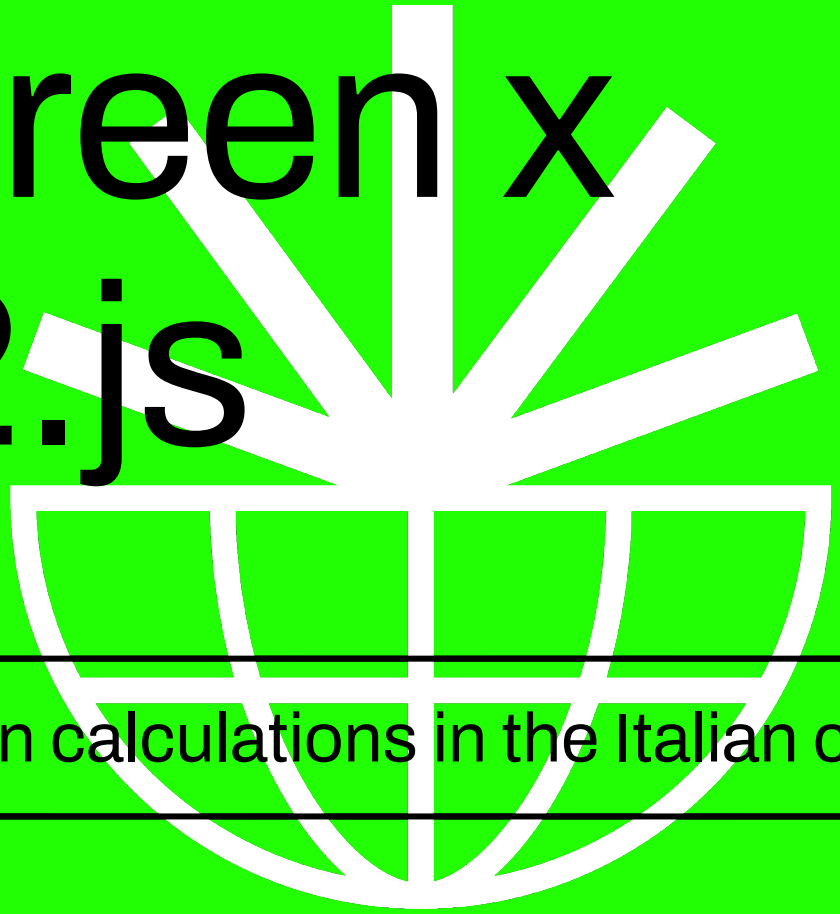
Sitigreen x CO2.js



Website carbon calculations in the Italian context

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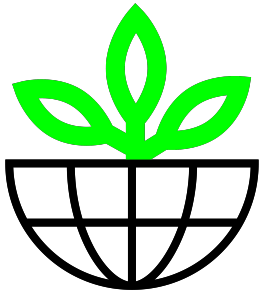
Hello, I’m Fershad!

Stuff I do

- Work with the **Green Web Foundation**
- Maintainer of **CO2.js**
- Creator of **Are my third parties green?**
- Writer of **COP Website Reviews**

I also …

- Play, referee, coach and organise **Touch Football in Taiwan**

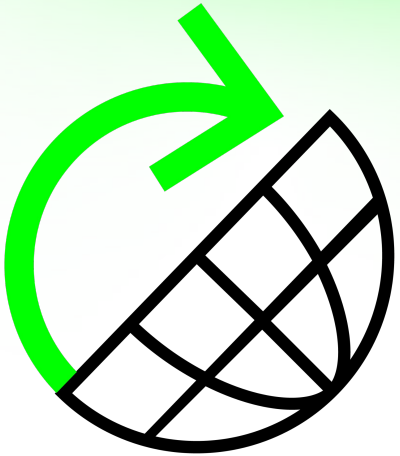


About the project

Update the Sitigreen website carbon calculator to return results that can be tailored for an Italian audience.

Why?

- Sitigreen's main audience is the Italian market.
- However, it originally **did not have the flexibility** to customise results for an Italian audience.



Why?

- It also lacked context:
  - About the location of the server.
  - About the location of the users.
- It used global averages in calculations.

In the end, all carbon emissions calculations look like a version of this:

Emissions *(g CO2e)* =

Energy Used *(kWh)* ***x Grid Intensity*** *(g CO2e/kWh)*

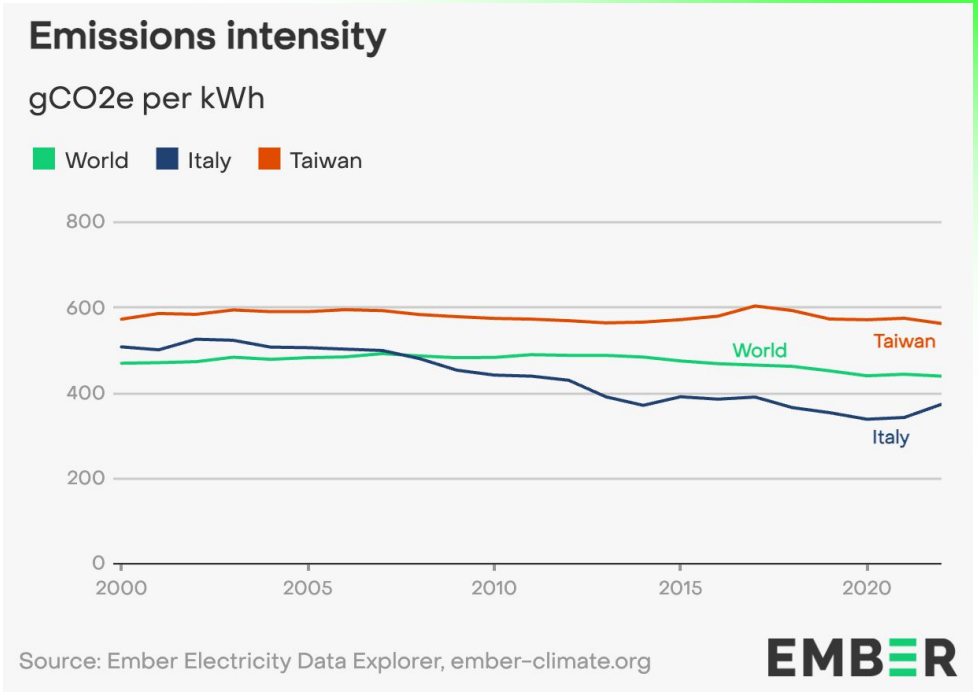
Under or over estimation

World: 437.67 g CO2e/kWh

Italy: 371.69 g CO2/kWh

Taiwan: 560.98 g CO2/kWh

Average annual grid intensity, 2022.

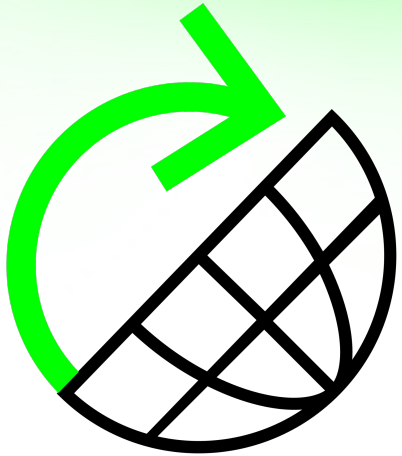


The project in detail

What changed. What didn’t.

What we changed

- Replaced previous API with CO2.js (Code)
- Added a field for users to select their location (UI)
- Check for website server location with IP 2 CO2 Intensity API (Code)
- Surface additional context to the results (UI)



What didn’t change

- Use the Sustainable Web Design (SWD) model for calculations
- The website is still written in PHP

Replace previous API with CO2.js

Why change?

- Needed a way to *change grid intensity* used for calculating:
  - User device emissions
  - Website server emissions

Why CO2.js?

- **Drop in replacement.** Uses the SWD model by default just like other popular calculators.
- Allows developer to **adjust** server, network, and device segment **grid intensity**.
- Includes annual average **grid intensity for 209 countries & 13 regions**.

A few extra changes

The previous API did a lot of stuff behind the scenes. Sitigreen now had to do that itself.

Check for green web hosting

- Using Green Web Foundation's Greencheck API.

Get data transfer of web page on load

- Using Google's PageSpeed Insight API.

Allow users to set their location

Four options:

- Italy
- Europe
- World
- Unknown

Fed into CO2.js for calculating emissions for user devices.

That achieved our MVP. But we added a few extra touches.

Check web server location

Why?

- If we can include context about the server location, then it improves the output we can generate.

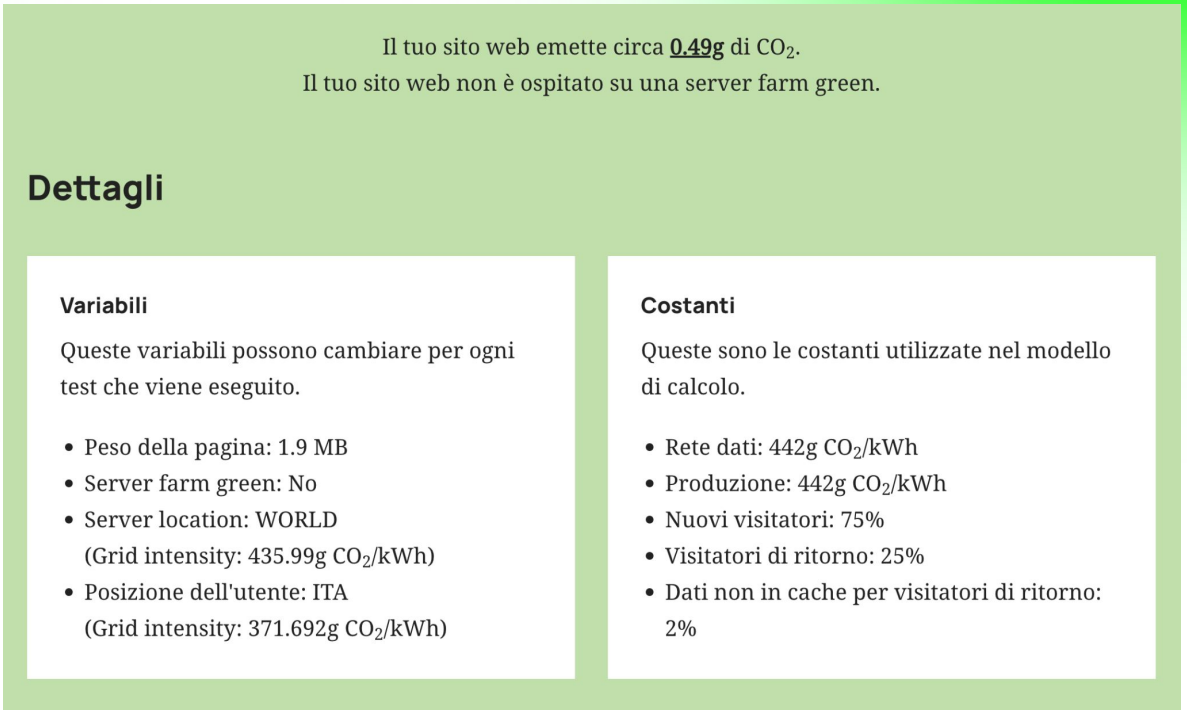
How?

- *If* the website being tested is **not green** when checked by the GreenCheck API.
  - Use a PHP function (`gethostbyname`) to find the web host IP address.
  - Check for the location of that IP address using the IP 2 CO2 Intensity API.
  - Fed into CO2.js for calculating emissions for website hosting.

Additional context in the results

This gives the user a clear picture of what went into the calculation.

It helps provide clarity around *why* the results here might differ from other website carbon calculators.



Il tuo sito web emette circa **0.49g** di CO_2.
Il tuo sito web non è ospitato su una server farm green.

Dettagli

Variabili

Queste variabili possono cambiare per ogni test che viene eseguito.

- Peso della pagina: 1.9 MB
- Server farm green: No
- Server location: WORLD (Grid intensity: 435.99g CO_2/kWh)
- Posizione dell'utente: ITA (Grid intensity: 371.692g CO_2/kWh)

Costanti

Queste sono le costanti utilizzate nel modello di calcolo.

- Rete dati: 442g CO_2/kWh
- Produzione: 442g CO_2/kWh
- Nuovi visitatori: 75%
- Visitatori di ritorno: 25%
- Dati non in cache per visitatori di ritorno: 2%

Summary

Summary

What we accomplished in this project

- Integrated CO2.js into Sitigreen's WordPress PHP code base.
- Provided a way for users to include context about *their* location in carbon estimates.
- Include additional context about the website server location in carbon estimates.

Raise the awareness of Italian people about the environmental impact of the digital sector.

Resources

Green Web Foundation Libraries & APIs

- CO2.js
- Greencheck API
- IP to CO2 Intensity API

Other APIs

- PageSpeed Insights
-

Other Data Sets

- Ember Climate

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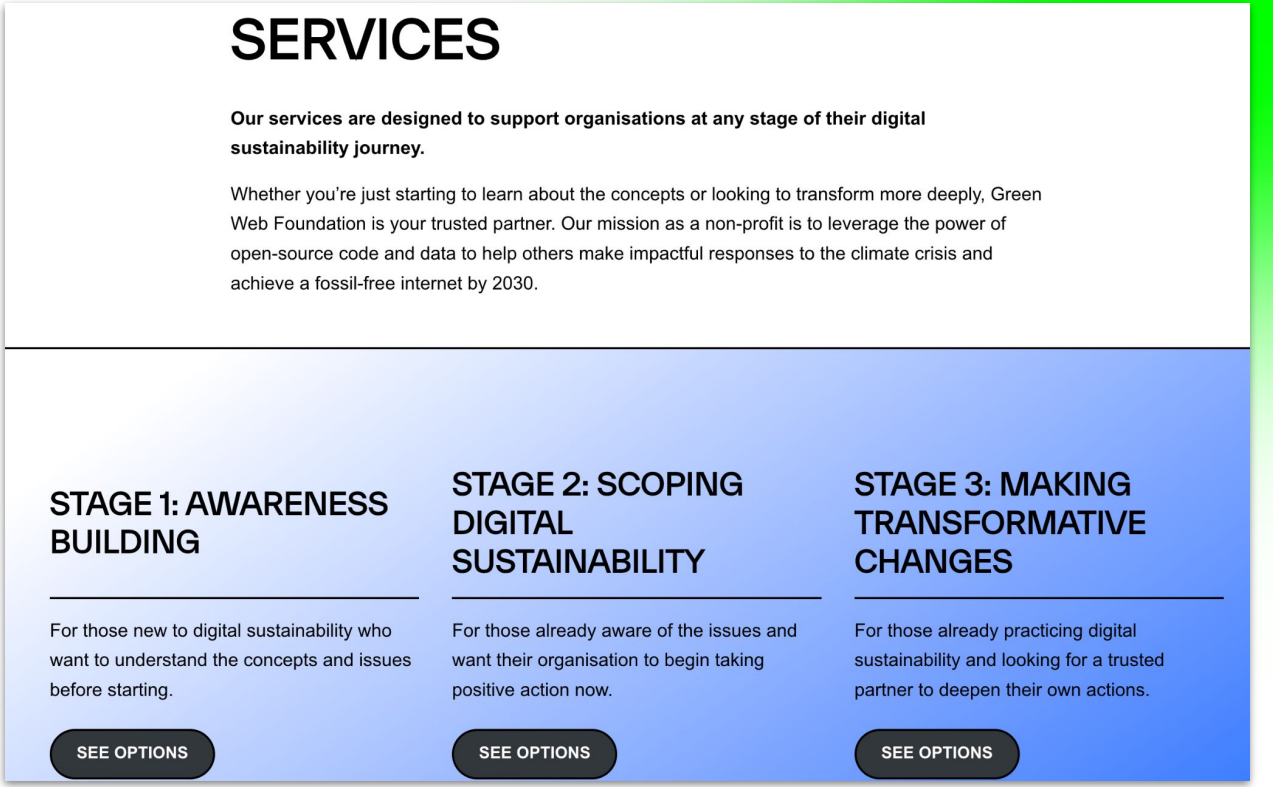

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THANK YOU

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