CLIMATE CRISIS: THE UNSUSTAINABLE USE OF ONLINE VIDEO
The practical case study of online video
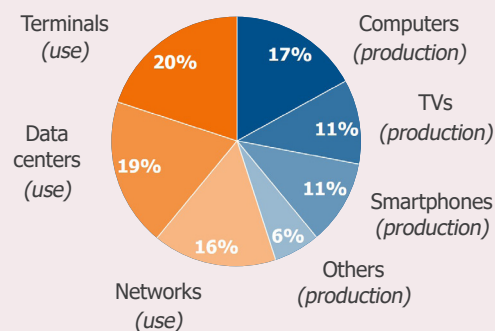### *Executive Summary*

CONTEXT – AN UNSUSTAINABLE AND GROWING IMPACT

The Paris Agreement commits all the governments of the planet to drastically reduce their greenhouse gas emissions from now to the end of the next decade. Any increase in energy consumption will make this historic challenge of avoiding climate chaos more difficult to overcome. Meeting this challenge demands rethinking the world's energy consumption, 80% of which is today provided by fossil fuels. This can only be considered by reviewing the functioning of each of our sectors of activity, all currently highly dependent on non-renewable resources.

A large share of public opinion and our economic and political decision-makers still consider that digital technologies do not require the same level of scrutiny as other sectors, regarding their compatibility with energy and climate imperatives. Nonetheless, **the direct and indirect environmental impacts ("rebound effects") linked to the uses of digital technologies are both unsustainable and increasing rapidly.**

Digital technologies now emit 4% of greenhouse gas emissions (GHG), that is to say more than civil aviation. This share could double from now to 2025 to reach 8% of all GHG emissions, i.e. the current share of car emissions. Reducing the threat of climate change requires drastically reducing global greenhouse gas emissions in the next few years; however, the energy consumption required for digital technologies is increasing by 9% a year.

In October 2018, The Shift Project published the report "Lean ICT – Towards digital sobriety". In it we recommended making digital transition compatible with climate imperatives and the constraints of resources. **Digital sobriety consists in prioritizing the allocation of resources as a function of uses, in order to conform to the planet's physical boundaries, while preserving the most valuable societal contributions of digital technologies.** This requires questioning the pertinence of how we use digital technologies, one of which is online video whose use we focus on here.

Terminals *(use)* 20% — Data centers *(use)* 19% — Networks *(use)* 16% — Others *(production)* 6% — Smartphones *(production)* 11% — TVs *(production)* 11% — Computers *(production)* 17%

Distribution of energy consumption per source for the production (45%) and use (55%) of digital equipment in 2017
[Source : Lean ICT, *The Shift Project* 2018]

KEY TAKEAWAYS

ONLINE VIDEO IS NOT A DEMATERIALIZED USE

Intensive use is now made of online video. Stored in data centers, videos are transferred to our terminals (computers, smartphones, connected TVs, etc.) via networks (cables, optical fiber, modems, mobile network antennae, etc.): all these processes require electricity whose production consumes resources and usually involves CO_2 emissions.

- **Video is a dense medium of information**: 10 hours of high definition video comprises more data than all the articles in English on Wikipedia in text format!

- **In 2018, online video viewing generated more than 300 MtCO₂**, i.e. as much greenhouse gas as Spain emits: 1% of global emissions.

- **Pornographic videos make up 27% of all online video traffic in the world.** Taken alone, in 2018 they generated more than 80 MtCO₂, i.e. as much as all France's households: close to 0.2% of global emissions.

- **The greenhouse gas emissions of VoD (video on demand) services (e.g. Netflix and Amazon Prime) are equivalent to those of a country like Chile** (more than 100 MtCO₂eq/year, i.e. close to 0.3% of global emissions), the country hosting the COP25 in 2019.

DIGITAL SOBRIETY REQUIRES THE REGULATION OF USES

- **The purpose of digital sobriety is to make the digital system resilient**: the aim is to create a framework that generates uses compatible with the constraints on resources.

- **Regulation is the process by which we can ensure that uses are in phase with the physical constraints that are imposed on the digital system.** Two tools are required to build it: the lever of legislation and the design of the systems that generate uses.

- **Addictive designs (autoplay, embedded videos, etc.) are incompatible with digital sobriety**, since they are aimed at maximizing the quantity of content consumed. The broadcasting platforms (their design, the underlying economic model, audience metrics, etc.) play a central role in the form taken by uses and thus their environmental impact. So, **uses are to a great extent the product of a system, and not the sole result of individual consumer behavior**.

- **Reducing the uses of digital technologies therefore requires regulating the mechanisms that generate these uses**: neither the self-regulation of broadcasting platforms nor the voluntary decisions of users will suffice.

REGULATION REQUIRES PRECISE PROCEDURES

- **At the individual level**, being "digitally sober" in one's online video consumption means using the lowest definition that can be used to benefit from contents, reducing one's consumption, and being more selective about what one watches.

- **On the collective level**, collaboration between the actors concerned is required to develop sobriety: regulatory bodies, politicians, service providers, the law, and the users.

- **The prioritization of uses is the key challenge of the debate**, in a world threatened by climate change: there is a risk of a random selection of uses occurring in any case if we do not reflect upstream on the uses we wish to preserve in priority.

- **The global dimension of the digital system demands both national and international regulatory tools**: an excellent subject for the European Union.

REGULATION FOR SOBRIETY IS A REALISTIC SOCIETAL DEBATE

- **Regulation in favor of digital sobriety is compatible with the principle of "net neutrality"**, which concerns the signification of contents, not their volume. Digital sobriety is aimed at making the digital system resilient, and managing it as a common good.

- **Prioritizing uses means evaluating respective pertinences.** However, the evaluation of societal pertinence goes far beyond technical environmental evaluation and must be carried out on the scale of society.

- **This evaluation must rely on tools that are already available** such as the sociology of uses and on the competences of **existing regulatory bodies** (in France: ARCEP, CNIL, CSA, Hadopi; in Europe: BEREC).

- **Reflection on the regulation of hateful online content shows that serious discussion is possible**, when there is a risk for societal integrity. There is no need for further proof of the societal risk linked to environmental constraints at a time when a "state of climatic emergency" is being evoked.

On the basis of the case study of online video, *The Shift Project* proposes **an initial series of questions to be asked explicitly in view to reducing the impact of digital uses intelligently**, and thus implementing digital sobriety. *The Shift Project* consulted a panel of experts and academics specialized in the societal issues of digital technology and online video, including: Jean-Samuel Beuscart (LSIS), Jocelyn Lachance (University of Pau), Julien Marcinkowski (expert in change management), Marion Muracciole (expert in gender equality), Gauthier Roussilhe (designer) and Lan Anh Vu Hong (expert in web marketing). These interviews have been combined with a literature review, calculations and an analysis of reports from regulatory bodies.

This report is accompanied with three tools:
• a browser extension (add-on) for Firefox to **visualise the environmental impact of one's online data consumption**, developed with Richard Hanna and Gauthier Roussilhe: available online: search *"Carbonalyser"* on *https://addons.mozilla.org*
• a **guide to reduce the size of video files**, produced with Gauthier Roussilhe: available on *https//theshiftproject.org/guide-reduire-poids-video-5-minutes/*
• an **educationnal video**, produced by the scientific communication agency Science Explainers: available on YouTube under the tile *"This video is bad for climate change: thank you for watching"*.

USES ARE AT THE HEART OF THE ENVIRONMENTAL IMPACT OF DIGITAL TECHNOLOGIES

Data traffic is responsible for more than half of digital technology's global impact, with 55% of its annual energy consumption. Every byte transferred or stored requires large scale and energy-greedy terminals and infrastructures (data centers, networks). This traffic is currently increasing by more than 25% a year, so it is necessary to characterize the uses related to it if we wish to manage the energy consumed by digital technologies intelligently.

Video flows represented 80% of global data flows in 2018 and 80% of the annual increase in their volume. The remaining 20% is composed of websites, data, video games, etc. In terms of uses, the overconsumption of digital technology is mainly comprised of videos. Driven by the deployment of very high-resolution technologies such as "8K", whose necessity is questionable, video absorbs a large share of network infrastructure costs, whereas lower resolution images would suffice for current uses.

Online video takes up the largest share of video flows, with 60% of global data flows in 2018. In this study the term "online video" designates a share of video data flows, corresponding to "on demand" uses: video files accessible via servers on a broadcasting platform (e.g. YouTube, Netflix, etc.) or direct broadcasting circuits (package channels, etc.) without definitive downloading of the file.

VIDEO, THE HEAVYWEIGHT OF DIGITAL TECHNOLOGY USE

20%: THE VOLUME OF GLOBAL DATA FLOWS OF ALL NON-VIDEO USES

These other non-video data flows cover extremely varied uses: web sites, emails, instant messaging, the storage of photos and various data, company networks, etc. They also cover uses that can be associated with video, but which we have chosen to separate, such as peer-to-peer (which permits exchanging files including videos) and video games.

80% FOR VIDEO USE

The rapid growth in the total volume of data – thus of energy consumption and its associated greenhouse emissions – is to a great extent due to video. This evolution runs counter to the objectives of the Paris Agreement.

20% OTHER VIDEOS

We have chosen to separate online videos from other types of video, that bring together here: live television streaming, live video (Skype, "camgirls", telemedicine, etc.) video monitoring, etc.

This type of video makes up 20% of the total flow of data.

60% ONLINE VIDEO

The largest share of video flows can be placed in the "online video" category. It represented 1.05 thousand billion billion bytes (1.05 zetta-bytes) in 2018, i.e. 60% of world data flows. It is thus the main type of video use and the main use of digital technology as a whole.

This generates 306 million tons of CO_2, i.e. 20% of the total greenhouse gas emissions (GHG) due to digital technology (utilization and production of all equipment confounded) and nearly 1% of world greenhouse gas emissions. Online video covers 4 main types of content.

34% VoD
(in online video)

These are videos hosted on streaming platforms that broadcast **film and serial type contents** (Netflix, Amazon Prime, etc.), grouped under the name VoD, for Video on Demand.

VoD represents 34% of online videos, 20% of total data flows and 7% of total GHG emissions due to digital technology.

27% PORNOGRAPHY
(in online video)

These are videos hosted on streaming platforms with **pornographic content** (Pornhub, YouPorn, XVideo, etc.). This excludes, for example, direct streaming, photos, etc.

Online pornographic videos represent 27% of online videos, 16% of the total flow of data and 5% of total GHG emissions due to digital technology.

21% "TUBES"
(in online video)

These are videos hosted on streaming platforms with **various types of content for all audience categories** (95% dominated by YouTube, the remaining portion being taken up by Dailymotion, Youku Tudou, etc.).

"Tubes" represent 21% of online video, 13% of the total data flow and 4% of total GHG emissions due to digital technology.

18% OTHERS
(in online video)

These are videos hosted by **social networks** (Facebook, Instagram, Tik Tok, Snapchat, Twitter, etc.) and **other online videos** (small streaming services, videos hosted directly on a site).

These other types of use represent 18% of online video, 11% of total data flows and 4% of GHG emissions due to digital technologies.

All non-video uses 20%
Online video 60%
Other video 20%

VoD 34%
Pornography 27%
Tubes 21%
Others 18%
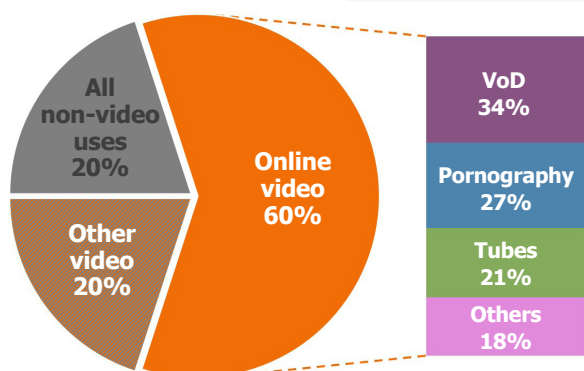
Distribution of online data flows between different uses in 2018 in the world

[Source : *The Shift Project 2019* - as of (Sandvine 2018), (Cisco 2018) and (SimilarWeb 2019)]

NOT CHOOSING IS NO LONGER A VIABLE OPTION

VoD, Pornography, Tubes and other uses: none of these four categories is negligible in online video uses. Alone, each of them represents 10 to 20% of global data flows. Implementing sobriety in online video uses means reducing the use and size of video files.

This reduction implies choosing between assigning a similar weight to every category, or choosing to give priority to certain of them to better preserve their use – whether in terms of resolution/size of video media (for example, which videos can remain in 480p rather than in "8k" display resolution?), platform design, etc.

The climate crisis and the planet's finite raw resources require that we reduce our greenhouse gas emissions, and our consumption of energy and raw materials. In a world confronted by such limitations, not choosing between uses will lead to the random imposition of constraints rather than to arbitration between options.

Not choosing means potentially allowing pornography to mechanically limit the bandwidth available for telemedicine, or allow the use of Netflix to limit access to Wikipedia.

From the standpoint of climate change and other planetary boundaries, **it is not a question of being "for" or "against"** pornography, telemedicine, Netflix or emails: **the challenge is to avoid a use deemed precious from being impaired by the excessive consumption of another use deemed less essential.**

This makes it a societal choice, to be arbitrated collectively to avoid the imposition of constraints on our uses against our will and at our expense. **In the 21st century, not choosing is no longer a viable option.**