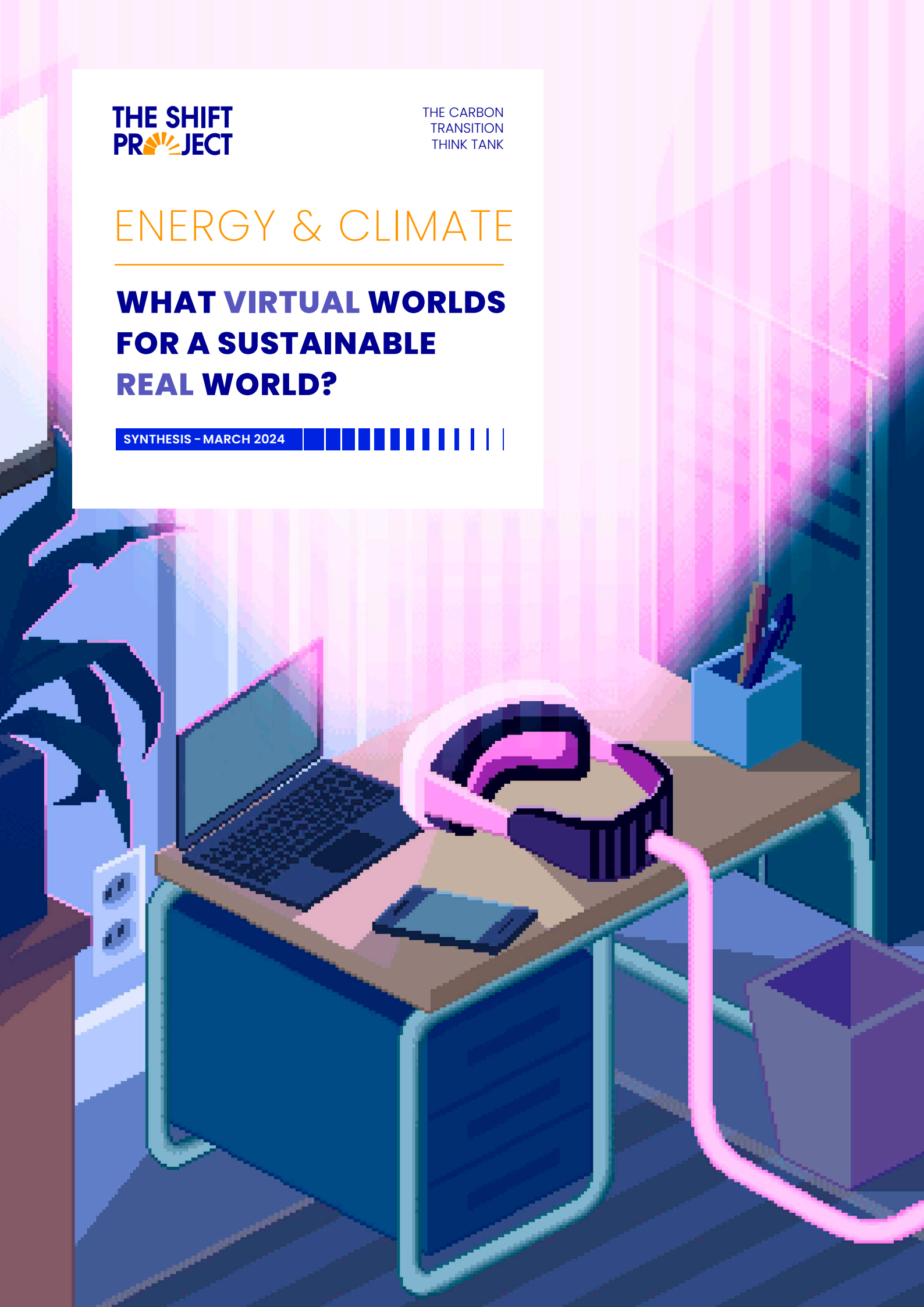
THE SHIFT PROJECT

THE CARBON TRANSITION THINK TANK

ENERGY & CLIMATE

WHAT VIRTUAL WORLDS FOR A SUSTAINABLE REAL WORLD?

SYNTHESIS - MARCH 2024



DIGITAL TECHNOLOGY, BOTH A TOOL AND A CHALLENGE FOR DECARBONISING THE ECONOMY

Digital technologies are not virtual tools but physical media.

Exchanging data is only possible thanks to devices (smartphones, computers, tablets, etc.), network infrastructures (terrestrial and submarine cables, mobile network antennas, fibre optics, etc.), servers, and data centres.

The digital sector's carbon footprint, which is growing at an average rate of 6% per year, already accounts for 3 to 4% of global emissions today (The Shift Project, 2021).

In France, it represents **at least 2.5% of the national footprint** (ADEME & Arcep, 2023).

Like other sectors of the economy, it must meet its decarbonisation target: **-45% by 2030 compared with 2020 at global level** (SBTi et al., 2020), which The Shift Project proposes to translate into a target of **-30% by 2030 for France.**

In a context of intense electrification of uses (mobility, buildings, industry, etc.), it is at the heart of planning and supply issues.

Bilan carbone

+6%

A YEAR

DIGITAL CARBON FOOTPRINT

-30%

COMPARED WITH 2020

DECARBONIZATION TARGET FOR 2030 FOR FRANCE

THE CRAZE FOR VIRTUAL WORLDS

AN EXISTING TECHNOLOGICAL GROUNDSWELL

The excitement surrounding virtual worlds is nothing new: since the 1990s, there have been successive cycles of enthusiasm and technological development around virtual reality, augmented reality, and immersive technologies.

At the same time, virtual worlds are part of the imaginary worlds conveyed by popular culture, video games, and films.

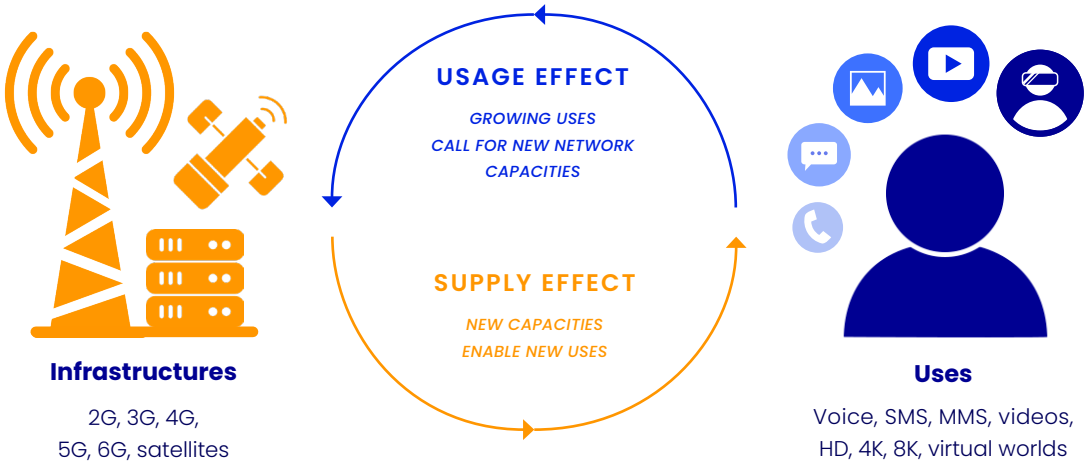
In October 2021, Meta's announcement to build a generalised virtual world, **the «metaverse», can be interpreted as a signal sent to the digital ecosystem** to structure the technological directions and regulations taken, rather than as the promise of a new ground-breaking service in the short term.

The signal has been taken seriously in France and Europe, with a surge of announcements and structuring around immersive technologies. This includes 6G, which the European Union has announced will enable the advent of this type of virtual world.

Far from being just media hype, and even though the terms "virtual worlds" or "metaverses" remain vague and multifaceted, **the technological dynamics upstream and downstream of this announcement will have a structuring effect on the decade to come.**

OUR USES & OUR NETWORKS

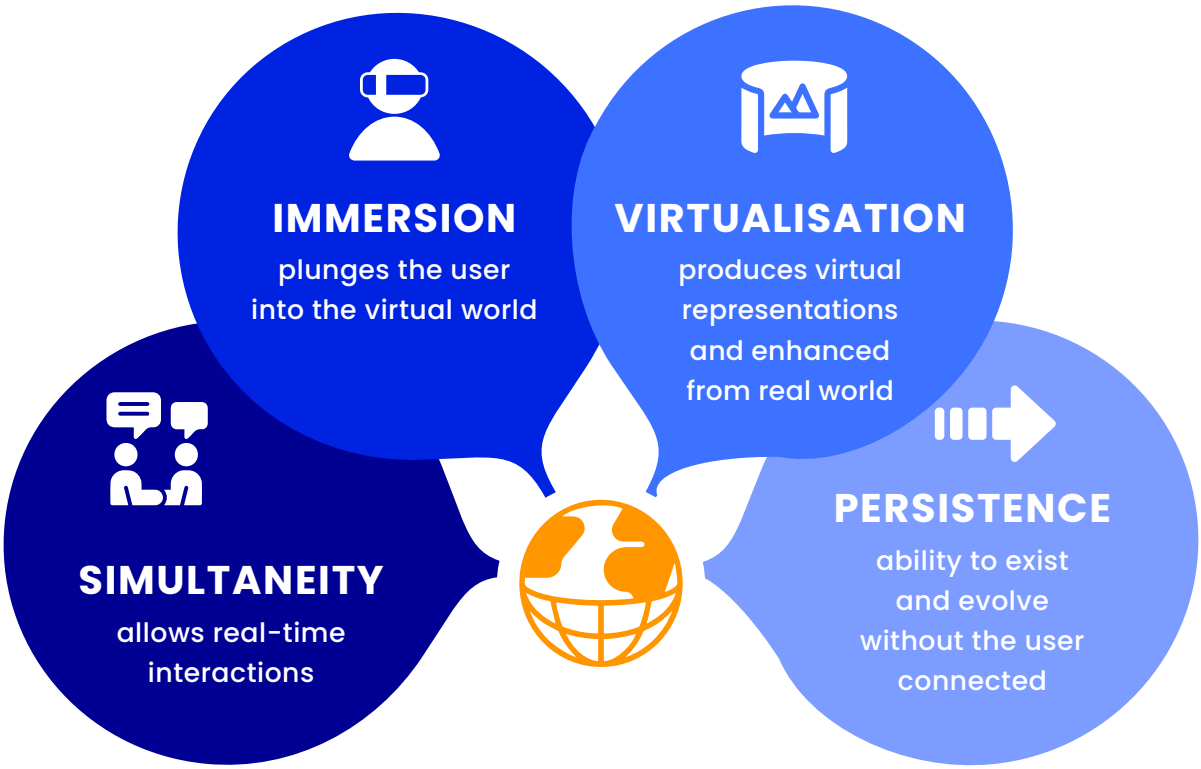
are two facets of the same dynamic



Source : The Shift Project, 2024

WHAT IS A VIRTUAL WORLD ?

Virtual worlds all revolve around 4 DEFINING CHARACTERISTICS :



FOUR OTHER CHARACTERISTICS DETERMINE THE SYSTEMIC IMPACT OF THEIR DEPLOYMENT :

- The possibility of **marketing** goods in the virtual world, and the need for a **large-scale** system to deliver the promised services.
- The structuring dynamics of today's digital world can also increase the pressure that virtual worlds put on infrastructures: the possibility of accessing services from **anywhere at any time,** and the **virtual/reality entanglement.**

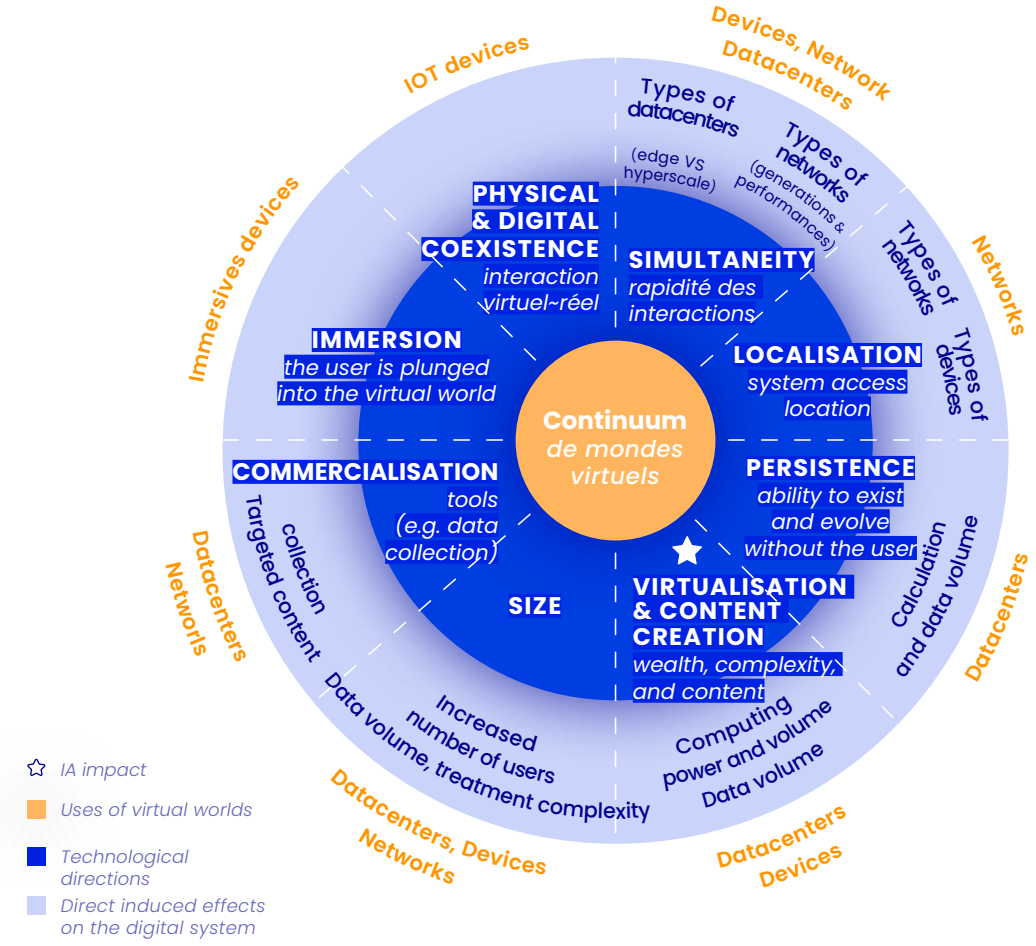
ENVIRONNEMENTAL
IMPACTS

Our work has culminated in a tool that :

- **Translates virtual worlds'** service promises into concrete implications for the digital system and its infrastructures.
- **To quickly link the proposed solutions** currently being produced by the virtual world ecosystem **to their energy-climate implications**

MATRICE - USES OF VIRTUAL WORLDS

& direct induced effects on the digital system



Source : The Shift Project, 2024

Certain combinations of virtual world characteristics are not compatible with controlling impacts. For example, combining immersion, simultaneity, and mobility puts strong pressure on new network infrastructure capacities and specifications (as in the case of immersive videoconferencing and cloud computing).

Explaining the energy-climate consequences of technological choices and usages that are made collectively is essential **if digital technology is to be steered towards a sustainable future.**

Undifferentiated deployment and widespread adoption of virtual world services are incompatible with a resilient trajectory for the digital system with **respect to the dual carbon constraint.**

Endorsing the undifferentiated deployment of virtual worlds would result in reinforcing the currently unsustainable dynamics of the digital realm, **placing it on an impact trajectory representing almost 7% of global carbon emissions in 2030, closely aligning with the most alarming scenario modelled by The Shift Project in 2021** (see opposite).

AT THE FRENCH LEVEL:

- In the case of mobile networks, making this scenario possible would require deploying technologies (latency, bandwidth, etc.) and capacity resulting in up to a 2-fold increase in their carbon-energy impacts;
- This would place the digital sector on a trajectory whose impacts in 2030 are far greater than the ADEME-Arcep trend scenario (ADEME & Arcep, 2023), and whose narrative is only compatible with the ADEME «Pari réparateur» scenario for 2050 (ADEME, 2021);

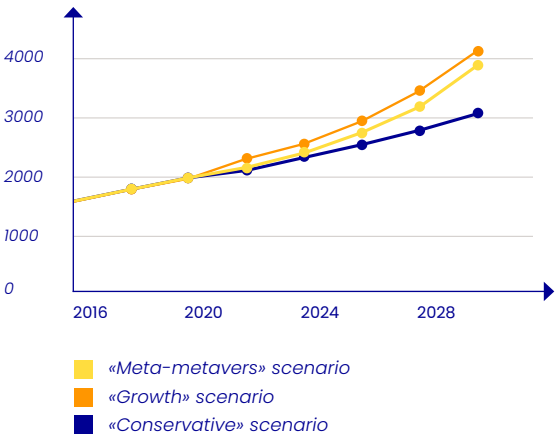
A differentiated deployment and sensible adoption of virtual worlds requires analysis and decision-making based on their net energy and climate contributions, to be assessed through «use cases» that take into account usage contexts **conditions of relevance**.

The assessment must be systematic, quantified, exhaustive (taking into account all phases of the life cycle and constructing a net carbon footprint) and **technologically segmented** (breaking down impacts by functionality or technological axis).

2016-2030 TRENDS
IN GREENHOUSE GAS EMISSIONS FROM THE DIGITAL SECTOR

2016-2025 Conservative and Growth scenarios (The Shift Project, 2021) extended to 2030 and Meta-metaverse scenario

(in $MtCO^2e$)



Source : The Shift Project, for the purposes of this report

RECOMMANDATIONS

Measurement and transparency 1

Conditioning deployments and investments on prior, quantified impact studies that demonstrate the service's energy and climate conditions of relevance.

Optimisation 2

Generalise new design paradigms that steer innovation and uses towards lean and resilient trajectories.

Collective reorganisation towards sobriety 3

By using tools such as our «uses - digital systems» matrix (to be used alongside eco-design and lifecycle analysis methods), free oneself from specifications and projects that are incompatible with reducing the impact of the digital system.

Training and skills 4

Train the stakeholders involved in the innovation process on the systemic and environmental impacts of the technological choices they make.

CONCLUSION

The sustainability of our essential usages will only be guaranteed by adapting the digital system to the twofold carbon constraint, which involves **keeping our equipment volumes and data volumes under control.**

Positioning our technological choices **towards digital sobriety** is not just a response to physical constraints, but an opportunity to set a new direction around which to structure **a genuine European digital ecosystem** for the 21st century.

THE SHIFT PROJECT

The Shift Project is a think tank working towards a post-carbon economy. As a non-profit organization recognized as being in the public interest and guided by the demands of scientific rigor, our mission is to enlighten and influence the debate on the energy transition in Europe. Our members are large companies that want to make the energy transition their priority.

www.theshiftproject.com

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Graphic design

Cover illustration : Virgile Bellaiche
Layout : Karine Pellan