

# **Sustainable Digitalization: Why we need to shift away from Big Tech business models**

**ICT4S, Rennes**  
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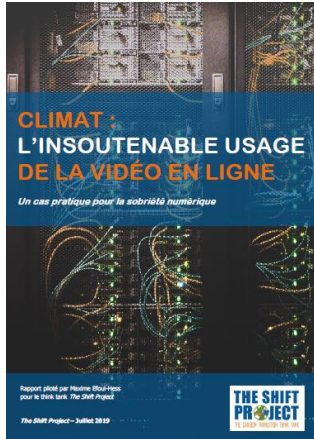
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October 2018

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



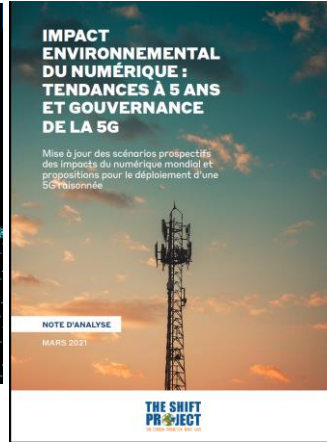
July 2019

Video streaming: an analysis of the drivers leading to unsustainability



October 2020

How to implement the sobriety principle ? Methodological frameworks



March 2021

2025 outlook and 5G governance framework



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Transitioning towards sustainable digital business models

Hugues Ferreboeuf

# Presentation

- The context
- Efficiency and affluence
- The Big Tech business models: drivers of unsustainability
- The way forward

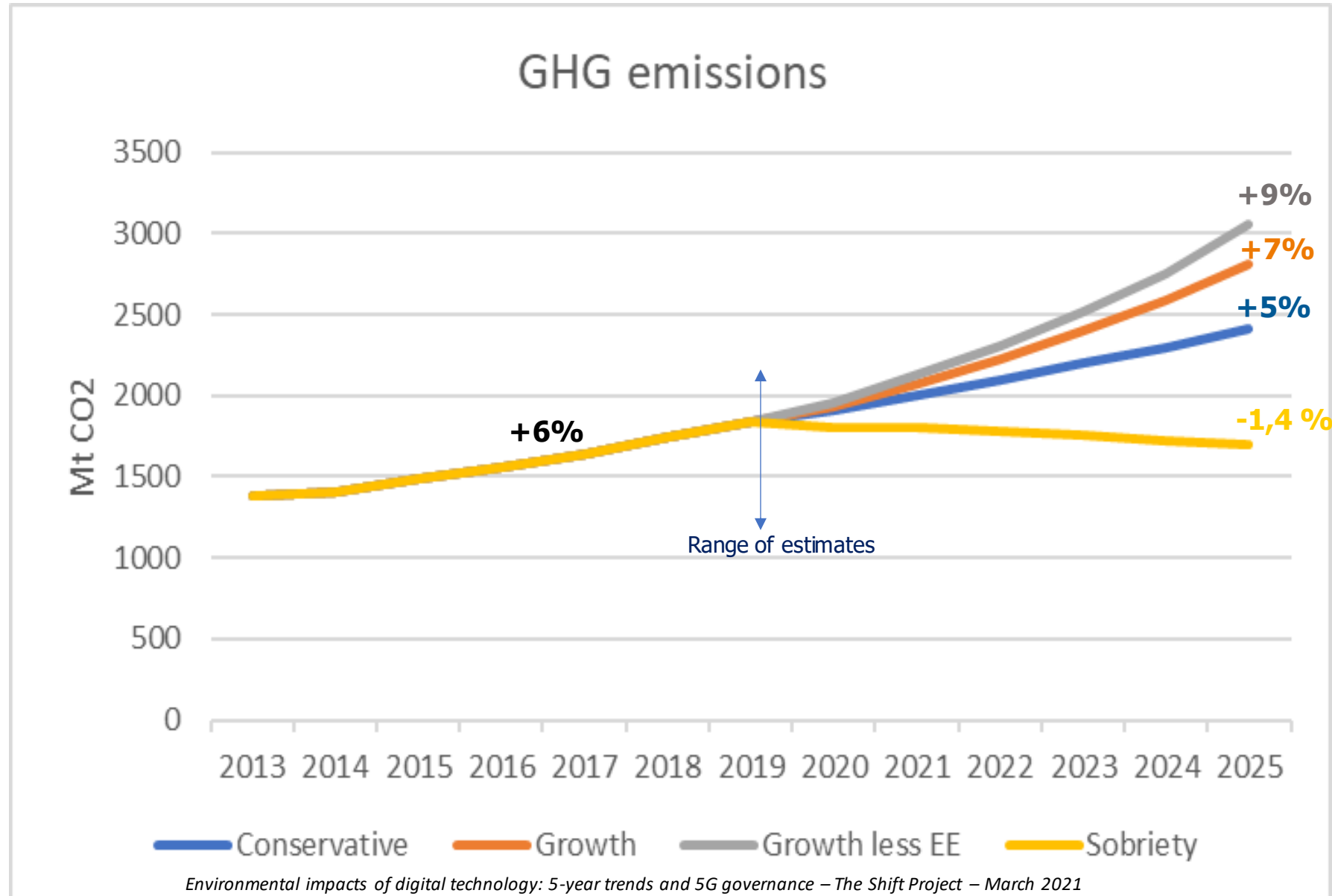
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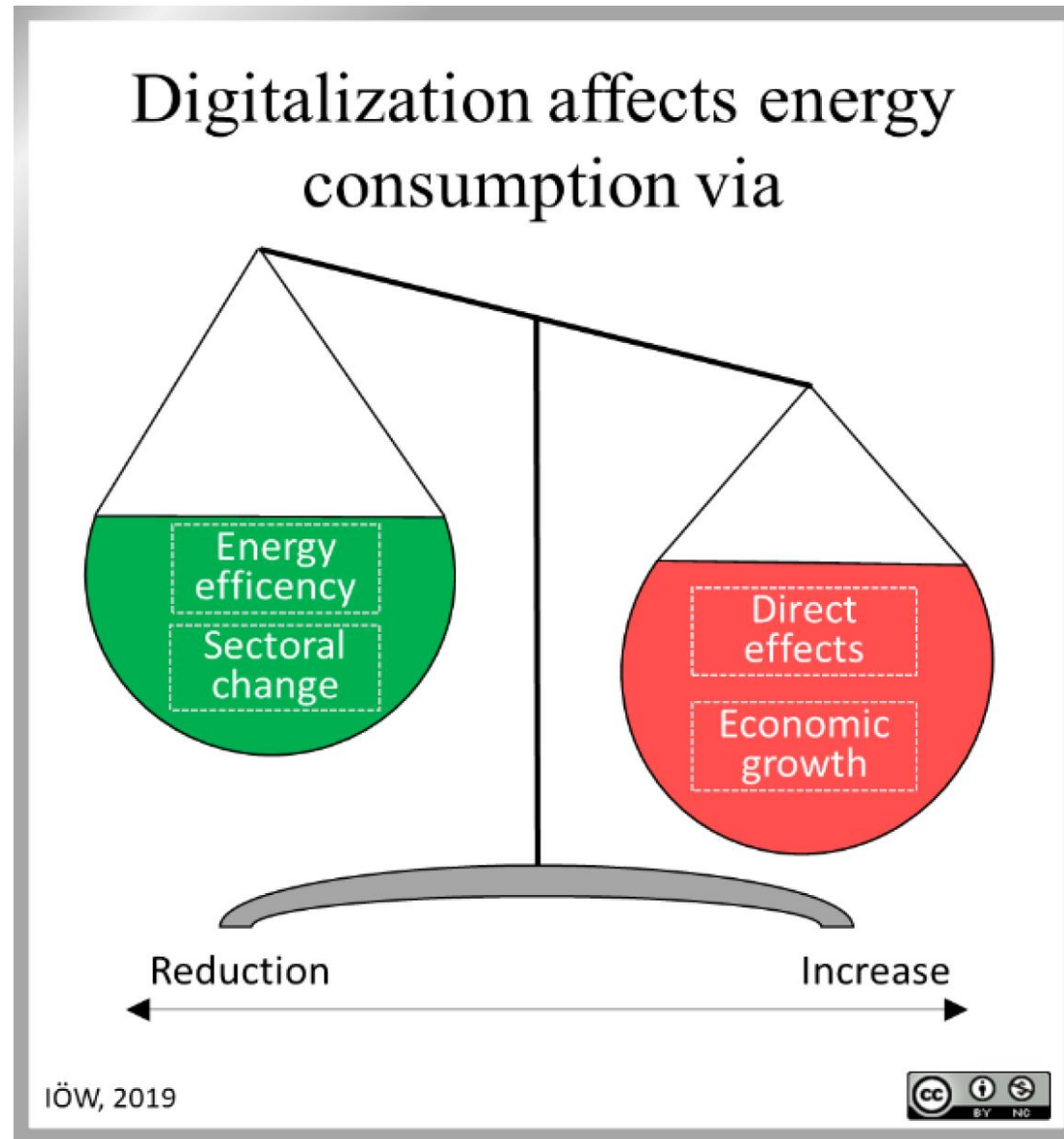
# Digitalization is currently unsustainable

The growth is sustained and will continue except if there is a shift **towards digital sobriety/sufficiency**

Current trend would eat up 15% of global GHG reduction by 2030



# Digitalization has not resulted in decoupling growth and energy



# The ICT sector needs to transform deeply

## **Digital Reset**

A fundamental redirection of the purpose of digital technologies for the deep sustainability transformation

# The ICT sector needs to transform deeply

## Seven Principles for a Digital Reset

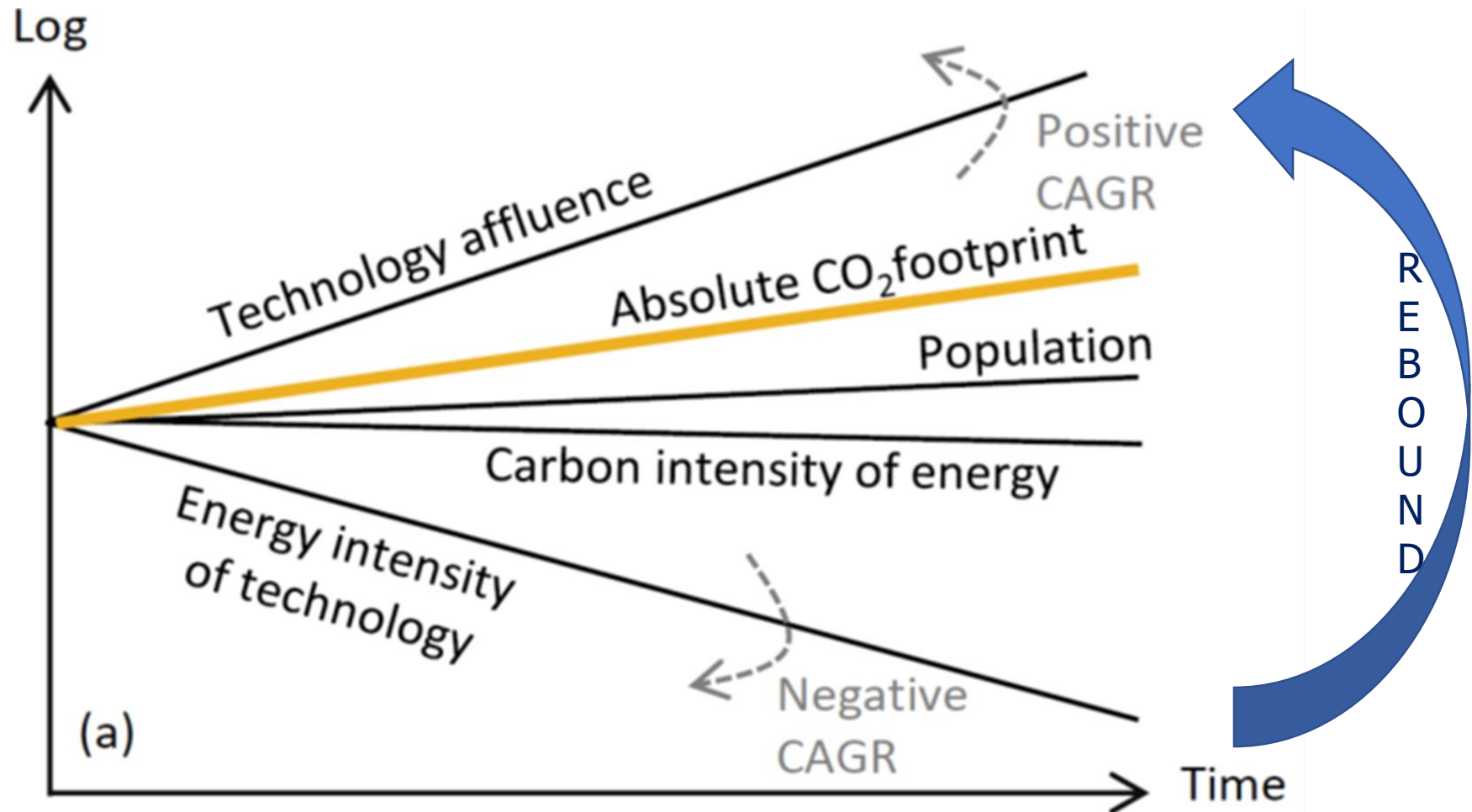
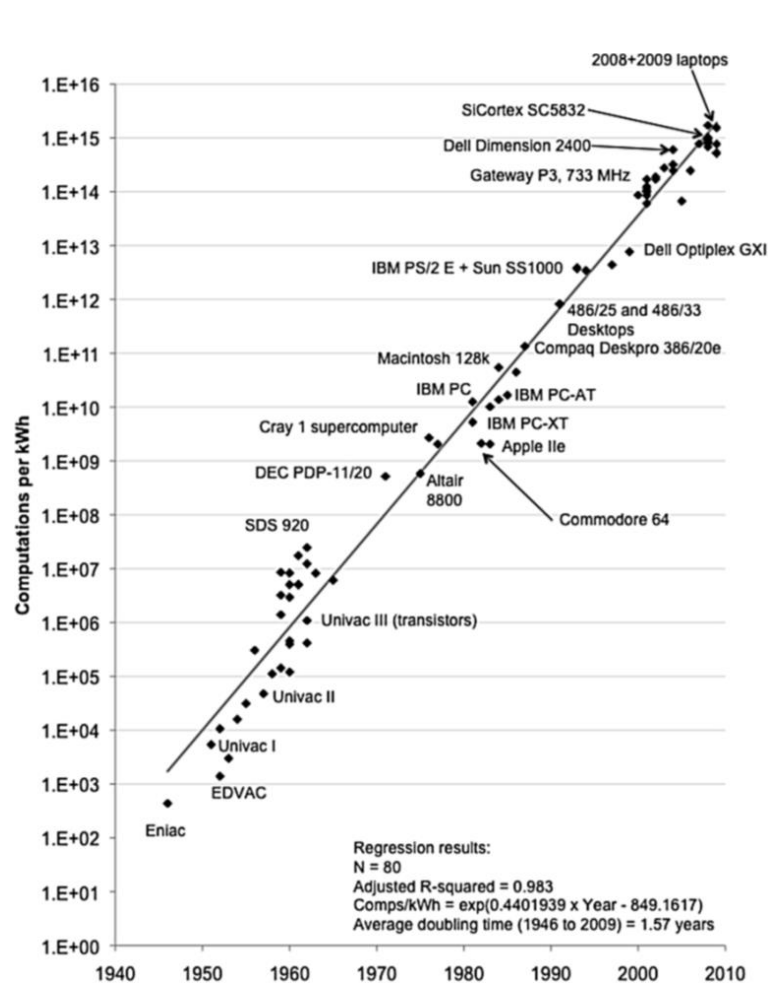
- Regenerative Design
- System Innovations
- Sufficiency
- Circularity
- Sovereignty
- Resilience
- Equity



# Efficiency and affluence

# Technology affluence grows more than energy efficiency

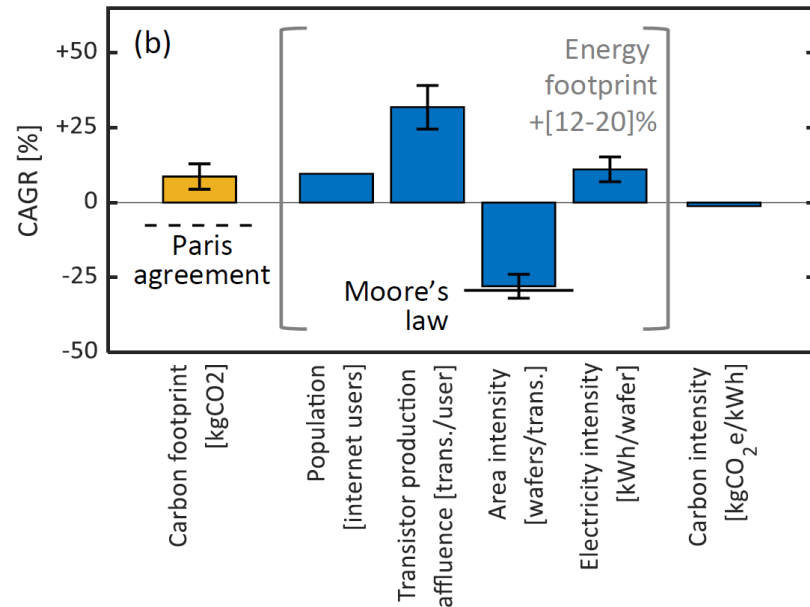
$$\text{Digital CO}_2 \text{ footprint} = \text{Population} \times \text{Digital Technology Affluence} \times \text{Energy Intensity of Technology} \times \text{Carbon Intensity}$$



# Technology affluence grows more than energy efficiency

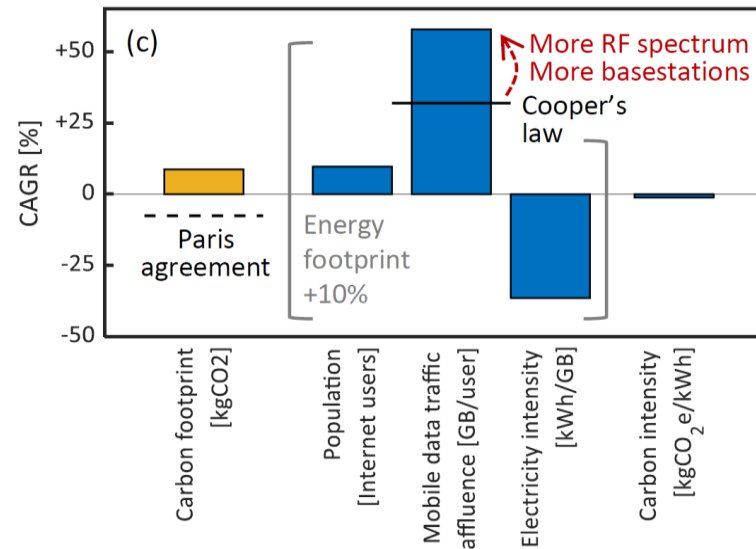
## End user devices

$$CO_2e = Users \times \frac{Transistors}{User} \times \frac{Wafers}{Transistor} \times \frac{kWh}{Wafer} \times \frac{CO_2e}{kWh}$$



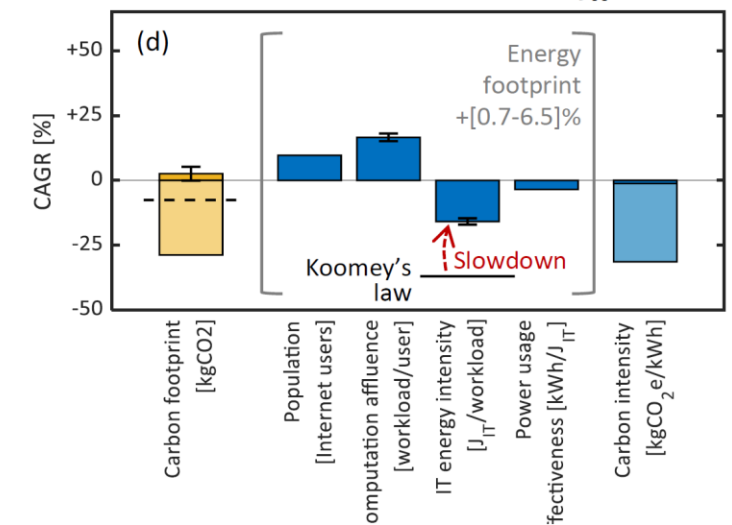
## Networks

$$CO_2e = Users \times \frac{GB}{User} \times \frac{kWh}{GB} \times \frac{CO_2e}{kWh}$$



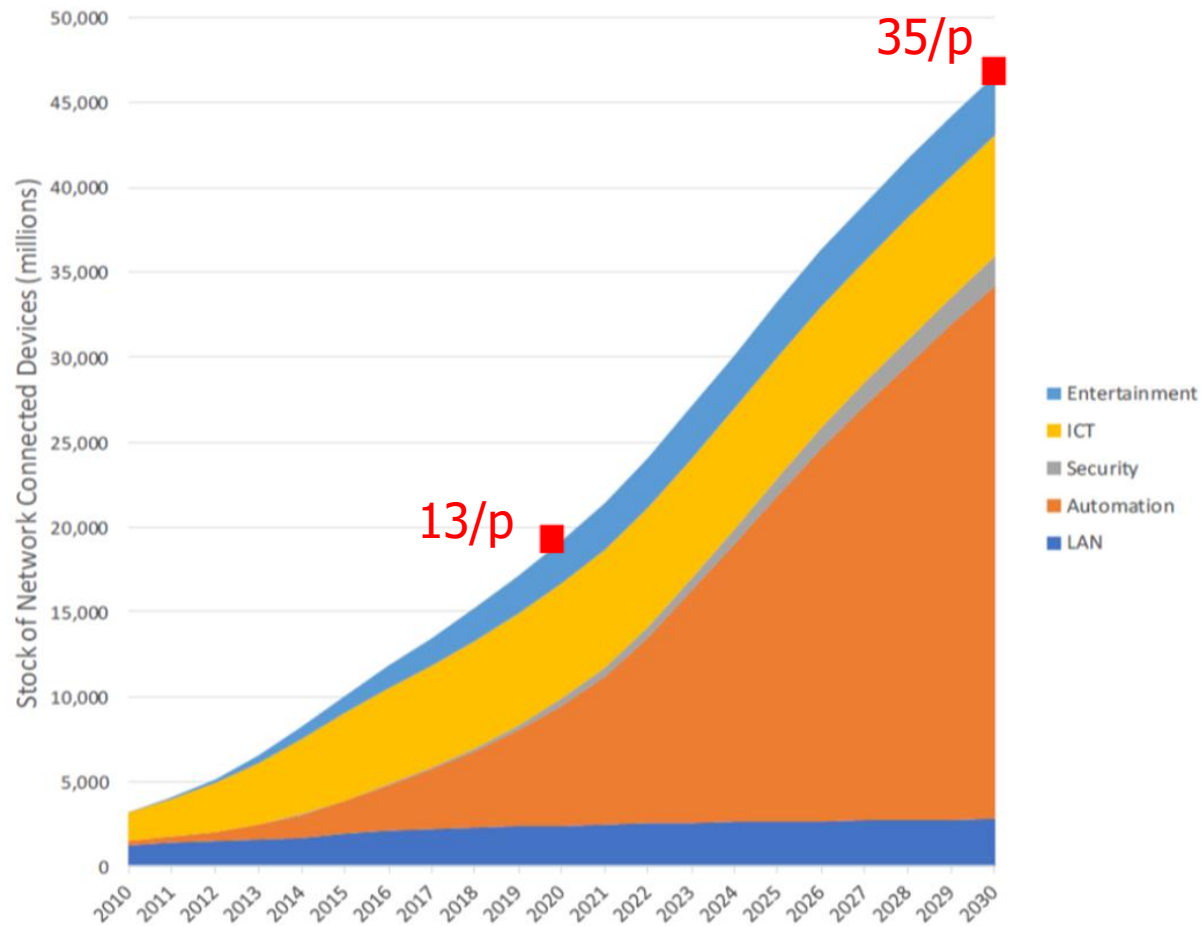
## Data centers

$$CO_2e = Users \times \frac{Workload}{User} \times \frac{J_{IT}}{Workload} \times \frac{kWh}{J_{IT}} \times \frac{CO_2e}{kWh}$$



# Digital affluence (excessive growth of) is the issue

Digital CO2 footprint = Population × Digital Technology Affluence × Energy Intensity of Technology × Carbon Intensity

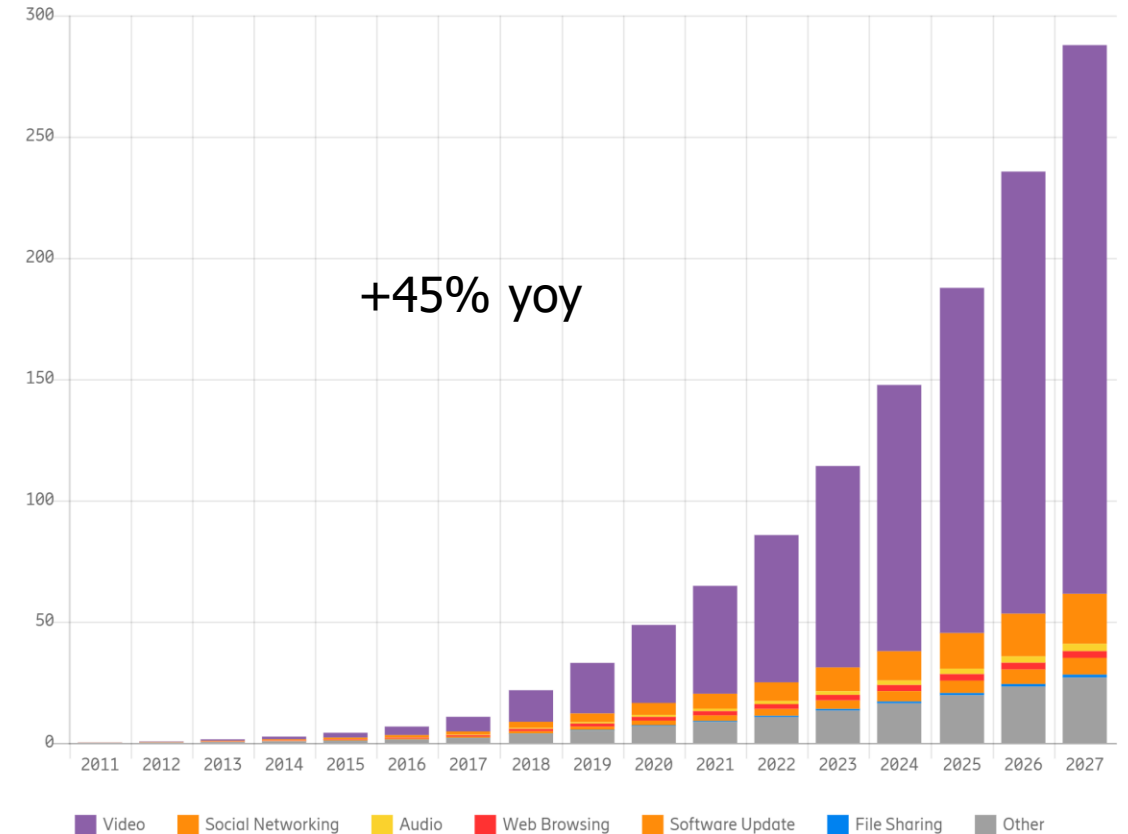


IEA 4E EDNA, 2019

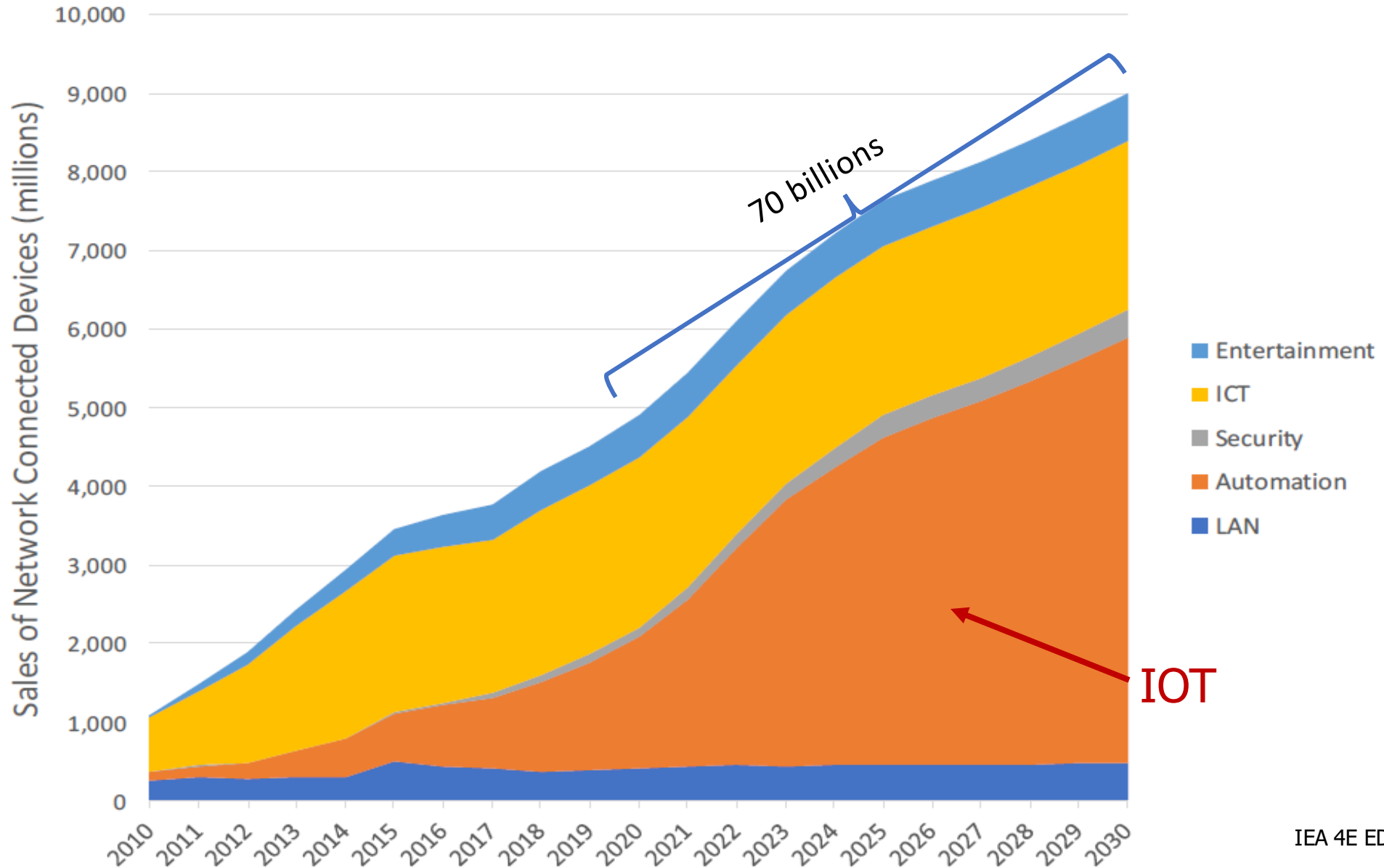
## Mobile traffic by application category

Unit: EB/month

Source: Ericsson (November 2021)

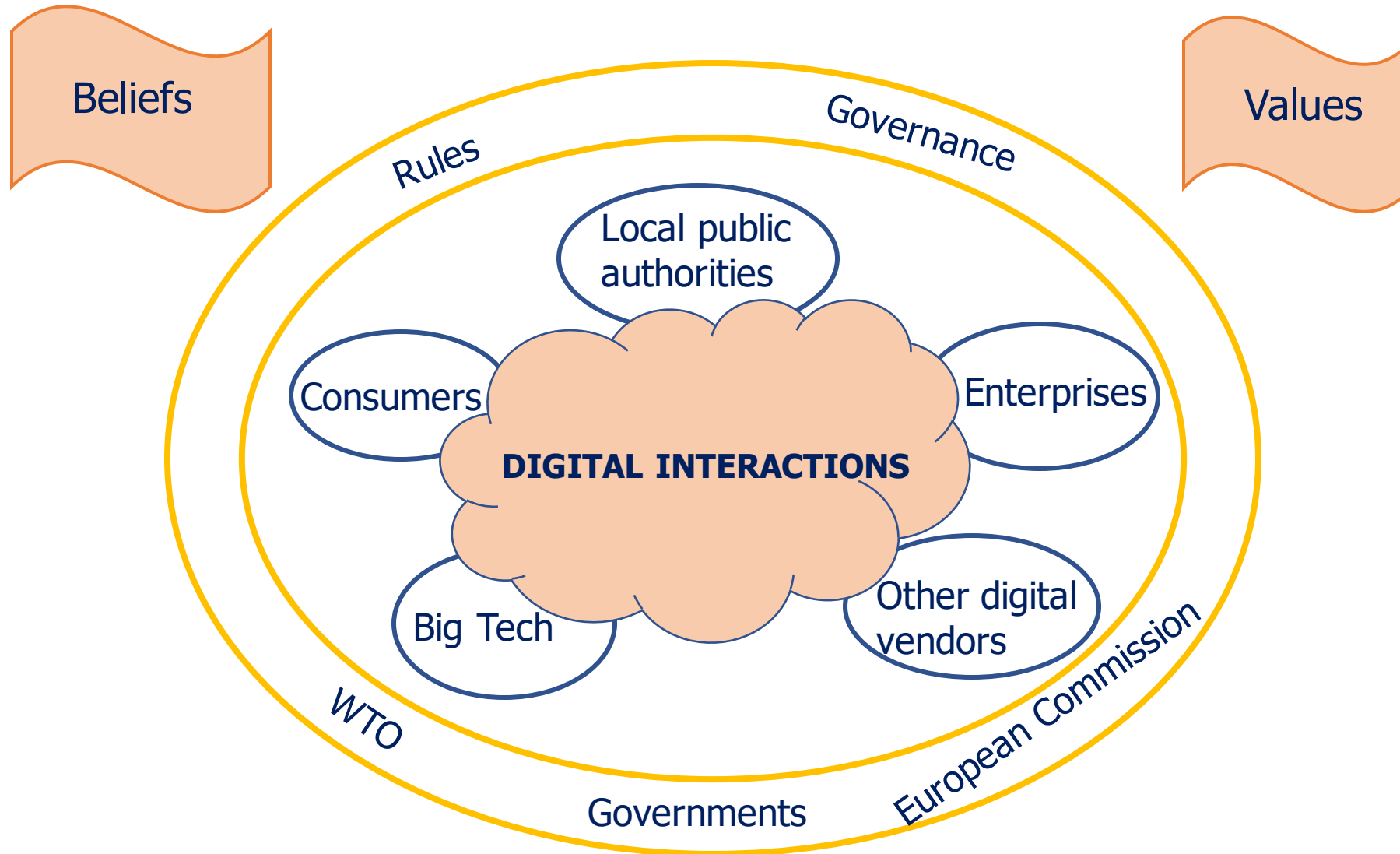


# Digital affluence (excessive growth of) is the issue



# **Digital affluence hypergrowth: a systemic issue**

# We face a system design issue



# We face a system design issue

Digital technology affluence is growing due to societal and economic behaviours:

- 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 indiscriminate "digital transition projects » bound to yield economic growth
- Software-induced obsolescence boosting hardware production in line with linear business models
- Big Tech (GAFAM, BATX) relying on audience maximization (two-sided market business model) and using addictive design techniques



# **The Big Tech business models: drivers of unsustainability**

# Market dominance

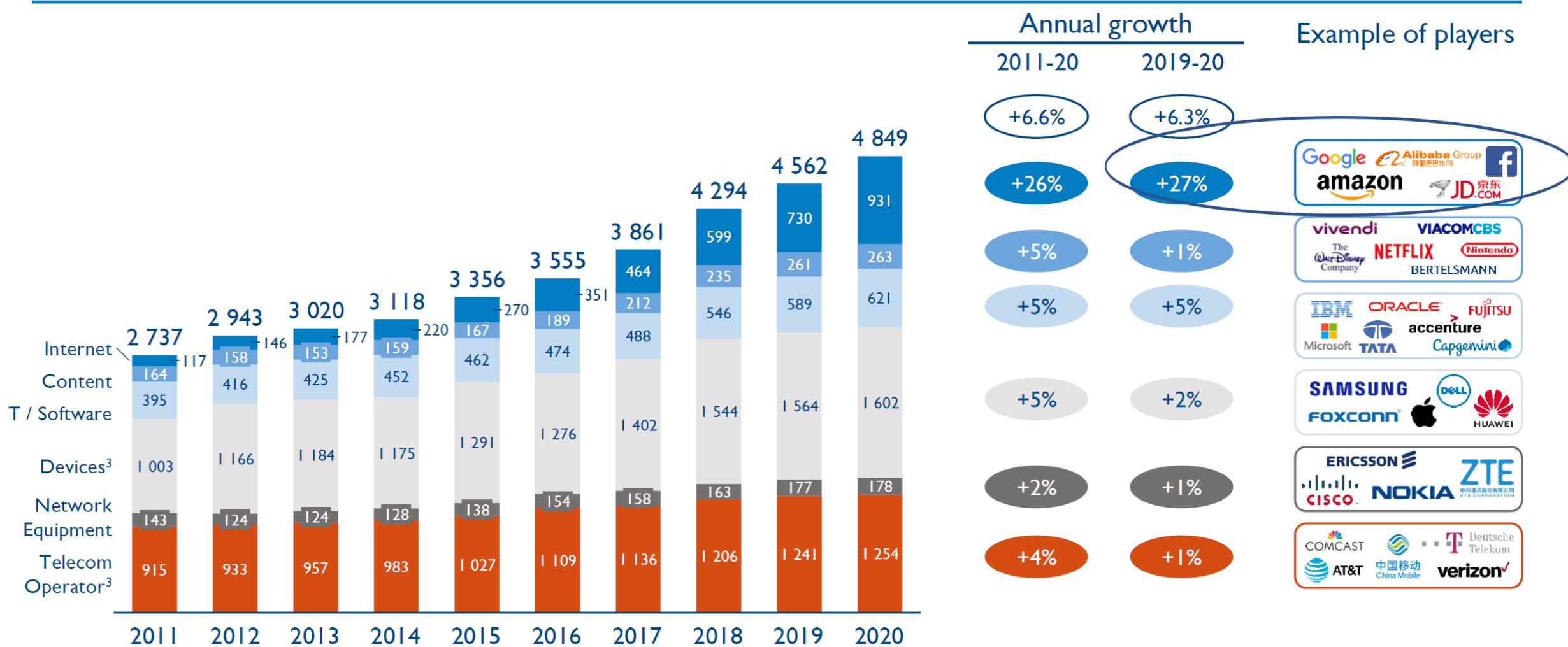
# The Big Tech are financial superpowers

Company	Market capitalization (B\$, 2020)	Rank
APPLE	2300	1
MICROSOFT	1700	3
AMAZON	1600	4
ALPHABET/GOOGLE	950	5
FACEBOOK	800	6
TENCENT	700	7
ALIBABA	650	9
NETFLIX	240	33
<b>TOTAL</b>	~ 9000	

# The Big Tech overpower the ICT sector

## Digital ecosystem revenue<sup>1</sup>

World, 2011-2020, billion euros<sup>2</sup>



Arthur D. Little (2021). Telecom Economics 2021. Fédération Française des Télécoms

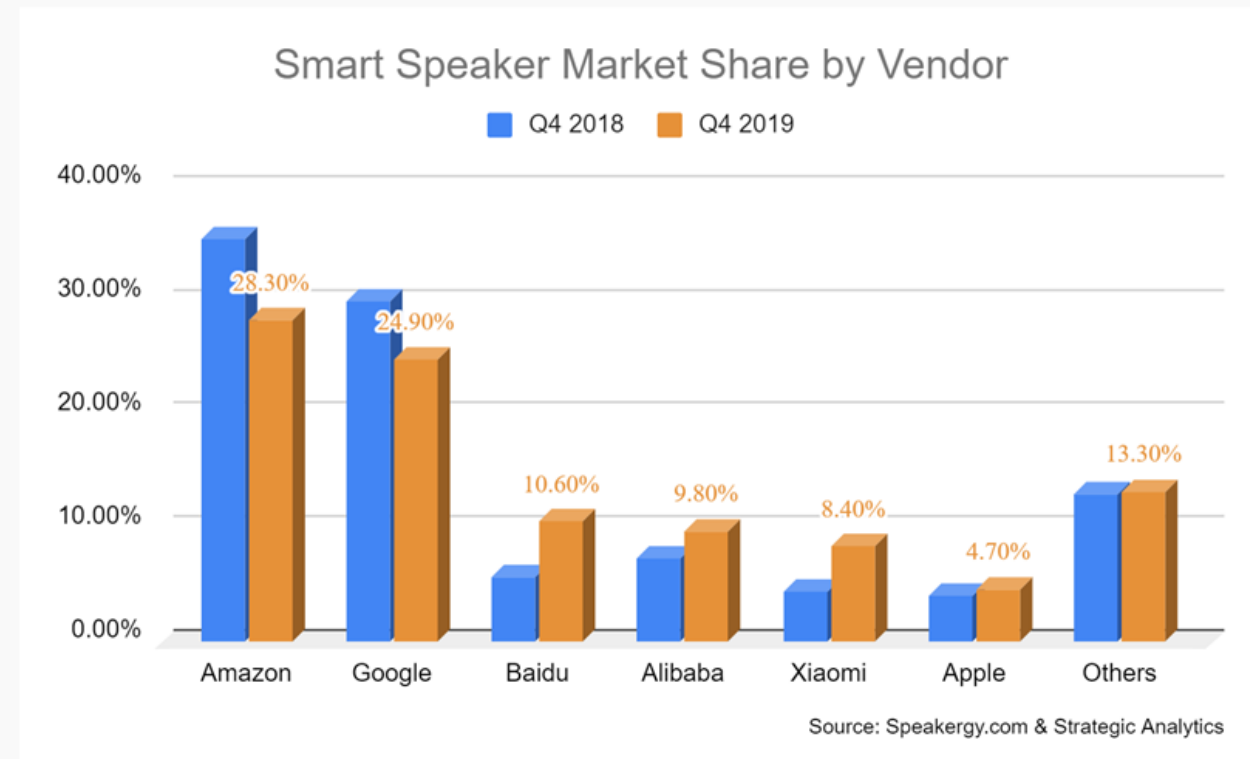
# The Big Tech create the market dynamics

2021

	Application Group	Total Volume
1	Google	20.99%
2	Facebook	15.39%
3	Netflix	9.39%
4	Apple	4.18%
5	Amazon	3.68%
6	Microsoft	3.32%
<b>TOTAL</b>		<b>56.96%</b>

Sandvine Global Internet Report, 2021

## Global Smart Speaker Market Share By Vendor

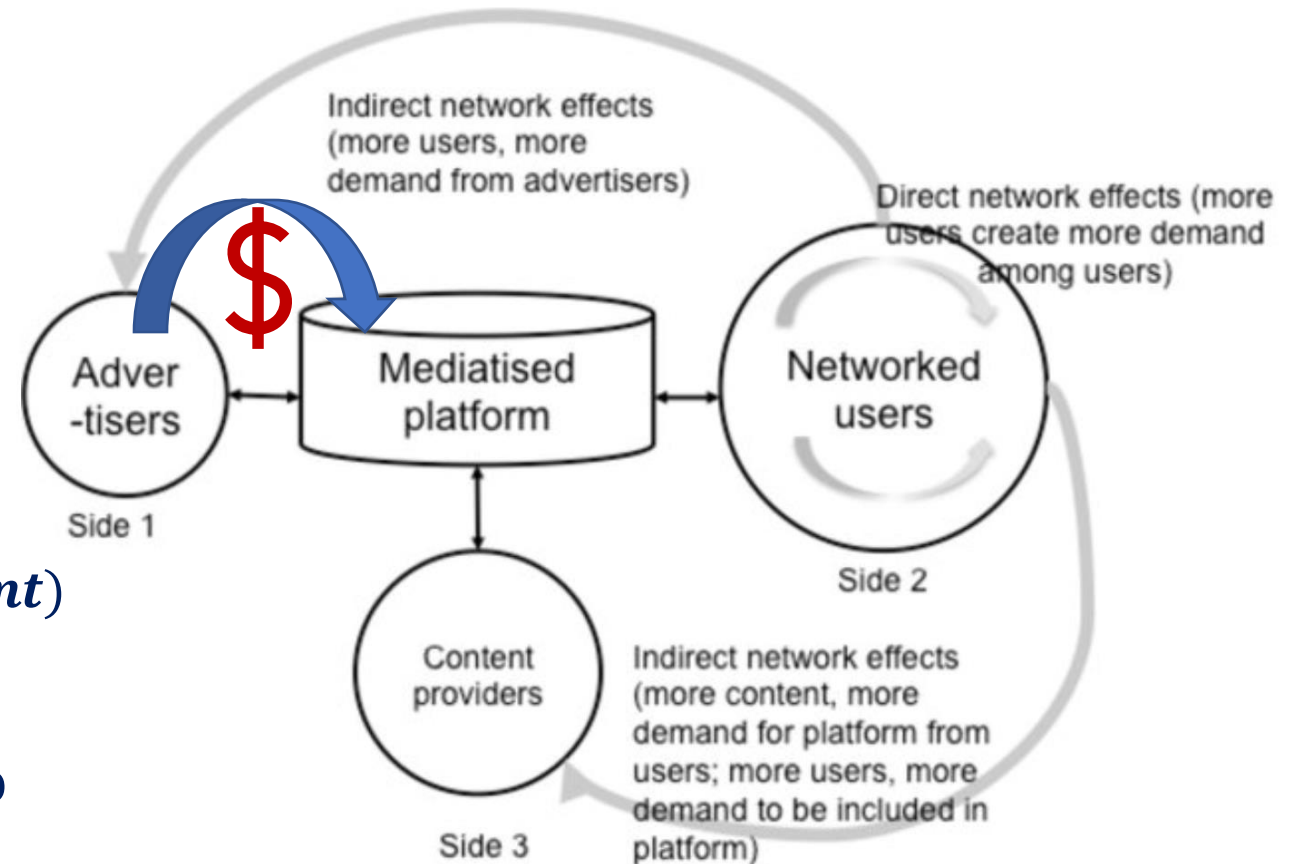


75% of total Internet traffic growth

# **Digital affluence as a production factor**

# Digital affluence fueling financial value

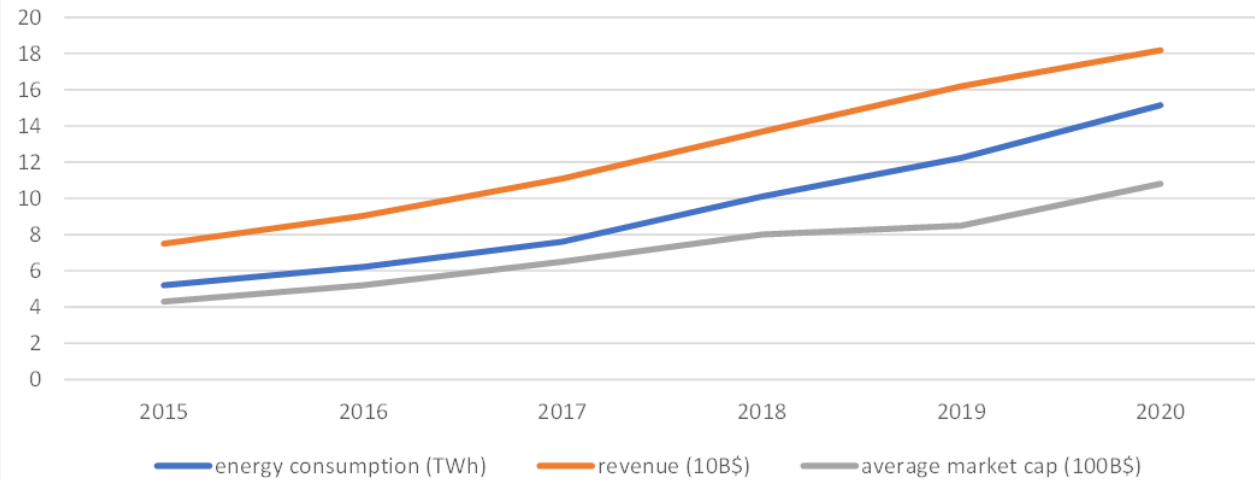
- Big Tech are Multi Sided platforms
- Audience monetization as major source of revenue
- Value capture =  $f(\# \text{ users}, \text{ user engagement})$
- Addictive design and data intensive content to attract, stimulate and retain users
- Digital affluence as a (free) production factor



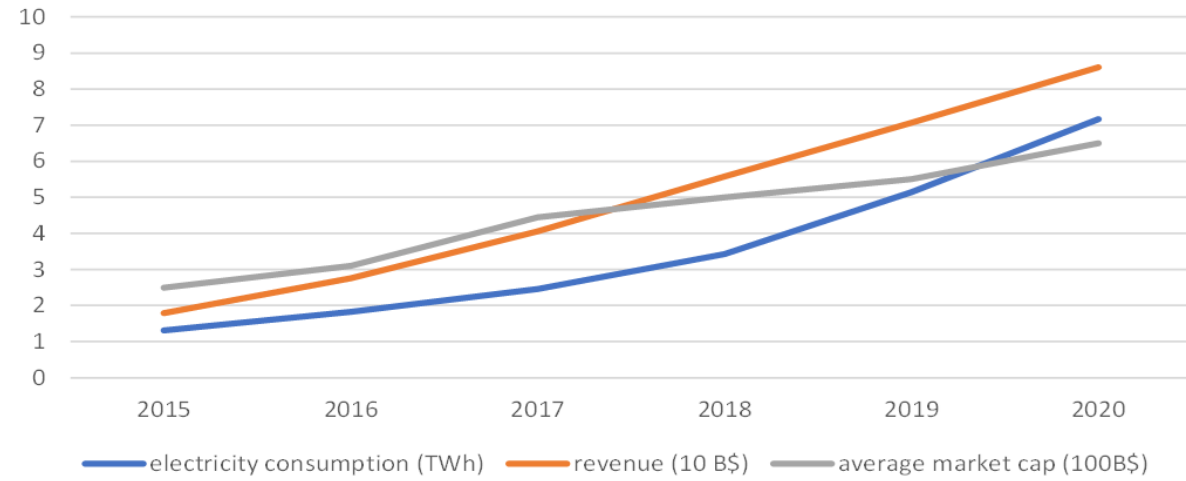
URI: <http://hdl.handle.net/10125/41374>

# The Big Tech business models: energy intensive, data hungry

Google: revenue, energy consumption, market cap



Meta: revenue, energy consumption, market cap



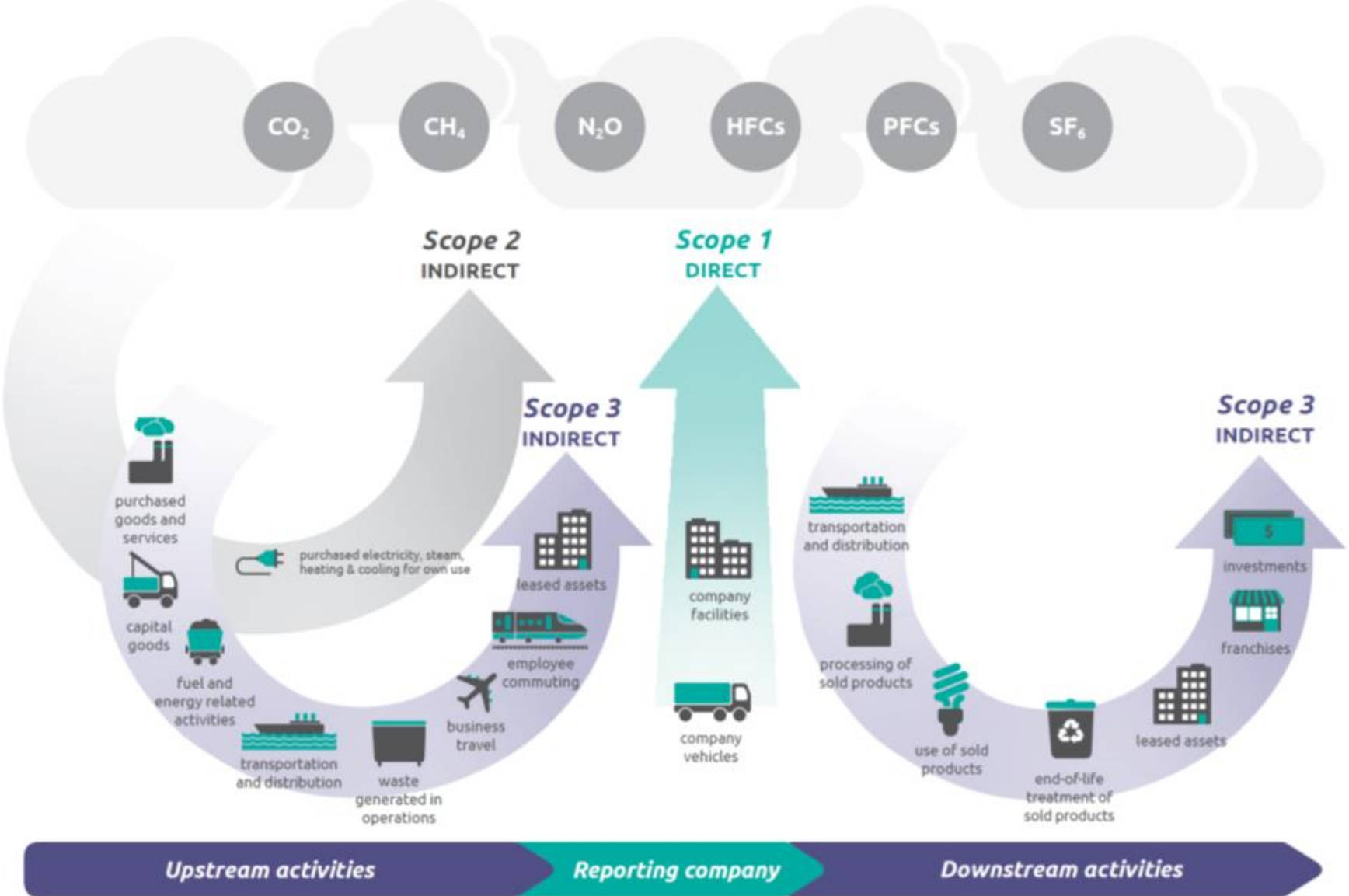
<b>CAGR 2015-2020</b>	<b>Google</b>	<b>Meta</b>
<b>Revenue</b>	20,0%	37,0%
<b>Energy consumption</b>	24,0%	40,0%
<b>Market capitalization</b>	20,0%	21,0%
<b>Revenue energy intensity</b>	3,8%	2,7%
<b>Internet traffic</b>	42,0%	60,0%

(CAGR Internet traffic 2015-2020 = 29%)



# **Misleading carbon neutral strategies**

# Sustainability across the value chain



# The Big Tech's value chain cannot be sustainable (1)

**“Carbon –neutral” strategies: all Big Tech will power all their sites (data centers) with renewable energy by 2030**

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Carbon neutrality in 2050 needs GHG emissions to be reduced by half in 2030 (source: IPCC 2022)

Carbon intensity of electricity: 2019 = 0,6 kgCO<sub>2</sub>/kWh      2030 Big Tech = 0,06      2030 value chain = 0,3

	2019	CAGR 2019/2025	2030
Hyperscale data centers: electricity consumption (TWh)	70	15.8%	349
Networks: electricity consumption (TWh)	349	5.0%	598
End-user devices electricity consumption (TWh)	505	7.5%	1120
Hyperscale data centers: share of total data center workload	0.48	4.0%	0.81

Source: The Shift Project, 2021

$$\text{GHG}(\text{data centers, networks, devices}) = \text{ELEC}(\text{data centers, networks, devices}) * (\text{carbon intensity of electricity})$$

# The Big Tech's value chain cannot be sustainable (1)



**« Greening » 100% of their electricity consumption  
DOES reduce by half Big Tech's scope 2 emissions**

# The Big Tech's value chain cannot be sustainable (2)

$ELEC_{2019}(\text{value chain}) = 480 \text{ TWh}$   $\xrightarrow{+260\%}$   $ELEC_{2030}(\text{value chain}) = 1.740 \text{ TWh}$

$GHG_{2019}(\text{value chain}) = 288 \text{ MtCO}_2$   $\xrightarrow{+50\%}$   $GHG_{2030}(\text{value chain}) = 438 \text{ MtCO}_2$

**Big Tech “carbon –neutral” strategies will actually drive up by 50% the carbon footprint of their value chain**

Indirectly they perpetuate the myth of decoupling digital hypergrowth and carbon emissions

**The way forward**

# Where to: alternative platform business models

Moving **away** from business models where revenue is generated by the sale of user-related information in exchange to free access to platform services and where the capture of user-related data is optimized thanks to addictive design techniques and digitally rich targeted advertising

## Examples

- Subscription-based services (eg mail, search, etc..)
- Cooperative platforms: voluntary provision of specific personal data, buyer/seller community
  - Platformization of existing cooperatives
  - Start-ups
- Public platforms

# How: public policies forcing changes

- **Make Big Tech smaller:** taxes, regulations, anti-trust measures etc...
- Make Big Tech business models less financially attractive: reinternalize externalities (eg network costs)
- Enforce scope 3 (value chain) carbon footprint measurement
- Forbid the acquisition of personal data by default (# current terms of reference)
- Support and adopt new web standards (web 3 ?) giving individual users full control over the usage of their data
- Support (including financially) alternative platforms



