Why we need to redesign Internet to fight climate change

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Background



Phase 1 report in October 2018 (French) & March 2019 (English)

Conclusion: we need to implement a sobriety principle in the digital ecosystem to contain its carbon footprint

www.theshiftproject.org

Lean ICT phase 2

20 people X 5 working groups

Phase 2 in process.

How to implement this sobriety principle ?

The focus is to propose public policies and to provide frameworks usable by private and public organizations

Report to be published in 2020.

Presentation

- Global warming: a summary
- The carbon issue is mainly an energy issue
- Digital energy consumption dynamics
- A design issue
- The way forward

Global warming

Global warming outlook: 3.5°C (could be revised to 5°)



Global Mean Temperature increase 2081-2100 vs 1986-2005 if BAU (IPCC AR5)

1.5 ## 2

Five Reasons For Concern (RFCs) illustrate the impacts and risks of different levels of global warming for people, economies and ecosystems across sectors and regions.



Impacts and risks associated with the Reasons for Concern (RFCs)

Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards. combined with limited ability to adapt due to the nature of the hazard or impacts/risks. Red indicates severe and widespread impacts/risks. Yellow indicates that impacts/risks are detectable and attributable to climate change with at least medium confidence.

White indicates that no

attributable to climate

change.

impacts are detectable and

Source: IPCC 1.5 special report

Global warming is a stock issue

Cumulative carbon determines warming



- Peak warming is approximately proportional to cumulative (total) emissions.
- Transient climate response to cumulative carbon emissions TCRE = Warming per 1000 PgC: *likely* 0.8-2.5° C

INTERGOVERNMENTAL PANEL ON Climate change

IPCC AR5 Working Group I Climate Change 2013: The Physical Science Basis



https://scripps.ucsd.edu/programs/keelingcurve/

But it is quite recent



https://scripps.ucsd.edu/programs/keelingcurve/

And worsening even faster every year



Emissions: production & consumption



Emissions: inequalities



Source: Emissions Gap Report 2019, UNEP

Missing inadequate targets: a double gap



What is needed to stay below 2° warming



We have to cut by half the CO2 emissions by 2030 in order to have a chance to stay below 2° warming

Carbon and energy

GHG: several gases but CO2 is the most impactful

Total Annual Anthropogenic GHG Emissions by Groups of Gases 1970–2010







Fossil CO2 emissions of all world countries, JRC report, 2018

Fossil emissions have been growing steadily in all sectors



Kyoto Protocol was signed in ... 1997

Fossil CO2 emissions of all world countries, JRC report, 2018

Reducing energy carbon intensity is not enough



IEA/World Energy Outlook 2018

Limiting global warming to 2°C REQUIRES energy consumption to peak before 2025

Digital energy consumption dynamics

Digital GHG emissions rising up and fast



+8% CAGR when global GHG should drop by 5% yoy

Energy consumption x 3 in 10 years



Energy consumption = Production + Use (+ End of Life)

Digital energy consumption breakdown



Almost **half** of energy is used to build the equipments

Network traffic at exponentional growth



Data center traffic and data storage growing even more



20 billions devices produced since 2010, 70 billions more by 2030 (?)



Beyond carbon: upstream and downstream land pollution



A design issue

Supply and Demand

> Digitization is the new engine of the current consumerist culture

- > Too many digital appliances in developed countries
 - ➤ a 4 people OECD household: 10 devices in 2012, 50 devices in 2022
 - > the next 50 billions are designed for comfort, not for the environment
 - short lifespans because of software induced obsolescence
 - vendors' business model = product-centric # service -centric
- Digital volumes grow much faster than energy efficiency
 - > volume 30% a year vs energy efficiency 15% a year
 - Screen time has increased by 45% in 8 years
 - Pervasive usage of video plus inflation of definition standards: SD, HD, UHD, 8K etc.
 - Mobility and Streaming vs Fixed and Broadcast
 - GAFAM's business model = audience monetization = addicting designs
- Highly polarized consumption :

Per capita	India	USA
devices	1	8
data	1	60

The rebound effect: the tragedy of technical progress

The induction of demand by increasing the efficiency of a production or consumption process

Ex: data centers (illustrative numbers only)

 2018
 2019

 1 energy unit / Gb
 0,85 energy unit / Gb

 One user = 1 Gb
 One user = 1,3 Gb

 Energy = 1unit
 Energy = 1,3*0,85 = 1,10 unit

More efficiency \rightarrow More videos or/and higher quality \rightarrow More energy

The digital sobriety alternative

Energy efficiency will NOT continue to grow as fast in the next 10 years as it did in the past 10 years:

- > Approaching the limits of current technologies
- > NO major technological breathrough industrialized in the next 10 years



No solution for 2030 target will come from more technology

- Reducing the growth of the « volumes » especially in developed countries is therefore mandatory : online video, online gaming and next (VR), lifespan of equipments,# devices/person, 5G
- Sobriety: video traffic: 17% vs 34%; data center volumes: 24% vs 29%; IOT production prioritized at 4 billion/year

IT WOULD STILL ALLOW TO PURSUE THE DIGITAL TRANSITION

Not like this



The way forward



The current overconsumption is a **systemic** issue resulting from different factors:

- Digital consumers unaware of the impacts (environment, health, behavior etc) and digitally hungry
- Enterprises engaged in digital transitions without connecting them to increasingly stringent environmental/energy transitions (eg IOT)
- Public authorities encouraging "digital transition" meant to yield economic growth without having defined it
- Dominant digital suppliers (GAFAM, BATX) relying on audience maximization (two-sided market business model) and using addictive design techniques
- Software-induced obsolescence boosting hardware production

Making change happen calls for a **systemic** approach:

- > Inform and influence consumers: media, public policies
- Inform enterprises and enable « augmented digital transitions » with tools and governance framework
- Demonstrate to public authorities (governments, EC, local authorities) the negative impacts of digital overconsumption and the possibility/interest of a renovated, leaner digital ecosystem
- > Use the european market power to influence digital suppliers

And build tools enabling ex-ante and ex-post environmental analysis of digital transition initiatives, including coverage of indirect and systemic rebound effects

Lean ICT phase 2

Public policies

- Health aspects: need for action
- Psychological drivers behind digital consumption: input to public policies

Enterprise architecture and governance

- > Integrate environmental dimension into EA framework
- > Show side benefits of sobriety : less complexity, more efficiency

Smart check-list

Identify macro conditions usable to deselect early on "smart projects" which cannot bring net environmental benefits

≻ 5G

Open a public debate to define the conditions that can make 5G compatible with environmental constraints

Also IOT, move to core/edge cloud etc

Example: integrate environmental metrics into Enterprise Architecture frameworks



Build sustainable solutions by leveraging Enterprise Architecture



Questions ?