

# Digital sobriety and its implications on the environmental impacts of cloud computing

73rd LCA Discussion Forum – Wädenswill – November 21, 2019



[www.theshiftproject.org](http://www.theshiftproject.org)

Hugues FERREBOEUF

Lean ICT Project Director

[Hugues.ferreboeuf@theshiftproject.org](mailto:Hugues.ferreboeuf@theshiftproject.org)

# Background



Lean ICT phase 2

20 people  
X  
5 working groups

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

Conclusion: we need to implement a sobriety principle in the digital ecosystem

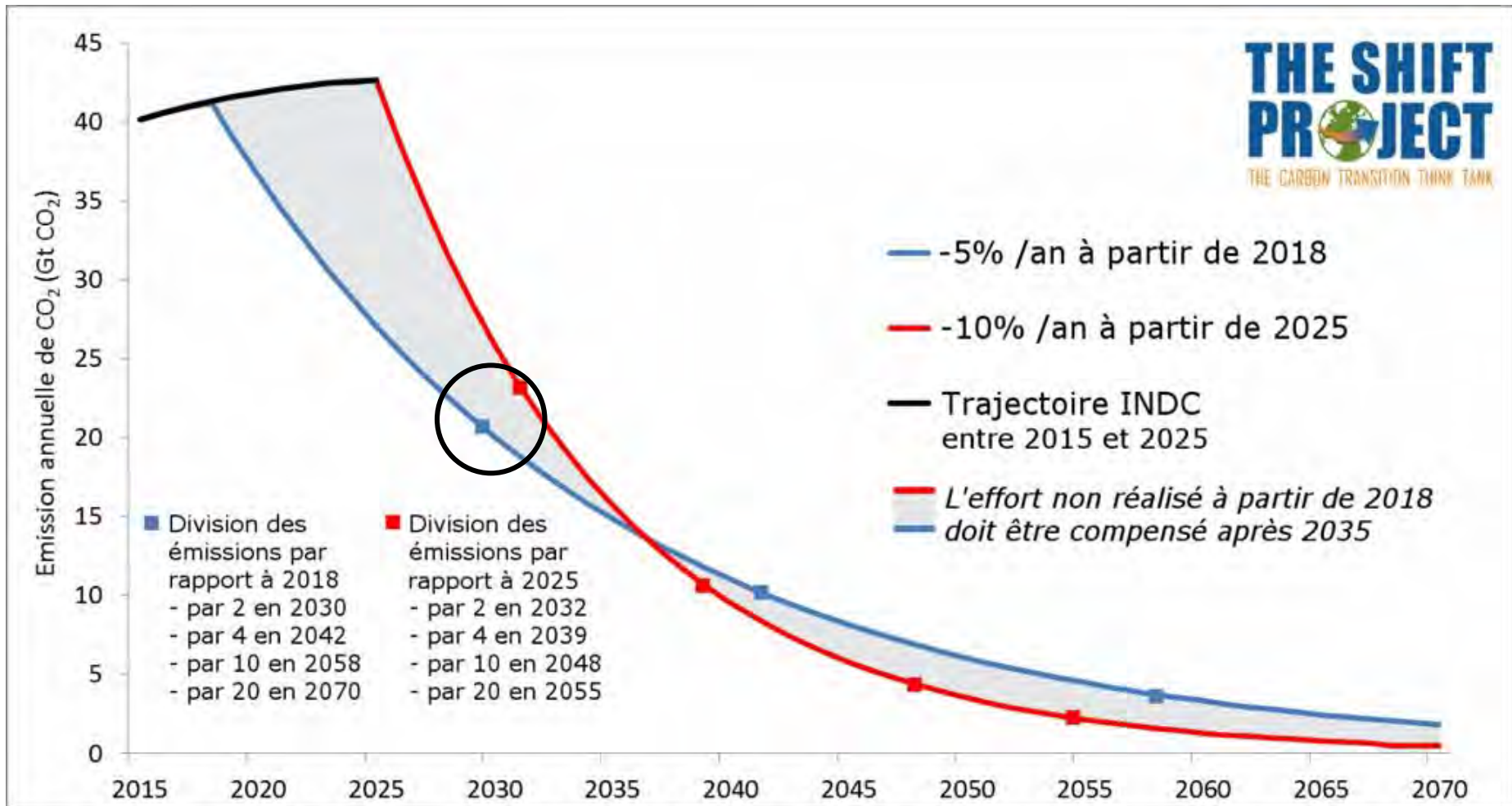
Work in process since March 2019.

How to implement this sobriety principle ?

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

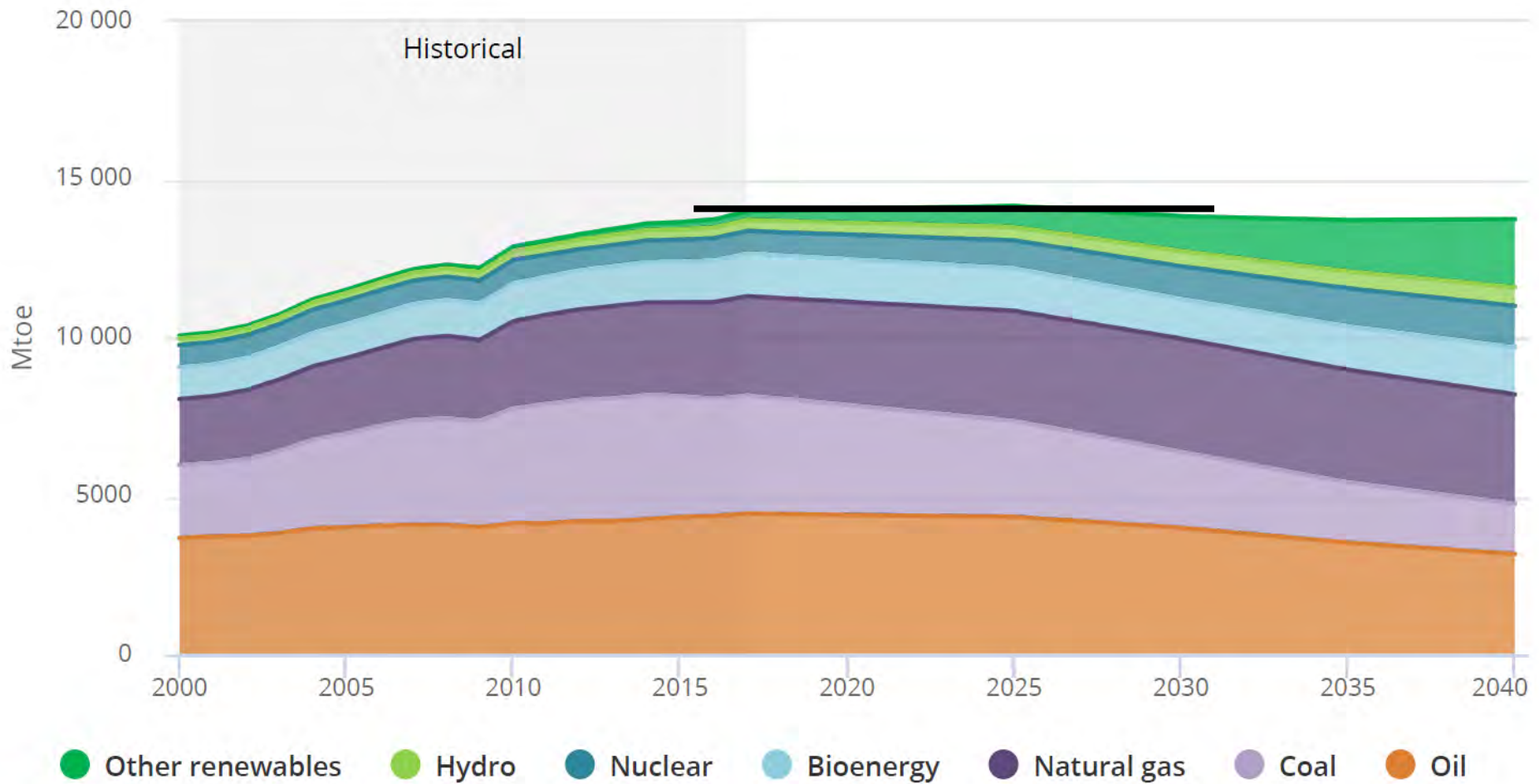
Report to be published in 2020.

# Our benchmark



We have to cut by half the CO<sub>2</sub> emissions by 2030 in order to have a chance to stay below 2° warming

# The GHG constraint is an energy constraint



IEA/World Energy Outlook 2018

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

# Presentation



- Phase 1 results and model

- Digital sobriety

- Why
- What
- How

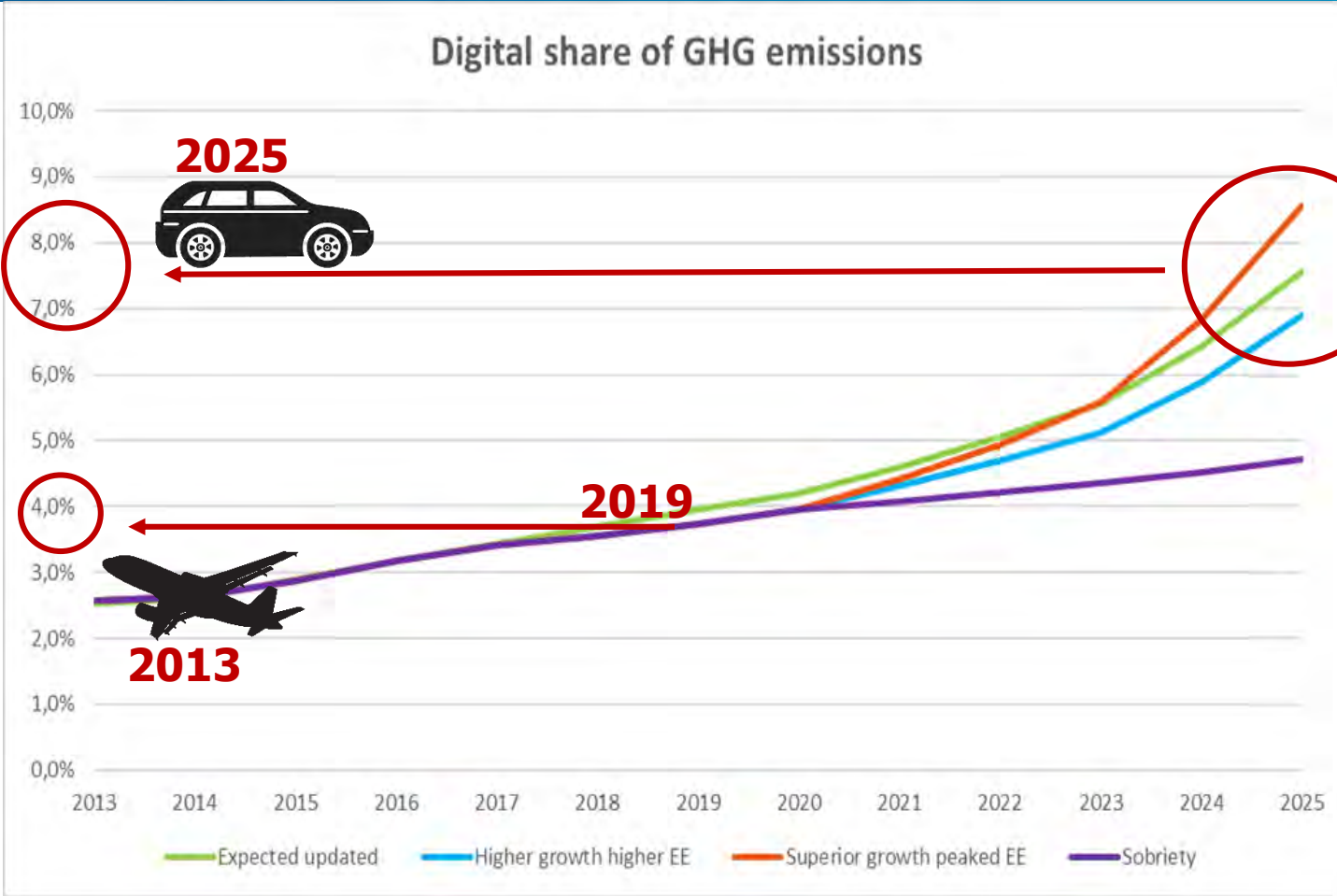
**Phase 1 results and model**

# Model



- Re-use and adaptation of the model developed by Andrae and Edler in « On Global Electricity Usage of Communication Technology: Trends to 2030” published in 2015
- Input data updated from 2018 sources ( Cisco VNI, Cisco GCI, Gartner, IDC )
- Assumptions on respective evolution of Energy Efficiency and Volumes (units produced, connected devices, traffic) to come up with different scenarii
- Embodied energy/carbon: revised figures based on primary information
- Results on different perimeters: world, developed countries, developing countries
- Beyond the model, identification of economic / societal /political issues related to current digital transitions

# Digital GHG emissions rising up



**BAU**

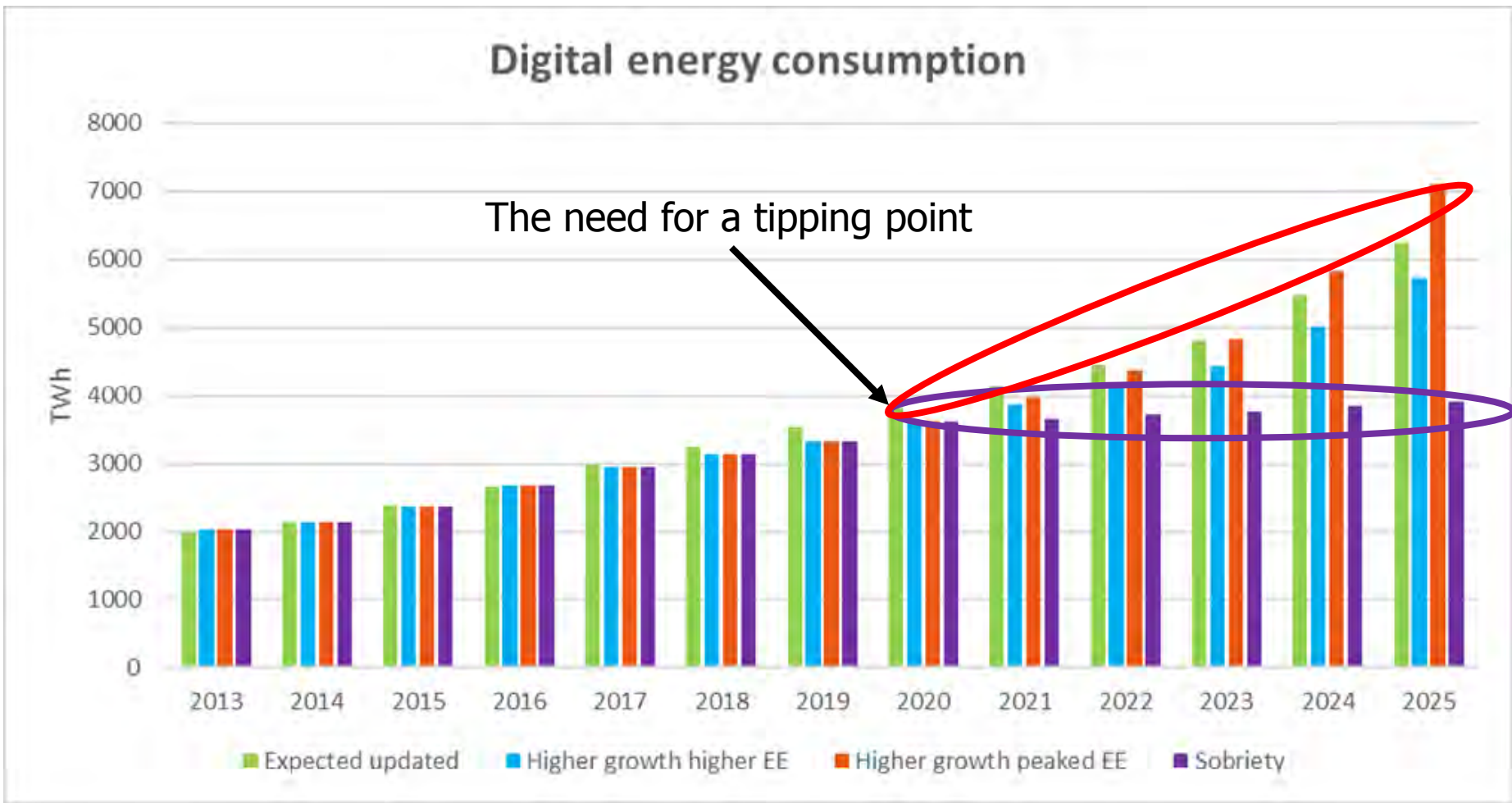
**Sobriety**

*Lean ICT report,  
The Shift Project 2019*

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

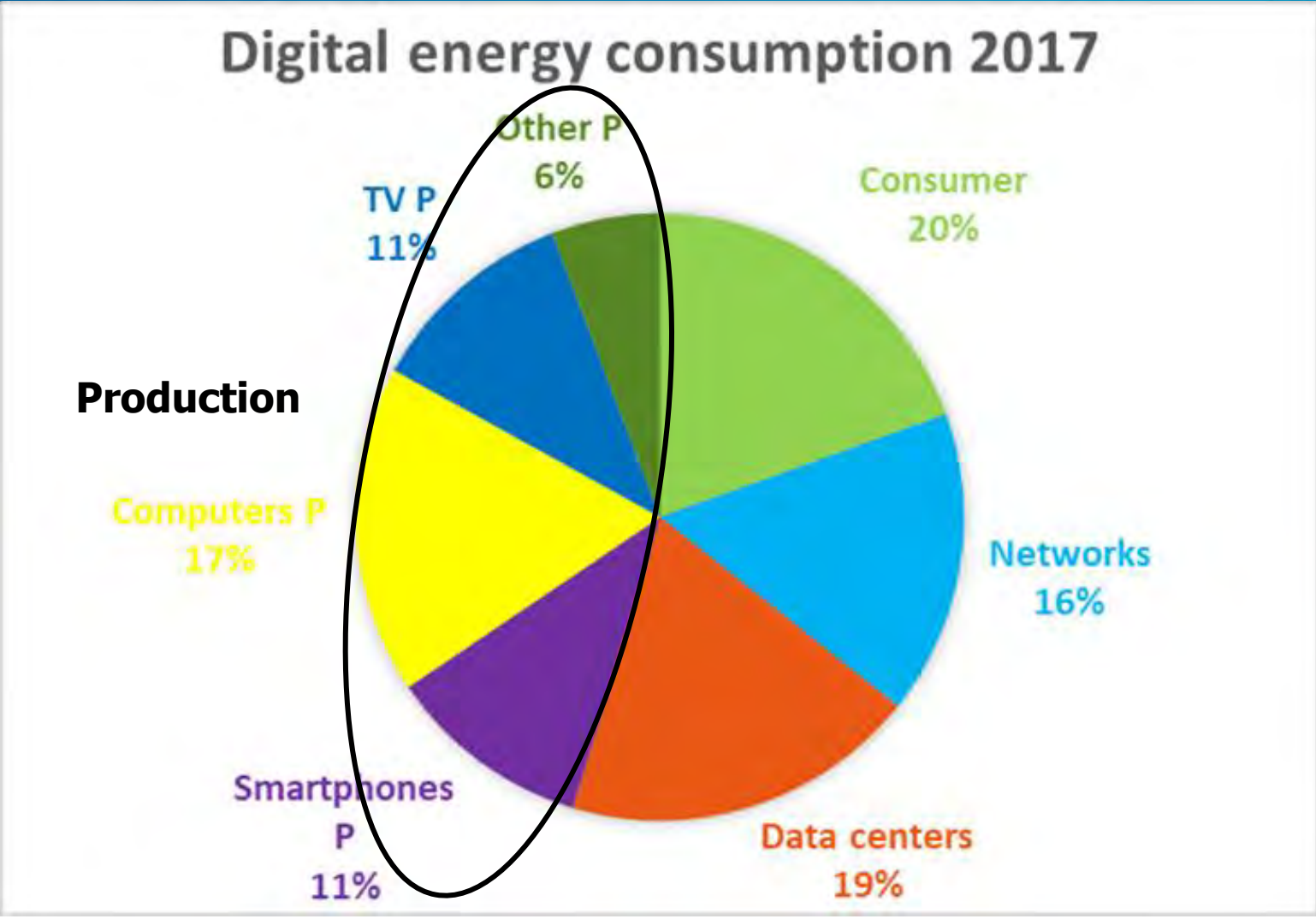


# Energy consumption x 3 in 10 years



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

# Digital energy consumption breakdown



**Production**

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

# Scenario « Expected Updated »

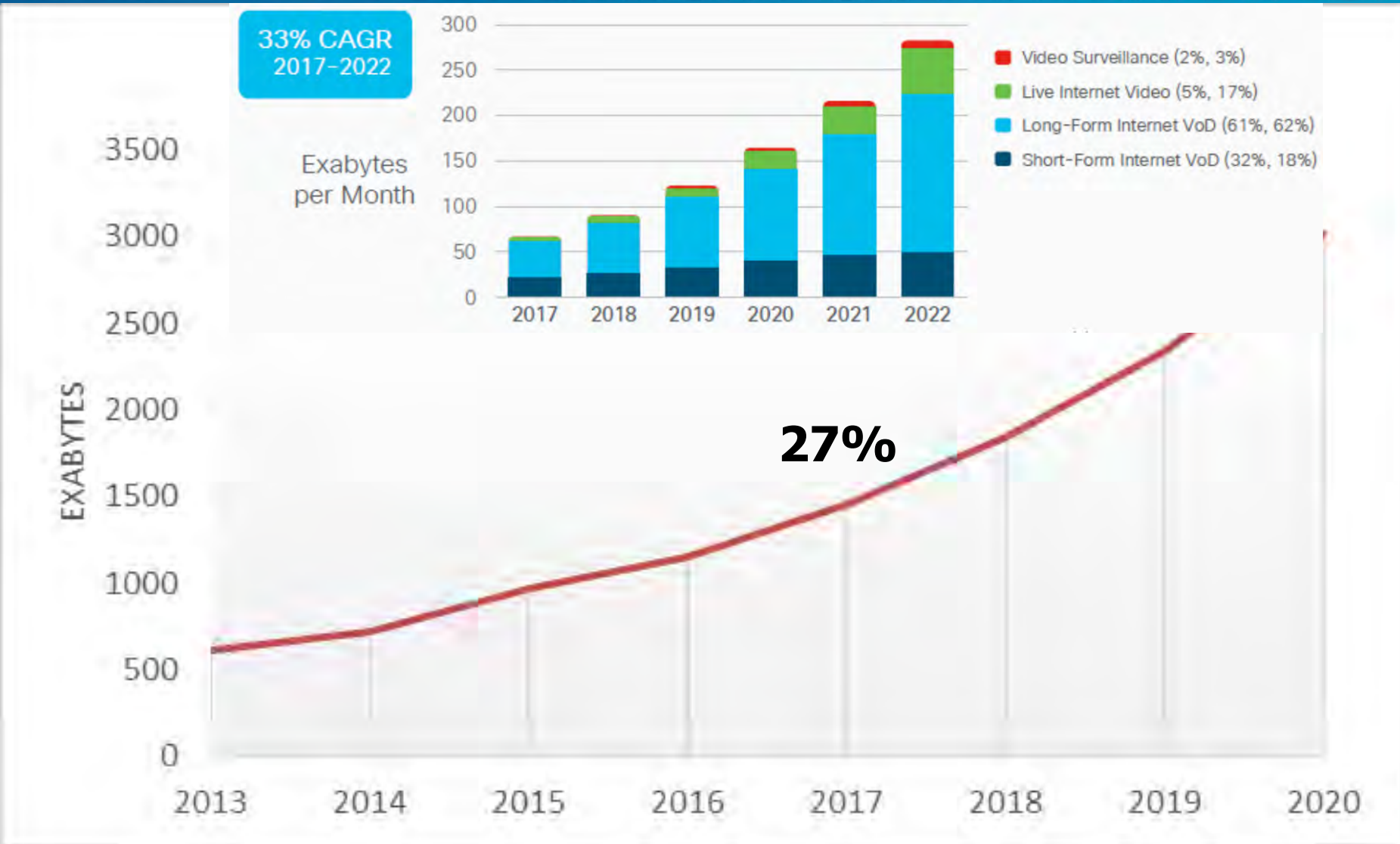


<b>Expected updated</b>									
<b>ENERGY CONSUMPTION (in TWh)</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2020</b>	<b>2023</b>	<b>2025</b>	<b>CAGR 2017-2025</b>
CONSUMER DEVICES	380	426	457	531	575	744	846	908	<b>6%</b>
NETWORKS	435	433	463	471	478	546	676	1007	<b>10%</b>
DATA CENTERS	323	322	400	498	593	894	1242	1918	<b>16%</b>
TOTAL USE	1137	1181	1320	1500	1646	2183	2764	3834	<b>11%</b>
TOTAL PRODUCTION	889	962	1053	1166	1344	1713	2097	2492	<b>8%</b>
TOTAL USE AND PRODUCTION	2026	2142	2373	2666	2990	3896	4861	6326	<b>9%</b>
% FINAL ENERGY CONSUMPTION	1,9%	2,0%	2,2%	2,4%	2,7%	3,4%	4,1%	5,2%	<b>9%</b>

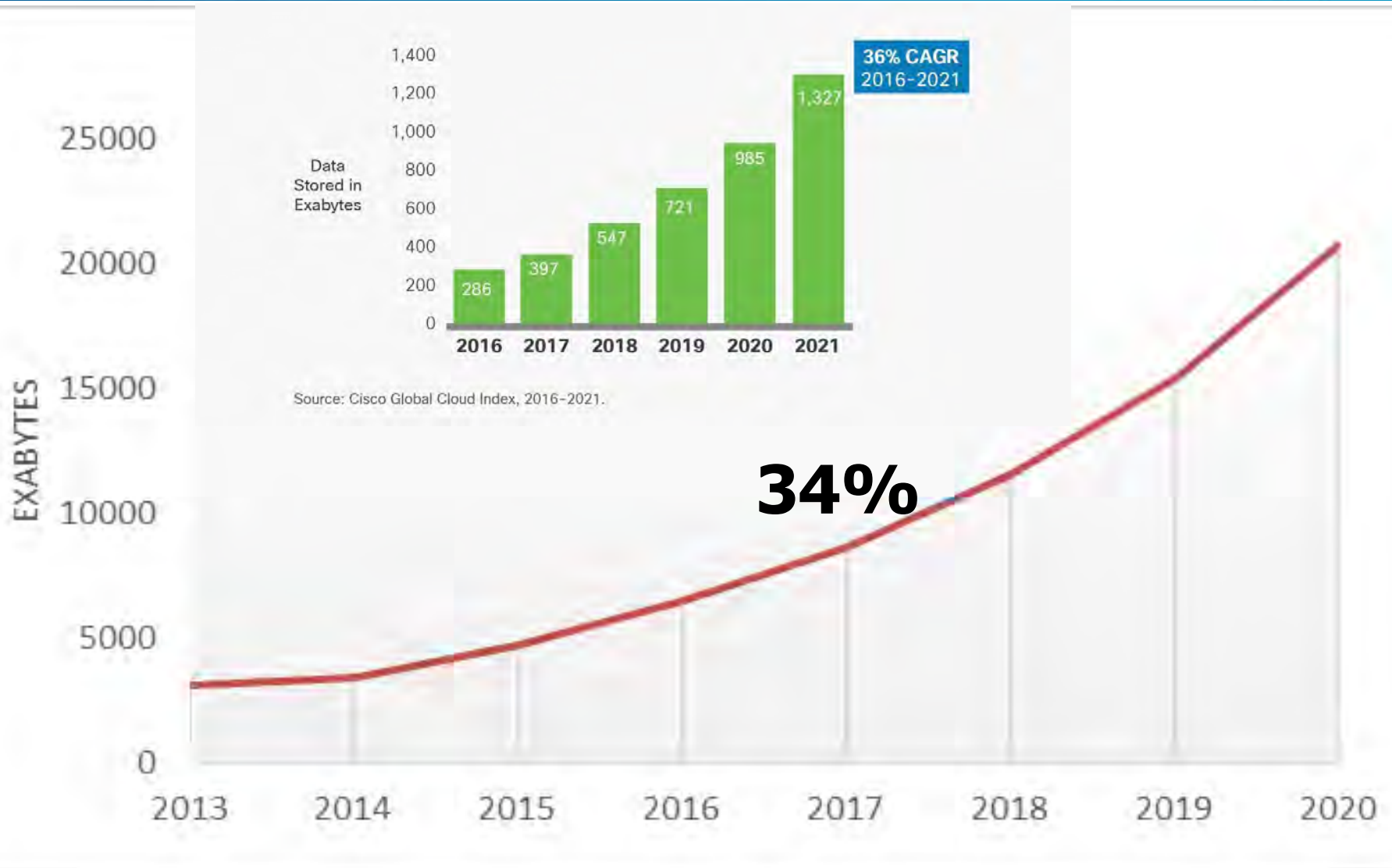
Energy efficiency gains ~ constant

Updated : 2018 Cisco VNI traffic and connected devices forecasts

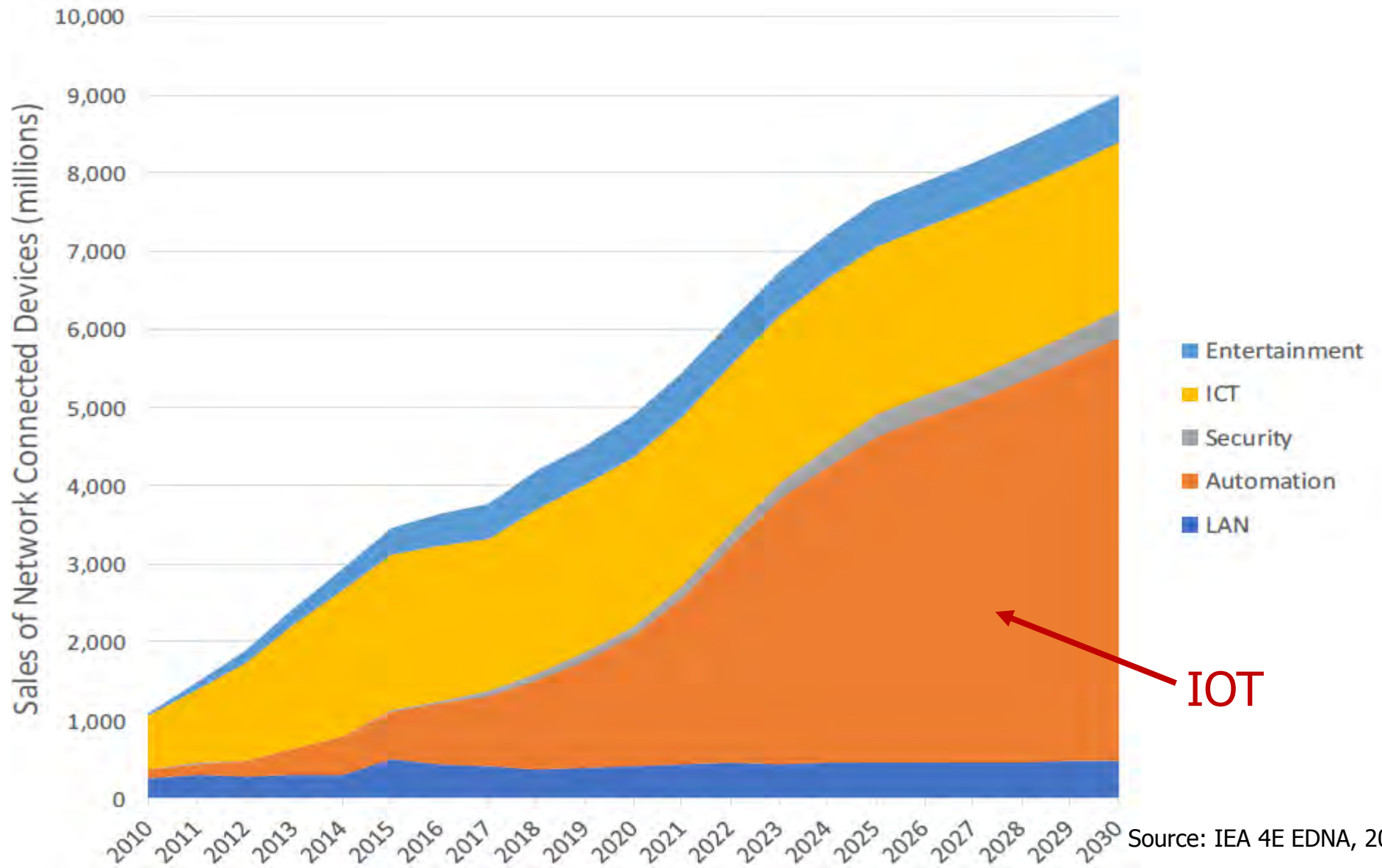
# Expected updated: network traffic



# Expected updated: data center traffic and storage



# Devices in production (illustrative)

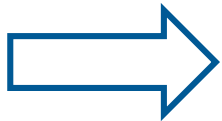


Source: IEA 4E EDNA, 2019

# Digital sobriety

# Concluding with sobriety

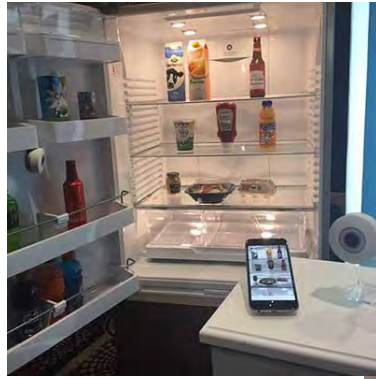
- Digital « volumes/activities » grow much faster ( $\sim 10\%$  to  $50\%$  yoy) than energy efficiency ( $\sim 0\%$  to  $20\%$ ), therefore energy consumption increases.
- Energy efficiency will NOT continue to grow as fast in the next 10 years as it did in the past 10 years:
  - Approaching the limits of current technologies
  - NO major technological breakthrough industrialized in the next 10 years



**Reducing the growth of the « volumes » is therefore mandatory for the next 10 years: video and next (VR), lifespan of equipments, # devices/person**



# Not this



## CES, Las Vegas, 2019



# Defining digital sobriety



- **Video traffic: 17% vs 34%**
- **Data center volumes: 24% vs 29%**
- **Smartphones: extension of lifespan → production stable at 1,5 billion/year**
- **IOT devices: annual production stable at 2020 level**
- **Energy efficiency : trends unchanged**

# Implementing digital sobriety



- The current overconsumption is a systemic issue resulting from different factors:
  - Digital consumers unaware of the impacts (environment, health, behavior etc)
  - 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- based business model) and using addictive design techniques
  
- 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

# Implementing digital sobriety: lean ICT 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

# Enterprise architecture and governance

**Draft**



## Define a strategy and measurable objectives

### Providers & partners



Adapt choice criteria & contracts

Indirect Carbon assessment transparency

Contribute to publications to influence the market

### Build sustainable solutions

Define information system sustainability principles



Rationalise current information system

Adapt process & business usages



Adapt internal developments, solution choices (software, data management, ...)



Adapt Infrastructures



Adapt project methods to deliver sustainable digital

### Measure environmental impact



Carbon assessment

Intermediary indicators



## Govern IS transformation toward sustainability



Develop awareness & train IT professionals & businesses on Digital Sustainability

# Questions ?

