

Webtechnologies

DNS AND DOMAINS, DIGITAL SUSTAINABILITY, CSS BASICS



Q&A → QUESTIONS ABOUT YESTERDAY?

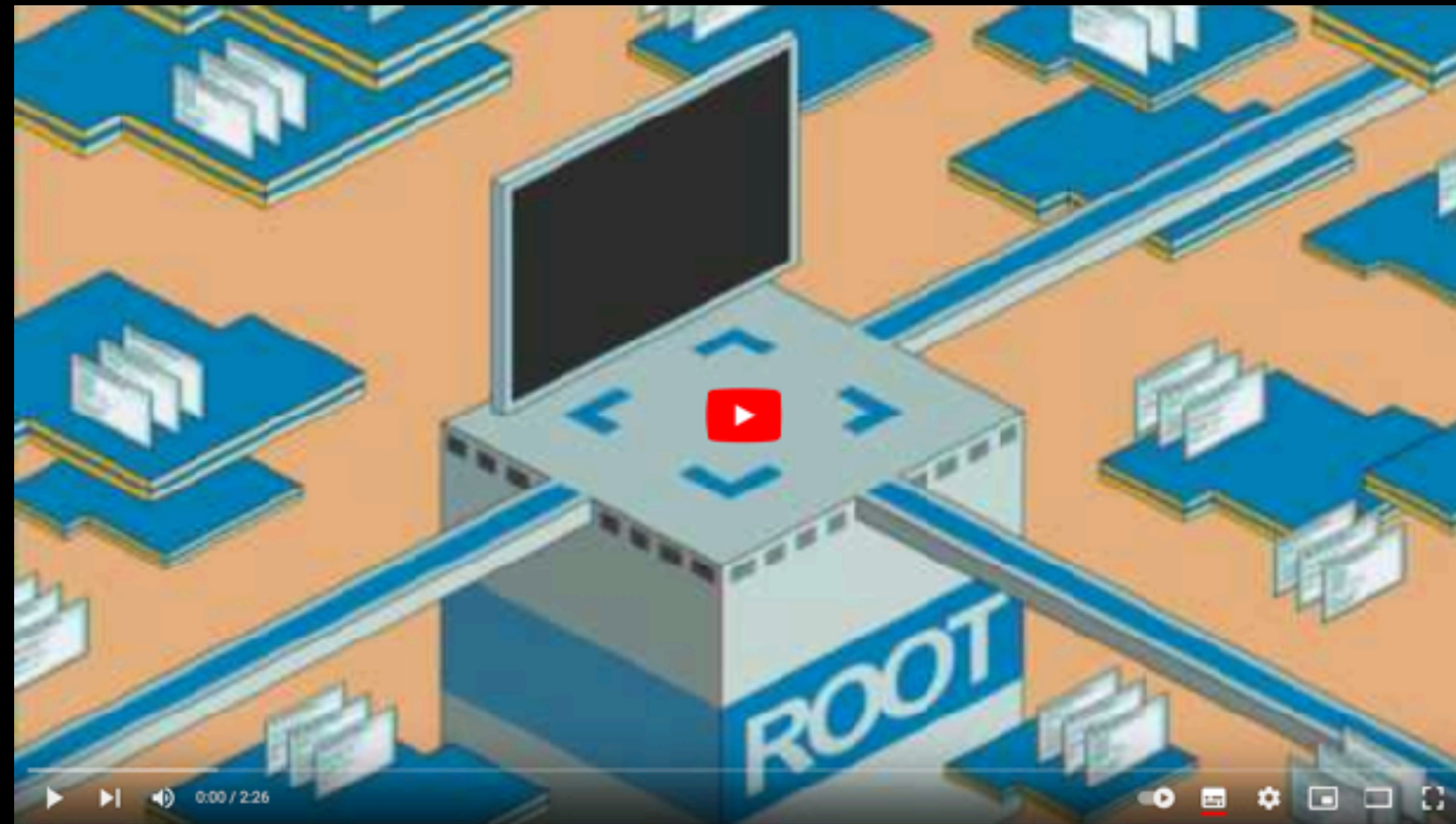
DOMAINS

- [duckduckgo.com](#)
- [zhdk.ch](#)
- [wired.com](#)
- [hallointer.net](#)
- ...

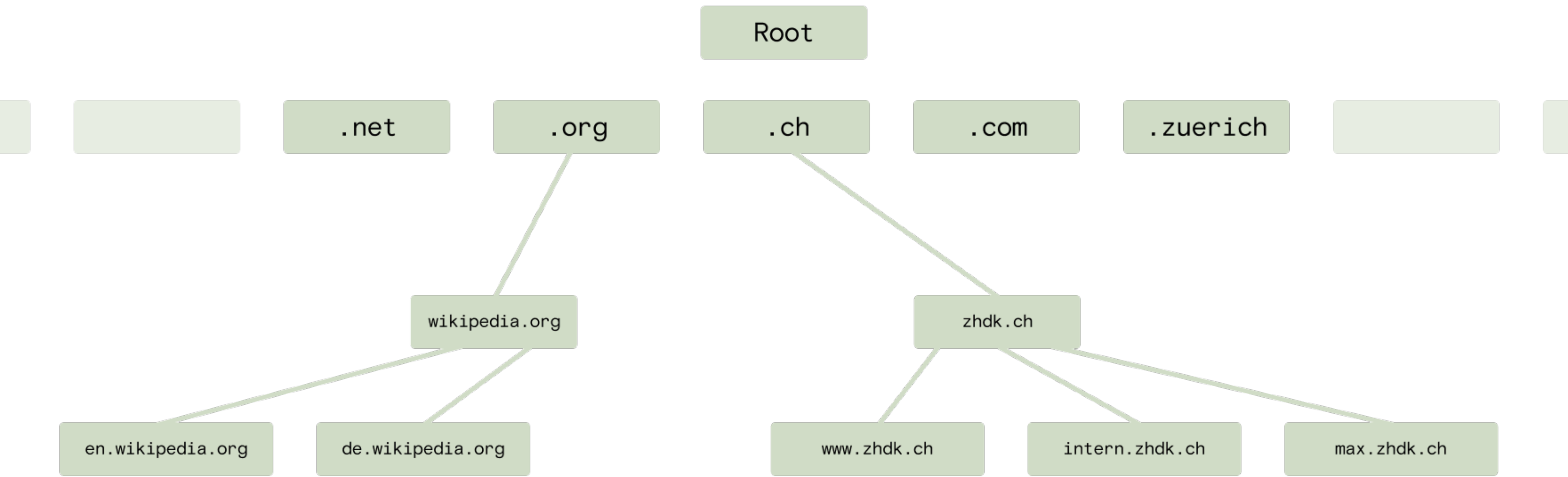
DOMAIN NAME SYSTEM (DNS)

- duckduckgo.com → 40.114.177.156
 - zhdk.ch → 195.176.247.145
 - wired.com → 151.101.2.194
-
- localhost → 127.0.0.1

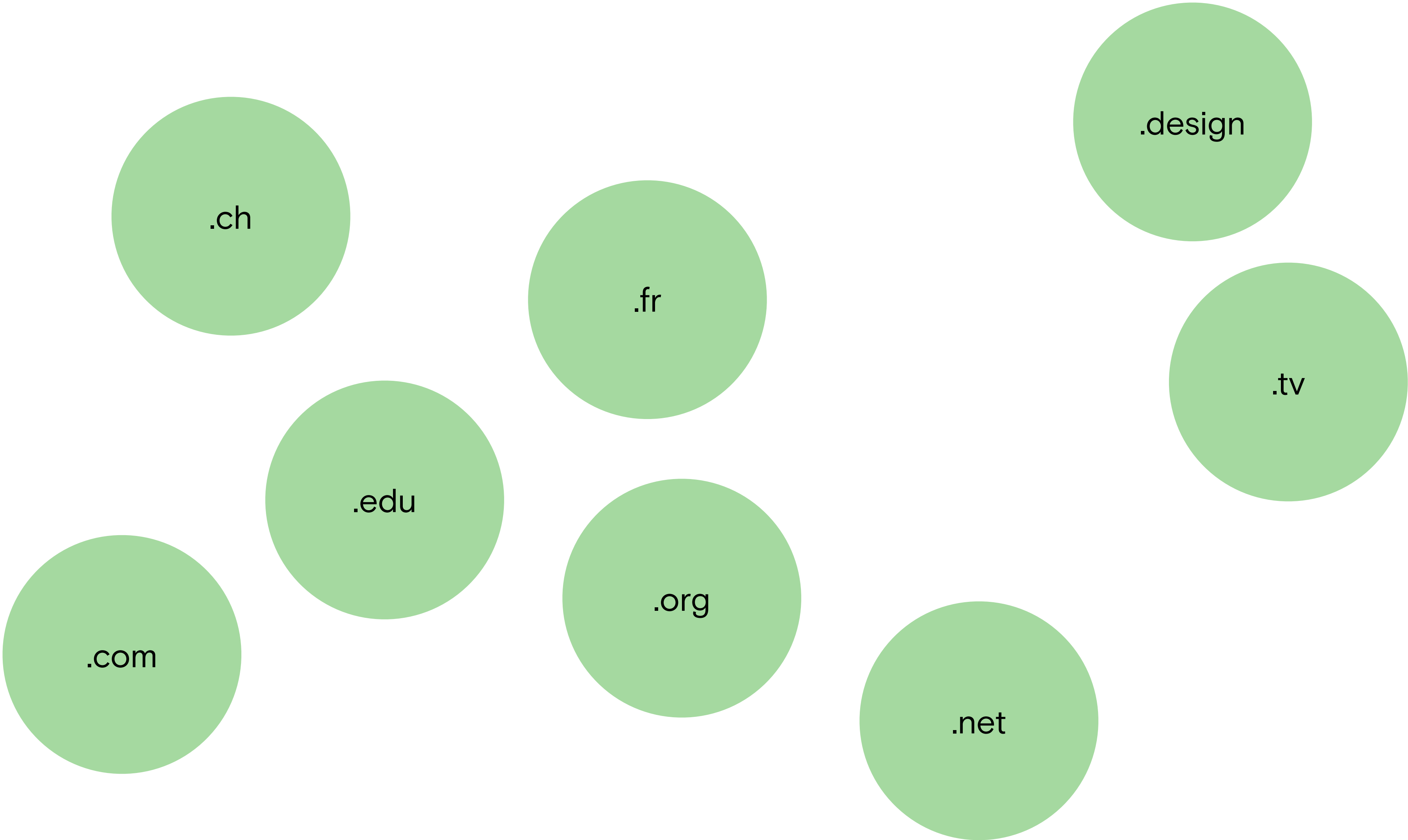
DNS



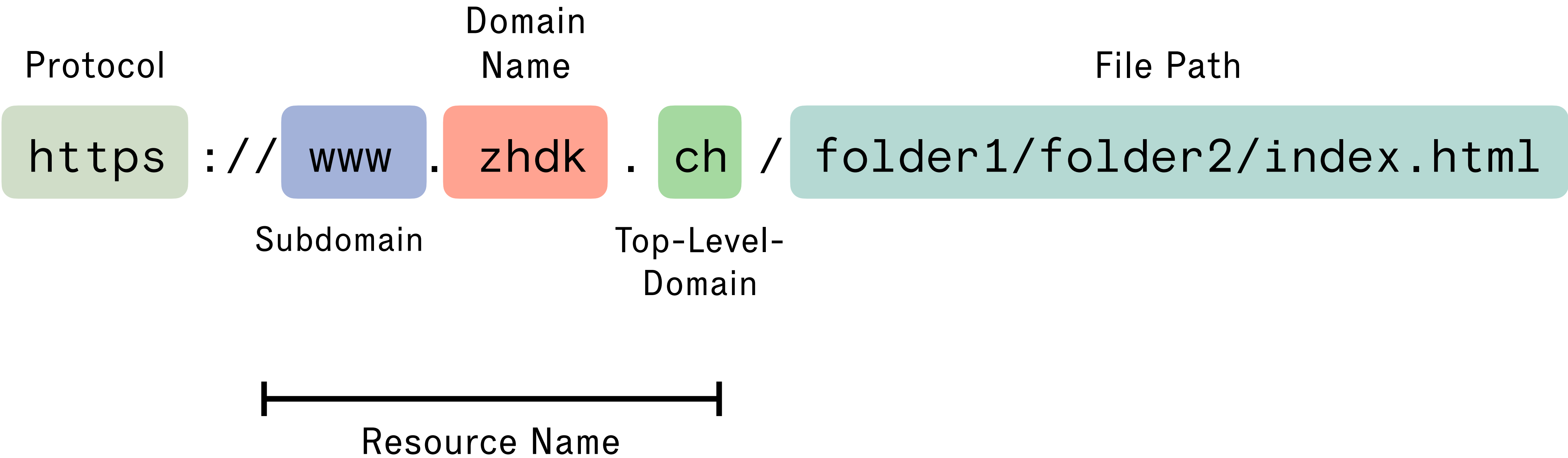
DNS LOOKUP HIERARCHY



TOP-LEVEL-DOMAINS



UNIFORM RESOURCE LOCATOR (URL)



UNIFORM RESOURCE LOCATOR (URL)

- <http://my-domain.to/path/to/my/file.zip>
- <https://www.chess.com/puzzles/rated>
- <https://goo.gl/maps/niVtxgPvNzmxvbB56>
- <https://www.youtube.com/watch?v=2ZUxoi7YNgs&t=65>

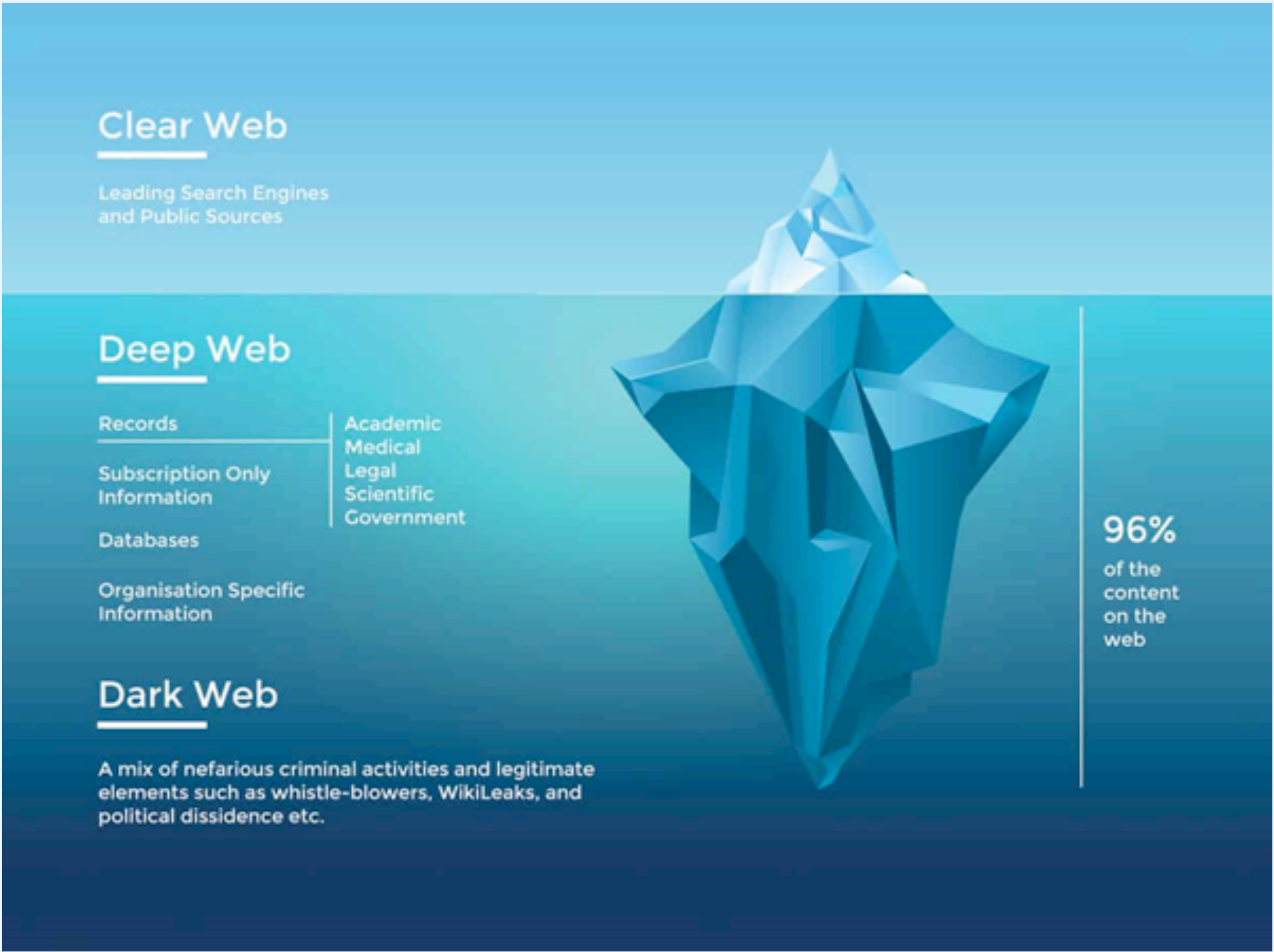
URL QUERY PARAMETERS

https://www.sudpol.ch/programm/?
jahr=2022&monat=3&kategorie=installation&post=pro-
senectute-tanznachmittag-4-11

URL QUERY PARAMETERS

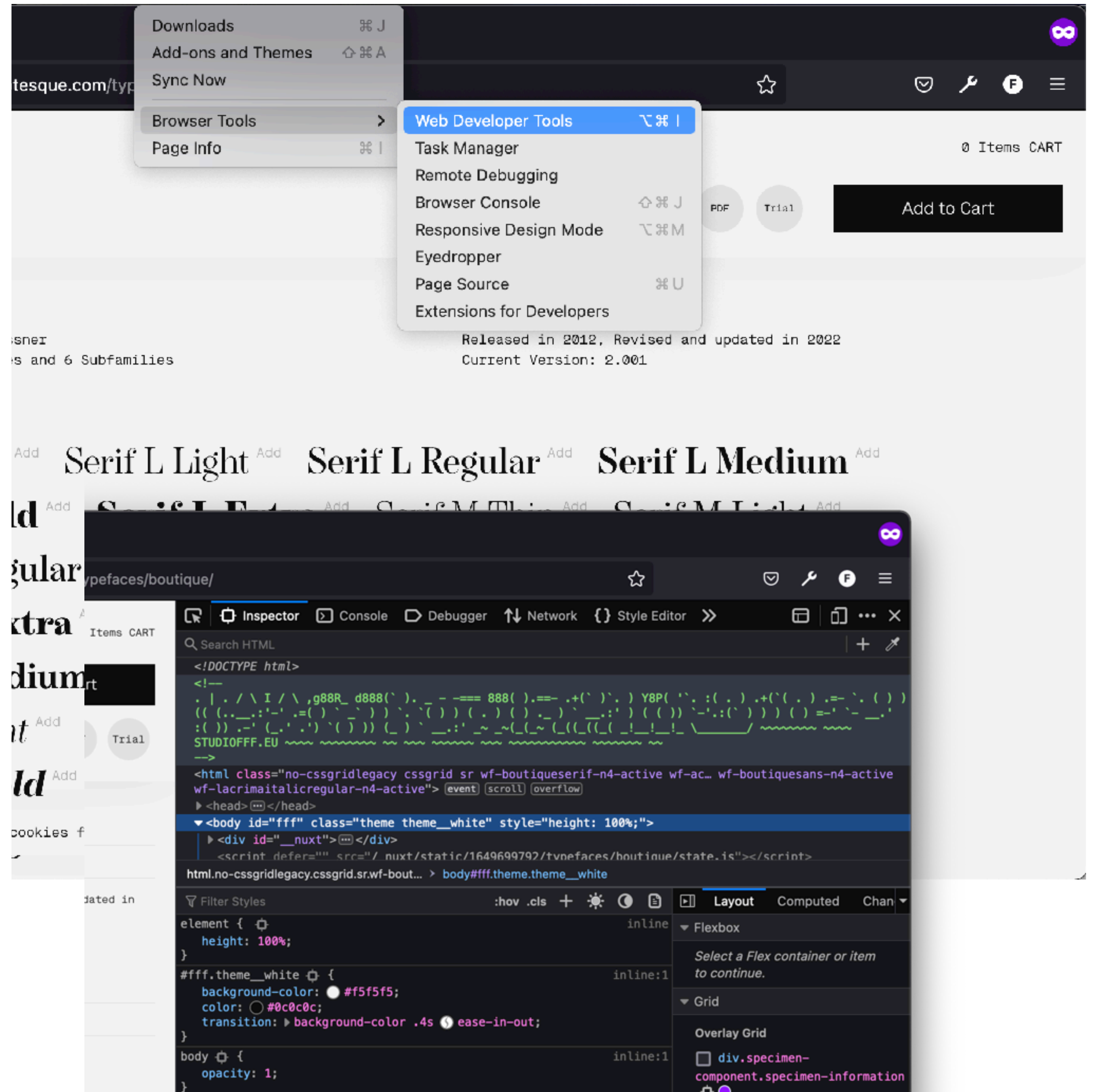
https://www.sudpol.ch/programm/
?jahr=2022
&monat=3
&kategorie=installation
&post=pro-senectute-tanznachmittag-4-11

THE WEB



DEVELOPER TOOLS

- Every browser is a bit different. Look for terms like «Inspector», «Web Developer Tools» or «Console».
- Shortcut:
 - Mac: Option + Command + I
 - Windows: F12



HELP!!!

- stackoverflow.com
- Mozilla Dev Network
(<https://developer.mozilla.org/en-US/>)
- caniuse.com
- GitHub issues
- Search engines
- Validation W3C (<https://validator.w3.org/>)
- Framework/Library Documentations
 - e.g.: nuxt.js
 - e.g.: lodash
- AI

HTML (HYPERTEXT MARKUP LANGUAGE)



```
1  <!DOCTYPE html>
2  <html lang="en">
3  <head>
4    <meta charset="UTF-8">
5    <meta http-equiv="X-UA-Compatible" content="IE=edge">
6    <meta name="viewport" content="width=device-width, initial-scale=1.0">
7    <title>Document</title>
8  </head>
9  <body>
10   An HTML document.
11 </body>
12 </html>
```


CSS (CASCADING STYLE SHEET)

```
1
2  html {
3    font-family: var(--sans-font);
4    scroll-behavior: smooth;
5  }
6
7  body {
8    color: var(--text);
9    background: var(--bg);
10   font-size: 1.15rem;
11   line-height: 1.5;
12   display: grid;
13   grid-template-columns:
14     1fr min(45rem, 90%) 1fr;
15   margin: 0;
16 }
17
18 body > * {
19   grid-column: 2;
20 }
21
22 body > header {
```

CSS

- Cascading Style Sheet
- Styling HTML elements
 - Position
 - Color
 - Appearance
 - Etc.

CSS: INLINE, INTERNAL OR EXTERNAL

```
1 <p style="text-align:right; color:green; font-family: 'times new roman'; margin-left:15px;">
2   This is just a simple,
3   inline formatted paragraph.
4 </p>
```

Inline css

```
1 <head>
2   .....
3   <link rel="stylesheet" type="text/css" href="external_file.css" />
4   .....
5 </head>
6
```

External css

```
1 <head>
2   <style type="text/css">
3     body {
4       background-image: url("img/image.png");
5     }
6
7     hr {
8       color: #efefef;
9     }
10
11    p {
12      margin-left: 15px;
13    }
14  </style>
15 </head>
16
```

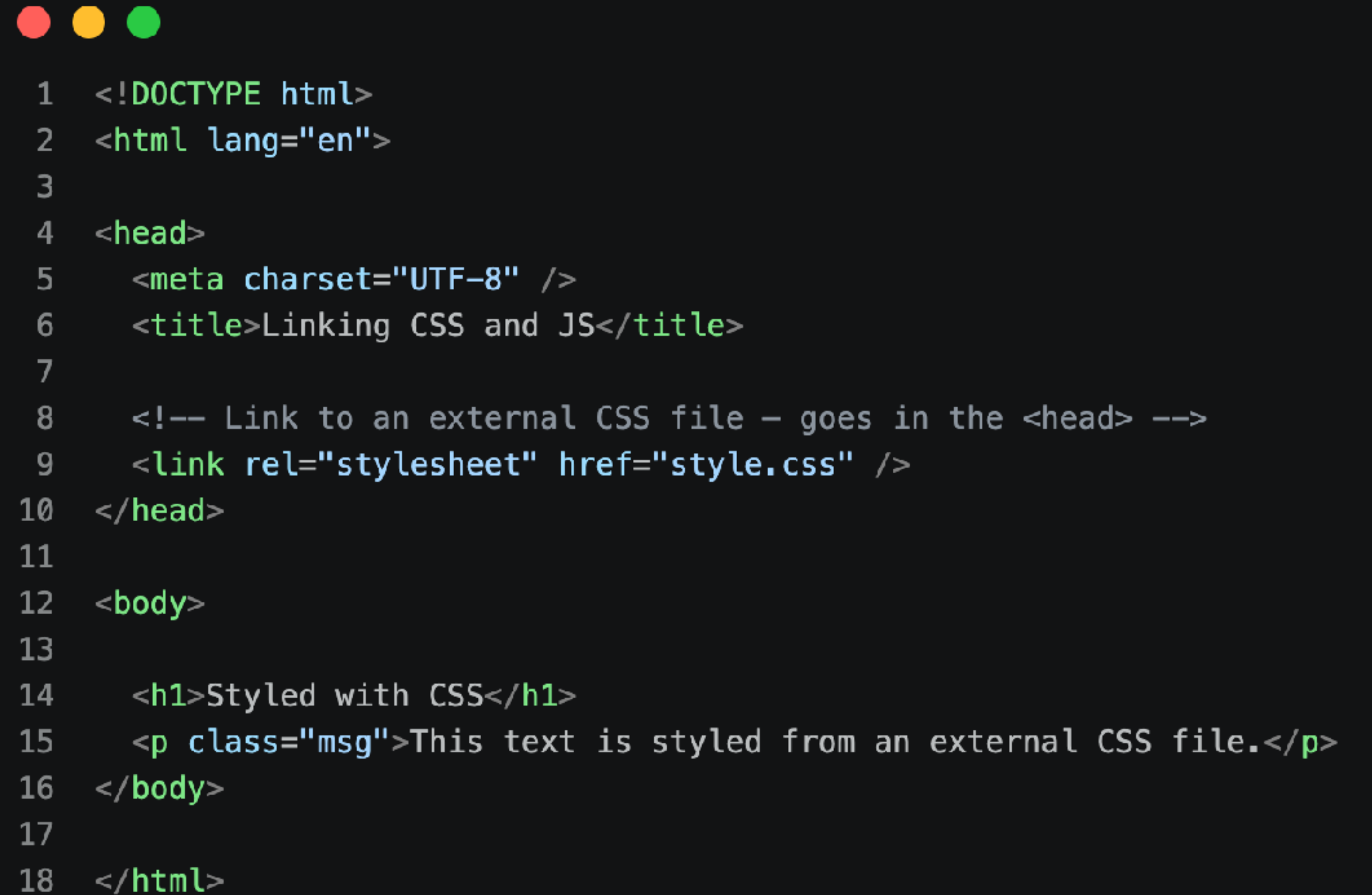
Internal css

CSS SELECTORS

```
a { color: blue; } /* Element */  
.wrapper { width: 100%; } /* Class */  
#content { margin-left: 1em; } /* ID */  
a:hover { text-decoration: underline; } /* Pseudo Class */  
div:before { content: "..."; } /* Pseudo Element */
```


CSS BASICS

- Include external css file in <head>
- Selectors tell the browser which parts should be styled in what way



```
1  <!DOCTYPE html>
2  <html lang="en">
3
4  <head>
5      <meta charset="UTF-8" />
6      <title>Linking CSS and JS</title>
7
8      <!-- Link to an external CSS file – goes in the <head> -->
9      <link rel="stylesheet" href="style.css" />
10 </head>
11
12 <body>
13
14     <h1>Styled with CSS</h1>
15     <p class="msg">This text is styled from an external CSS file.</p>
16 </body>
17
18 </html>
```

CSS BASICS

- Selectors tell the browser which parts should be styled in what way

```
1  body {
2    font-family: sans-serif;
3    padding: 2rem;
4    background-color: #f5f5f5;
5  }
6
7  h1 {
8    color: #1db954;
9  }
10
11  .msg {
12    font-size: 1.2rem;
13    color: #333;
14  }
15
16  .btn {
17    padding: 0.5rem 1rem;
18    font-size: 1rem;
19    cursor: pointer;
20  }
```

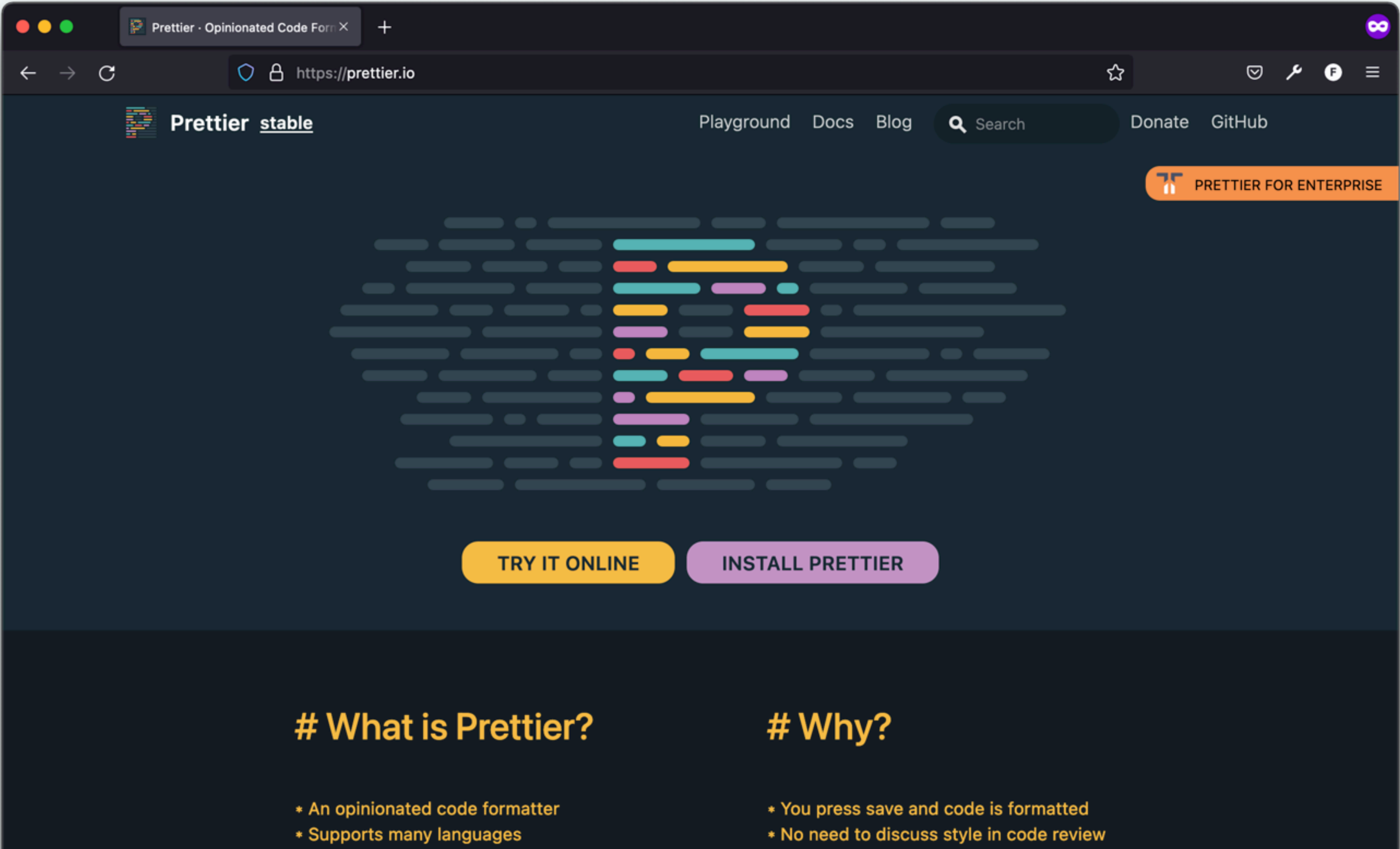
EXERCISE 5

- Create a .css file
- Include it in your recipe html
- Change styling of raw markup
 - Change text color: *color*
 - Change typeface: *font-family*
 - Change font size: *font-size*
 - Change image size: *width (& maybe height)*

CSS

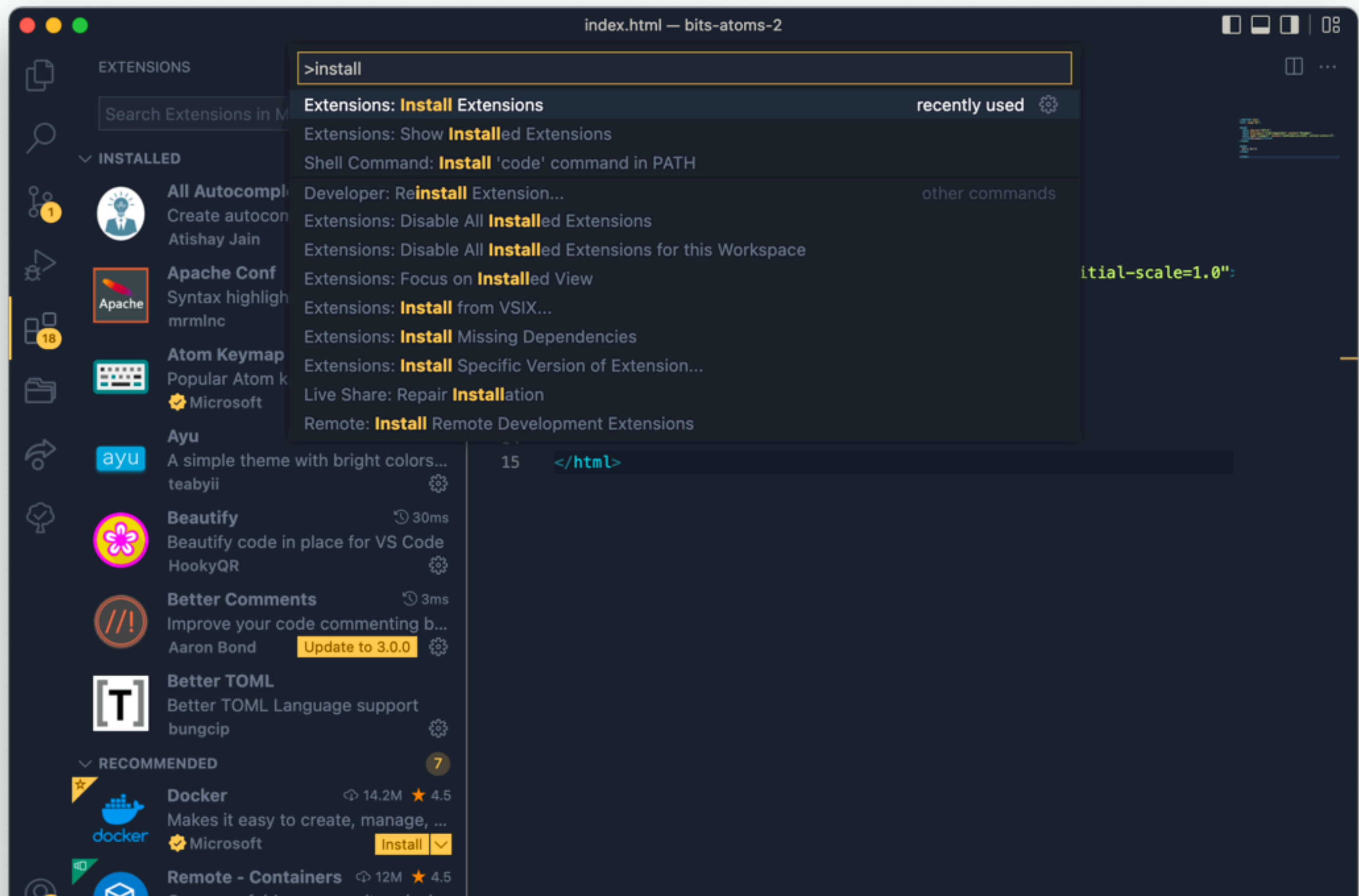


CLEAN CODE



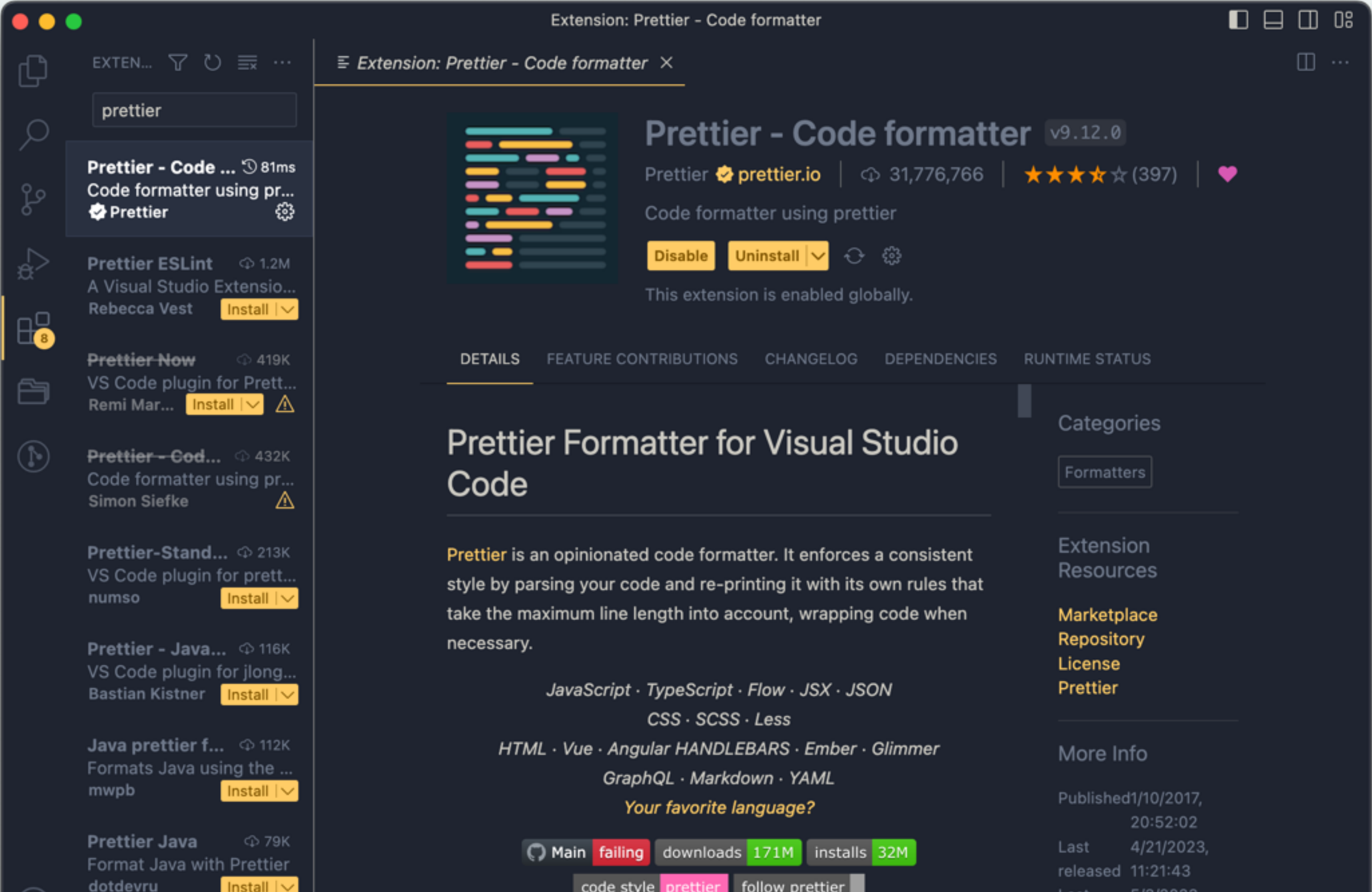
PLUGINS IN VISUAL STUDIO CODE

- View → Command Palette
OR
Shortcut: Shift + Command + P
- Type: Install extensions



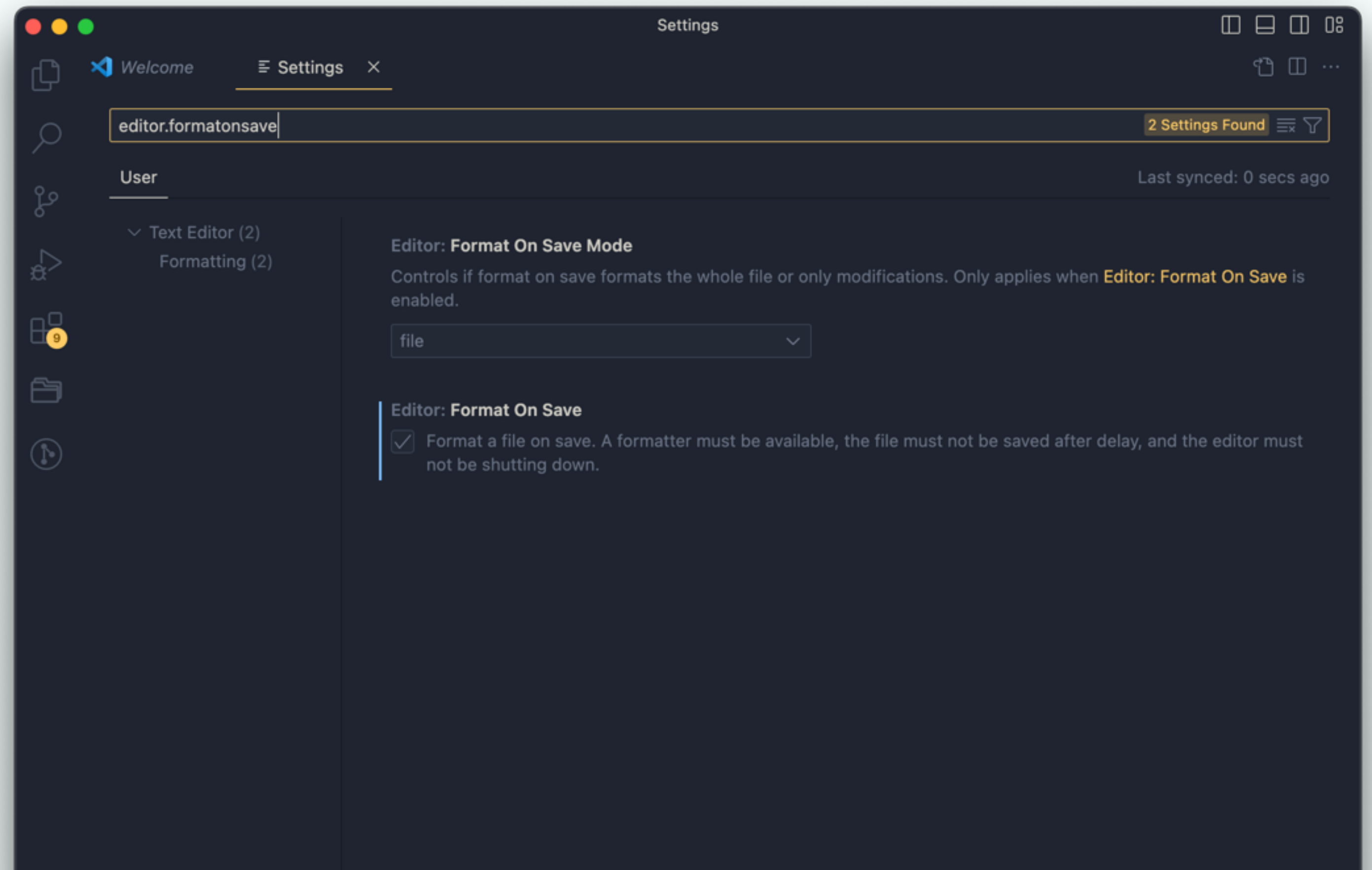
INSTALL PRETTIER

- Type: prettier and install



FORMAT ON SAVE

- Open Preferences
 - «*Command + ,*» OR
 - *Code* → *Settings* → *Settings*
 - Type: *editor.formatonsave*
 - And add checkmark



Webtechnologies

DIGITAL SUSTAINABILITY

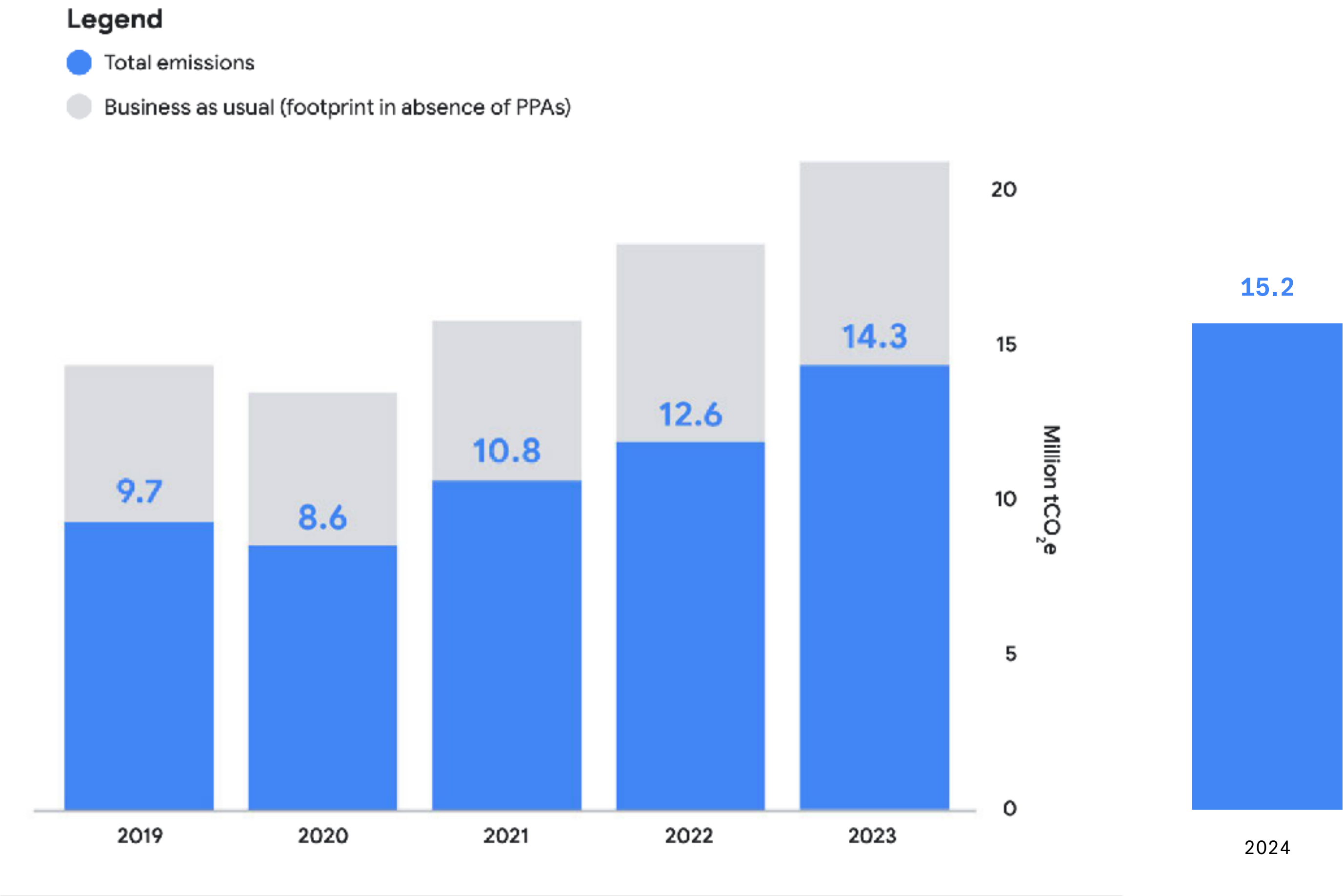


ENERGY CONSUMPTION 2023

«This paper considers key issues surrounding energy consumption by information and communication technologies (ICT), which has been steadily growing and is now attaining **approximately 10% of the worldwide electricity consumption** [...]»

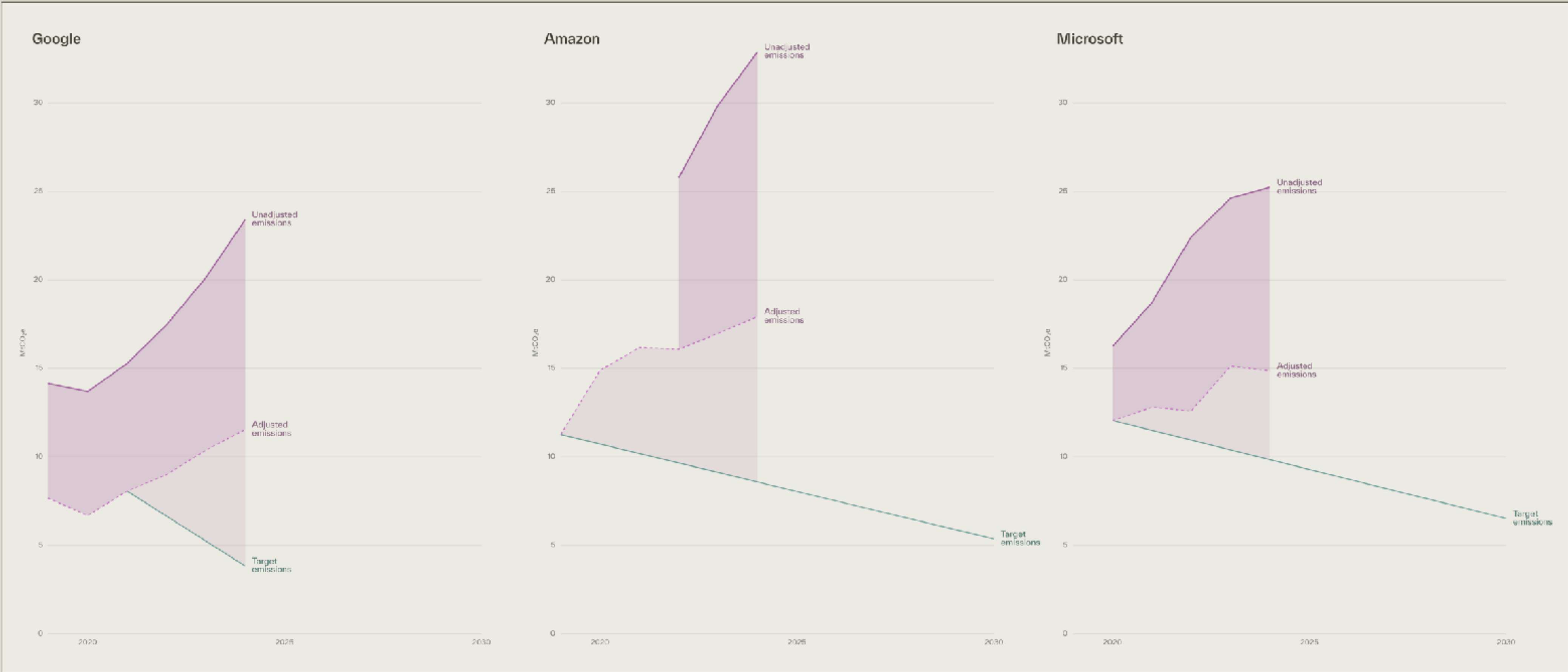
Gelenbe, Erol. “Electricity Consumption by ICT: Facts, Trends, and Measurements.” Ubiquity 2023, no. August (2023): 1–15.
<https://doi.org/10.1145/3613207>.

GOOGLE'S EMISSIONS OF CO₂e (CO₂ EQUIVALENTS)



MISSING TARGET EMISSIONS BY FAR

Tech company emissions deviate sharply from their own net-zero targets

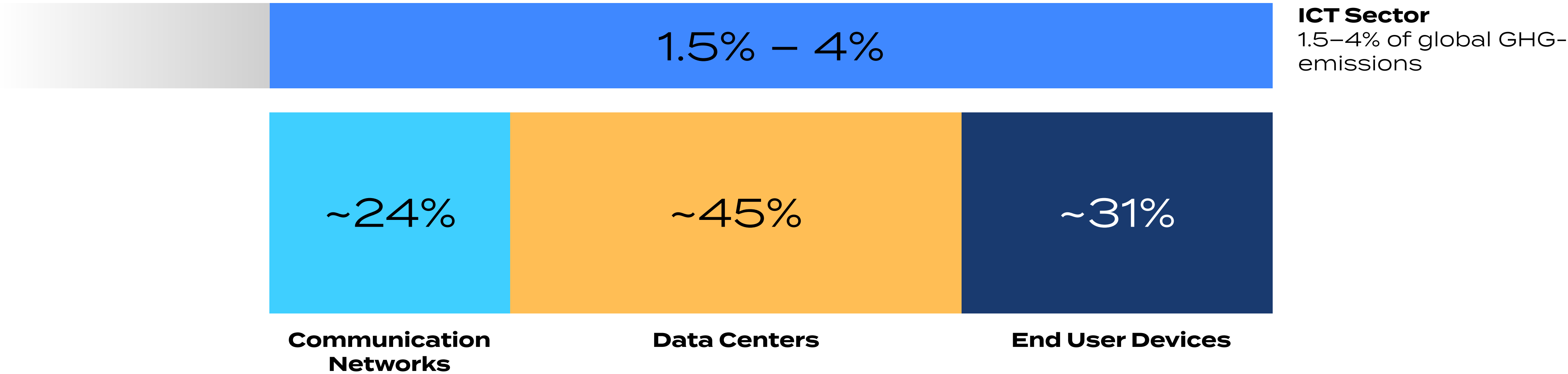


The total emissions of Google, Amazon and Microsoft deviate from their own targets as well as their market-based adjustments. All values are in megatons of carbon dioxide equivalents (MtCO₂e). Source: The AI Climate Hoax: Behind the Curtain of How Big Tech Greenwashes Impacts (for more details about the data, see Appendix C), Ketan Joshi, 2026, co-commissioned by Green Web Foundation

DOWNLOAD

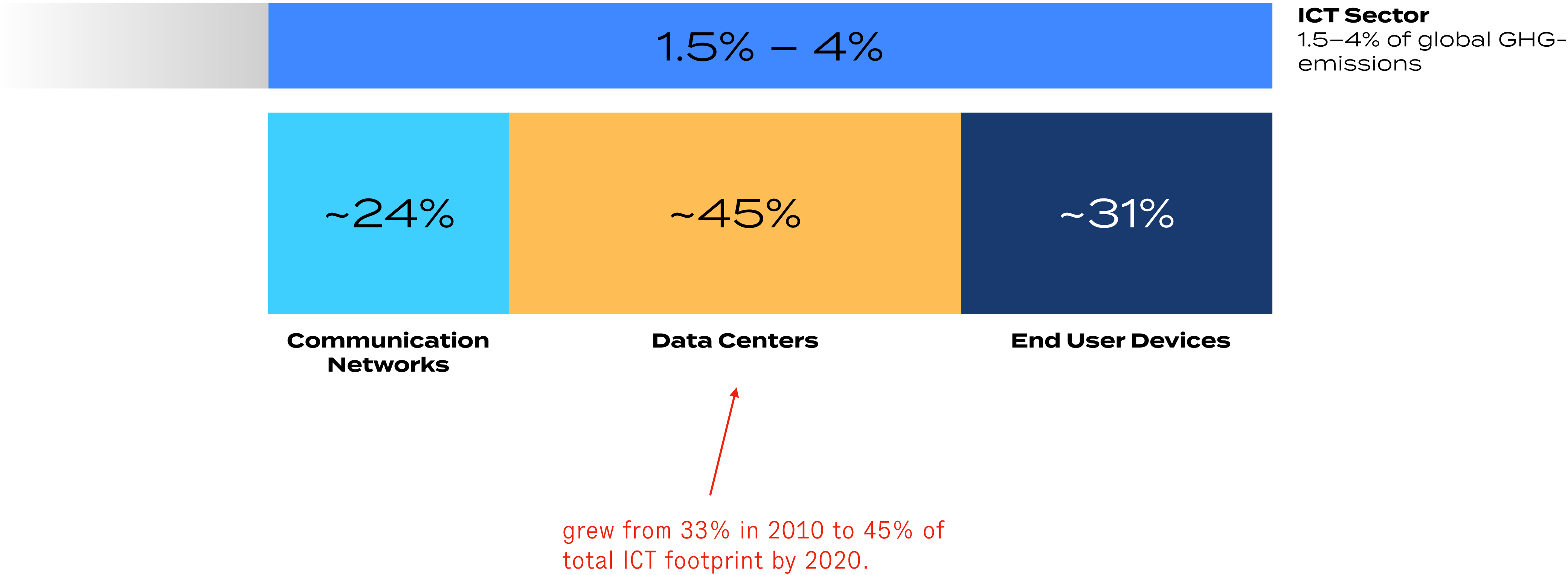


GHG EMISSIONS / ENERGY CONSUMPTION



GHG = Greenhouse Gas

GHG EMISSIONS / ENERGY CONSUMPTION

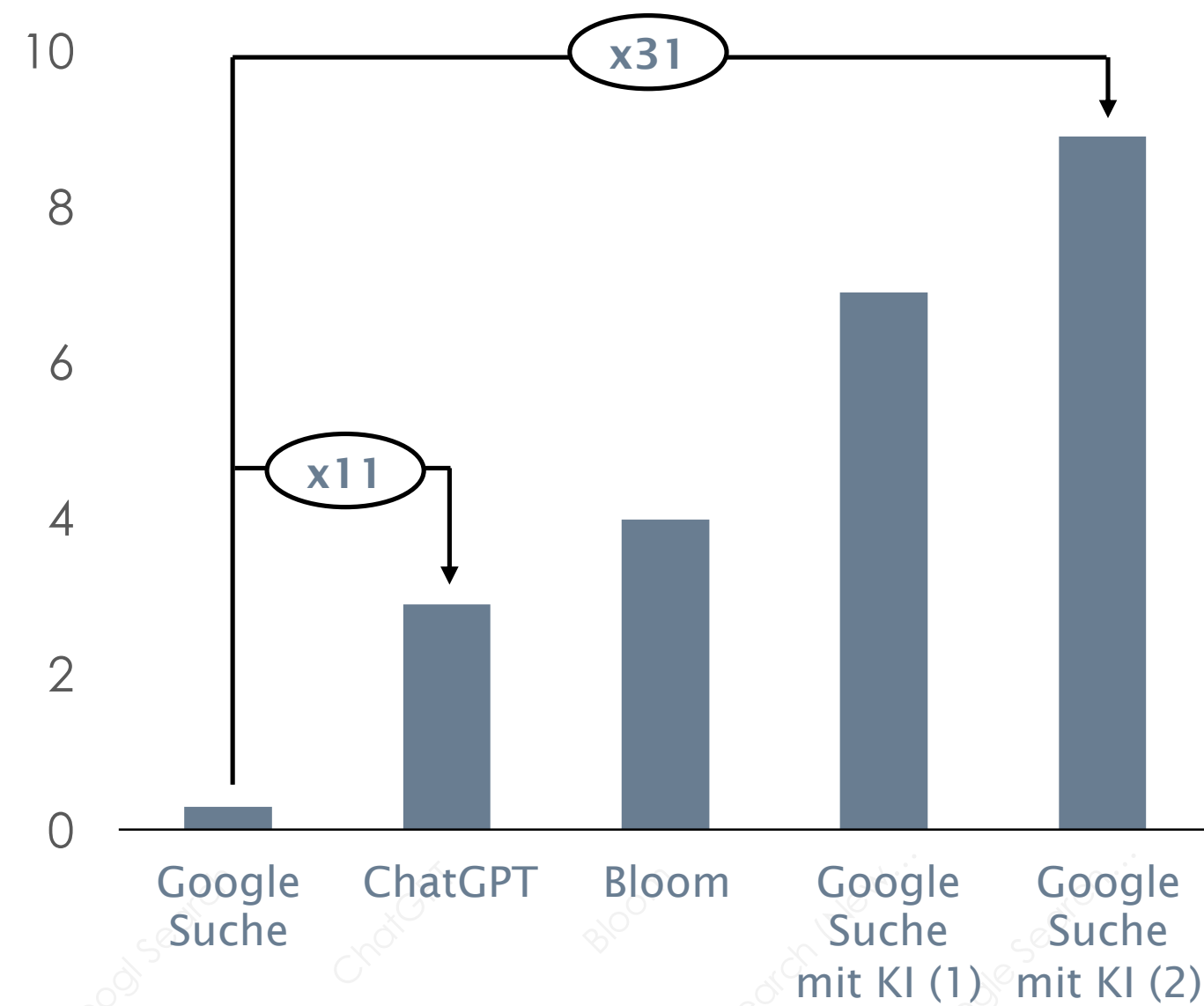


GHG EMISSIONS / ENERGY CONSUMPTION



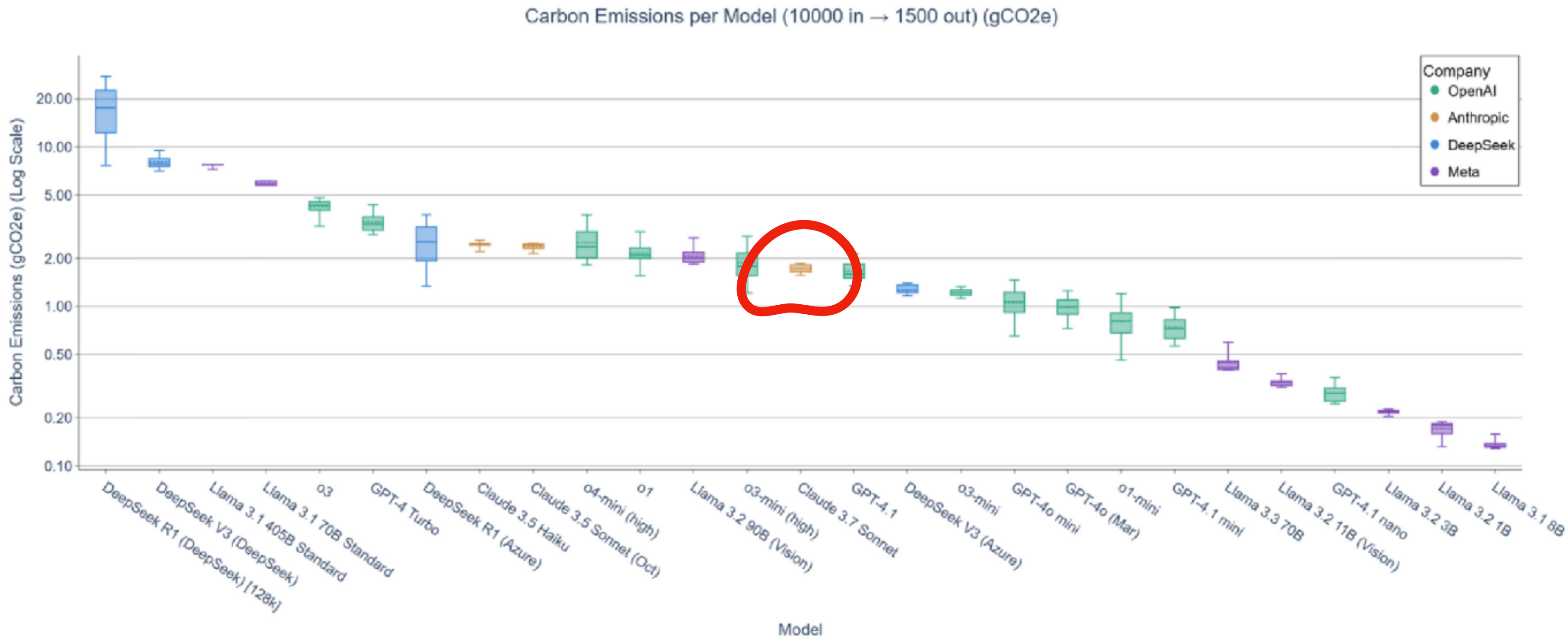
AI VS. GOOGLE SEARCH

Energieverbrauch pro Anfrage Wattstunden



Ein Austausch mit KI
kostet wahrscheinlich
10-30x mehr
als eine Keyword-Suche.

CARBON EMISSIONS PER MODEL



Claude 3.7 Sonnet:
10k tokens in,
1.5k tokens out

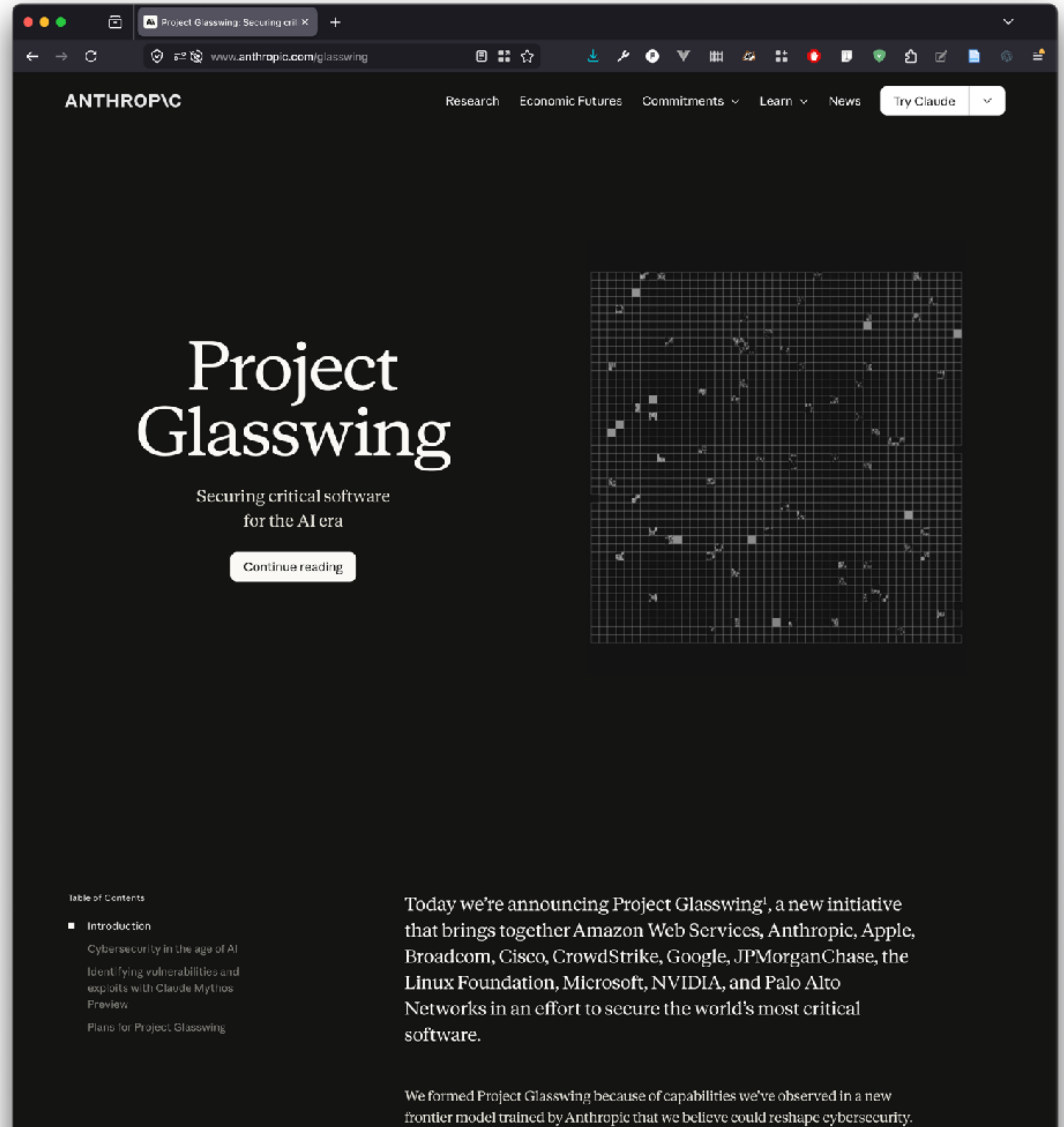
→ ~ **1.8g CO₂e** per prompt

CARBON EMISSIONS PER MODEL



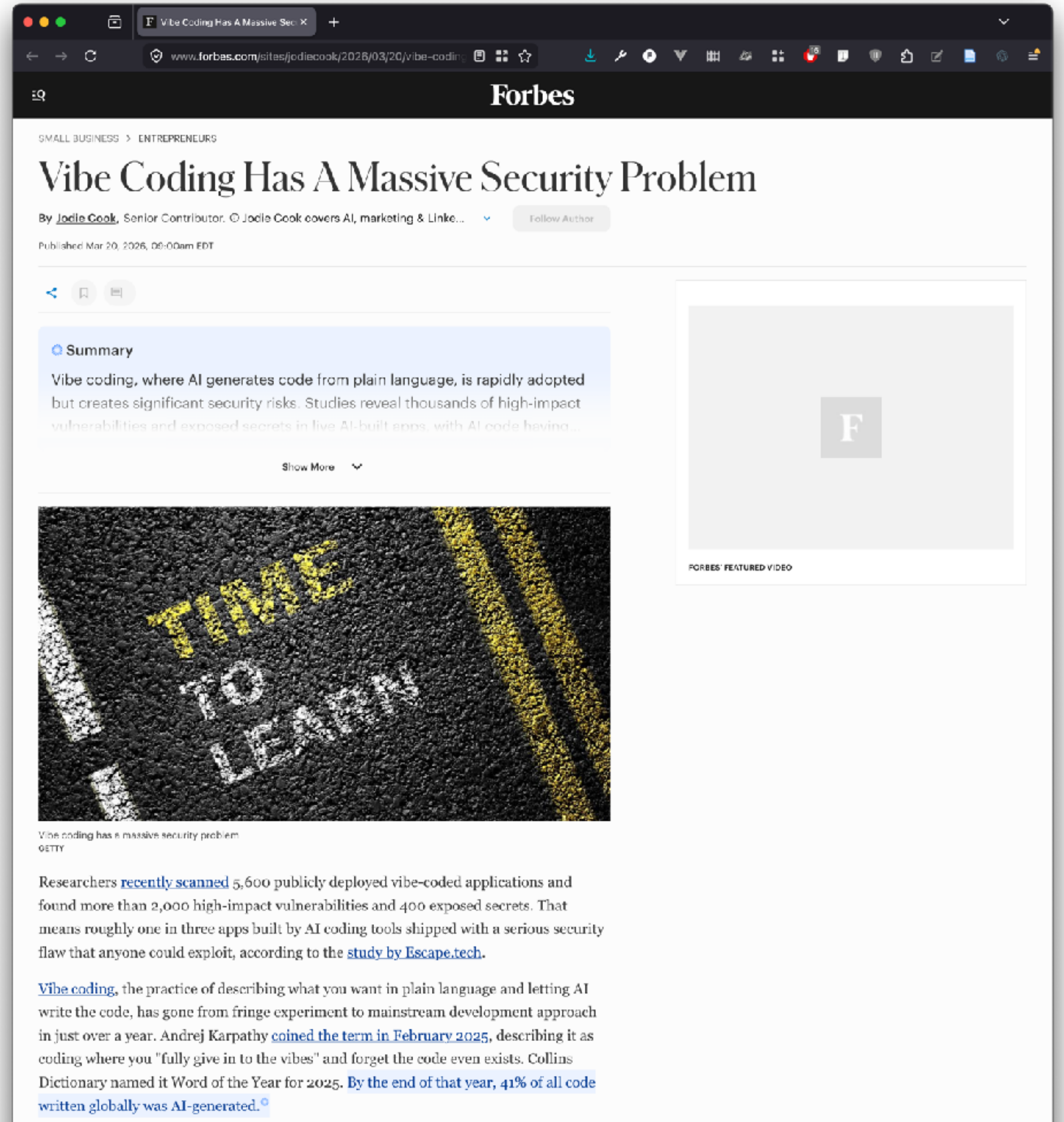
NEW PROBLEMS WITH AI

- New Anthropic model *Mythos Preview* found thousands of high-severity vulnerabilities, including some in *every major operating system and web browser.*
- Not safe to release



NEW PROBLEMS WITH AI

«Researchers recently scanned 5,600 publicly deployed vibe-coded applications and found more than 2,000 high-impact vulnerabilities and 400 exposed secrets. That means roughly one in three apps built by AI coding tools shipped with a serious security flaw that anyone could exploit, according to the study by Escape.tech.»



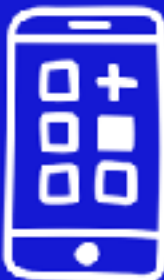
CARBON CALCULATORS AND TOOLS

Over a year, with  **10,000**
monthly page views,
zhdk.ch
produces



**149.02kg of CO2
equivalent.**

As much CO2 as boiling
water for 20,193 cups of tea



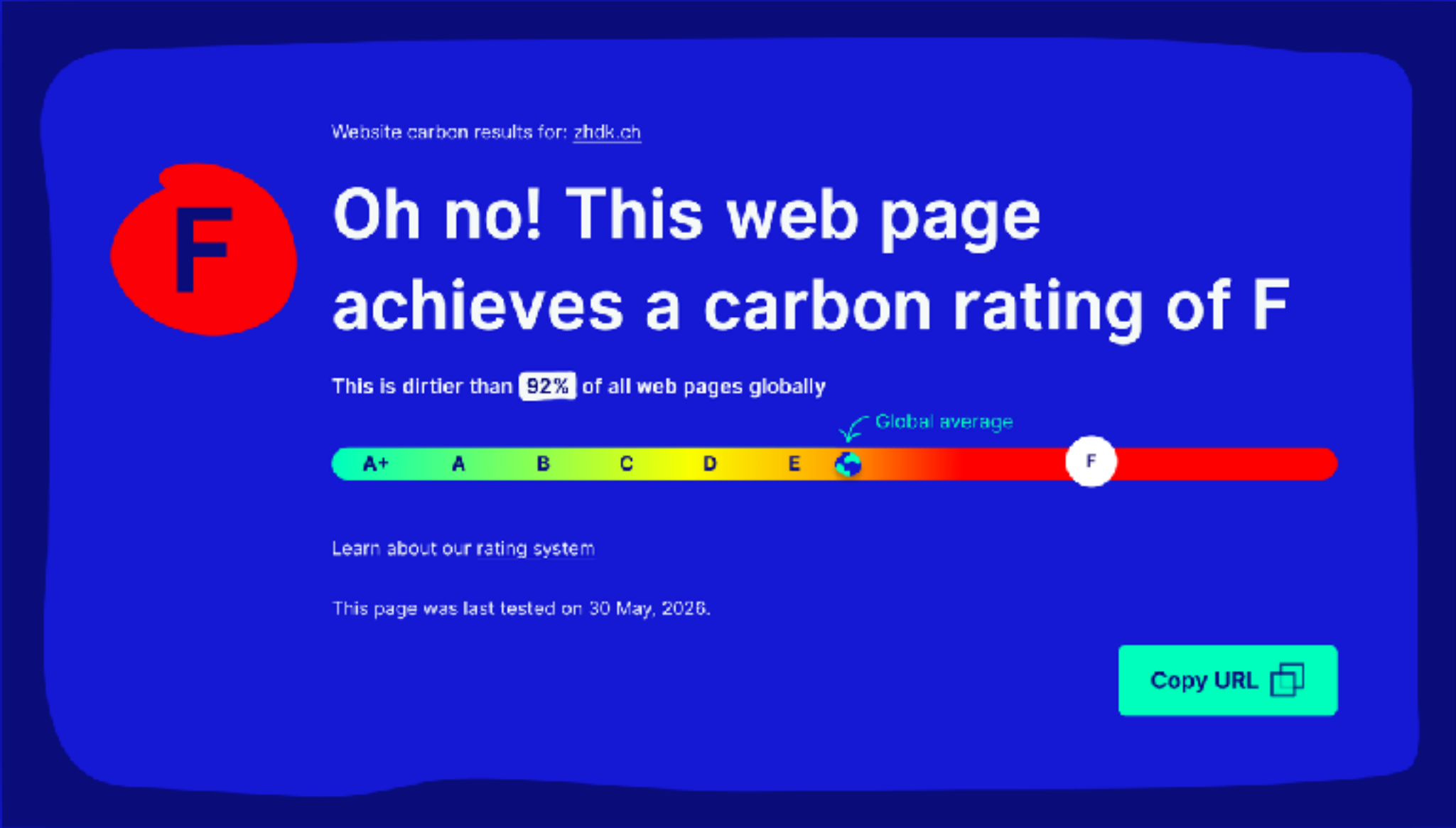
302 kWh of energy

As much CO2 as 25,139 full
charges of an average
smartphone



159 billion bubbles

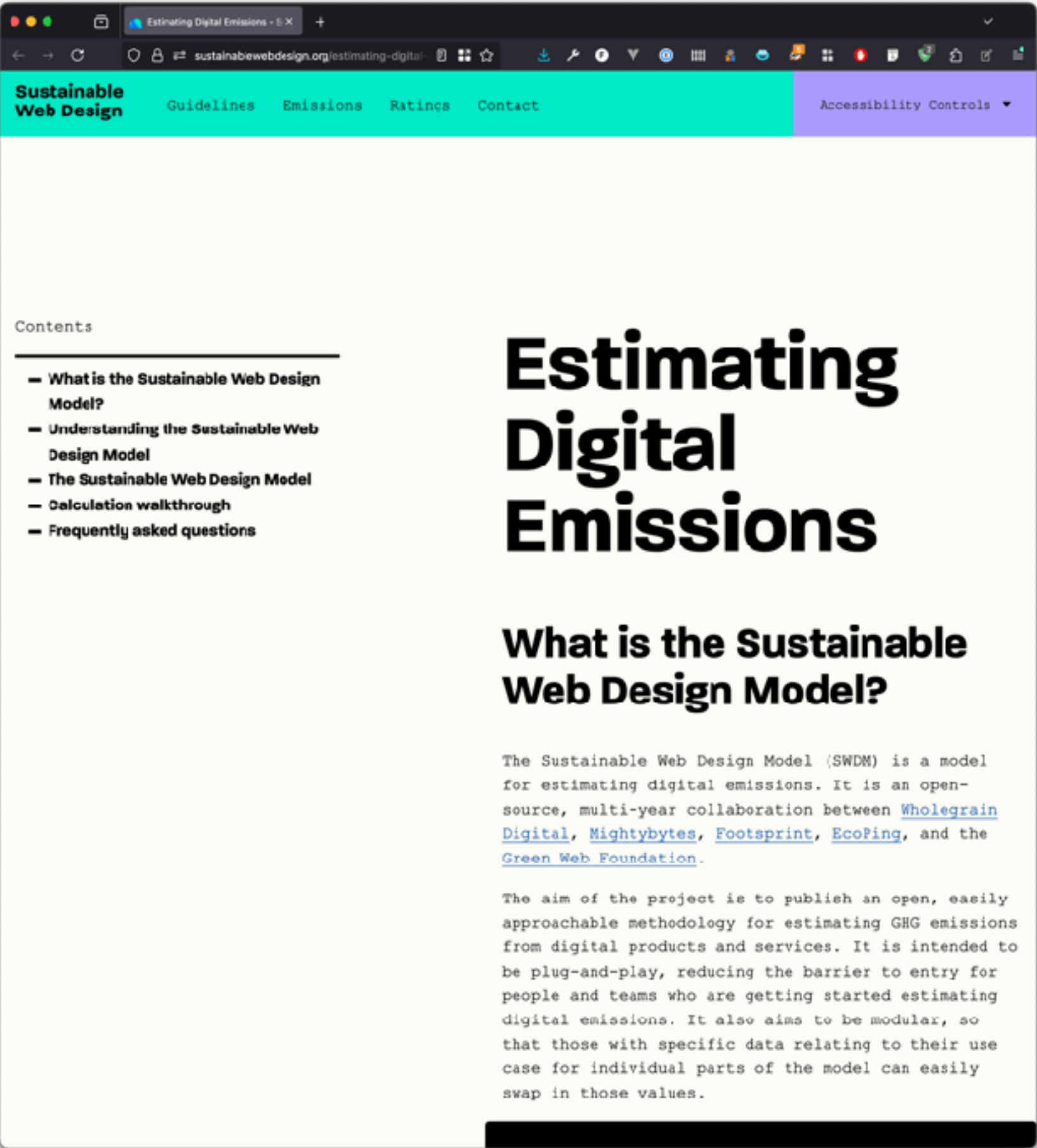
Woah, that's a lot of bubbles!



ESTIMATING DIGITAL EMISSIONS

Average Emissions per Page View (gCO2e) =

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



ESTIMATING DIGITAL EMISSIONS

Combination of power used by:

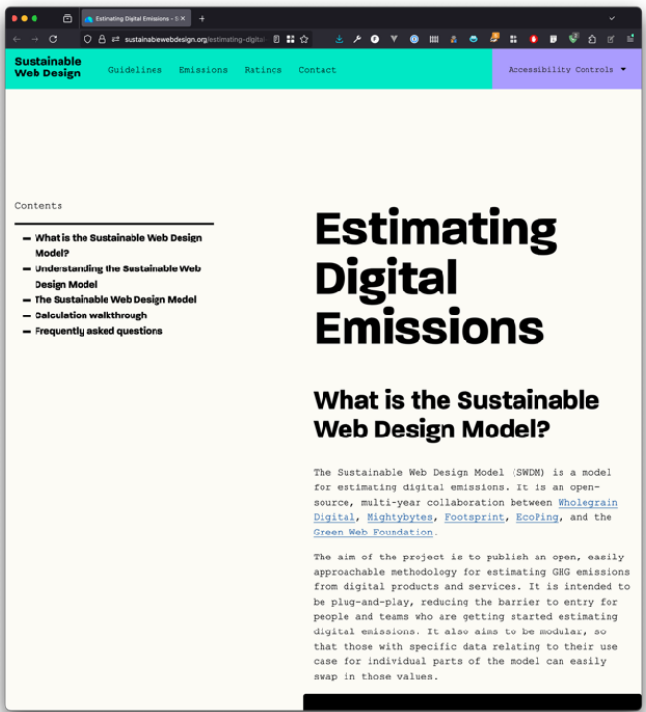
- **Data Centers**
- **Network**
- **User devices**

Each one for both:

- **Operation**
- **Embodied Emissions**

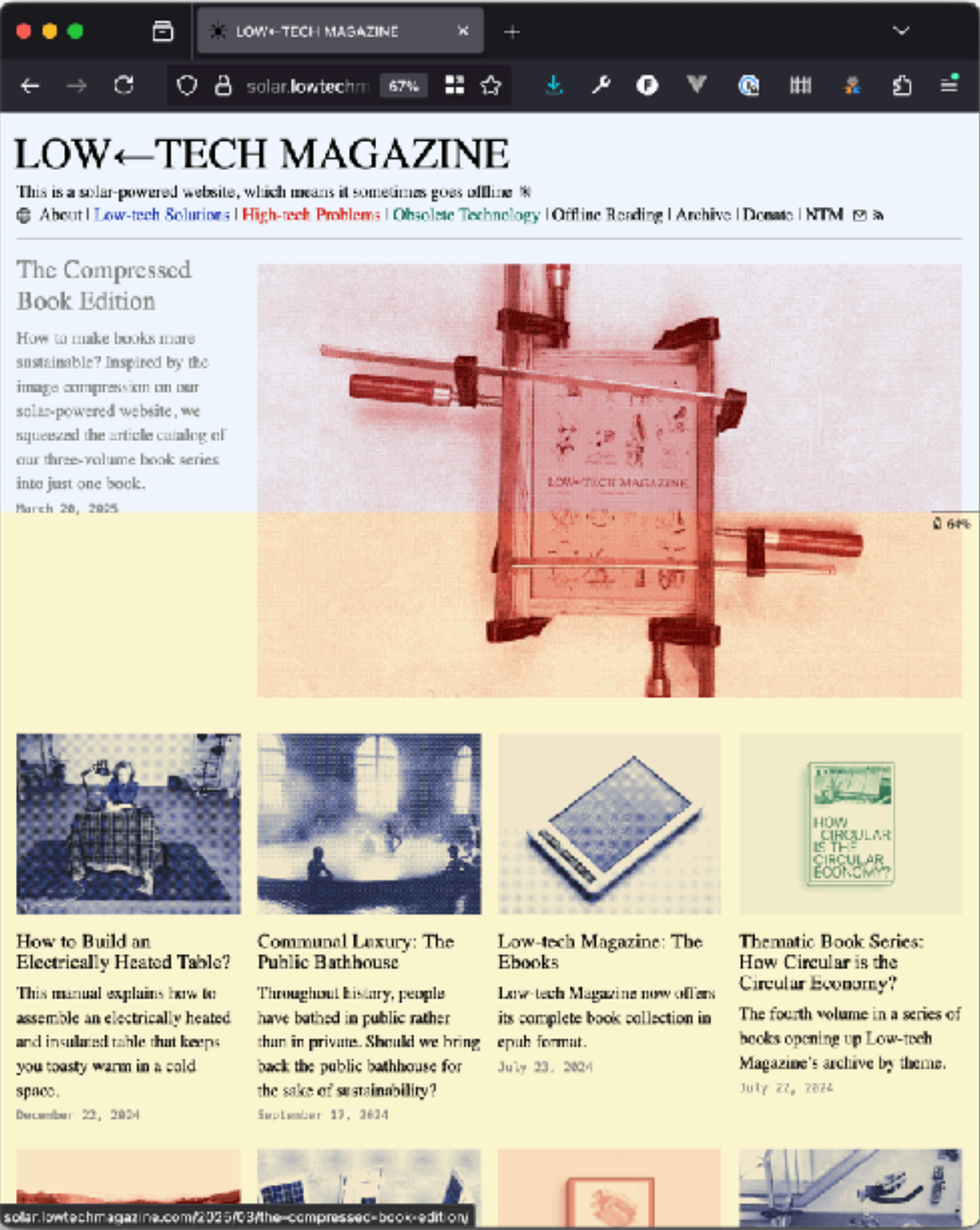
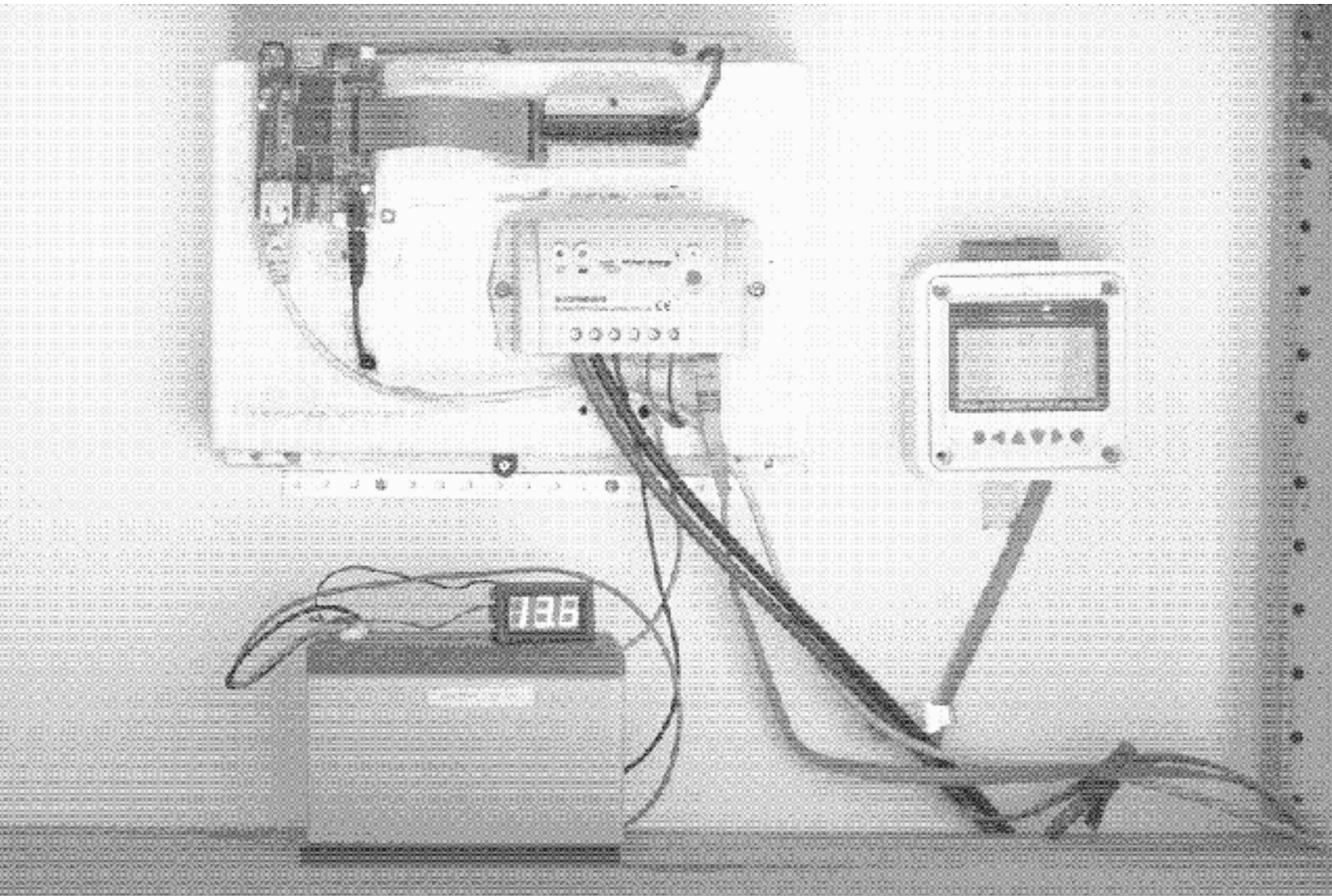
x **Energy Intensity** of grid
(depending on grid, global average: **494 gCO2e/kWh**)

→ divide by total data transfer → Result in **gCO2e/GB**



- Total energy consumption for data centers: 290 TWh ([IEA 2022](#))
- Total energy consumption for the network: 310 TWh ([IEA 2022](#))
- Total energy consumption for user devices: 421 TWh ([Malmudin 2023](#))
- Total data transfer across the internet: 5.29 ZB ([ITU 2023](#))

SOLAR POWERED WEBPAGE



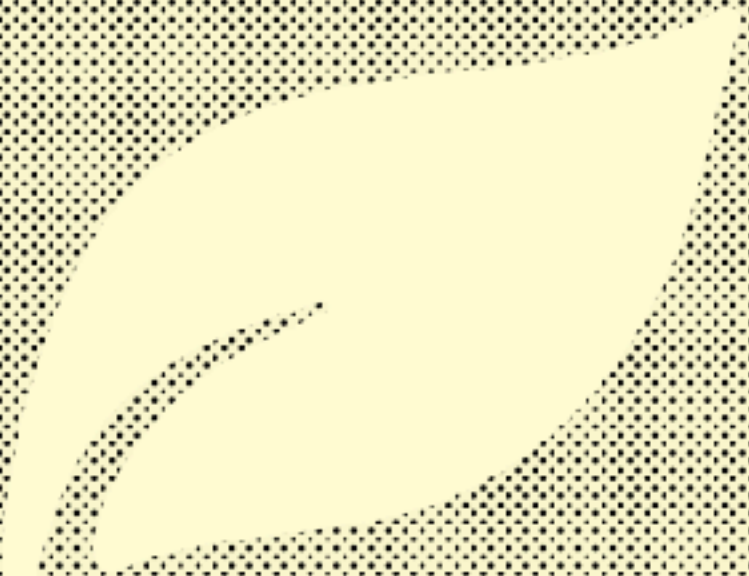
ECO-DESIGN GUIDE

Guide especially for webdesign (UX/UI)

<https://designersethiques.org/fr/thematiques/ecoconception/guide-d-ecoconception>



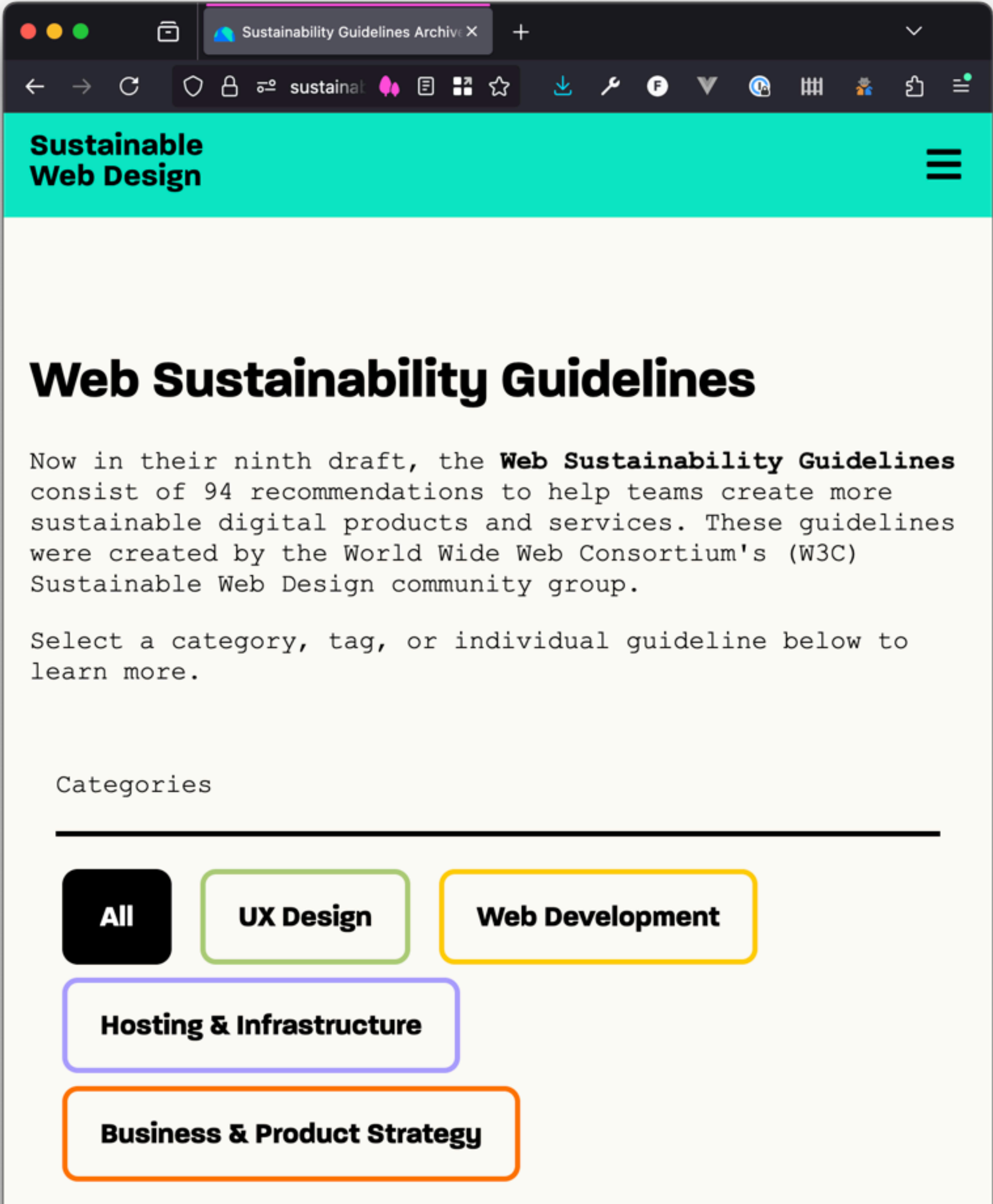
Le guide d'écoconception de services numériques



WEB SUSTAINABILITY GUIDELINES

<https://sustainablewebdesign.org/guidelines/>

List of action points for different categories.



ACTIONS

- Creating awareness
 - Regulations & Laws
- Prevent cheap AI powered by fossil fuel.
- Create resource-efficient products and services
- Use green infrastructure
- Best practices
 - good designs
 - fewer page loads
 - quick finds
 - fewer images/video
 - using good image compressions
 - lazyloading content
 - fewer data
 - smaller (js) files

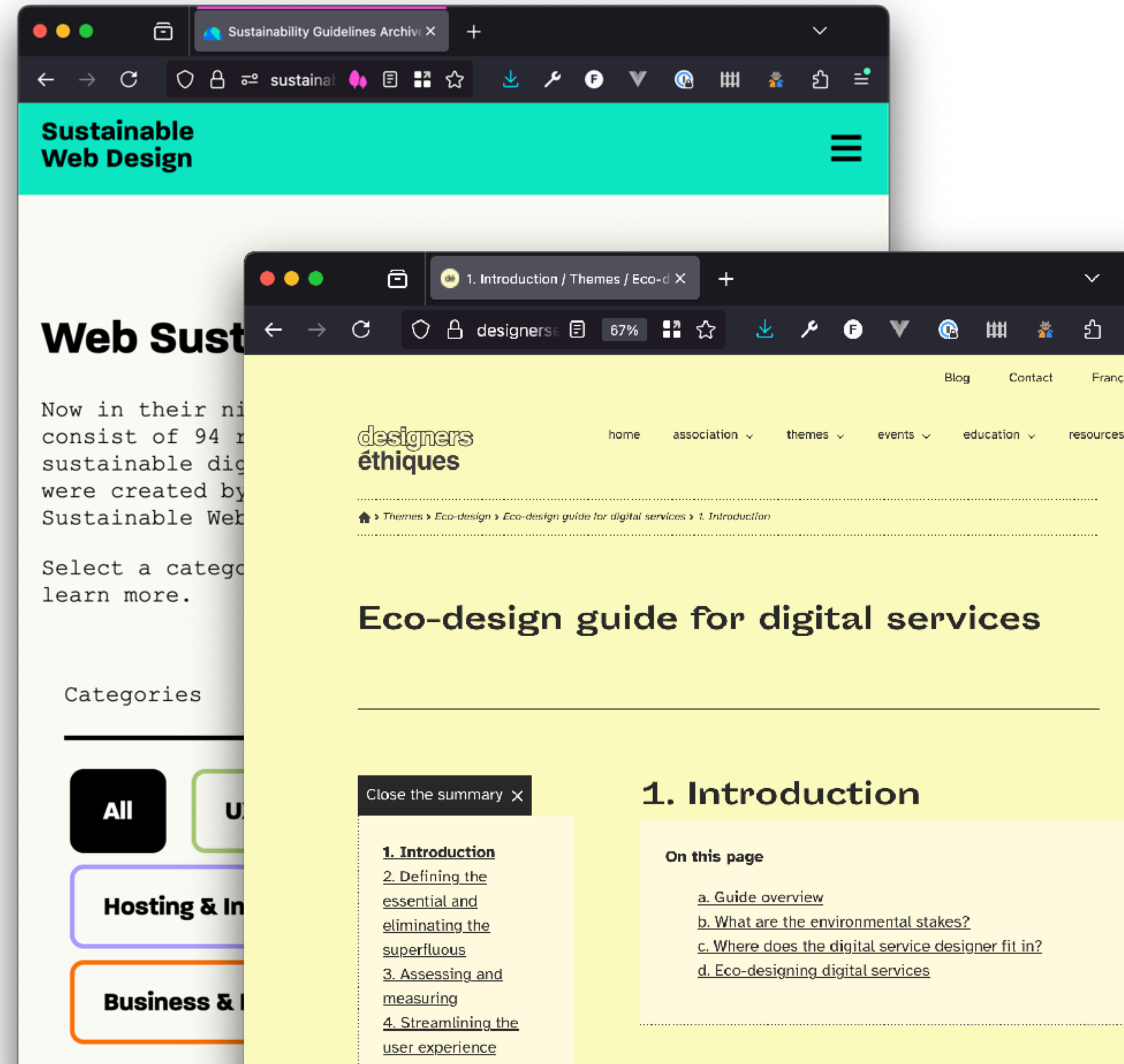
EXERCISE 6

Use 10min to look at these resources.

<https://sustainablewebdesign.org/guidelines/>

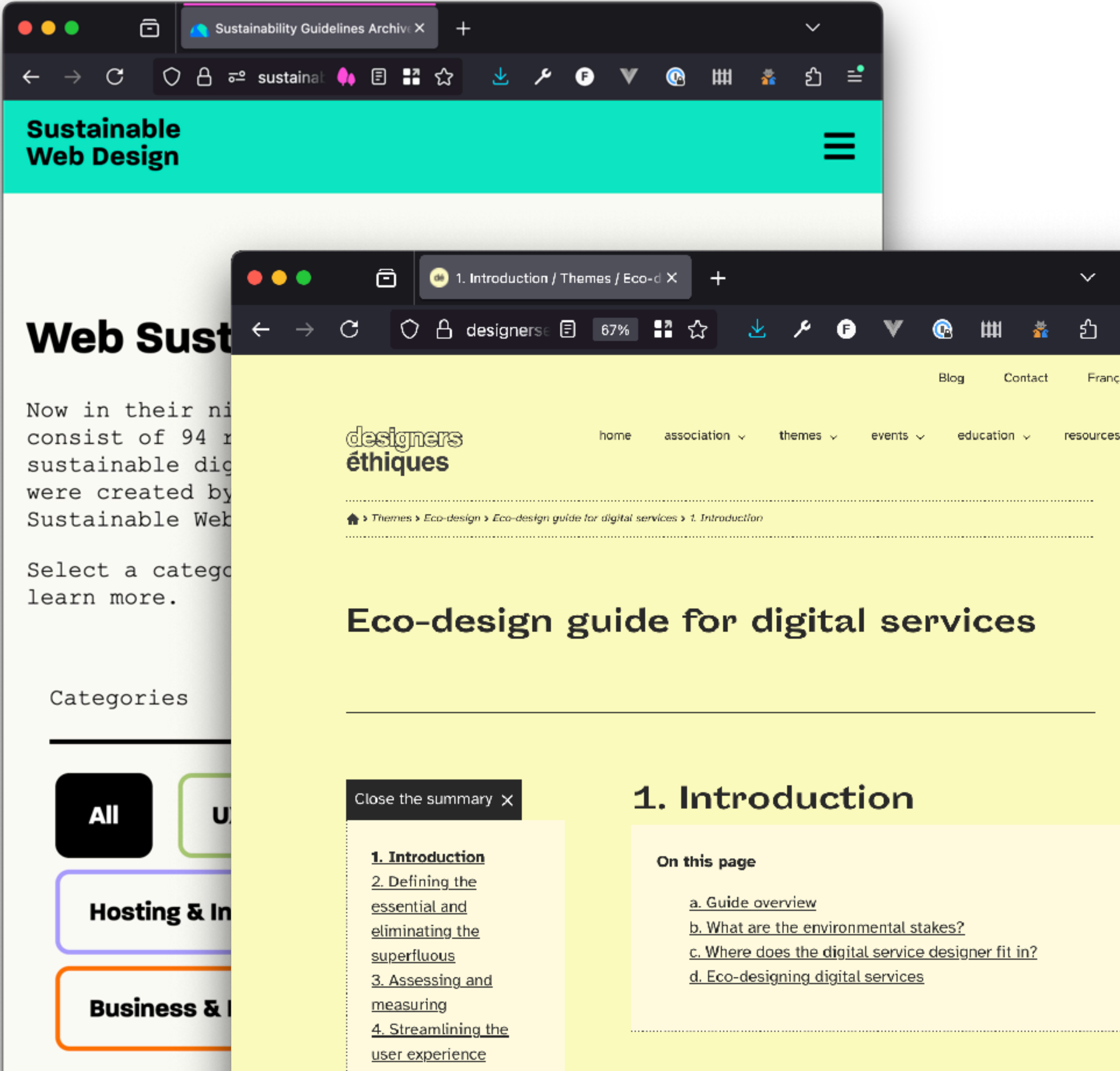
<https://designersethiques.org/en/themes/eco-design/eco-design-guide-for-digital-services>

- Write down notable aspects



EXERCISE 6

Discussion

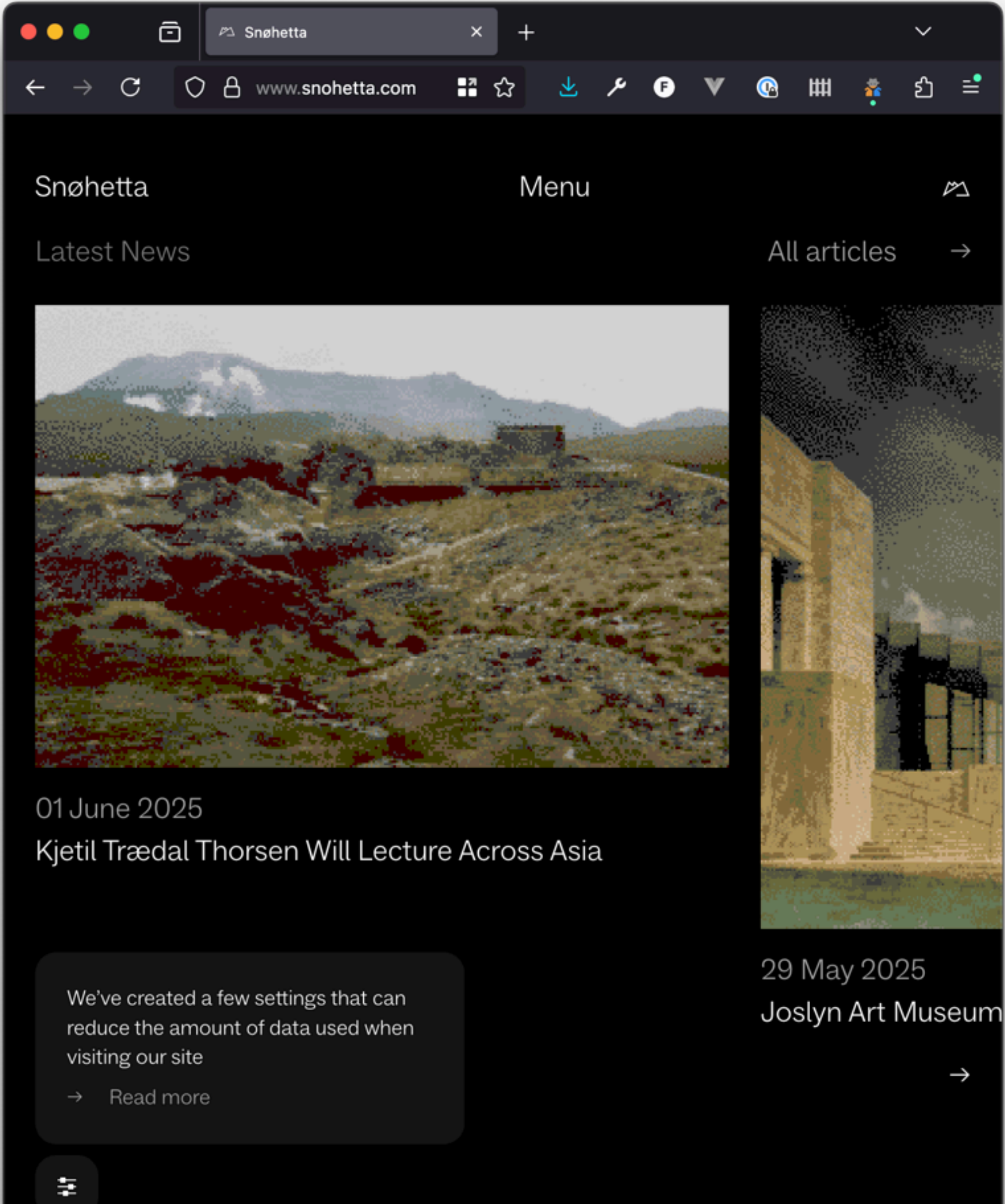


PLANET

Planet as a Co-Client

Planet centric design

USER CHOICE



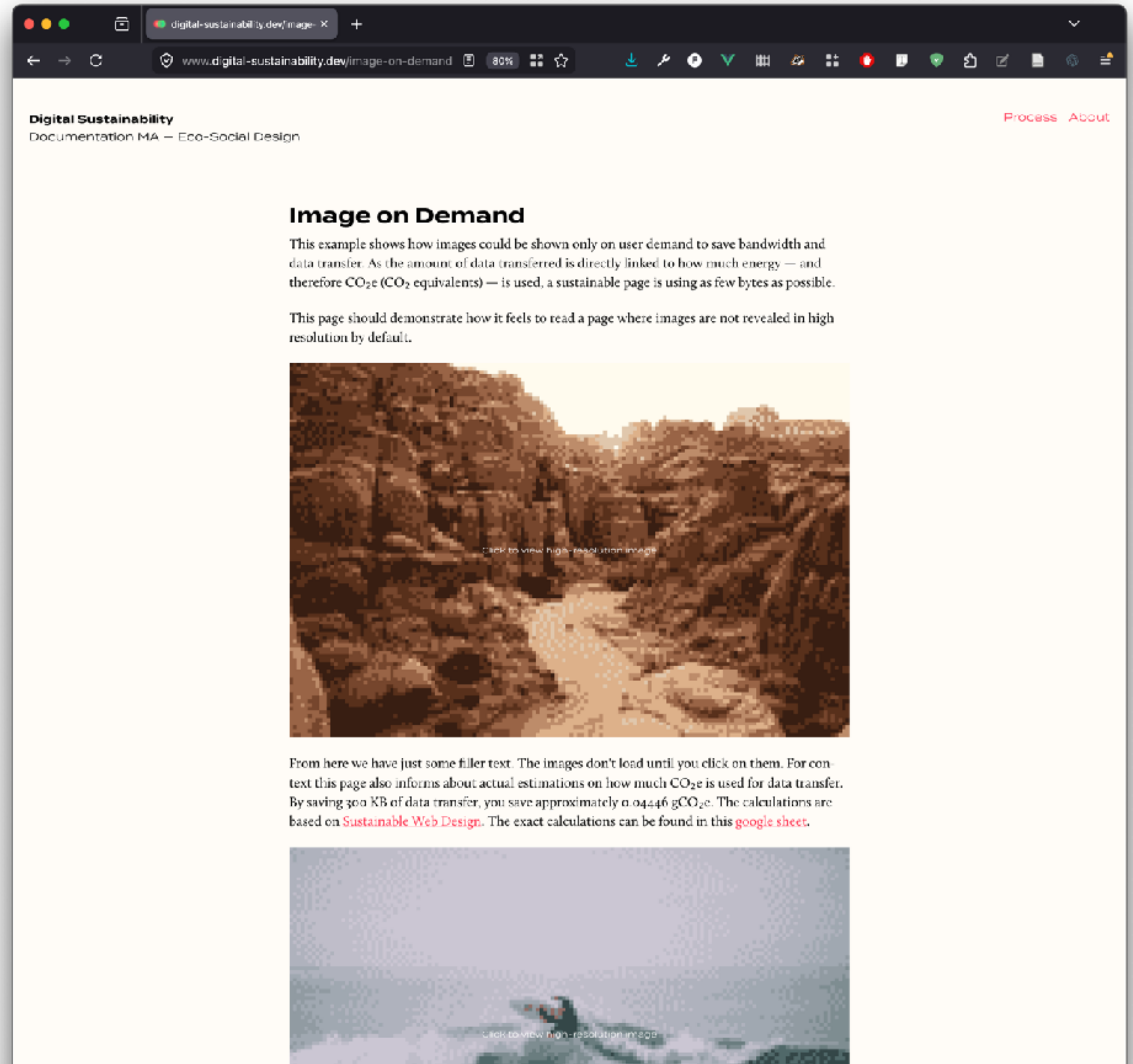
Dark mode: On

Simplified: On

Low-res: On

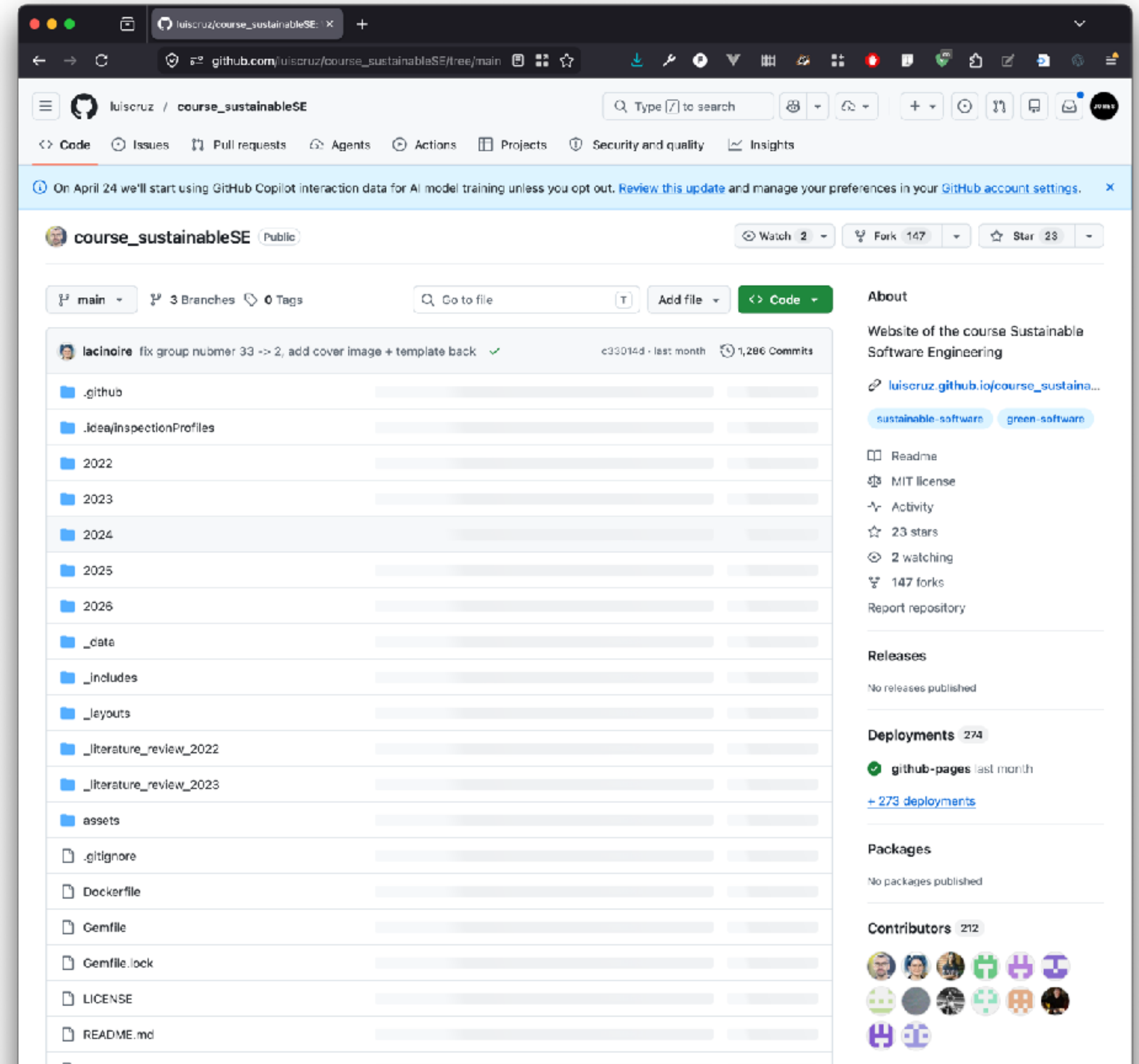
INTERACTION

- Using Interaction as a tool to raise awareness.



OPEN SOURCE: SUSTAINABLE SOFTWARE ENGINEERING EXERCISE 7

- Skim through public student proposals for sustainable software engineering projects on:
<https://short.jonasscheiwiller.ch/ses>
- Choose a project in [YEAR]/papers/[NAME].pdf, which you think is smart/interesting/outstanding/... and prepare a quick presentation of 5min.
- Groups of 4



OPEN SOURCE: SUSTAINABLE SOFTWARE ENGINEERING

5MIN PRESENTATIONS

MORE ABOUT DIGITAL SUSTAINABILITY...

The cover art for the 'Environment Variables' podcast features a dark green background with a stylized, glowing green map of the world. Various icons are overlaid on the map, including a USB symbol, a hand, and a fork. The text 'ENVIRONMENT VARIABLES' is written in white, uppercase letters across the middle of the map.

Podcast

Environment Variables

Green Software Foundation

The cover art for the 'Green IO' podcast features a dark blue background. On the left, there is a logo consisting of an orange circle with a white diagonal bar through it, and the text 'Green IO' in white below it. A small orange horizontal line is positioned under the 'IO'.

Podcast

Green IO

Gaël DUEZ

CSS AND SPECIFICITY



```
1  * {  
2    margin: 0;  
3  }  
4  
5  .class {  
6    font-size: 30px;  
7    margin: 10px;  
8  }
```

EXERCISE 7B

- Try to solve the CSS exercises from <https://short.jonasscheiwiller.ch/ex7b>
 - Download HTML and CSS file
 - Work on styling and visually confirm changes in the browser