

# Digitalisation for the Green Deal

## Module 6

### Impact of digital transformation on the environment and clean technologies

# Agenda

6.1 ICT and Climate Change

6.2 Digitalisation applied to clean energy

6.3 Digitalisation supporting the circular economy

# Digitalisation for the Green Deal

## Module 6.1: ICT and Climate Change

# Agenda

## **Module 6.1: ICT and Climate Change**

- Environmental costs of digitalisation
- Case study: Ali Baba's Ant Forest

# Digitalisation: positive vs negative impacts on the environment

Impact	😊 vs 😞
Production and distribution of ICT equipment	
Dematerialization and online delivery	
Energy consumption in use (directly and for cooling)	
Reduced need for travel	
Greater energy efficiency in production and use, and recycling	
Short product life-cycles and e-waste	

# Digitalisation: positive vs negative impacts on the environment

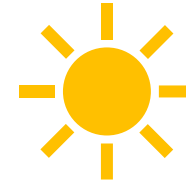
Impact	😊 vs 😞
Production and distribution of ICT equipment	😞
Dematerialization and online delivery	😊
Energy consumption in use (directly and for cooling)	😞
Reduced need for travel	😊
Greater energy efficiency in production and use, and recycling	😊
Short product life-cycles and e-waste	😞

# Focus on ICT & Climate interaction

What is the effect?



- **Energy consumption**
- **Consumption of resources** (e.g. „rare earths“)
- **Electronic waste** is polluting the environment + „recycled“ under extremely bad circumstances
- **eCommerce** increasing postal deliveries



- **Smart devices:** reduce energy need for devices
- **Smart-grids** allow for flexible and decentral energy-grids + renewable energy sources
- **Teleconference-systems** reduce need for travel
- **Control and transparency**



**Understanding digitalisation means to acknowledge and to comprehend its dual nature.**

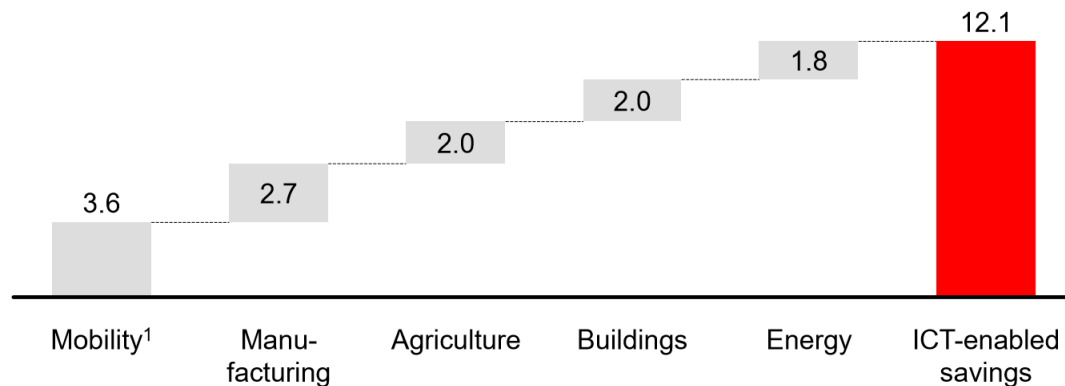
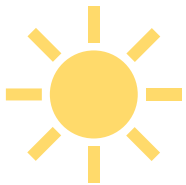
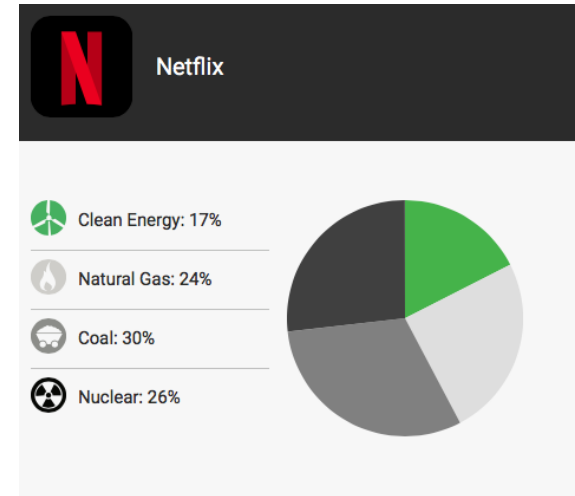
# ICT & Climate

## What is the effect?



*Across the tech sector we need to recognize that data centers will rank by the middle of the next decade among the large users of electrical power on the planet."*

- Brad Smith, President Microsoft -

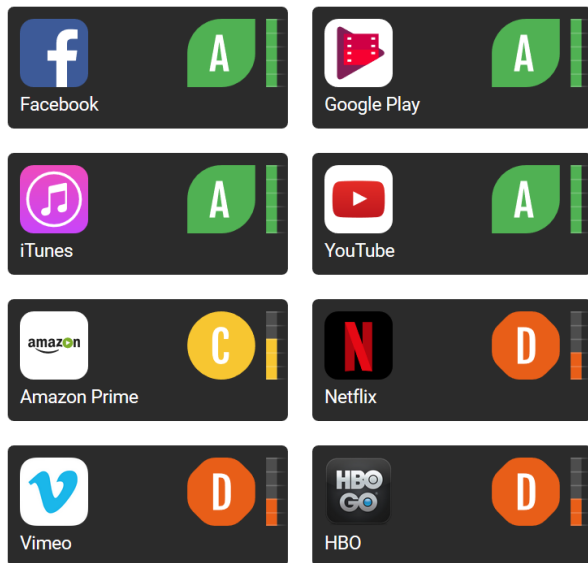


**CO2 abatement  
potential by sector  
(2030)**

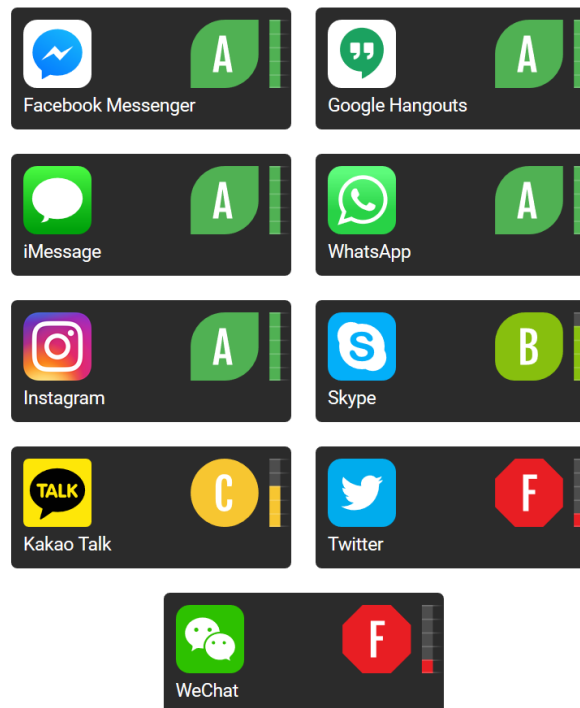


# Are your apps clean?

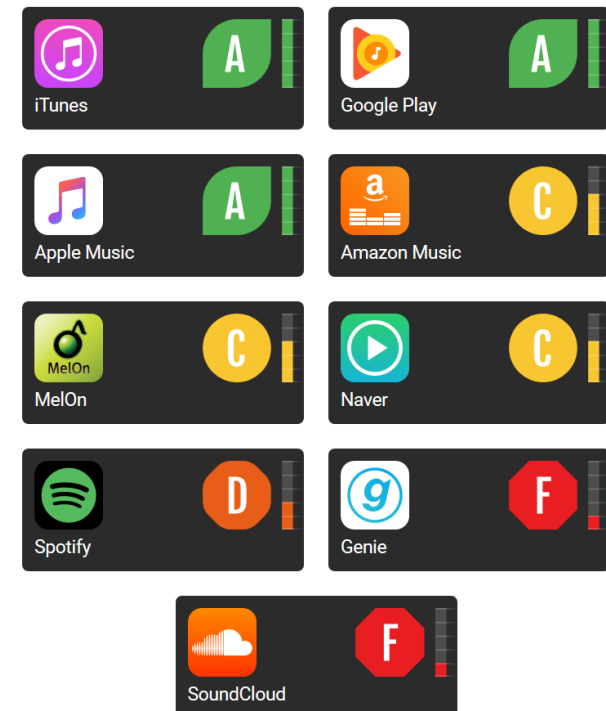
## VIDEO



## MESSAGING

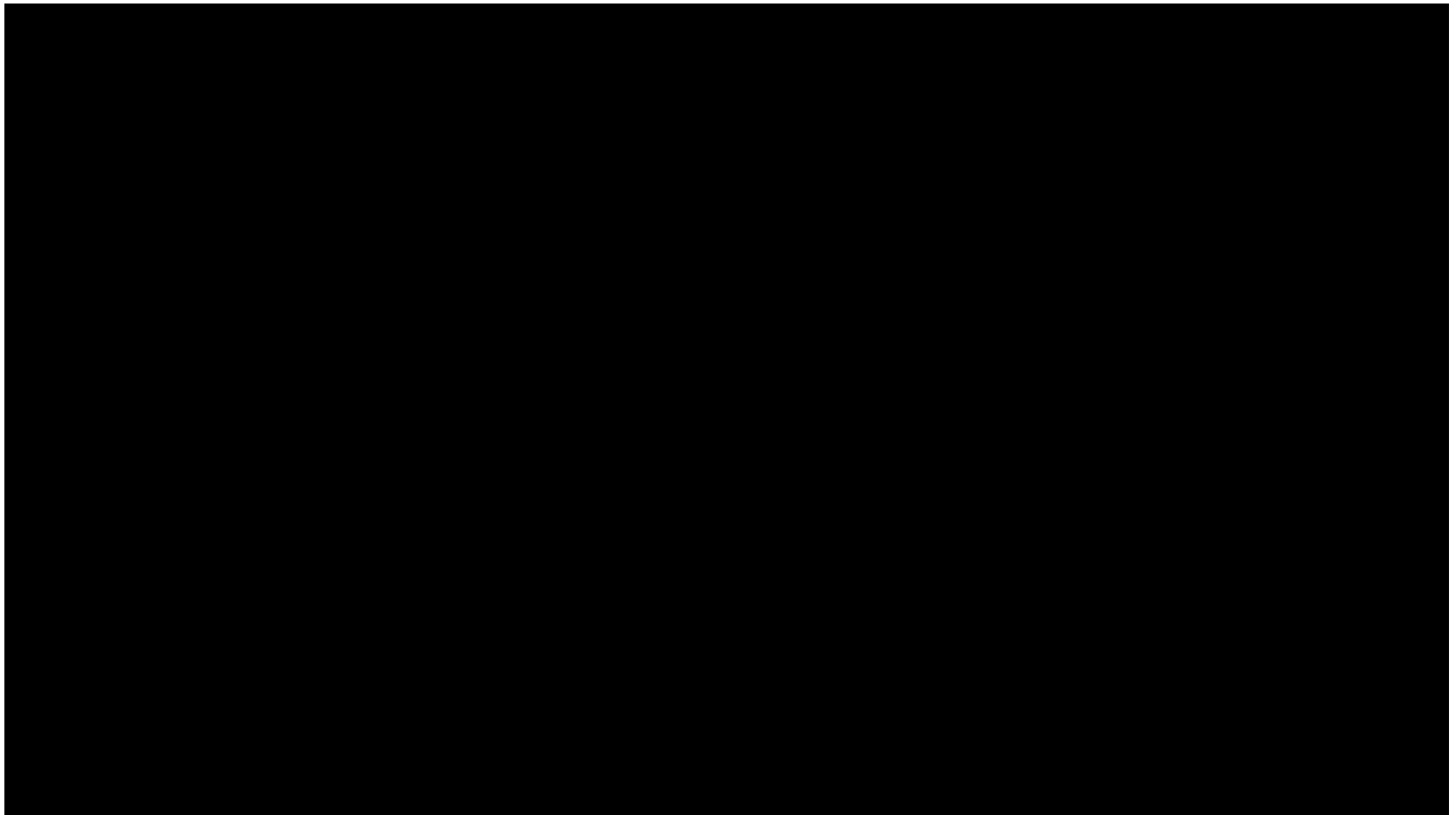


## MUSIC



Click Clean Report [Greenpeace] - <http://www.clickclean.org/international/en/>

# E-Waste: where does it go?



# E-waste, quantified

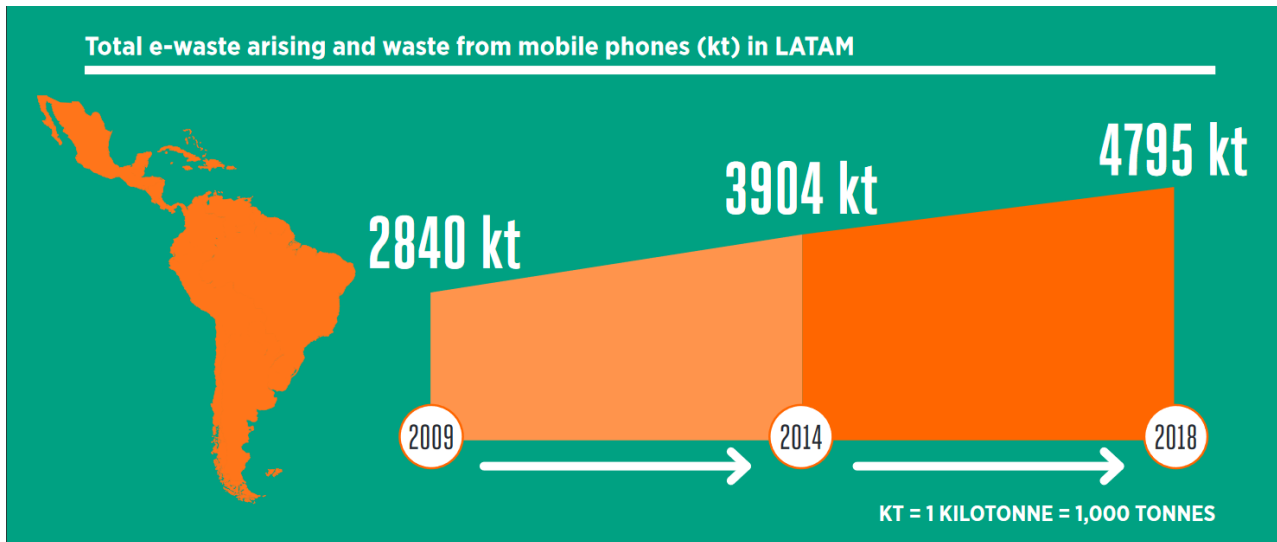


Note: 2017-2021 are estimates

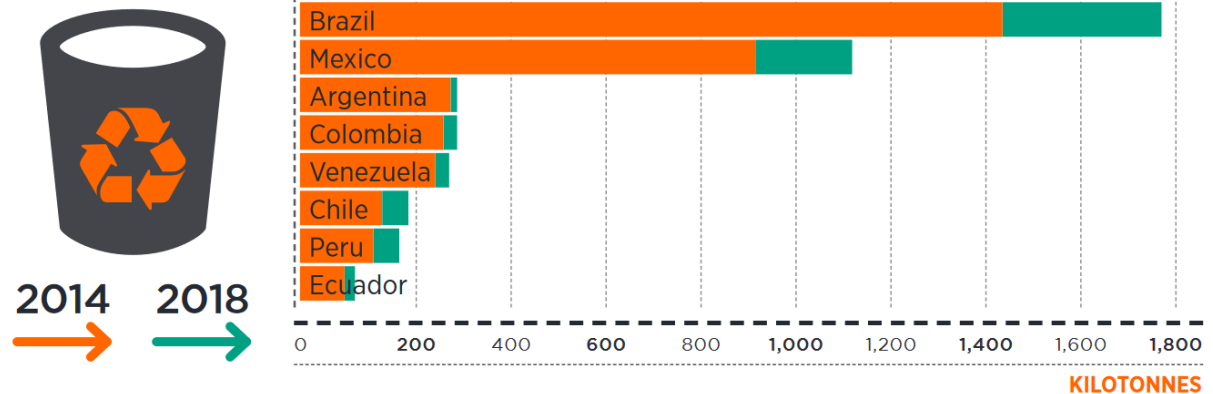
Source: ITU, 2018

# E-waste, quantified

Total e-waste arising and waste from mobile phones (kt) in LATAM



eWaste in main Latam markets



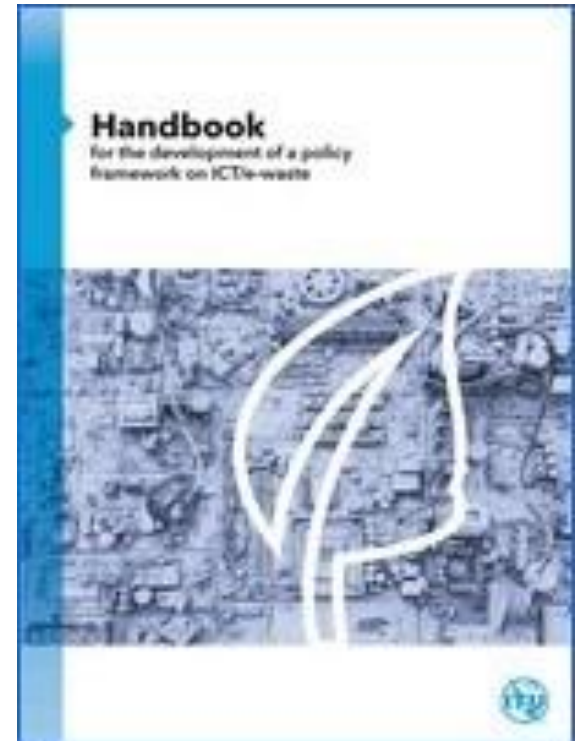
Source: GSMA, 2015

# E-waste: possible (bottom-up) solutions

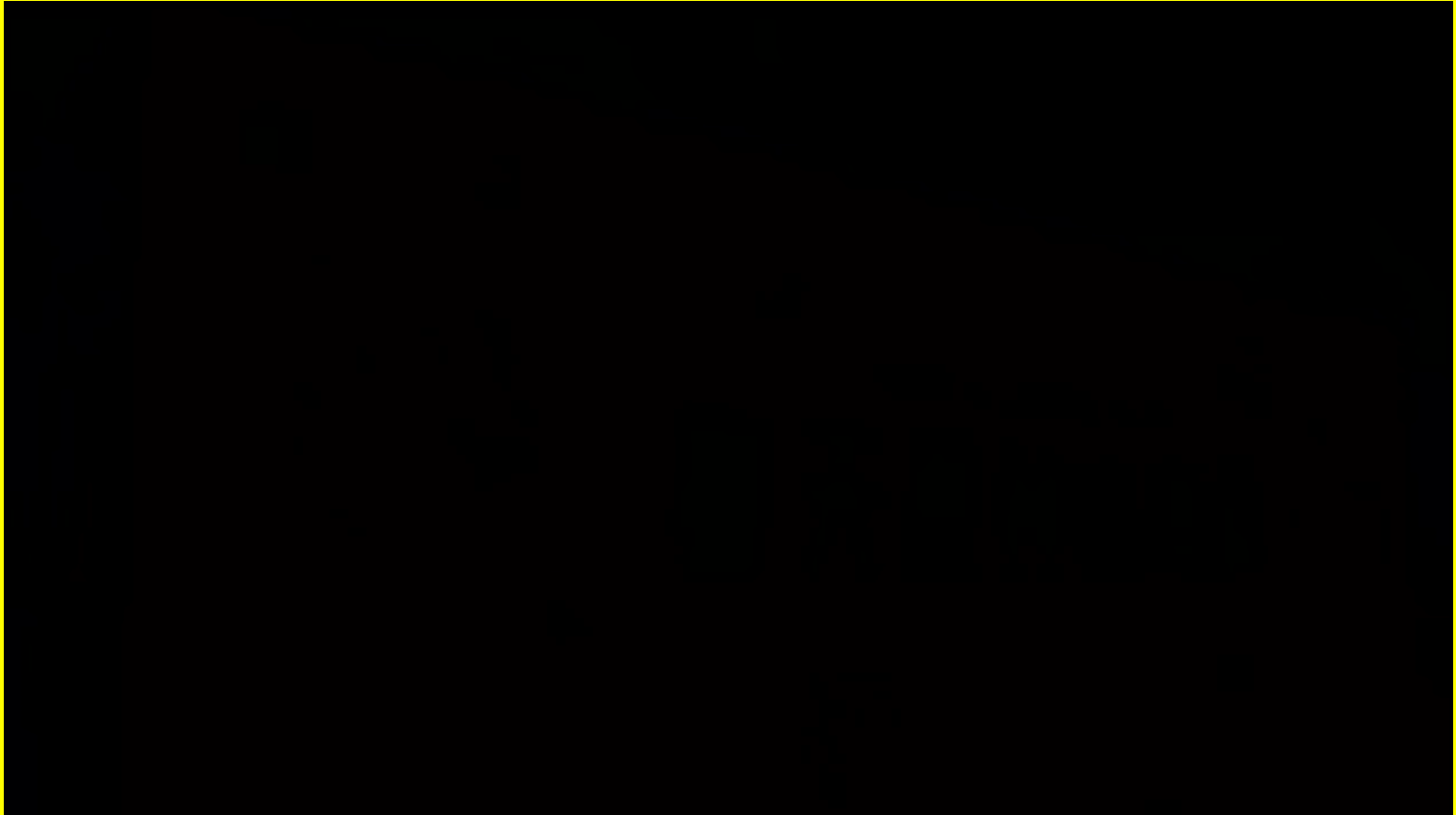
- Agboglobloshie Makerspace Platform (AMP)  
<https://qamp.net/>
- World Reuse, Repair and Recycling Association  
<http://wr3a.net/>
- Solving the E-waste Problem (StEP) Initiative  
<http://www.step-initiative.org/>
- The Restart Project  
<https://therestartproject.org/>

# E-waste: possible solutions at the policy level

- Handbook for the development of a policy framework on ICT/e-waste
- Developing an e-waste national policy and regulatory framework for **Malawi** [study]
- E-waste Management Policy and Regulatory Framework for **Saint Lucia** [study]



# Ali Baba (Alipay) Ant Forest



# Ali Baba (Alipay) Ant Forest

- Over 500 million users
- Planted 100 million real trees in Northwest China
  - **Total area of 112'000 hectares,**
- Protected a total area of 12'000 hectares.
- Creation of 400'000 job opportunities (USD 8.4 million in income for farmers)
- Awarded as 2019 *Champion of the Earth for Inspiration and Action* by UNEP



# Ali Baba (Alipay) Ant Forest



**10 min**

## Open Discussion

- What do you think about such a solution?
- Is it replicable? Is it scalable?
- Can it be improved?

# Digitalisation for the Green Deal

## Module 6.2: Digitalisation applied to clean energy

# Agenda

## Module 6.2: Digitalisation applied to Clean Energy


- Introduction to Clean Energy
- Implications for Development Cooperation
- The Digitalisation & Energy nexus

# Clean Energy Transition: why?

- A more secure, competitive and sustainable energy system will address the existential challenge of our time - **climate change**.

## How?

1. Energy **efficiency** first!
2. Showing **global leadership** in the take-up of renewables
3. A new energy **rulebook**
4. More **rights** for consumers
5. Increased security of supply thanks to a **smarter** and more efficient electricity market

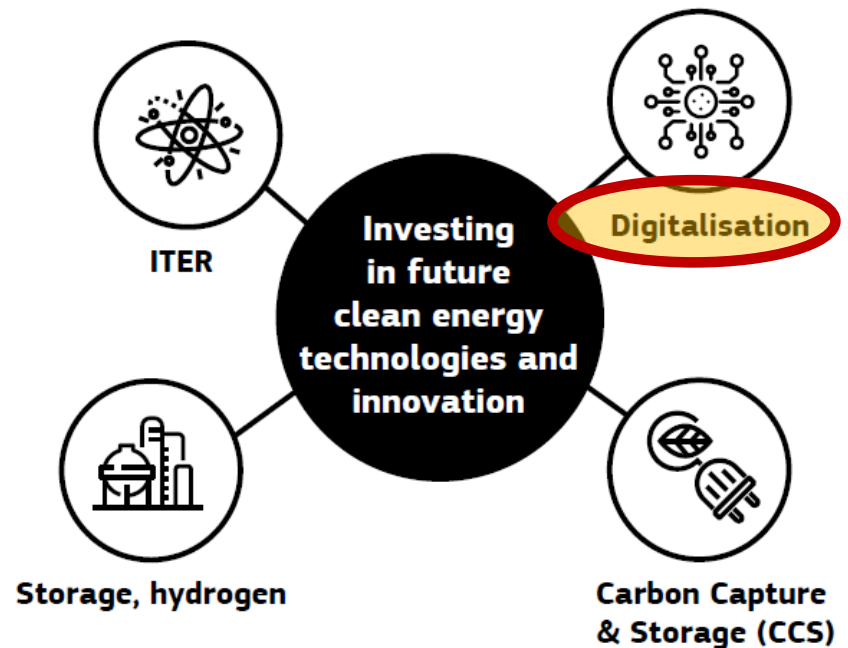


**EU Energy targets by 2030**

- At least **40%** cuts in greenhouse gas emissions
- At least **32%** renewables in energy consumption
- At least **32.5%** energy efficiency

# Clean Energy Transition

- The clean energy transition requires important investments: **research** and **innovation** will contribute to the creation of a strong industrial basis and make the EU a global technology leader

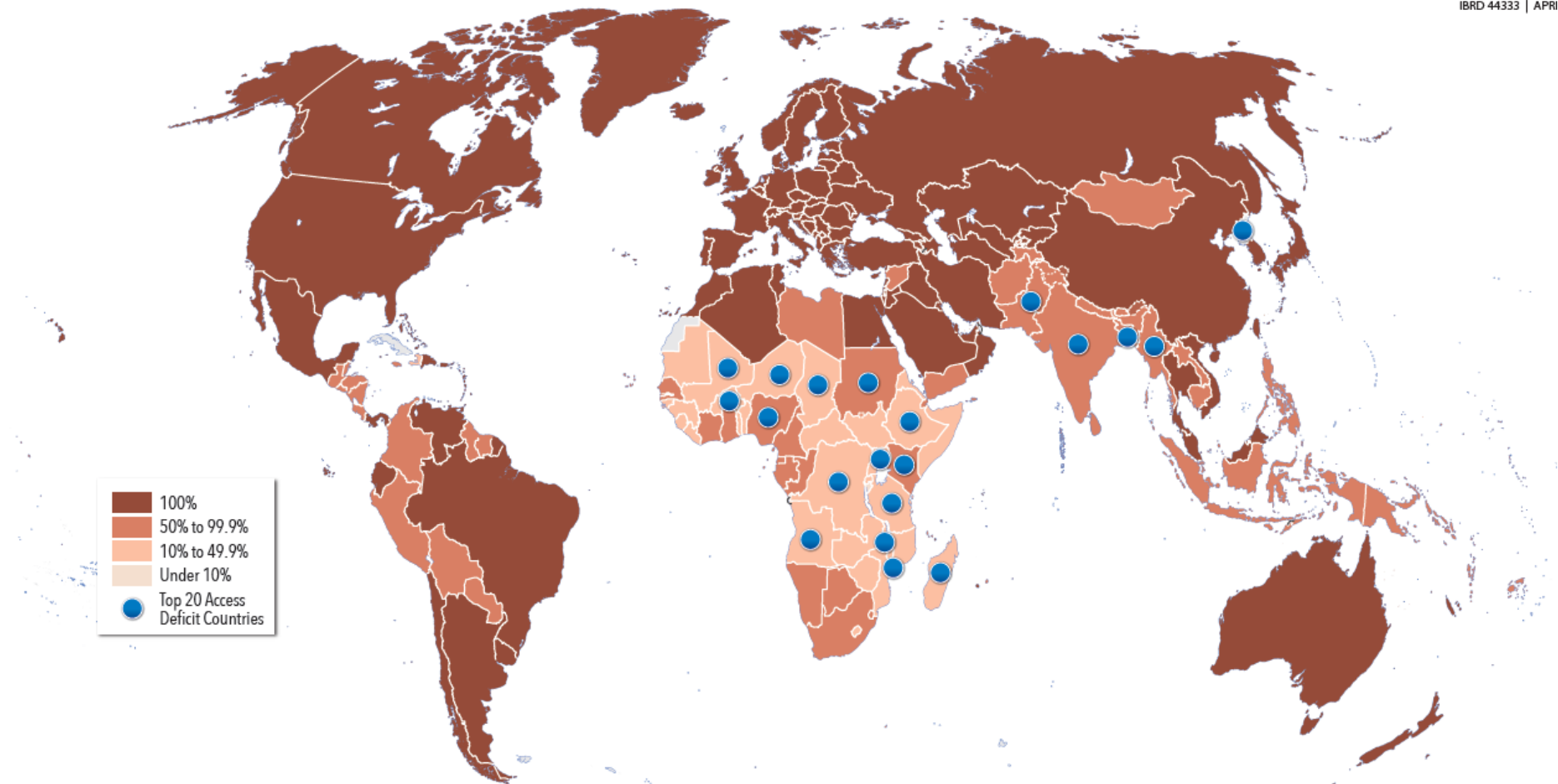


# Clean Energy and Cooperation

- EU's external **energy policy** is based on **close cooperation** with all our external partners, to ensure security of supply, foster the global clean energy transition, and create a level playing field for EU companies on global energy markets.
- **International energy cooperation** is also key for managing the EU's external energy dependency, given that the EU imports half of its energy needs.

# Clean Energy and Cooperation

- **Boosting investment** in clean energy in our close **neighborhood**, and particularly in **Africa**, will create sustainable growth and jobs locally.
  - EU is Africa's biggest partner for sustainable energy
  - Access to energy in Africa is a key European policy goal
  - Approximately €2.7 billion of financial assistance has been or will be provided to Sub-Saharan Africa in the period from 2014 to 2020, giving about 40 million people access to energy.
  - **EU-Africa Platform of Sustainable Energy Investments** established

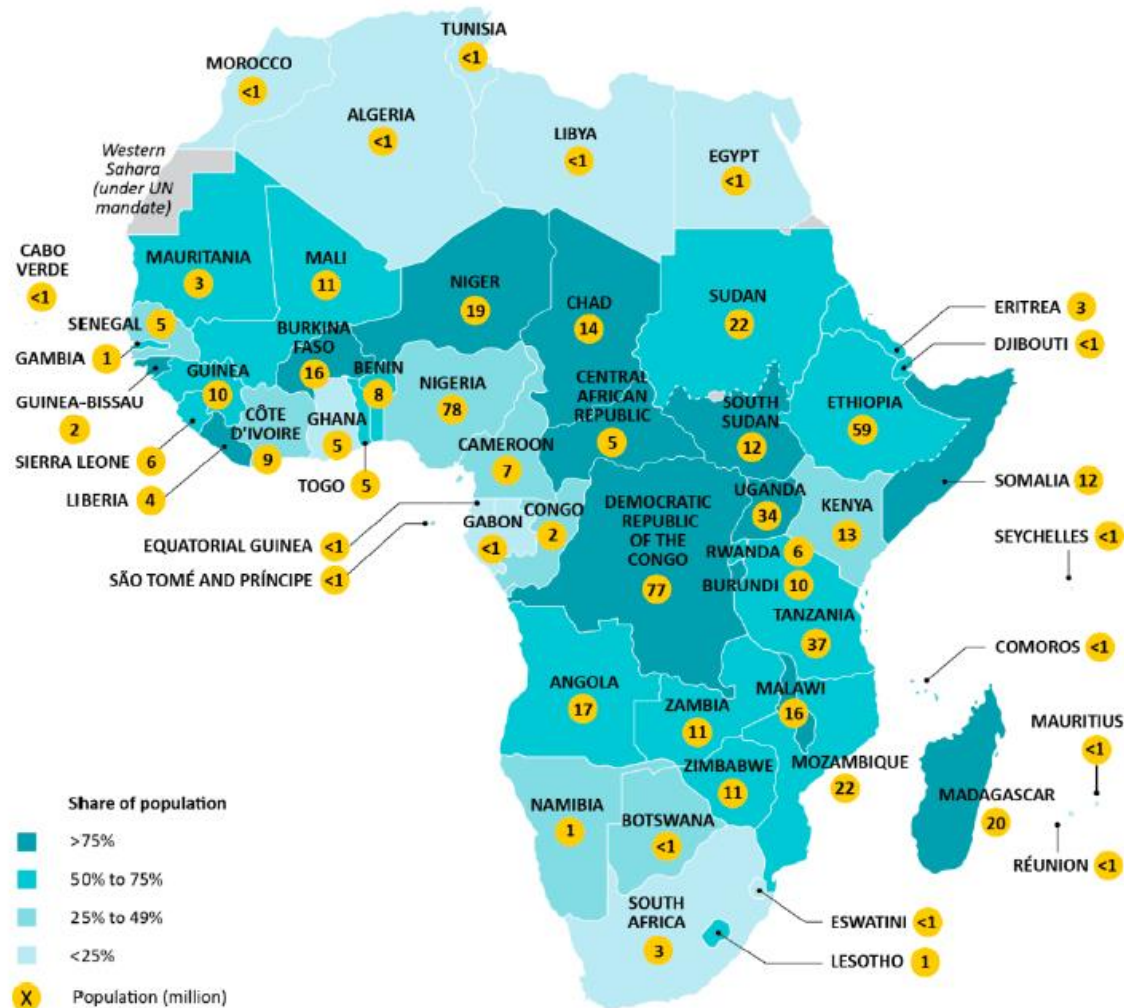


Share of population with access to electricity in 2017

Source: World Bank.



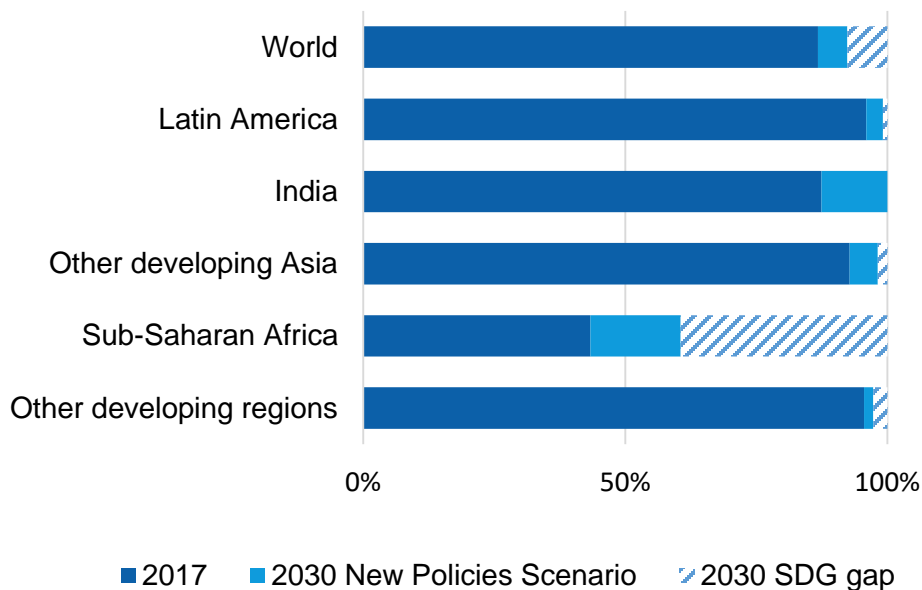
## Population without access to electricity by country in Africa, 2018



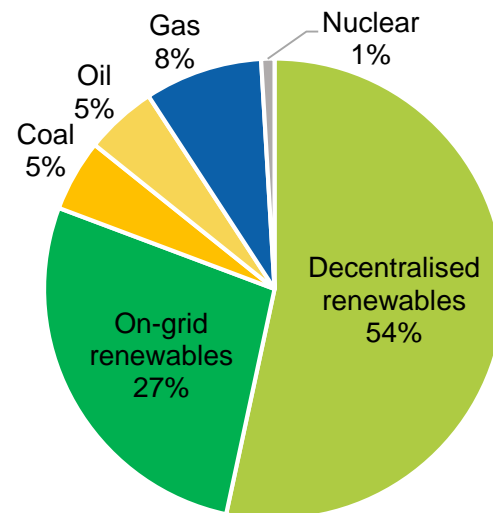
## Electricity access rates by region in 2017 and 2030

### Least-cost solutions to providing universal access to electricity by 2030

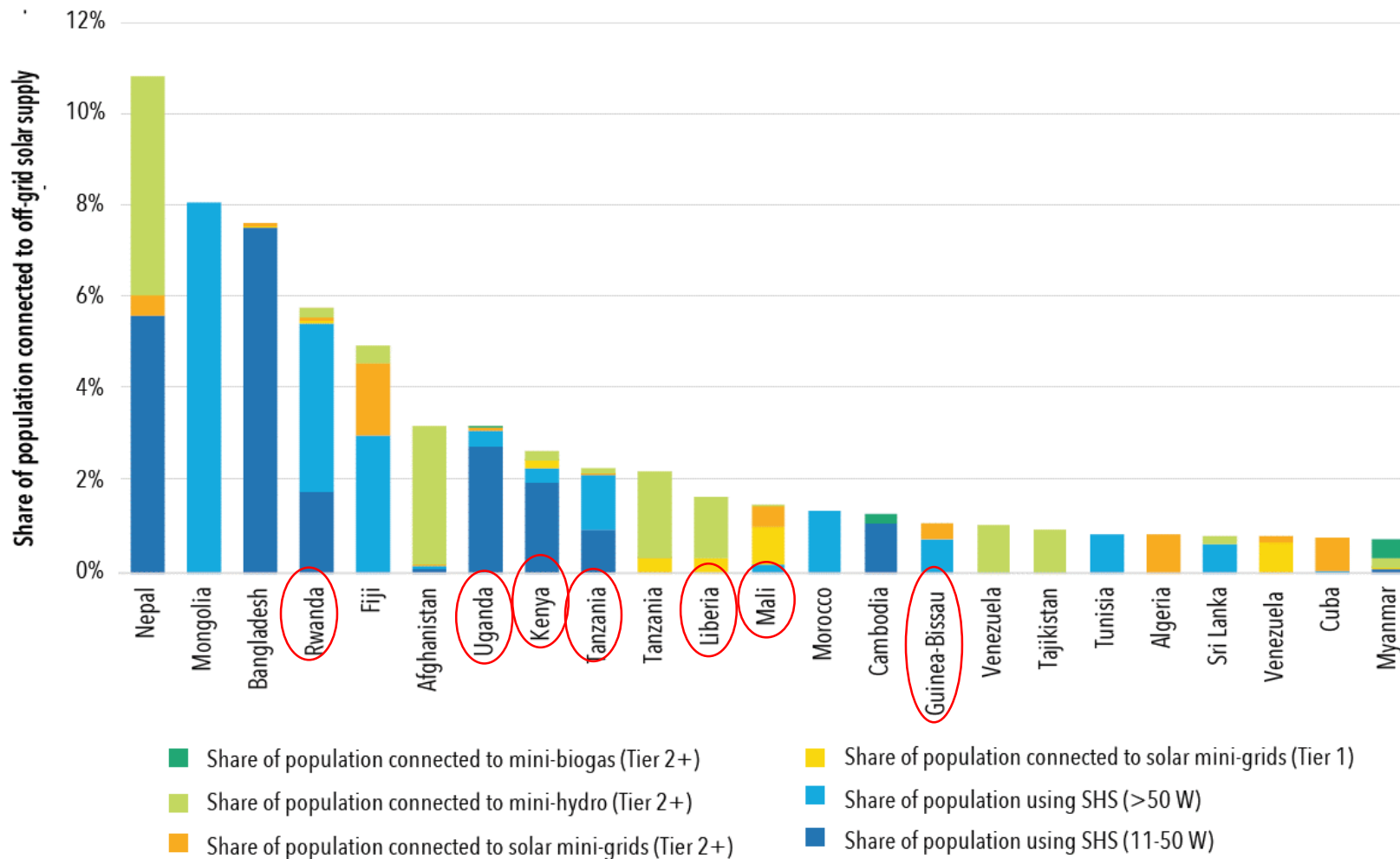
*Electricity access rates*



*Least-cost solutions to provide universal access by 2030 in the sustainable development scenario*

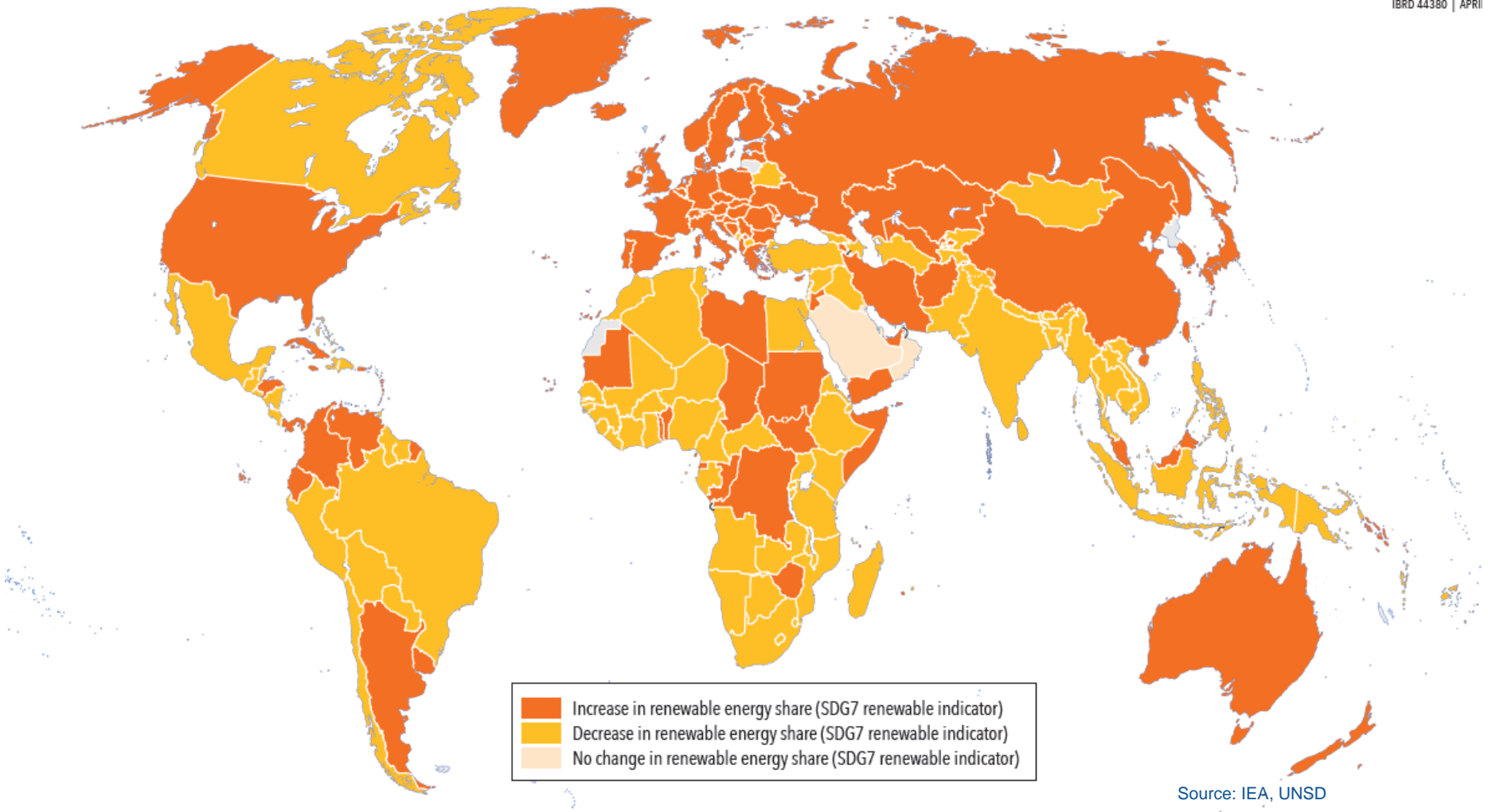


## Top 20 countries with highest rates of electricity access to off-grid supply (tier 1 or higher). 2017



## Change in renewable energy's share of total final energy consumption between 2010 and 2016

IBRD 44380 | APR11



# Digitalisation & Clean Energy

## A clash of Worlds: who will win?

- **Utilities** seek to ensure reliable electric service to customers and therefore prize stability
- **Tech start-ups** are focused on rapid change.
- Successful firms from Silicon Valley created new markets and established natural monopolies.
- Start-ups in the Energy sector seek to conquer markets already monopolized by incumbent firms (e.g. electric power utilities).

# Digitalisation & Clean Energy

## Technology is not enough

- Some firms/governments are using digital innovations to increase energy efficiency
- Some firms are using digital technologies to reduce the cost of extracting oil & gas
  - Enable higher consumption of fossil fuels and overwhelm the carbon savings
- Digitalization can support clean energy systems IF policies incentivize decarbonization

# Opportunities from Digitalisation

- In 2016, global investment in digital electricity infrastructure and software reached \$47 billion
  - Figure greater than the amount spent on natural gas-fired power plants.
- Upgrading the existing electricity system is only the first step in an electric power revolution.
- Important effect of digital innovations:  
**decentralization of power systems** around the world

# Contribution of Data Science

- Opportunities to better understand and manage complex energy systems thanks to the dramatic increase in energy-related data
- Forecasting of renewable output & customer demand
  - **Optimize the provision of distributed clean energy resources**
  - **Save energy by disaggregating smart meter data**
  - **Increase energy efficiency in buildings by informing intelligent management of building heating and cooling patterns**



# Contribution of Data Science

- Plan and operate complex energy systems that cross multiple sectors
  - **Electricity system operators can recruit fleets of electric vehicles to serve as mobile batteries to support the grid**
  - **Enable multi-modal transportation**
  - **Emerging countries can determine how best to expand electricity access to rural communities that lack it by predicting which areas are most easily served by centralized transmission lines and which are better suited for isolated microgrids**

# Digitalisation & Clean Energy

## StoveTrace - India

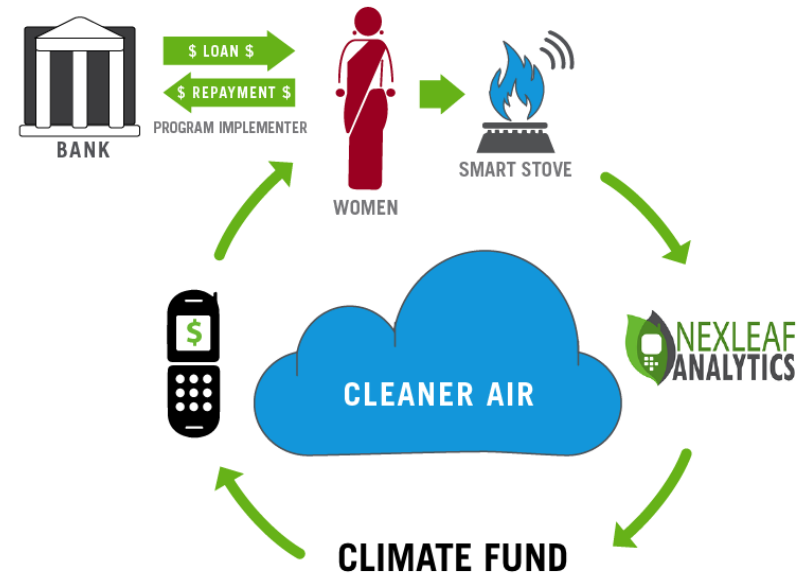
- Every day, about 3 billion people rely on open fires inside their homes to cook meals.
- Exposure to the resulting indoor smoke kills more than 4 million people around the world each year.
- These fires also emit high quantities of black carbon, which is the second-largest contributor to global climate change.

→ “Clean” cookstoves are designed to replace these harmful cooking methods, but many obstacles exist to achieving widespread adoption.

# Digitalisation & Clean Energy

## StoveTrace - India

- StoveTrace is a cloud-based remote monitoring system for improved cookstoves in rural households.
- StoveTrace continuously uploads data on cooking events in a home, giving improved stove stakeholders access to use measurements in near real time, without additional field visits.
- StoveTrace also enables rural women to receive cash payments for their measured use of improved cookstoves and **carbon mitigation**.
- StoveTrace has been installed in over **700 households** across more than **30 villages** in India.



# Digitalisation & Clean Energy

## M-KOPA, Kenya/Nigeria/Uganda

### PRICING

Paying for your M-KOPA device					
Product	Daily rate	Number of days	Deposit	Gross price	Cash price
M-KOPA Solar Power Set	NGN 2,975 425/ day	104	NGN 39,000	NGN 348,000	NGN 275,000

### What is in the box

- 32" Flat Screen Digital TV
- 2 x M-KOPA 6000 Control Units
- 2 x 60 W Solar Panel
- 2 x Solar Tube Lights
- 1 x 6M Extension Cable
- 1 x 18" Fan
- Phone Charge Cables
- 2 x Solar Lights with high and low setting

### Benefits Of M-KOPA Solar Set

- TV-up to 12 hours of viewing (including daylight hours)
- Fan-upto 12 hours
- Lights upto 6 hours a night
- Hours of usage is only an indication, true usage will depend on the solar home system.
- No need to buy petrol,save money
- Make payments in full and on time to qualify for system upgrades and more
- No more cost,smoke and noise from a generator
- 2-year warranty on the M-kopa system /panel/battery/TV
- 1-year warranty on accessories and lights



# Digitalisation & Clean Energy

## HITCH - Nigeria

- HITCH is a cost-effective solar+battery-powered smart wireless router that automatically creates and interconnects community WiFi hotspots into a dynamic cloud
- HITCH devices run entirely on renewable energy (solar and battery) to power the services.
- Including off-grid charging capacity to power functional productivity-enhancing devices (such as smartphones and LED lights) for end-users as an add-on to the value proposition.

# Digitalisation & Clean Energy

## Latin America

- In **Chile**, Enel Green Power has been using IoT to monitor hydroelectrical power generation
  - **MEMS (Micro Electro Mechanical Systems)** acoustic sensors for energy harvesting
    - Collecting data to **reduce costs** and **increase energy efficiency**
- In **Mexico**, Siemens introduced the first digitalization system optimizing the use of electricity while reducing the emissions of contaminated gasses

# Major opportunities, major risks

- Proliferation of internet-connected devices on the electric power system
  - **Multitude of new access points for malicious hackers seeking to steal sensitive customer data or take down the grid**
- Privacy issues: electricity consumption data can be extremely revealing
  - **Household's consumption habits profiling**
  - **Proprietary business practices**

# Major opportunities, major risks

## ANALYSIS

### Are smart meters real-time surveillance spies?

Smart meters provide highly detailed energy-use data that law enforcement can use to bust indoor pot farmers. And that's only the tip of potential smart meter surveillance.



Smart meters provide highly detailed energy-use data. The info can be used by police to find and to bust indoor pot farms, by insurance companies to determine health care premiums, and by criminals to determine if you own high-dollar appliances and when is the best time to steal them. And that's only the tip of the potential privacy invasion iceberg.

In central Ohio, police file at least 60 subpoenas each month for energy-use records of people suspected in indoor marijuana growing operations, [reported the Columbus Dispatch](#). Most of the houses with indoor pot growing operations are reportedly in quiet neighborhoods without much traffic. DEA agent Anthony Marotta said the subpoena is only one tool used to catch "grow house" operators. Police get a tip about suspicious activity, but if undercover officers don't discover anything illegal during a stake out, then utility consumption records can be sought. "How else can I get an indicator to get probable cause if I can't see anything?" Marotta said to reporter Dean Narciso.



# Major opportunities, major risks

 SEARCH

THE | DIPLOMAT  
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TECH BIZ

## Cyber-Attack in the Bathroom: Japanese Toilet Can Be Hacked

Bluetooth vulnerability allows one brand of Japanese toilet to be operated remotely.



By [J.T. Quigley](#)  
August 05, 2013



As if the idea of your computer or smartphone being hacked wasn't troubling enough, your own toilet could be the next target of a cyber-attack – thanks to a Bluetooth vulnerability with the commode's Android app.

Increasingly, electronics manufacturers are pushing “always-connected” devices that can be controlled by smartphones via companion applications. Smart TVs, washing machines, air conditioning units, and even light bulbs can be controlled remotely, as long as Wi-Fi or Bluetooth has them tethered to a smartphone. The added convenience comes with added risk, as any device with a live connection could potentially be exploited by a savvy hacker.

Information security firm Trustwave posted an advisory earlier this week warning consumers of a Bluetooth security vulnerability that targets a specific range of Japanese luxury toilets. The weakness would allow anyone with an Android-powered smartphone to [remotely operate any Inax Satis toilet](#) with the [Mr. Satis app](#), due to the fact that the company had not implemented a

# Digitalisation for the Green Deal

## Module 6.3: Digitalisation supporting the circular economy

# Agenda

## Module 6.3: Digitalisation supporting the circular economy

- Circular Economy & Digitalisation
- Main approaches for Circular Economy & Digitalisation
- Farm to Fork Strategy
- Deep Dive: Blockchain
- Working group 😊

# Digitalisation & Circular Economy

- Two transitions already happening in the EU
- Efforts to promote them are rarely aligned

## How to do it?

1. Think systemically, define a **vision and act**.
  - Digital review of the circular economy transition
  - Sustainability review of the digital transition
2. Provide an adequate **governance** framework and economic **incentives**
  - Expansion beyond siloed agendas
3. Encourage **collaboration** across European society and economy as well as globally
  - Raise awareness

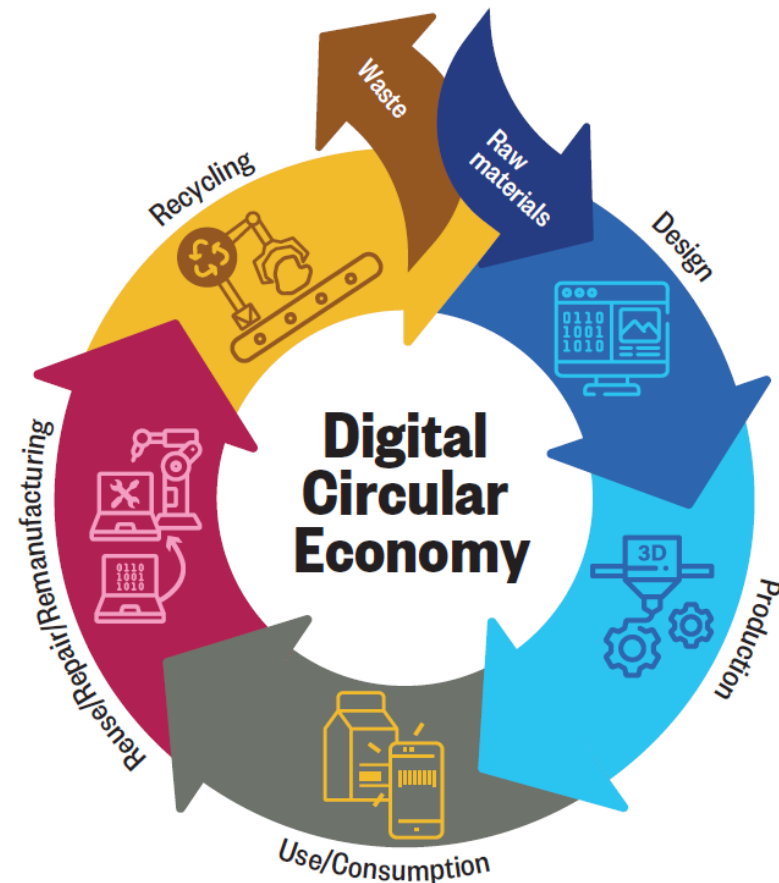
## Why to do it?\*

- The transition to Circular Economy would create **new markets, jobs** and **products**
- Boost EU GDP by 7%
- Generate a net economic benefit of €1.8 trillion by 2030.

\* (On top of saving the Planet)

# Digitalisation & Circular Economy

- Data and digitally-enabled solutions are already contributing to the circular economy.
  - **Improve the use of natural resources, design, production, consumption, reuse, repair, remanufacturing, recycling and the overall waste management.**



# Leveraging Digitalisation towards the Circular Economy

## Different approaches

1. Improve connections and information **sharing**
2. Make products, processes and services **more circular**
3. **Influence & empower** citizens and consumers

# 1. Improve connections and information sharing



## Key functions

- Raise awareness
- Comply with existing (EU) rules
- Produce actionable knowledge
- Improve policymaking
- Reusing, recycling, and minimising waste
- Sharing assets
- Enabling feedback loops
- Reverse logistics
- Enabling secure information sharing



## 2. Make products, processes and services more circular



### Key functions

- Encouraging reuse
- Enabling repair
- Improving predictive maintenance and durability
- Improving waste collection, sorting and recycling

# 3. Influence & empower citizens and consumers



Increase citizen/consumer awareness, and enable them to make sustainable choices and co-create knowledge

## Key functions

- Information provision
- Nudge behavior change
- Incentivizing recycling
- Co-creating knowledge

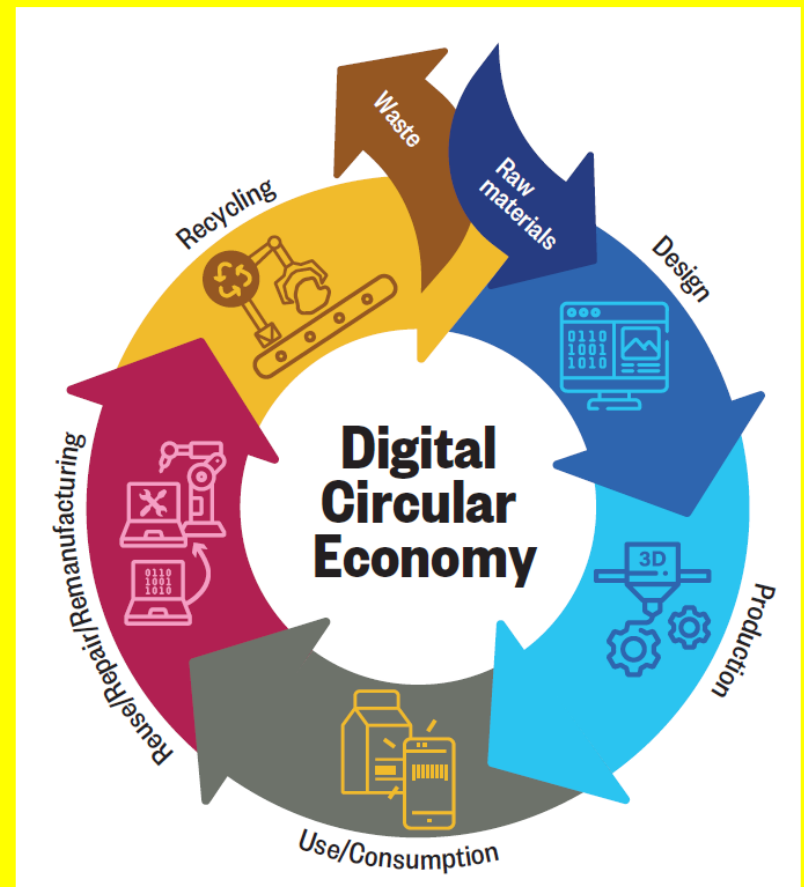
# Digitalisation & Circular Economy

## Quick fire round

- Do you know any examples?



**2 min**



# Digitalisation & Circular Economy

## Coliba – Ivory Coast

- Coliba team collects plastic waste from households and businesses through a [mobile app](#) and a 40+ strong team of employed collectors, sorts and cleans the plastic at Coliba's facility.
- The team transforms the clean plastic into pellets and re-sells these pellets to local or international buyers who use them to create new goods.
- Plastic bottles collected from over 3,000 monthly active users on the mobile app
- 2 tons of plastic a day recycled



# Digitalisation & Circular Economy Cambodia – smarter infrastructure

- Cellcard already saves \$7,600 and 38.4 metric tonnes of CO2 per site over a 5 year period.
  - GSMA demonstrated how Cellcard could have saved \$51,200 per site over a 10 year period, with CO2 emissions reduced by an additional 82.2 metric tonnes of CO2 over five years, by shifting to fully solar-powered sites.
- Cellcard's use of solar power saving as much as \$30M over a 10-year period as well as 100,000 metric tons of CO2.20.



# Digitalisation & Circular Economy

## Closing the Loop: making mobile phone more circular



# Farm to Fork Strategy

- Key to achieving the goals of the EU's Green Deal.
- Regulatory and non-regulatory measures needed for more efficient, climate-smart systems that provide healthy food, while securing a decent living for EU farmers and fishermen.



make sure  
Europeans get  
affordable and  
sustainable food



tackle climate  
change



protect the  
environment



preserve  
biodiversity



increase  
organic  
farming

# Farm to Fork Strategy



**2 min**

## Quick fire round

- What can be the contribution to achieving a circular economy?



# Farm to Fork Strategy

Contribution to achieving a circular economy



# Deep dive: Blockchain

## Definitions

- **Distributed ledger technology** (DLT) the technology behind bitcoin, ether, etc.
- DLT is a decentralized system for **recording transactions** with mechanisms for processing, validating and authorizing transactions that are then recorded on an immutable ledger.
- Blockchain is one implementation of DLT.
- Blockchain is referred to as an "*Internet of value*", meaning a secure way to store and transact value – anything from currency, stocks, contracts and even votes – from one entity to another.

# Blockchain for supply chains

- A blockchain can assist in providing an immutable record from the provenance to the retail store of a product.
  - Increase **consumers' trust** in the products that they buy
  - **Reward the producers** who employ good agricultural practices
  - Overall support **sustainable farming** and **responsible consumption**

# Blockchain

## A case study from Vietnam

GIỚI THIỆU VỀ FRUITCHAIN

# Blockchain for supply chains

- In **India**, a research on the use blockchain technology for **fertilizer subsidy disbursements** to farmers have been implemented
  - Streamline the distribution of subsidy payments to farmers without the need for documents or multiple points of authorization.

# Blockchain

## Forestry, Environmental management

- In **China**, a company aims to use blockchain for forestry economic development and rural poverty alleviation.
- In **Spain**, the Ministry of Agriculture, Fisheries and Food also plans to apply blockchain technology to develop the forestry industry.
- Companies such as Poseidon are developing blockchain-based systems to **track individual/company's carbon footprint** and then providing opportunities to offset it.
- IBM works with Veridium to **tokenize carbon credits** that are verified by third parties according to international standards.

# Blockchain

## Fisheries

- Blockchain can be used to **track and deter illegal**, unreported and unregulated fishing (IUU)
- **WWF** is developing TraSeable, an application to stamp out illegal fishing and human rights abuse in the Pacific Islands' tuna industry.

# Blockchain

## Issues and Opportunities across Farm2Fork

- Blockchain-based implementations still suffer from **traditional challenges** such as a lack of or poor infrastructure, failures of interoperability, and other technology issues.
- Although the trend now is to try a blockchain-based implementation of traditional processes, in most cases this adds **unnecessary overheads** and does not yield any **tangible benefits**.
- What it does promise is to deliver a **transparent, decentralized, secure transaction process** and may reduce transaction costs.



# Challenge



**15 min Work**

**10 min Presentation**

- Each group assesses the specific digital solution
- How does it support the creation of a more circular economy?