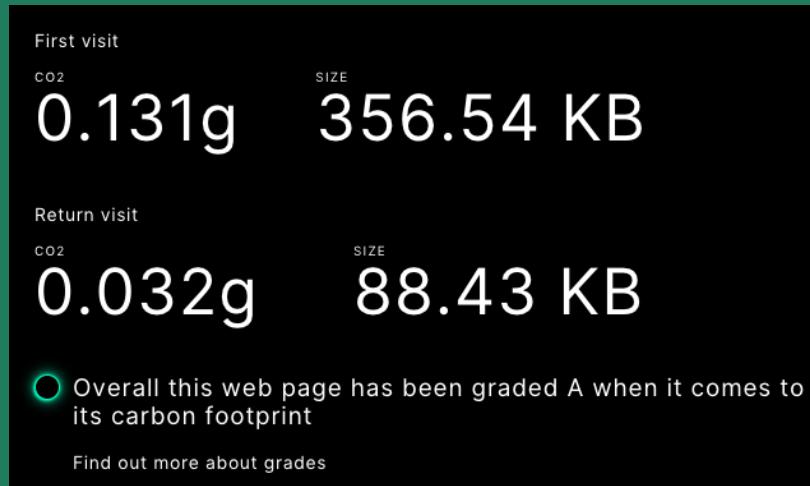
Index

- Awareness
- Best Practices
- Metrics
- Tools 
- Community

Checking CO₂ Emissions

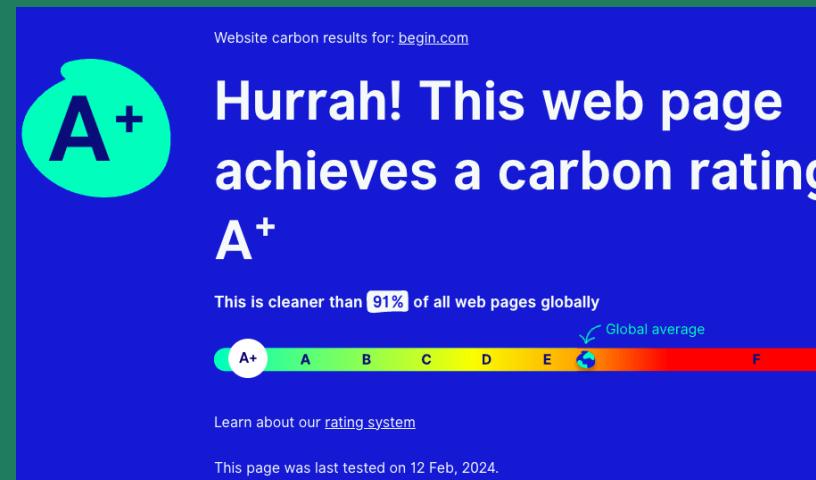
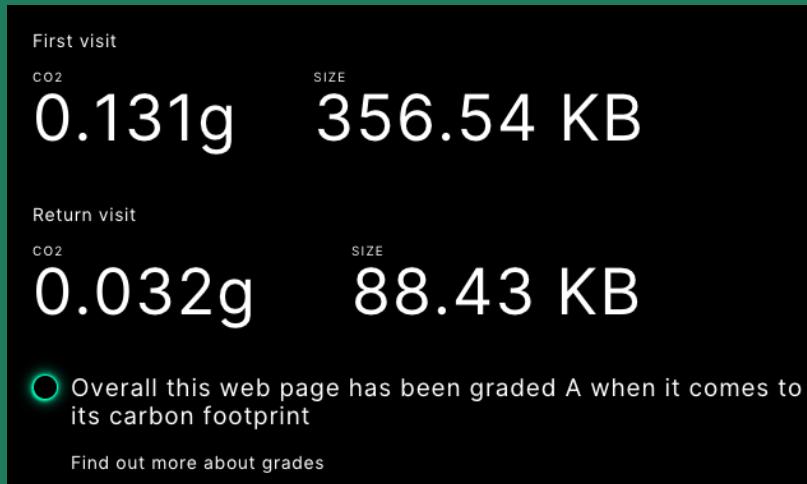
Checking CO₂ Emissions

- Beacon



Checking CO2 Emissions

- Beacon
- Website Carbon Calculator

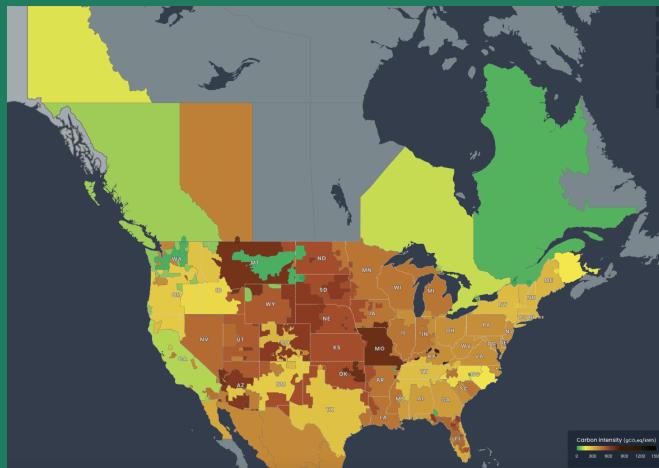


Estimating CO₂ Emissions

- CO₂.js works in browser and node.js

Electricity Generation by Region

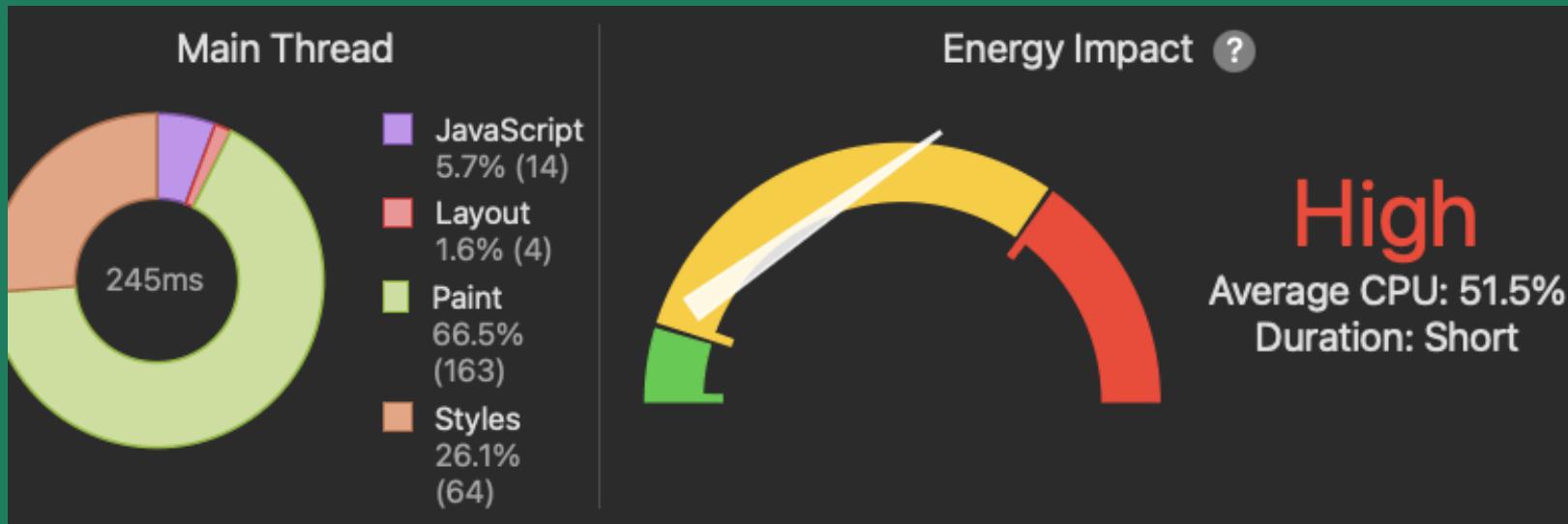
- Electricity Maps



Green Web Hosting

- Search the **directory**

Browser Energy Usage



Safari Energy Impact Meter

Font Tools

Font Tools

- Modern Font Stacks system font stacks

Font Tools

- Modern Font Stacks system font stacks
- WebFont Generator to convert to to WOFF2

Font Tools

- Modern Font Stacks system font stacks
- WebFont Generator to convert to WOFF2
- FontDrop to investigate fonts

Font Tools

- Modern Font Stacks system font stacks
- WebFont Generator to convert to WOFF2
- FontDrop to investigate fonts
- Font Subsetter to remove unused characters

Index

- Awareness
- Best Practices
- Metrics
- Tools
- Community 

Community

- Green Web Foundation
- Green Software Foundation



ST FLOOR
EXHIBITS
ST ROOMS

↓ BAIRD AUDITORIUM
ATRIUM CAFE
MUSEUM SHOP

Geology, Gems
& Minerals

Geology, Gems
& Minerals
HOPE DIAMOND

JANET AMHERST BOUTOLE
HALL OF GEOLOGY
& MINERALS

Fossil Hall

Fossil Hall

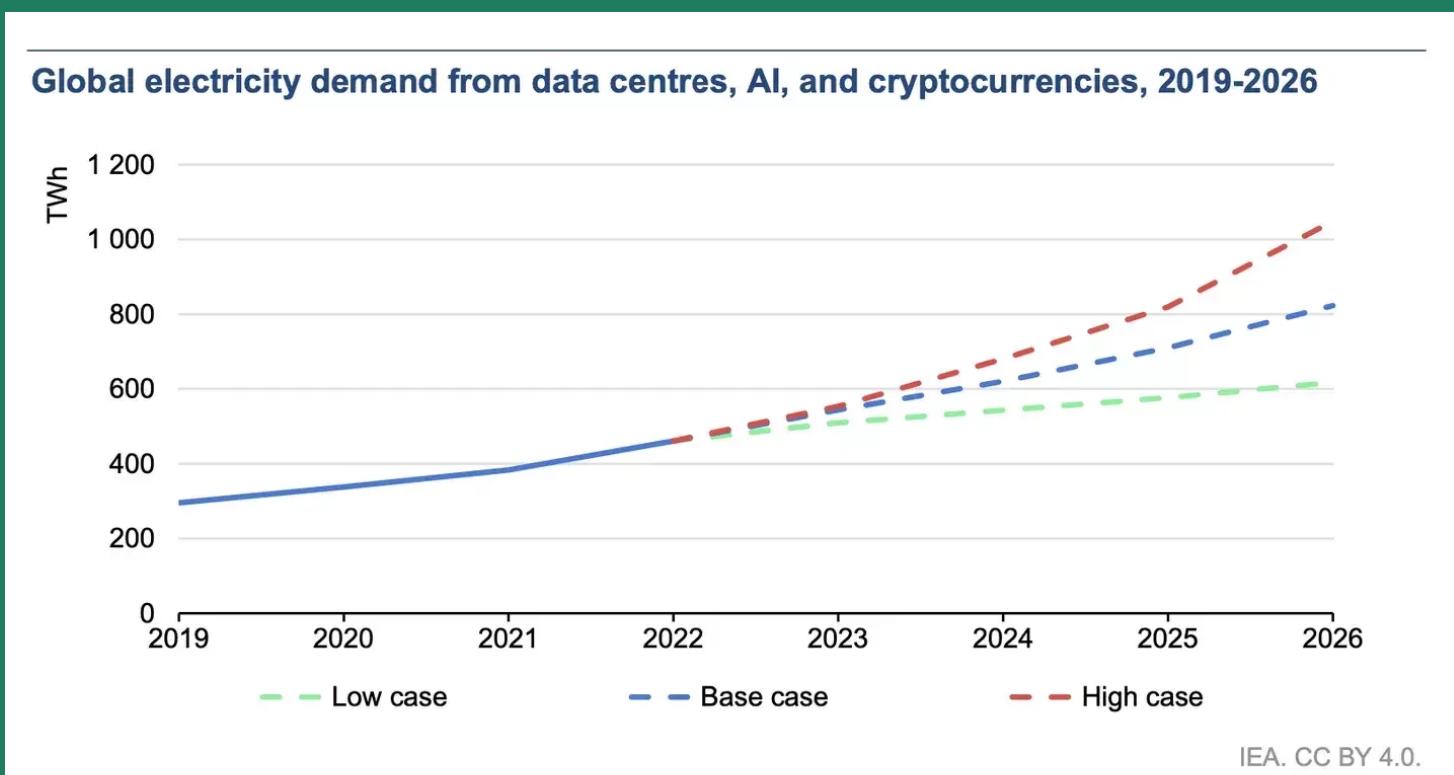
Elephant Discovery Station

KENNETH E. BEHR

Elephants in Danger Your Choices Make a Difference

Artificial Intelligence & Cryptocurrencies

Artificial Intelligence & Cryptocurrencies





Thanks!