

6th AIEE Energy Symposium

Current and Future Challenges to Energy Security

Digital economy footprint. How can we engage to reduce its environmental impact?



Rome, 14-16 December, 2021

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Contents

Covid19's impacts on digital sector: Smart working, E-commerce & Streaming

Global energy consumption and carbon impact of ICT sectors and users

Emissions of digital strategies: Why our internet habits are not clean as we think?

EU's 2030 digital strategy goals

Digital sobriety: a new strategy to reduce environmental impacts

Introduction



With the global COVID-19 restrictions and the develop of the smart working, our reliance on digital technology increased in 2020. Therefore video calls, emails, instant messaging and virtual entertainment replaced face-to-face interactions in and out of the workplace.



Between February and April 2020, at the peak of worldwide lockdowns, global internet traffic increased by 40%.



Digital technologies already contribute between 1.4% to 5.9% of global greenhouse gas emissions.

Web traffic is set to double by 2022, with mobile internet users expected to jump from 3.8 billion of last year to 5 billion by 2025, said IEA.

To achieve the de-carbonization's global goals and to begin the era of green Digitalization & Communication it's fundamental to reduce the Digital technologies greenhouse gas emissions and its consumption!

Covid19's impacts on digital sector: Smart working, E-commerce & Streaming

During and after the lockdown, the role of internet in our life has become increasingly important, starting from the new ways of working remotely, to streaming platforms and to online purchases via mobile.



Smart working → 

- Microsoft Teams reported an increase from 2 million (2017) to 145 million (Q2 2021) users globally, with an average of **900 million meetings and daily video-calls** (2021).
- **1 hour** of video-call generates from 150 to **1,000 grams of CO₂** and requires between 2 and 12 liters of water.
- leaving the video camera off during a video conference can reduce the ecological footprint by 96%



E-Commerce → 

- in 2021 online purchases reached the value of **39.4 billion euros** (+ 21% compared to 2020).



Streaming → 

- **+16 million** subscribers in the first quarter of 2020.
- **1 hour** of streaming video equals approximately **100g** of CO₂ (it consumes like a 1,000W air conditioner running for 40 minutes Source: Dimpact).
- Watching contents in standard definition instead of high definition could lead to an 86% reduction in emissions.

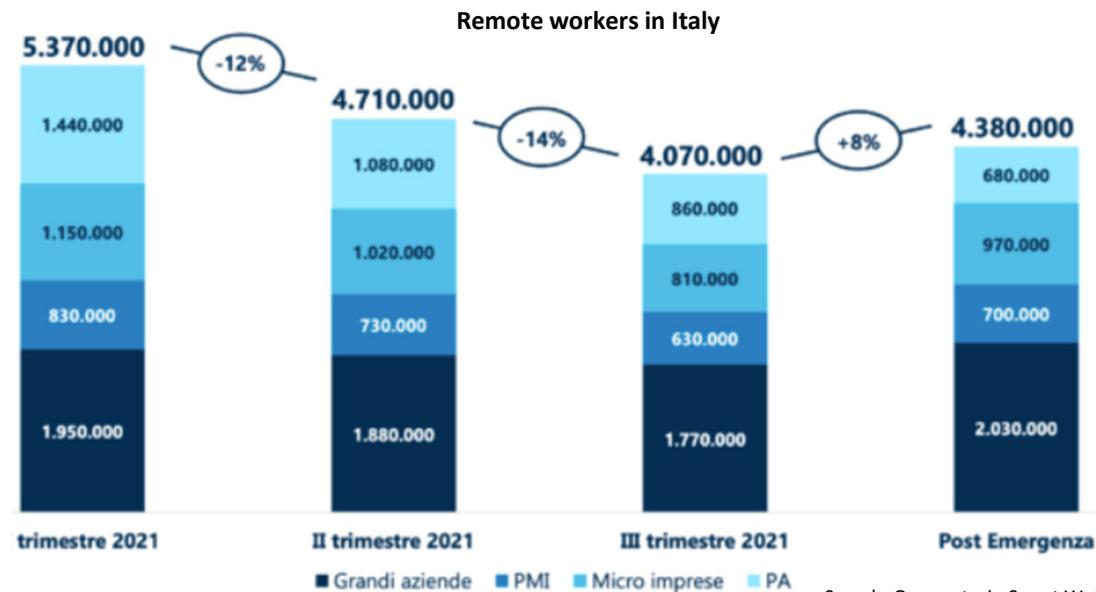
Smart working



It reduces travel and therefore emissions

It increases home energy consumption

It maximises the unconditional use of digital channels to keep in contact with colleagues.

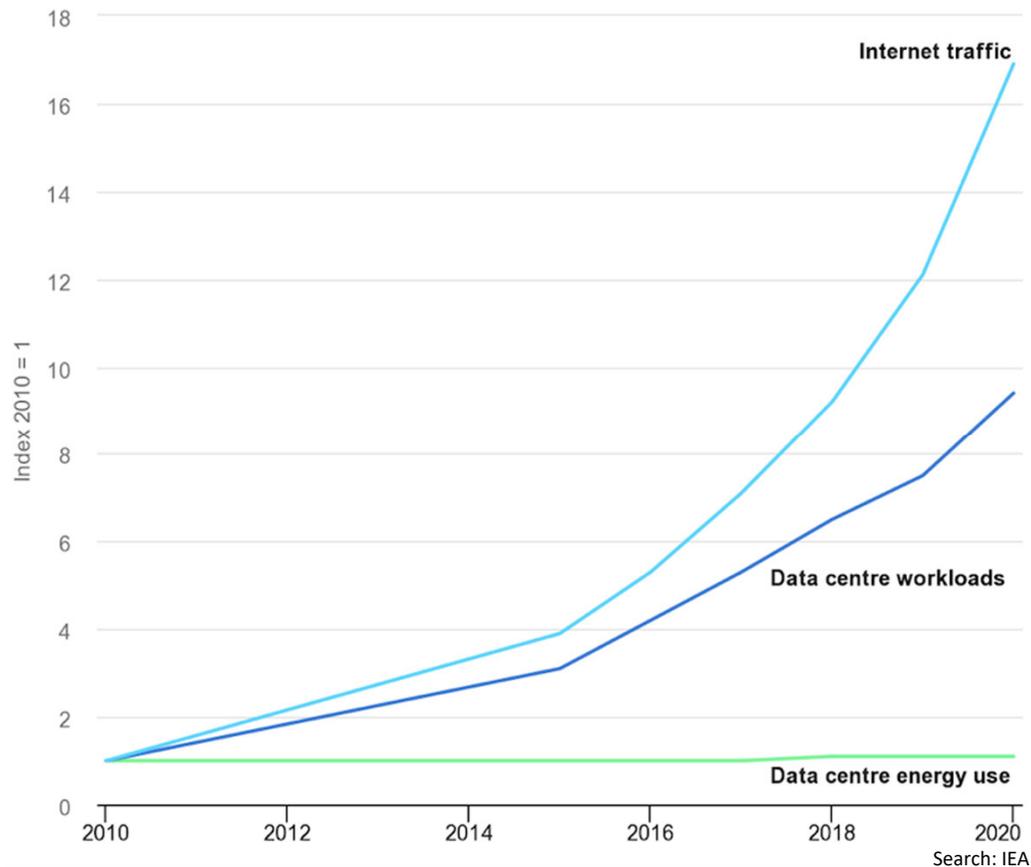


4.38 Million of people work from home sending, sharing, video-calling and searching messages and information, raising internet traffic and contributing in a massive way to digital emissions.

Digital files and information are stored in data centres. To be always active with flawless performance, data centres consume large amounts of energy, contributing to CO₂ emissions.

Global energy consumption and carbon impact of Information and communication technology (ICT) sectors

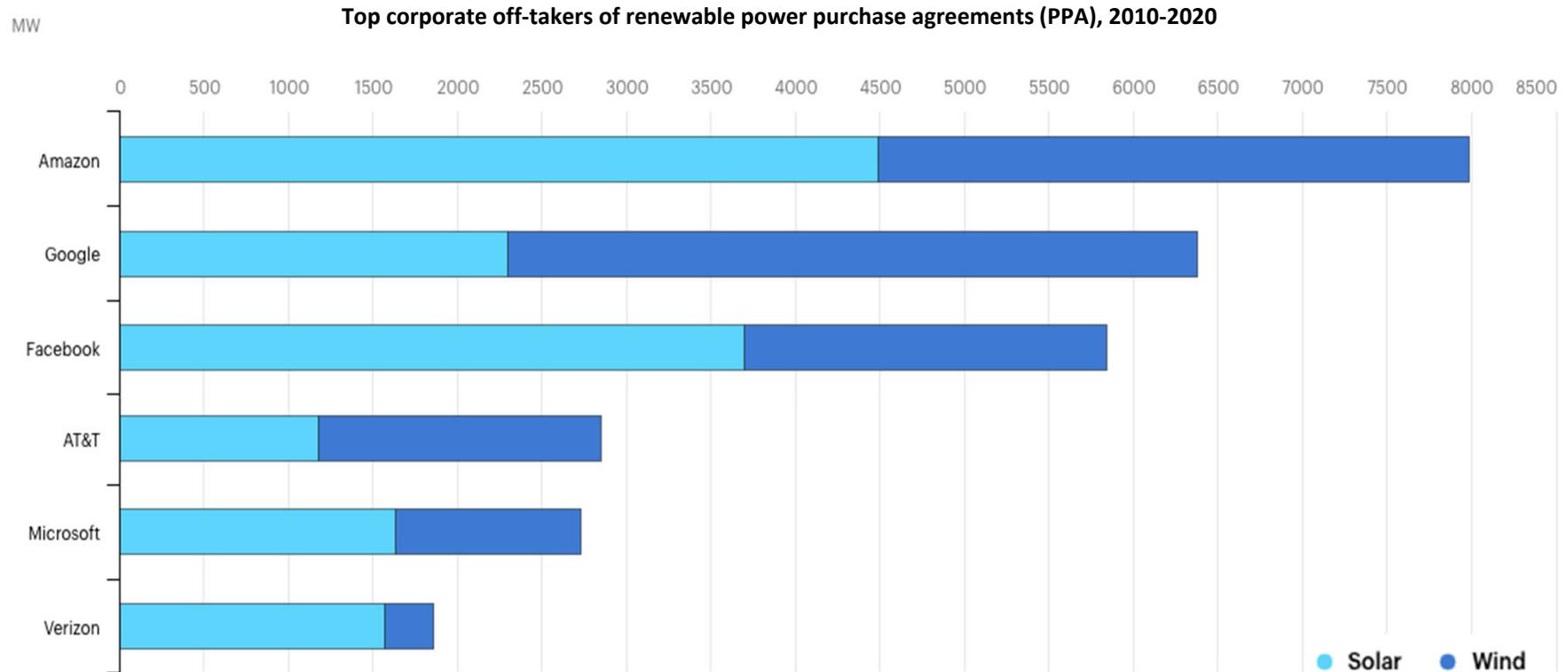
Global trends in internet traffic, data centres workloads and data centre energy use, 2010-2020



- Global internet traffic rose up by over 40% in 2020. It increased more than double between 2017 and 2020, and could grow up again by 2023 if current trends are sustained.
- **Data centres** are responsible for around **1% of the world's energy demand**. It's expected to rise with the growth of the digital economy and the number of connected user.
- Actually, Digital instruments produce about **3.7%** of global greenhouse emissions..

The energy consumption of digital was 1.9% of global energy consumption in 2013, 2.7% in 2017 and it could reach a variable peak between **8.7% and 15.5% in 2025** if, in addition to energy optimization activities, "**digital sobriety**" actions are not undertaken correctly.

ICT companies and their purchasers of renewable energy



Search: IEA

Matching 100% of annual demand with renewable energy purchases or certificates does not guarantee that data centres are actually 100% powered by renewable sources all the time. The variability of wind and solar sources may not match a data centre's demand profile, and renewable energy purchases might even be for a different grid or region.

Emissions of digital strategies: Why our internet habits are not clean as we think?



SMS

0.014g CO₂e for each sms

It has reduced digital ecological footprint, but it is dying out in daily use.



MAIL

4g CO₂e for each email

Considering **300 billion** emails that are sent and received every day all over the world.

1.200 million t CO₂e for the total n° of email



Internet Search

0.2g CO₂e for each Google search

Considering **3.5 billion** daily searches on Google, Users are responsible for the production of about 80 kg of CO₂ per year.

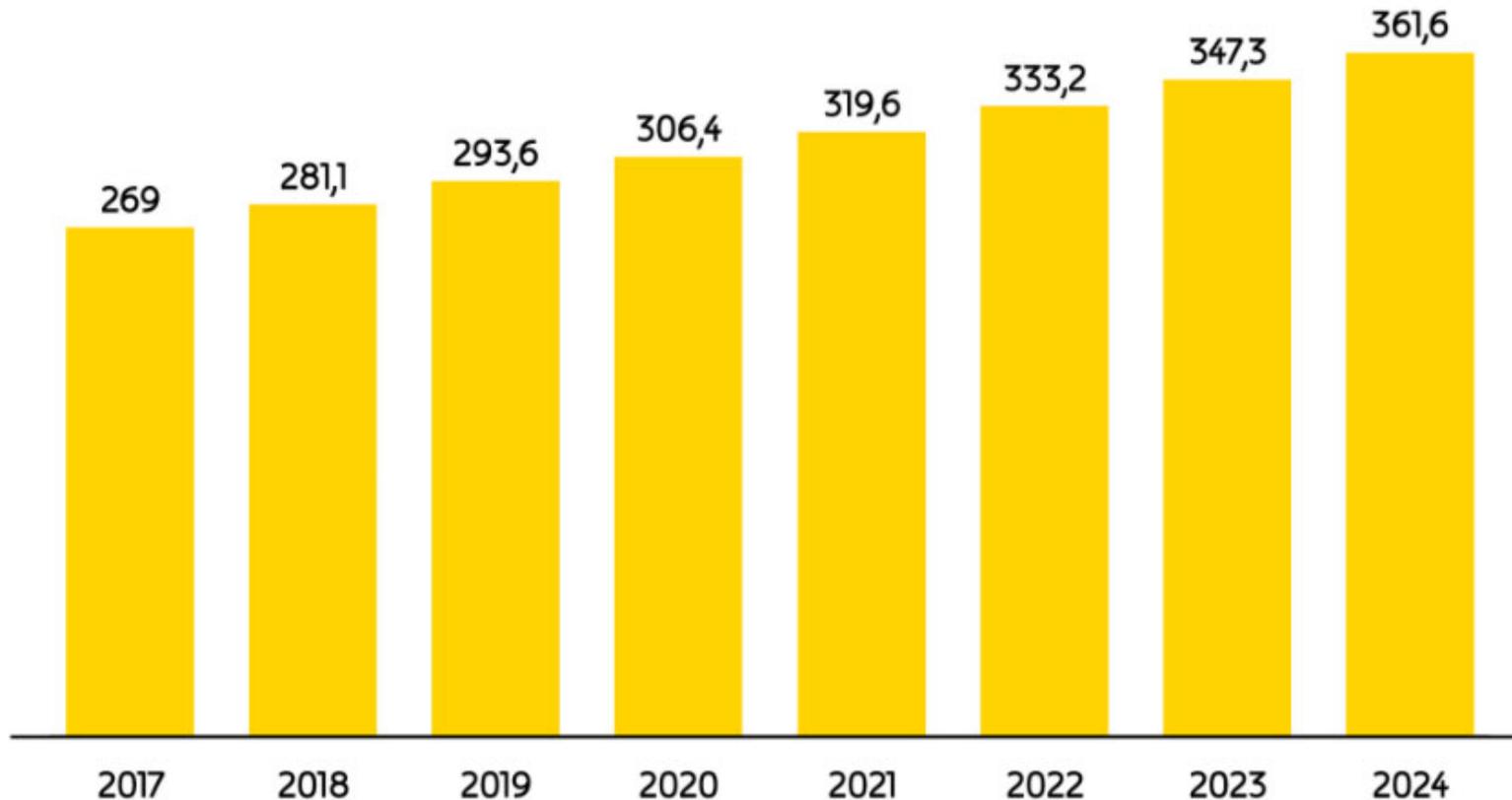


MAIL with attached

50g CO₂e For each email with attached documents or pic

The footprint per email message in the future might be higher than today's levels because people overuse this channel to communicate and to work.

Number of sent and received e-mails per day worldwide from 2017 to 2024



Search: Radicati group

- Number of sent and received e-mails per day worldwide will **increase by 34,42% in 2023 compared to 2017** levels.
- The level of emissions related to the sent and received email will increase considerably if users don't change their way of communicate and if data centres don't start to use 100% of renewable energy.

Road to 5G Technologies



The nature of data transmission is rapidly changing:

From desktop to Mobile

Develop of on-line videos and e-commerce purchases from mobile



Mobile device traffic is growing up (+50%)

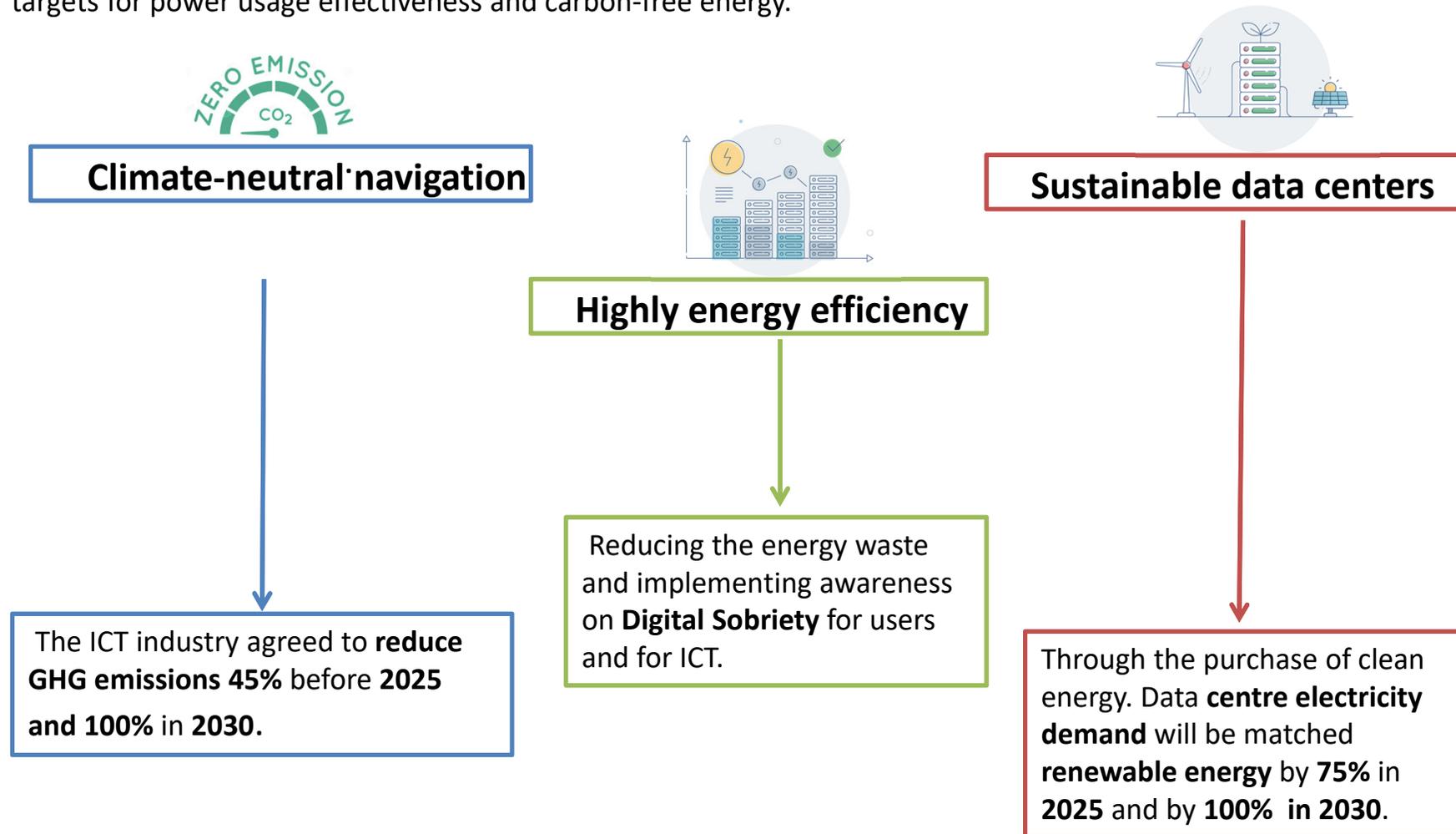


Wi-Fi-only devices such as laptops and desktop computers (+17%)

- Mobile networks are rapidly switching from older 2G and 3G technologies to more efficient 4G and 5G. By 2022, 4G and 5G networks together are expected to carry 83% of mobile traffic, compared with less than 1% for 2G.
- **4G** networks are roughly **5 times** more energy-efficient than **3G** and **50 times** more efficient than **2G**.
- Network infrastructure providers and operators are projecting that **5G** networks could be **10 to 20 times** more energy-efficient than **4G**.

EU's 2030 digital strategy goals

In January 2021, European data centre operators and industry associations launched the **Climate Neutral Data Centre Pact**, which includes a pledge to make data centres climate-neutral by 2030 and has intermediate (2025) targets for power usage effectiveness and carbon-free energy.



Digital sobriety: a new strategy to reduce environmental impacts



Digital Sobriety means to avoid digital consumerism promoting an increasingly pushed digitization that incentives awareness and the use of more efficient sustainable digital tricks.

To reduce the impact of the digital footprint it is therefore necessary to have a more **responsible and conscious attitude towards digital tools**.

SUCH AS:



Exchange of office documents on a shared platform.



Reduce the use of the webcam during **video-calls**.



Reduce the **definition of streaming video** watching the standard one

A videoconference, whose participants are located in different countries, could alone produce up to 215 kilograms of CO₂ emissions (although the energy consumption of videoconferencing is high, using these software to replace travel by car, train or plane, means saving on average 93% of emissions).

The ICT companies' efforts to reduce emissions levels

Information and communication technology (ICT) companies are investing substantial sums in renewable energy to protect themselves from volatility in energy prices, to reduce their environmental impact and to improve their brand reputation.



Ecosia is planting a tree for every 45 searches it performs.



This sort of **carbon offsetting** can help to remove CO₂ from the atmosphere, reducing the rise of temperature and respecting the de-carbonizations goals.



2030 Goal: Carbon free energy all day long for all the week



- New **Climate Science Information Centre** : new space that will be highlighted on social media, with authoritative information on climate change.
- **2030 Goal** : zero net emissions on the entire supply chain and other indirect emissions relying on emerging technologies that absorb CO₂ from the air.

Conclusion

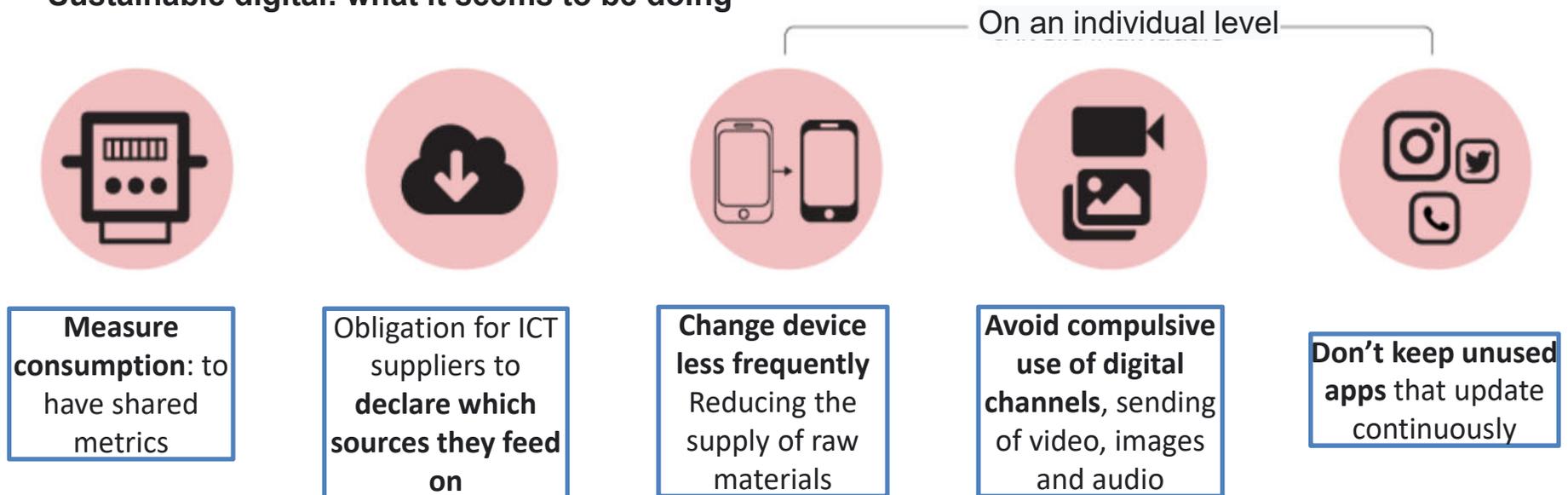
Digital pollution includes all sources of environmental pollution produced by digital tools. It is divided into two parts: the first is related to the manufacture of any digital tool, and the second to the functioning of the Internet.

Possible solutions:

Information and communication technology (ICT) companies should strive to make their products more efficient and sustainable implementing **renewable energy**.

Users have to concretize **digital sobriety** implementing efficiency and Circularity (Each individual behaviors may seem irrelevant, but if we all adopt them together it can make a difference).

Sustainable digital: what it seems to be doing



“When digital transformation is done right, it’s like a caterpillar turning into a butterfly, but when done wrong, all you have is a really fast caterpillar” — George Westerman



*Thank You
for Your attention!*