Building a Sustainable Web

A practical exploration of Open Source tools and strategies

Sustainability:

"meeting the needs of the present without compromising the ability of future generations to meet their own needs."

- United Nations Brundtland Commission (1987)

Valeria Salis

Software developer @ SparkFabrik

- Distinguishing marks: a hybrid background, way too many interests and passionate about technology since I remember.
- I started off as a backend developer, but then I switched to the dark side (front end).
- Strong interests: accessibility and sustainability.

Today's topics

- ➔ Basic information, where it all started
- ➔ Deep dive into open source resources and tools
- ➔ The reason why OS and the community aspects have had a key role

Disclaimer:

With this talk I wanted to share **my journey** and **my experience** as someone deeply concerned about climate change that one day had to face the **negative impacts** of the Web, something that I've always loved.
It isn't an "expert" point of view.

Let's start with the basics

The Internet has always been my happy place.

- “If the Internet was a country, it would be the **4th** largest polluter” - *Sustainable Web Manifesto*
- *The Internet is responsible for about **4%** of total CO2 emissions*
- *Air transport is responsible for “only” **2%** of total CO2 emissions*

UX and Web Sustainability

- ➔ Sustainability also means **speed**, **performance**, **usability** and **accessibility**
- ➔ Working towards a more environmentally friendly UX will also make users happier
- ➔ https://tech.sparkfabrik.com/en/blog/ux-and-sustainable-web/

Great starting point, wasn't it?

Not enough, for me.

Where do we go from here?

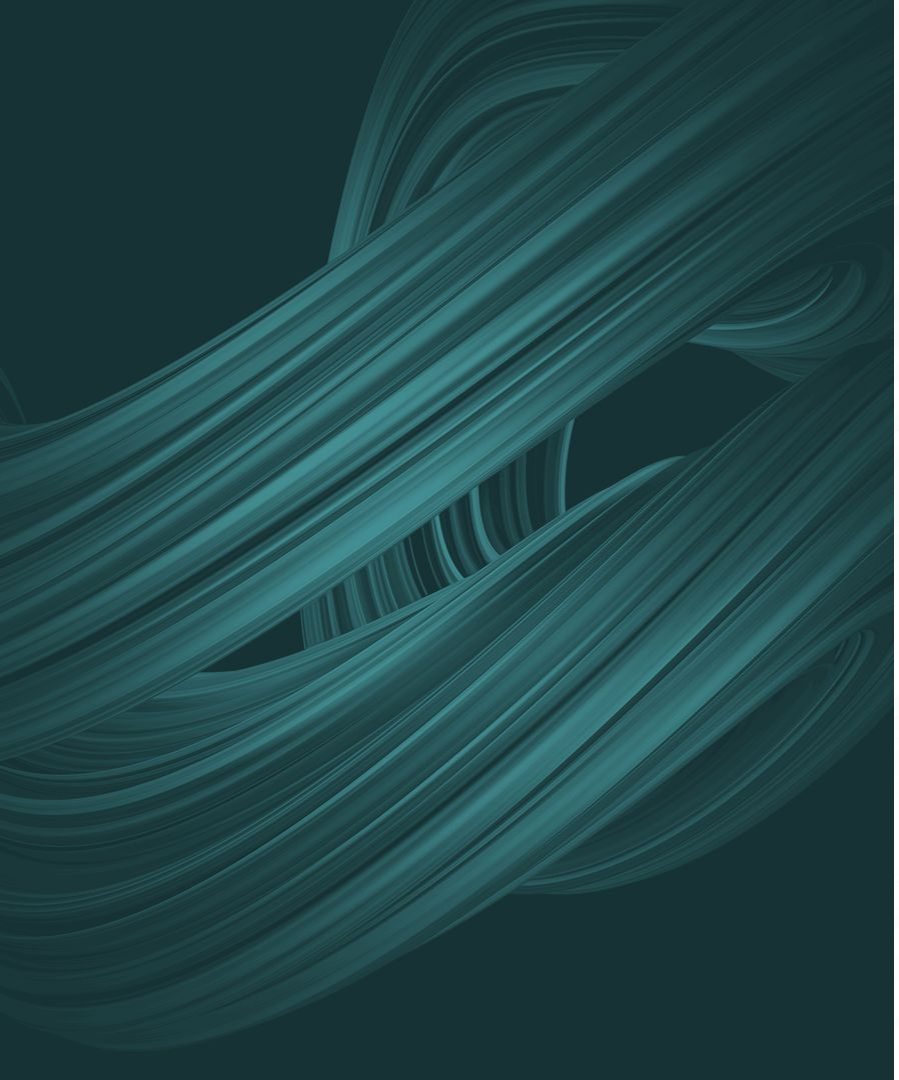
- ➔ October 2023: took place the Cloud Native Sustainability Week https://tag-env-sustainability.cncf.io/events/cloud-native-sustainability-week/
- ➔ It is a global event consisting of local meetings around Cloud Native Sustainability.

- ➔ One main thing I learnt is that we use the Cloud very badly. **Approximately 90% of cloud data is used only one time.**

But, as a software developer, what else can I do?

Green Software for Practitioners

https://training.linuxfoundation.org/training/green-software-for-practitioners-lfc131/

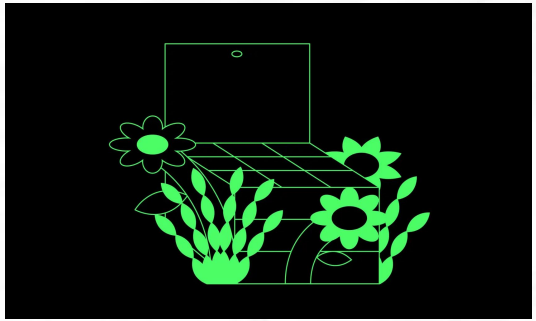


- Online course created by the Green Software Foundation along with the Linux Foundation
- It is a starting point for people who are involved in building, deploying, or managing a software application and want to do that in a greener way

Main actions to reduce the carbon emissions of software

Energy efficiency

Consume the least amount of electricity possible.



Hardware efficiency

Use the least amount of *embodied carbon* possible.

Carbon awareness

Do more when electricity is clean and less when it's dirty.
(*demand shifting* and *demand shaping*)

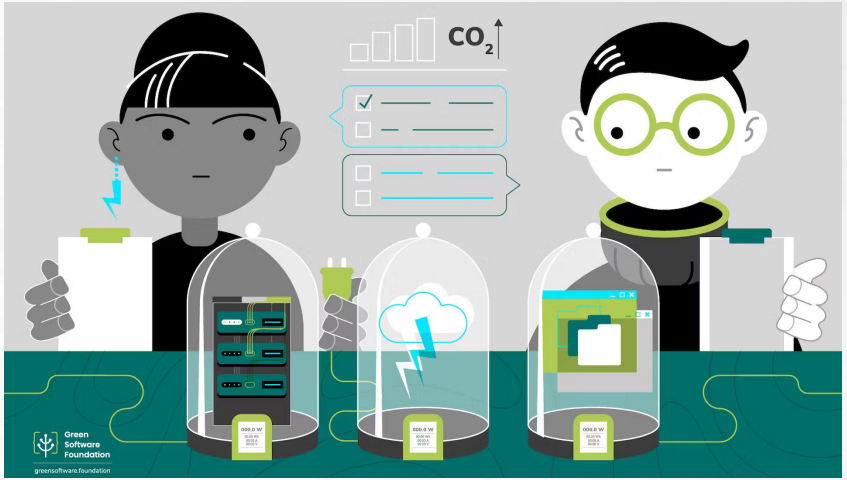
What you can't measure, you can't improve

Greenhouse Gases protocol (GHG)

The **most widely used** and **internationally recognized** greenhouse gas accounting standard
It divides emissions into three main scopes:

- ➔ Scope 1: direct
- ➔ Scope 2: indirect
- ➔ Scope 3: other indirect emissions from the organization's supply chain

Software Carbon Intensity (SCI)



Developed by the GSF, aims to **give a score** to a software application in order to understand **how it behaves** in terms of carbon emissions.

More energy and hardware efficient and carbon aware → lower SCI score

$SCI = (E * I) + M)\ per\ R$

What about the community?

Environmental Sustainability Technical Advisory Group

https://tag-env-sustainability.cncf.io/

- The TAG's goal is to **advocate for**, **develop**, **support**, and **help evaluate** environmental sustainability initiatives in cloud native technologies.
- https://github.com/cncf/tag-env-sustainability/

- Two working groups: **Green Reviews** and **Communications**
- People are involved in various ways depending on their technical skills and/or their interests.
- Everyone wishes to do something, to participate and give even a small helping hand on currently active projects and discussions.

Different people have **different backgrounds** which leads to **different approaches** to issues and **different ideas**.
It also means that everyone can give their own point of view and the result can definitely be more *complete*.

This had a key role in trying to define some kind of “learning path” for us *wannabe-greener-devs*. 🌱

https://developers.thegreenwebfoundation.org/

https://opensustain.tech/

https://kube-green.dev/

https://ecograder.com/

- ➔ CO2.js
- ➔ Grid Intensity CLI
- ➔ Greencheck API
- ➔ And a lot more

Read some books! 📖

Sustainable Web Design by Tom Greenwood

https://abookapart.com/products/sustainable-web-design

World Wide Waste by Gerry McGovern

https://gerrymcgovern.com/world-wide-waste/

How bad are Bananas? The carbon footprint of everything by Mike Berners-Lee

https://howbadarebananas.com/

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That's all Folks!