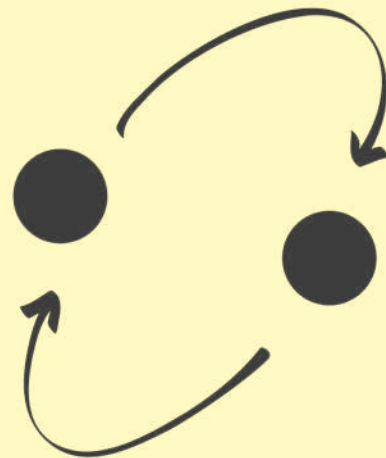


Eco-design: What is the role of design in building sustainable services?



ICT4S 2023

Who am I ?



Aurélie Baton

- **UX/UI designer** - freelance
- In charge of the **ecodesign program** at Designers Ethiques
- **Co-author of the ecodesign guide**
- Member of the **GreenIT** group

Born and bred in Rennes ;-)
Now living in Rouen



Anne Faubry

We'll try to cover...

1. The basics of ecodesign
2. Some ecodesign best practices
3. ROX : expo “Celtique ?”
4. Conclusion and resources

Part 1

Introduction to ecodesign

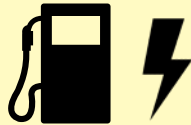
What is the impact of digital technologies ?

- The impact is **huge** and **growing very fast**.
- The impact is **not only on CO₂** but on **multiple indicators** :



GHG

Greenhouse Gas
Emissions



Energy

Primary energy used to
produce the final energy



Resources

Consumption of abiotic
resources such as metals



Water

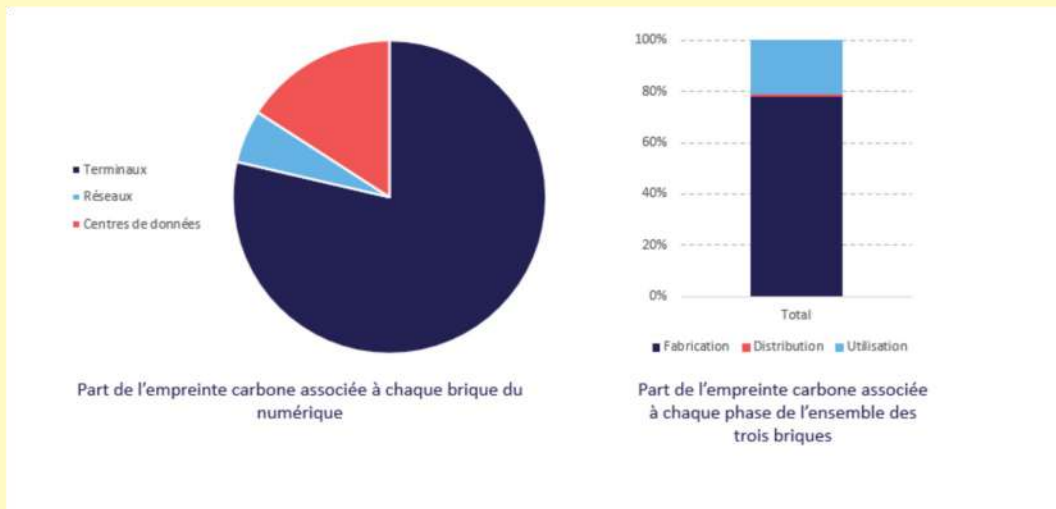
Water consumption
used in making
electronic components

And more !

More info : [Environmental footprint of the digital world - Green IT, GreenIT.fr, 2019](#)

What has the most environmental impact ?

→ The biggest impact is in **making** the **devices**.



The **electronic equipment and devices** have the most impact.

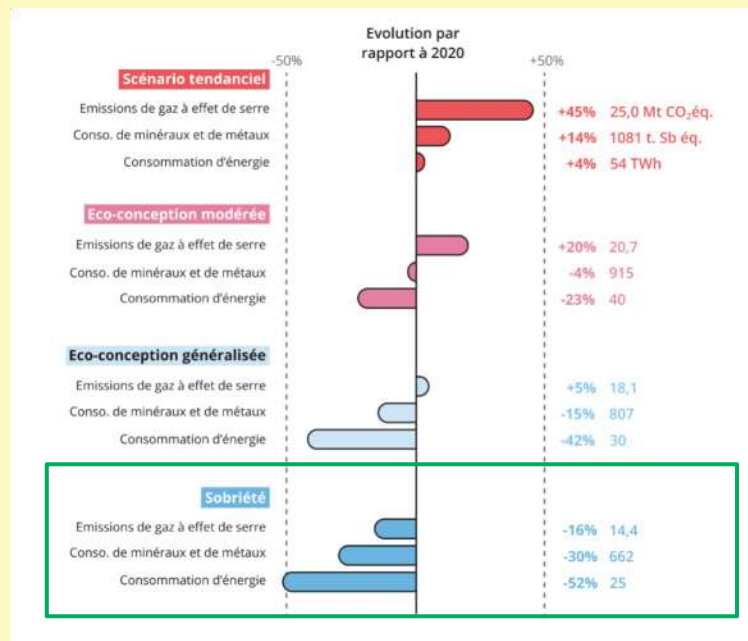
The **manufacturing phase** is the most important

Source : [Etude numérique et environnement - Arcep Ademe - Janvier 2022](#)

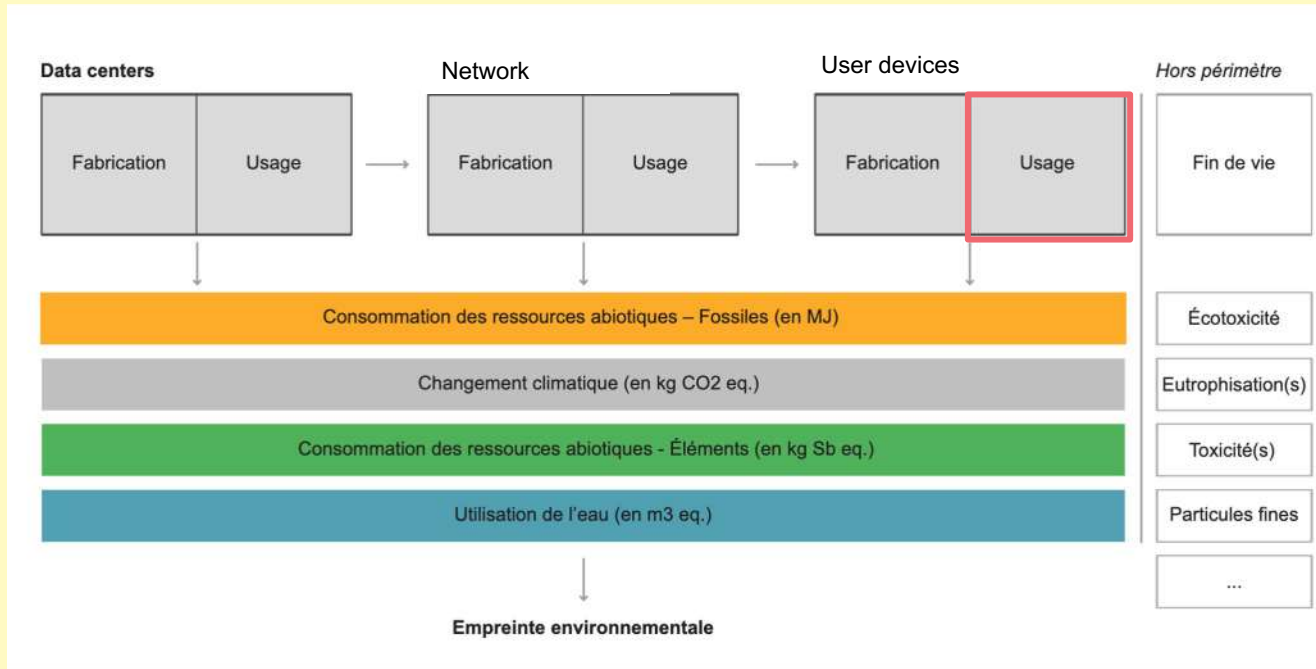
What scenarios for the future?

Prospective scenarios establish that the only way to reduce emissions is to **combine sobriety and ecodesign measures.**

Source : Etude numérique et environnement 2020, 2030, 2050
 Arcep Ademe - Mars 2023

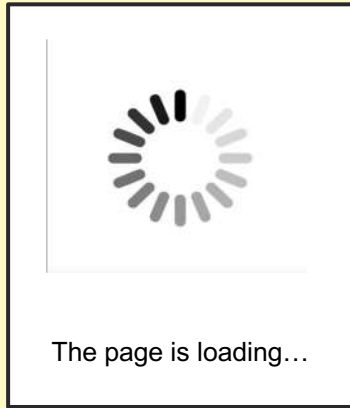


We don't build devices, so what can we do?

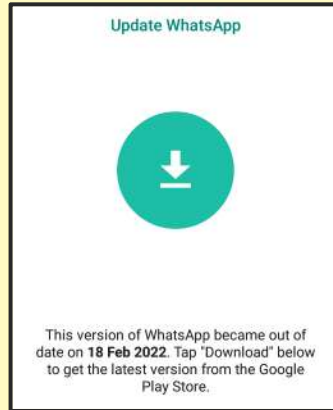


[Explications sur l'empreinte carbone du streaming et du transfert de données,](#)
Gauthier Roussilhe

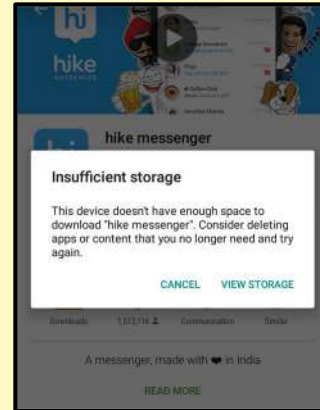
What about technological obsolescence?



Your phone seems to work **very slowly?**



An **update can't be installed?**

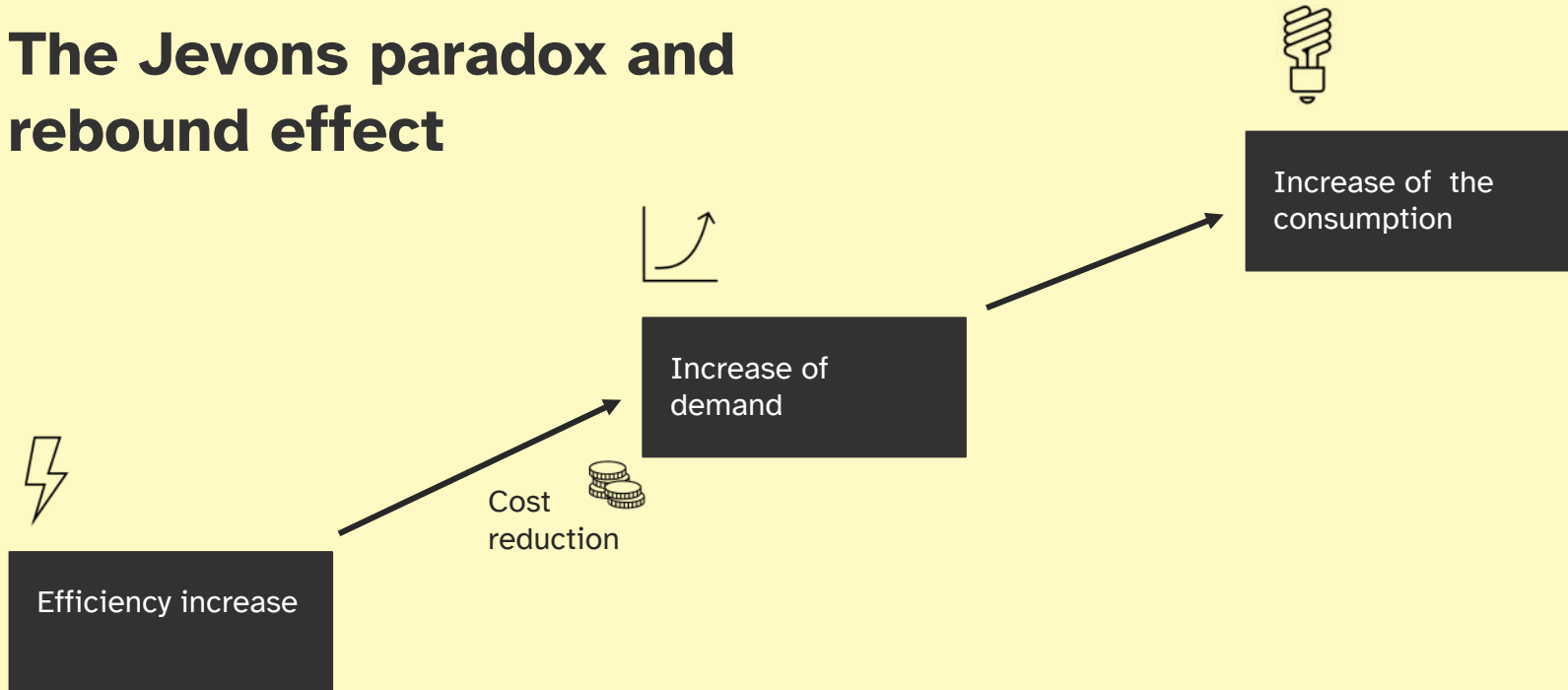


There is **no space left** to install an app?

The smartphone replacement rate is around **21 months** globally

<https://www.counterpointresearch.com/smartphone-users-replace-their-device-every-twenty-one-months/>

The Jevons paradox and rebound effect



[Jevons paradox - Wikipedia](#)

What is ecodesign?

Ecodesign is about **integrating the environment**,
from the **beginning of the design process** of a product or a service,
and at **every step of its life-cycle**.

More info : ISO 14062 (AFNOR, 2004)
Replaced by IEC 62430

What are the key principles of ecodesign ?

1. Define the functional unit

What is it?

The **main function** of a product or service:
A **unit of reference** that corresponds to a user goal.

What is it for?

- **Estimate the impact** of a product or service.
- **Compare products or services** when we do a life-cycle assessment (LCA)

Examples of simple functional units:

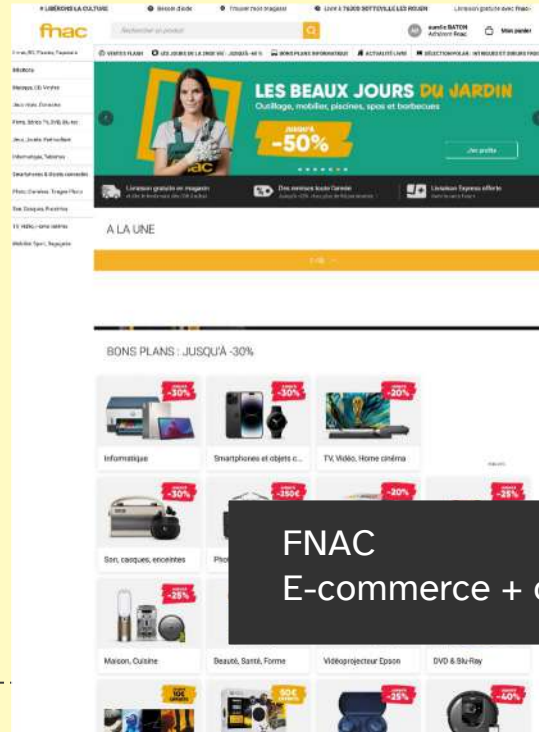
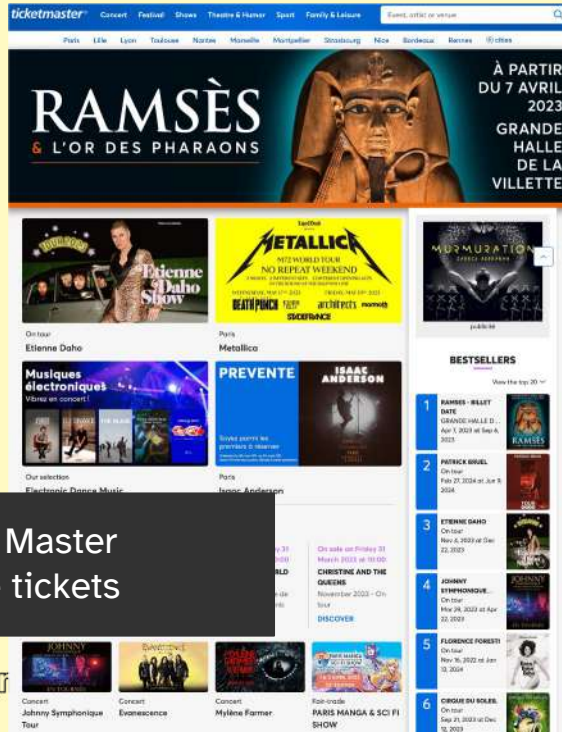
- Buying a ticket for a concert.
- Looking for a phone number.
- Booking an appointment.
- Checking your bank account.
- Watching a video (during 10 min)

<https://www.eco-conception.fr/static/fonction-unite-fonctionnelle-acv.html>

[Livre blanc écoconception - AGIT 2017](#)

1. Define the functional unit

Example : buying a ticket for a concert



You can't compare the landing pages, you have to **compare the user journey.**

Ticket Master
Online tickets

FNAC
E-commerce + online tickets

2. Estimate the impact of all the equipment

... all the equipment and devices needed for the digital service :



Electronic
equipment
and devices



Network



Data centers

3. On all the steps of the life-cycle:

of the **service...**

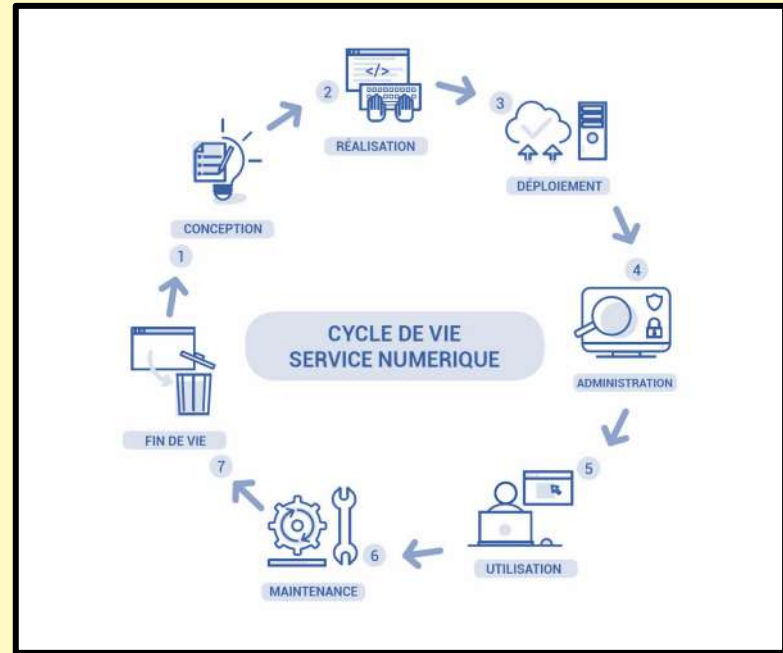


Illustration : www.eco-conception.fr

3. On all the steps of the life-cycle:

and of the equipment and
devices

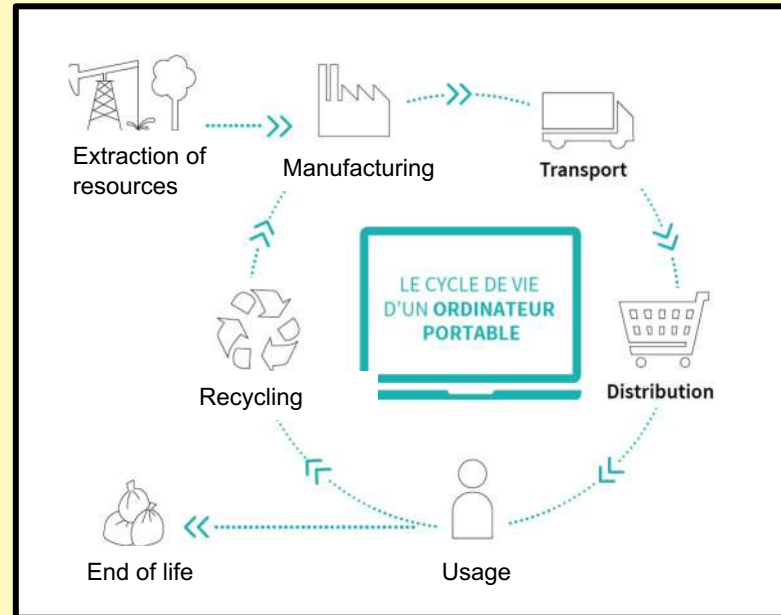


Illustration : [Ademe - Face cachée du numérique](#)

4. According to several environmental indicators

... to avoid impact transfers



Resource use



Climate change
(GHG emissions)



Water
consumption



Waste
production



Ecotoxicity

Etc.

More info : [Digital technologies in Europe: an environmental life cycle approach](#)

5. In a continual improvement process

- Identify the **most significant levers for improvement**
- Choose the ecodesign level
- Document the process

Several levels of ecodesign

Improving what already exists

↳ **Redoing the service entirely**

↳ **Rethink the whole system**

More info :

[The 4 levels of ecodesign](#)

More info: [L'écoconception c'est quoi - Pôle écoconception](#)

Part 2

Best practices

Where do we start?

1. Challenge the need for “digital”

- Does the service need to be digital?
- Are there other ways to fulfill this need?
- Are there risks to exclude people who don't have access or can't use a digital service ?

Comptage de lapin anonyme !

Un haricot blanc dans la boîte au couvercle en plastique = un visiteur unique **pour toute la durée du festival !**

1 pour 4 jours !

Un haricot blanc dans la boîte métallique = un visiteur unique **pour la journée !**

1 par jour !

Protocole conforme RGPD. Pour les demandes d'accès, s'adresser à la buvette !

Conférence Pas Sage en Seine
<https://passageenseine.fr/>
Thank you Richard Hanna for the example

2. What is essential?

- What are the real needs to achieve the goal?
- Are there other ways to do it?
- What is the quality or quantity required?
Is high quality really necessary?

More info: [1. Define the must haves and eliminate the non-essential - The intro guide to digital eco-design](#)



Functional unit :
“Listen to a podcast”

3. What are the possible impacts of my service ?

- What happens when **100 million people** use your product?
- **Who or what disappears** if your product is successful?
- If the **environment** was your client, **how would your product change**?
- What would **using** your product "**too much**" look like?
- When you picture your user base, **who is excluded**?



Tarot cards of tech

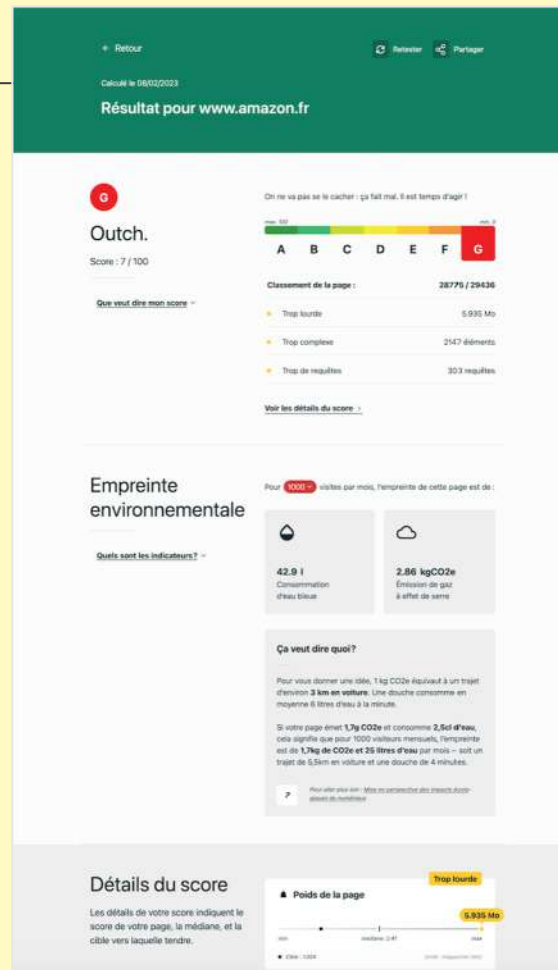
Source : <https://tarotcardsoftech.artefactgroup.com/>

4. Assess and estimate

Estimate the impact of the user journey based on the functional unit

- What are the main issues?
- Where are the most important levers of improvement?
- What are the priority?

More info : [2. Assess and measure - The intro guide to digital eco-design](#)



4. Assess and estimate

Estimate the impact of the user journey based on the functional unit

- What are the main issues?
- Where are the most important levers of improvement?
- What are the priority?

More info : [2. Assess and measure - The intro guide to digital eco-design](#)

The screenshot shows the GreenIT EcoIndex tool interface. At the top, there are buttons for 'Lancer l'analyse', 'Vider le cache navigateur', and 'Sauver l'analyse'. Below these are 'Historique' and 'Aide' buttons. A checkbox 'Activer l'analyse des bonnes pratiques' is checked. The main section displays 'EcoIndex' with a score of 3.81, 'Eau (cl)' with 4.39, and 'GES (gCO2e)' with 2.92. Below this is a table with three columns: 'Nombre de requêtes' (163), 'Taille de la page (Ko)' (13361), and 'Taille du DOM' (4718). The bottom section is titled 'Bonnes pratiques' and lists various optimization tips with green checkmarks for good practices and red crosses for issues. The issues listed include: 20 domains found (<3), 17 images not cropped in the browser, 12 inline stylesheets, 16 inline javascripts, 0 HTTP errors, 163 HTTP requests (<27), 0 images downloaded but not displayed, 3671 bytes maximum cookie size (<512), and 67 static resources with cookies (total 72.3Ko).

EcoIndex	Eau (cl)	GES (gCO2e)
3.81	4.39	2.92

Nombre de requêtes	Taille de la page (Ko)	Taille du DOM
163	13361	4718

Bonnes pratiques

- Ajouter des expires ou cache-control headers (>= 95%) ✓ 98.1% ressources cachées
- Compresser les ressources (>= 95%) ✓ 100% ressources compressées
- Limiter le nombre de domaines (<3) ✗ 20 domaine(s) trouvé(s)
- Ne pas retailer les images dans le navigateur ✗ 17 image(s) retailée(s) dans le navigateur
- Eviter les tags SRC vides ✓ Pas de tag SRC vide
- Externaliser les css ✗ 12 inline stylesheet(s)
- Externaliser les js ✗ 16 inline javascript(s)
- Eviter les requêtes en erreur ✓ 0 erreur(s) HTTP
- Limiter le nombre de requêtes HTTP (<27) ✗ 163 requête(s) HTTP
- Ne télécharger pas des images inutilement ✓ 0 image(s) téléchargée(s) mais non affichée(s) dans la page
- Valider le javascript -- Analyse non supportée par ce navigateur --
- Taille maximum des cookies par domaine(<512 Octets) ✗ Taille maximum = 3671 Octets
- Minifier les css (>= 95%) -- Analyse non supportée par ce navigateur --
- Minifier les js (>= 95%) -- Analyse non supportée par ce navigateur --
- Pas de cookie pour les ressources statiques ✗ 67 ressource(s) statiques avec un cookie (Au total 72.3Ko)

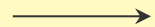
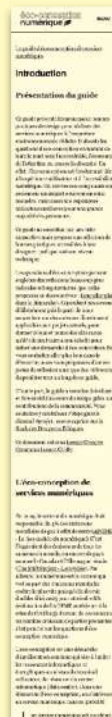
5. Think “mobile first”

Before

Pros :

- No problem when displayed on mobile
- Keep the information to what is essential

Example : prototype for the Ecodesign guide website



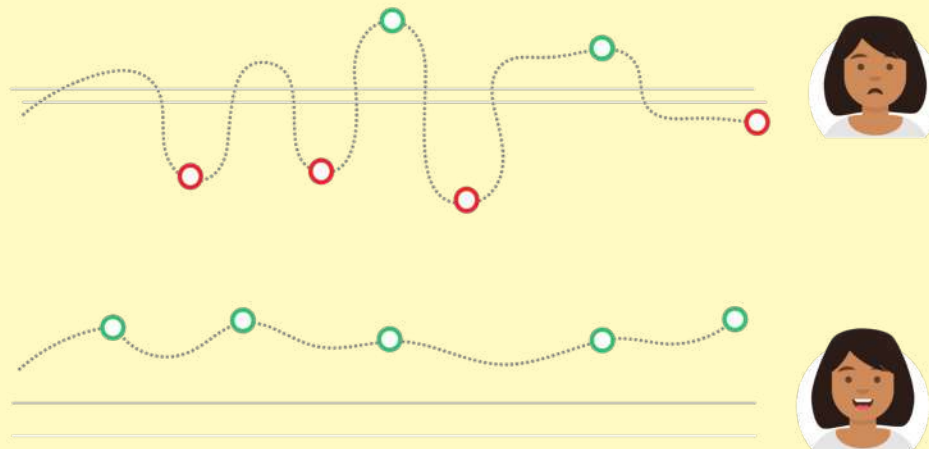
After



6. Simplify the user journey

Provide a **smooth user experience** to reduce friction and time

- What is the number of steps to achieve the user goal?
- What are the main painpoints and how to fix them?

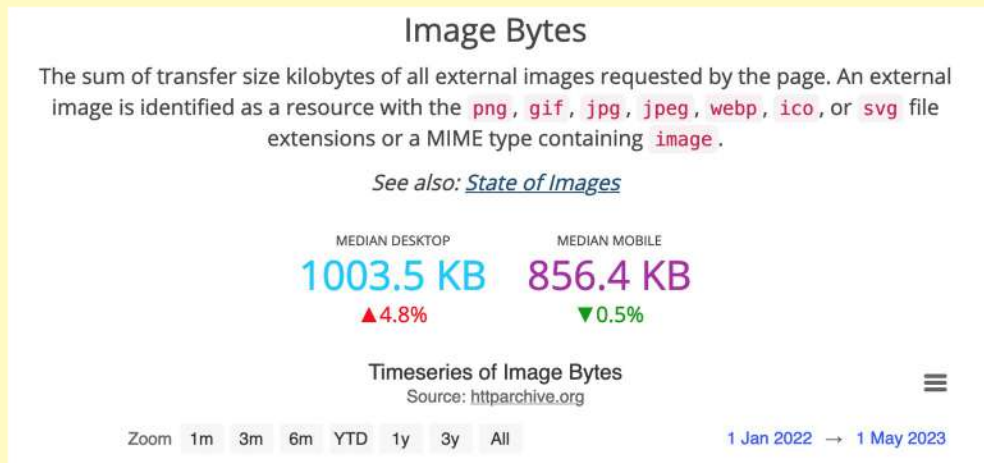


Plus d'infos : [Simplifier le parcours et Ecoconception / Les 115 bonnes pratiques - 3ème édition](#) - Bonne pratique n°3

6. Optimize images

Reduce page weight by optimizing images

- Is the image necessary? Does it bring value?
- What size is necessary ? What quality ?
- Is the image inclusive?



Images account for a big part in the weight of web pages [archives http](#)

Plus d'infos : [Réaliser et développer - Les images](#)

7. Limit the use of plugins and widgets



Do

Replace social media widgets with:

- an image and a link
- just links
- or is it needed on every page ?



[Facebook](#), [Twitter](#), [Instagram](#), [Linkedin](#), [Flux RSS](#)
[Inscrivez-vous à notre newsletter mensuelle.](#)

Replace the Google map with:

- an image and a link (to Open Street Map)
- an address and a link
- or just the address if nobody is going to come to your office ;-)



Plus d'infos : [Réaliser et développer - Les plugins et widgets](#)

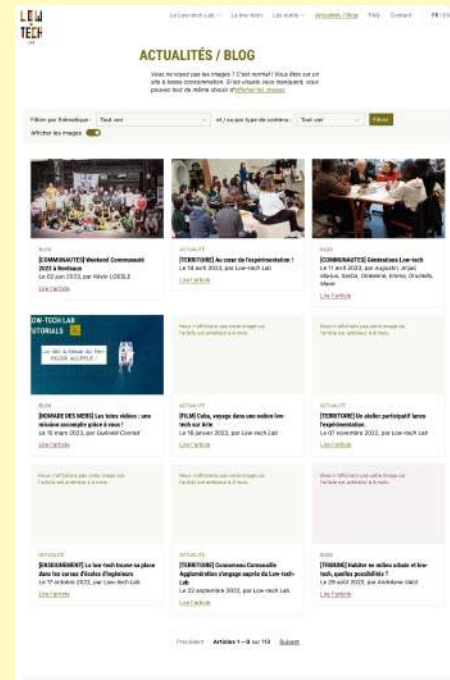
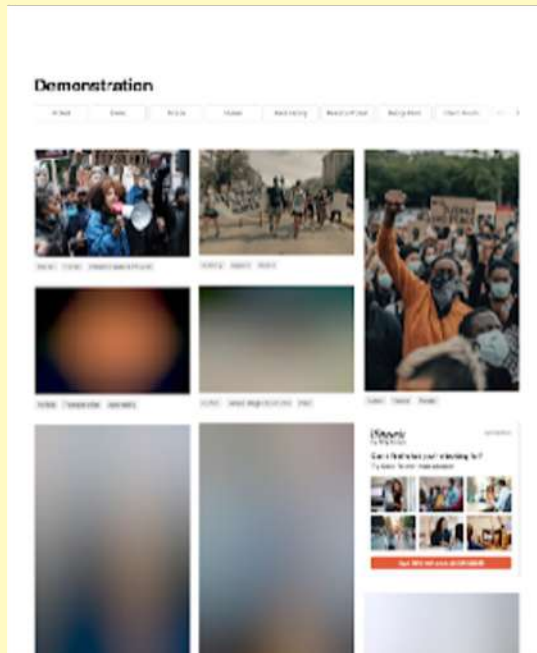
Exemple : <https://ruchebiocoop.com/>

8. Ban infinite scrolling

Choose the right number of elements to display.

Infinite scrolling is meant to increase the time spent on a website.

Exemple : Unsplash uses infinite scrolling whereas Low Tech Lab uses pagination.



9. Test with low bandwidth

Test your site on a low bandwidth
(browser development tools).



10. Think offline mode

Think about an offline visualisation to be accessible even in zone that have no network coverage.

The Waorani people live in the middle of the Amazonian forest and use Mapeo to record resources of the forest.

The offline mode is essential for this type of work.

Info : [Mapeo - Digital Democracy](#)

[Mapeo - Waorani case study](#)



**And the burning question on
everybody's lips...**

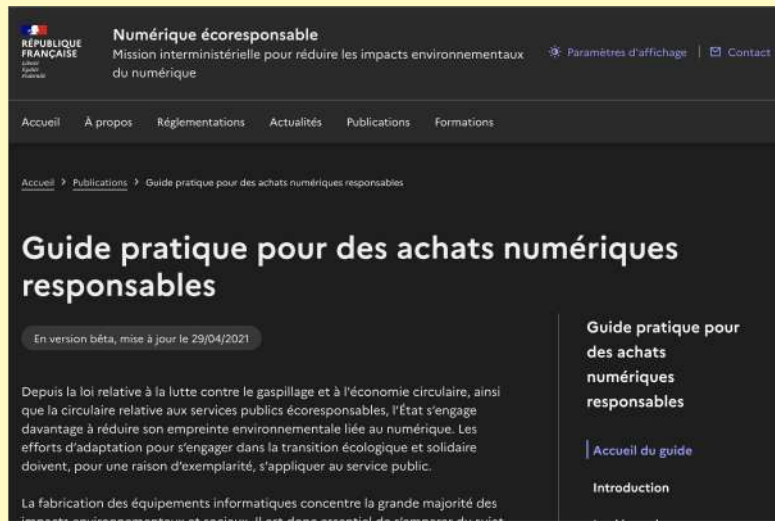
What about the dark mode ?

Consumes less energy on OLED screens

But :

- Only 9% energy saved if the brightness of the screen is at 50%.
- Has no impact on LCD or LED
- Can cause accessibility issues for some people.
- Need to provide both a light and dark version.

→ Probably not the first thing to tackle



Example providing an alternative between a light and dark background

On this topic:

[Faut-il activer le mode nuit pour augmenter l'autonomie de ma batterie ? Le cas de l'application Twitter - Greenspector](#)

[What is the impact of Dark Mode on battery drain? – Mobile Enerlytics](#)

Examples of eco-designed websites



<https://sustainablewebdesign.org/>



<https://www.rebootcommunication.org/>



<https://www.exposition-celtique.bzh/>



<https://behaven.com/en>



<http://ruchebiocoop.com/>



<https://www.adaptaville.fr/>

Other examples on [Lowwww directory](#) et [guide d'ecoconception designers ethiques](#) - [aller plus loin](#)

Part 3

Return on experience: “Celtique?” exhibition

Expo “Celtique ?”



<https://www.exposition-celtique.bzh/>

More details on the process :

- [La démarche d'écoconception - L'expo "Celtique ?"](#)
- [Eco-concevoir le site d'une exposition : nous avons relevé le défi ! - Green IT](#)

A bit of context

- Goal: Create a **responsive website for an exhibition** of the Musée de Bretagne on the subject of Celtism.

- Specifications :
 - **Ecodesigned**
 - **Accessible**
 - **Cookie-free**
 - **Open-source** as much as possible

- The **website** is meant to **have its own life** beyond the “in person” exhibition to provide resources for different types of people (teachers, students, aficionados, etc).

A bit of a challenge

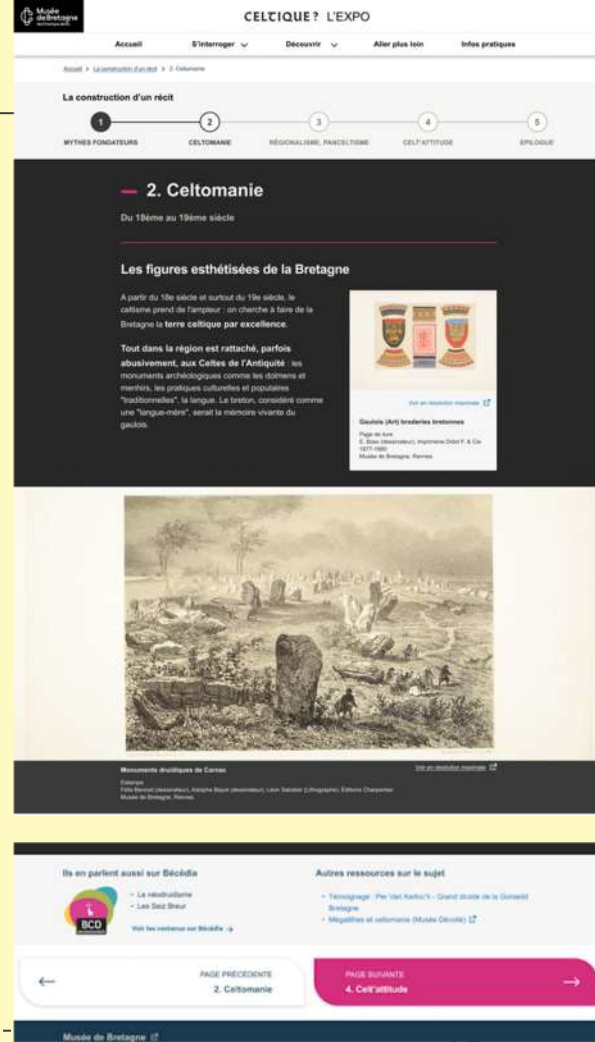
An exhibition means :

- photos (lots)
- illustrations
- videos
- podcasts
- documents
- interactive quiz
- some guidance to navigate between all those resources

Adapting for the web

Solutions :

- Simplified structure (removing nested levels)
- Progression indicator (1, 2, 3, 4)
- Navigation buttons (previous / next)



Photos

Solutions :

- **Selected** Images
- **Resized** and **compressed** image on the page
- Possibility to open in **higher resolution** for specific needs



[Voir en résolution maximale](#) 

Bustes

Roche en cours de détermination
(stéatite ?)
1ère moitié du 1er siècle avant J.-C.
Fouilles menées par Stéphane Bourne
(INRAP) en 2019 à Trémuson (22), sur
le site de La Morandais
Collection privée
© Emmanuelle Collado, Inrap

Photos

Example of gain :



Original size :
13,9 MB
(9600 x 5400)



Resized HD :
241 KB
(1812 x 1024)



Resized and optimized for desktop :
47 KB
(800 x 418)

Videos

Solutions :

- Vidéos **resized** and **compressed**
- Integration of videos using **HTML5 player** rather than integrated YouTube plugin
- Not all videos displayed by default (load more button)



Original size :
491 Mo
(HD 1080p)



Resized (Handbrake) :
128 Mo
(720p)



Compressed (CompresserVideo.fr) :
30 Mo
(720p)

Quiz

Solutions :

- **Reduce the number** of questions from 12 to 9
- **Give up** the idea of a progression bar
- Provide an **indication of the status** above the Submit button (You have have X questions left to answer before you can see your result)



Police

Solutions :

- Use of a system font : Arial
- Visual identity in the exhibition logo in svg



Overall result

- Pages with a score of A or B
- Overall user journey with low impact

Url	Request number	Page Size (KB)	Dom Size	Greenhouse Gases Emission (gCO2e)	Water Consumption (cl)	EcoIndex	Grade
https://www.exposition-celtique.bzh/revenir_aux_sources/breton_langue_celtique	10	432	311	1.38	2.06	81.18	A
https://www.exposition-celtique.bzh/revenir_aux_sources/celtes_d_une_rive_a_l_autre	14	623	328	1.42	2.13	78.93	B
https://www.exposition-celtique.bzh/revenir_aux_sources/une_armorique_celtique	14	628	323	1.42	2.13	79.11	B
https://www.exposition-celtique.bzh/revenir_aux_sources	9	348	185	1.27	1.91	86.41	A
https://www.exposition-celtique.bzh/	12	413	345	1.41	2.11	79.61	B

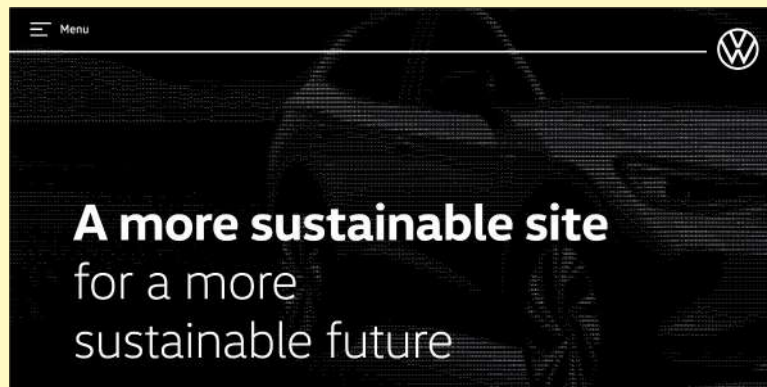
Partie 4

Conclusion and resources

Beware of greenwashing...

Questions to ask yourself:

- What is the real motivation?
- Is it for marketing purposes?
- What is the impact of the service or product being sold?
- Are there also steps taken towards accessibility, inclusion, and ethics?
- Is the ecodesign process documented?



Volkswagen - un **bel exemple de greenwashing**

Is it going to be expensive?

Just like for accessibility, it will not cost more if it's done from the start!

It can improve the service on several levels:



Better user satisfaction:

- Better SEO
- Smoother user experience



Wider target audience:

- Better inclusion of people with limited access
- Better accessibility



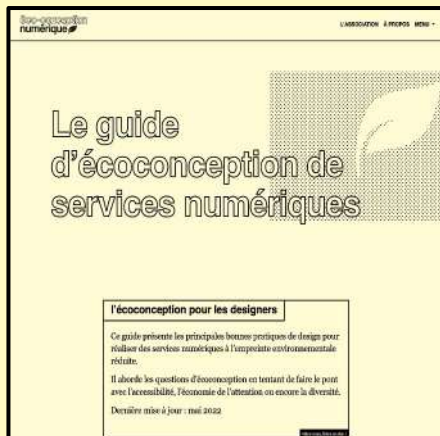
Better company image and values



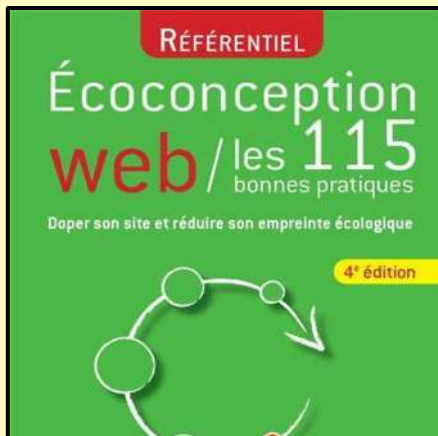
Savings:

- Hosting
- Equipment and devices

Reference guides (some in the process of being translated !)



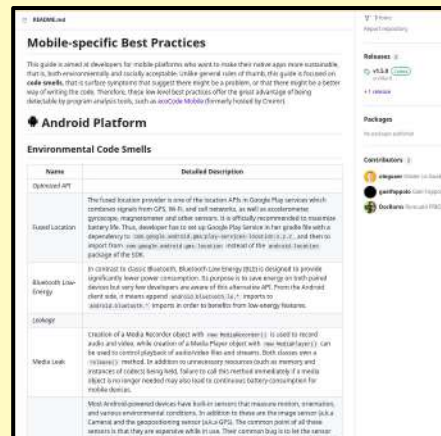
The guide to eco-design
Designers Éthiques



Écoconception web, les 115 bonnes pratiques (4^{ème} édition) and Github
GreenIT



Référentiel d'écoconception WordPress
GreenIT

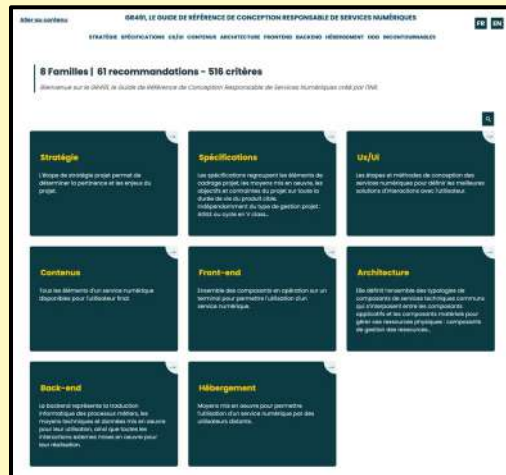


Guide de bonnes pratiques mobile
GreenIT

Reference guides

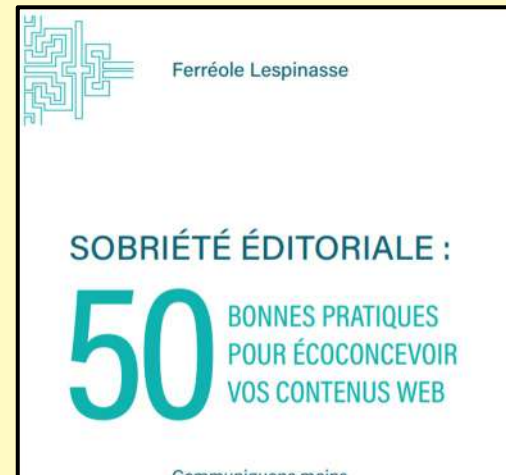


[Référentiel général d'écoconception de services numériques \(RGESN\) - DINUM](#)



[Handbook of Sustainable Design of Digital Services \(GR491\) -](#)

INR



[Principes de sobriété éditoriale : 50 bonnes pratiques pour écoconcevoir vos contenus web.- Ferréole Lespinasse](#)

The main goal of ecodesign is to...



prolong the life of devices
to stop building new devices

MERCI !

Don't hesitate to contact us:

- On Slack : designersethiques.slack.com
- By email aurelie@designersethiques.org

