Alliance for Internet of Things Innovation

Brussels, 17 March 2022

AIOTI Feedback on 2022 Strategic Foresight Report – Better understanding the twinning between the green and digital transitions

Green and digital transformation requires a combination of innovative mindset, technology and infrastructure, skilled people, open markets and leadership. In particular, we would like to emphasize that ICT will play a central role in addressing the climate and environment challenges EU faces, both by deployment of ICT technology to support other industrial sectors to reduce their emissions and environmental footprint (ICT for Green), as well as by addressing the ICT sector's own climate and environmental footprint through Green ICT programmes. In the context of AIOTI, we highlight the two key ICT technologies: IoT and Edge Computing.

Digital transformation of business generates significant efficiency gains including energy savings

Despite disappointing productivity growth in most OECD countries during the 2010s, new technologies like IoT, edge computing, cloud computing, 5G, AI resemble previous general purpose technologies in their potential pervasive impact to boost productivity in almost all economic sectors.

There is also growing real-world evidence that the productivity impacts of the fourth industrial revolution could be profound.

Digital transformation does not just benefit larger companies, but as well SMEs. Introducing smart contracts and automating back office functions for example, can reduce late payments and improve business cash flow. Going online and trading across borders can enable SMEs to reach a similar number of customers as larger rivals. Finding new ways to work can also reduce costs, by moving to a shared office provider for when working from home is not desired. Larger firms may keep large offices for prestige, marketing and other advantages.

SMEs who are adopting digital tools increased their productivity by 16% on average[1]. 45% of SMEs saw an increase in sales after they started to accept digital payments (avg. increase of 12%). Digital payments can be processed x7 faster than non-digital payments, saving time for owners/employees[2].

[1] Ministry of Trade and Industry Singapore, 2019. Digital Adoption Among Firms and Impact on Firm-Level Outcomes in Singapore. https://www.mti.gov.sg/Resources/feature-articles/2019/Digital-Adoption-Among-Firms-and-Impact-on-Firm-Level-Outcomes-in-Singapore.
[2] Visa, 2019. Digital Transformation of SMEs: The Future of Commerce. https://www.visa.co.uk/dam/VCOM/regional/ve/unitedkingdom/PDF/visa-digital-transformation-final.pdf

Green transformation reduces GHGs

Moreover, it is important to be emphasized that ICT, e.g., IoT and edge computing, will play a central role in addressing the climate and environment challenges EU faces, both by deployment of ICT technology to support other industrial sectors to reduce their emissions and environmental footprint (ICT for Green), as well as by addressing the ICT sector's own climate and environmental footprint through Green ICT programmes. Figure 1 lists examples of the types of scenarios in delivering ICT for Green and Green ICT objectives. Moreover, Figure 1 shows that in the ICT for Green scenarios, the usefulness of ICT can reduce the GHG (or carbon footprint in industrial domains) on industrial sectors that is 7 to 10 times of the ICT carbon footprint.

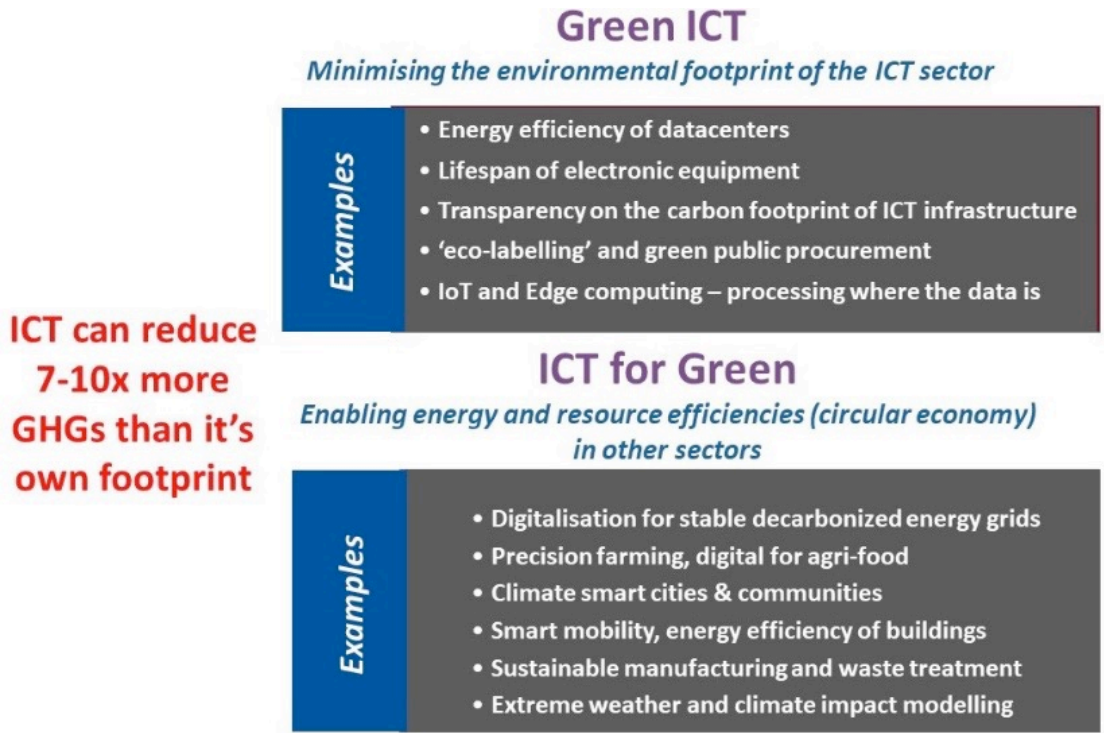

Figure 1: Green ICT and ICT for Green (source: European Commission)

In a variety of vertical industry sectors, companies tend to use absolute metrics to assess their progress on decarbonization. Absolute emission reduction goals are also favored by environmentalists to measure the overall carbon impact a company has on the environment. This approach may work for many of the verticals whose business volume only vary moderately; However, for the overall ICT industry, absolute carbon emission may not be the best metric to assess its progress on de-carbonization, as the usage of mobile networks, fixed networks, and data centers has expanded rapidly around the world in the past decade as society has become more digitalized.

As such, de-carbonization efforts in the ICT industry may not be fully satisfactory if they are targeting absolute reduction. Instead, it might be useful for ICT infrastructure operators to focus at their de-carbonization progress relative to the amount of data they process. To create a link between carbon emissions and data traffic, the relationship between carbon emission and primary and secondary energy consumption needs to be understood.

Worth taking into account is also the aspect of inequality in the start of individual EU countries to both transformations. It means that the start of green and digital transformation takes place at different levels of advancement in particular countries. Due to the possibilities of the Member States, both transformations will take place at different pace, therefore, there will be some kind of asymmetry in achieving the set goals. Asymmetry is understood as the pace of implementation of transformation by the Member States, but also as the asymmetry in achieving the goals of digital and green transformation (each separately).In view of the above, it is justified to consider in the report also the mentioned context of carrying out the green and digital transformation in the field: "Questions / Issues to consider".

An important activity related to GHG reduction is Carbon removal. Carbon removal refers to processes for absorbing CO2 out of the atmosphere, with methods ranging from planting trees to building industrial carbon-absorption machinery. Processes for removing carbon from the atmosphere include:

- Bioenergy with carbon capture and storage (BECCS): atmospheric CO2 is absorbed by plants and trees as they grow, and then the plant material (biomass) is burned to produce bioenergy. The CO2 released in the production of bioenergy is captured before it reaches the atmosphere and stored in geological formations deep underground on very long time scales. Since the plants absorb CO2 as they grow and the process does not emit CO2, the overall effect can be to reduce atmospheric CO2.
- Afforestation (planting new trees) and reforestation (replanting trees where they previously existed) are also considered forms of CDR because they enhance natural CO2 'sinks'.
- Chemical capture: Another technique uses chemical processes to capture CO2 from the air and store it away on very long time scales. In a process known as direct air carbon capture and storage (DACCS), CO2 is extracted directly from the air and stored in geological formations deep underground. Air is drawn into the DACCS system using an industrial scale fan. Liquid DACS systems pass the air through a chemical solution which removes the CO2 and returns the rest of the air back into the atmosphere. Solid DACS systems captures CO2 on the surface of a filter covered in a chemical agent, where it then forms a compound. The new compound is heated, releasing the CO2 to be captured and separating it from the chemical agent, which can then be recycled. The captured CO2 can then be compressed under very high pressure and pumped via pipelines into deep geological formations. This permanent storage process is known as 'sequestration'. There are 15 DACS plants currently in operation worldwide – Climeworks operates three in Switzerland, Iceland and Italy. Together, these small-scale plants capture approximately 9,000 tonnes of CO2 per annum. The first large-scale plant, currently being developed in the Permian Basin, Texas, is expected to capture 1,000,000 tonnes (one megatonne) per annum when it becomes operational in 2025.

In addition to carbon removal initiatives, technologies are being developed to capture emissions from energy intensive installations before they are emitted into the atmosphere. These are referred to Carbon Capture, Utilisation and Storage (CCUS) technologies. CCUS technologies are not referred to as being carbon 'sinks' as they do not absorb carbon from the atmosphere, but rather they stop it from being emitted. It involves the capture of CO2 from large point sources, including power generation or industrial facilities that use fossil fuels. If not being used on-site, the captured CO2 is compressed and transported by pipeline, ship, rail or truck to be used in a range of applications, or injected into deep geological formations (including depleted oil and gas reservoirs or saline formations) which trap the CO2 for permanent storage.

There are three drivers of interest in carbon removal.

a) The first is that at a global level the pace of emission reductions is currently insufficient to meet the targets set out in the Paris Agreement to maintain global average temperatures to no more than 1.5 degrees C. In particular there are sectors of the economy that are proving harder to decarbonise such as aviation, and certain industrial processes. One use of carbon removal could be to compensate for GHG emissions from sectors that cannot completely decarbonize, or which may take a long time to do so. If global average temperatures overshoot 1.5 degrees C, we would need carbon removal technologies to bring the temperature back down.
b) Voluntary Carbon Markets: Many companies have committed to emission reduction targets and are interested in using carbon removal techniques to help them offset their emissions that are hard to abate. Voluntary (i.e., non-governmental) markets have emerged to source and verify emission reductions from carbon removals. Carbon removals in this context are a contentious subject as many believe there is a risk they could be used to avoid delivering on emission reduction plans. There is also uncertainly over their sustainability, for example carbon.
c) The European Commission plans to put forward a proposed regulatory framework for the certification of carbon removals by the end of 2022. It is possible that such a certification scheme could pave the way for land use to be included in the EU Emission Trading System after 2030.

There are opportunities to apply digital technology to support these processes. These include:

- IoT and Edge computing solutions to support Carbon Capture, Utilisation & Storage (CCUS) such as monitoring, control and process optimisation using e.g., connectivity platforms and connected sensors, big data and AI, cloud and edge computing.
- Material science for chemical capture processes: machine learning could well be applied to accelerate progress on material science research to find optimal liquid or solid compounds to increase the efficiency of capture.
- Identifying areas for planting trees using a combination of satellite imagery, ground collected data, and machine learning.

The Carbon Removal Centre acts as a convening body for this nascent industry.

Alliance for Internet of Things Innovation

About AIOTI

AIOTI is the multi-stakeholder platform for stimulating IoT Innovation in Europe, bringing together small and large companies, start-ups and scale-ups, academia, policy makers and end-users and representatives of society in an end-to-end approach. We work with partners in a global context. We strive to leverage, share and promote best practices in the IoT ecosystems, be a one-stop point of information on all relevant aspects of IoT Innovation to its members while proactively addressing key issues and roadblocks for economic growth, acceptance and adoption of IoT Innovation in society.

AIOTI's contribution goes beyond technology and addresses horizontal elements across application domains, such as matchmaking and stimulating cooperation in IoT ecosystems, creating joint research roadmaps, driving convergence of standards and interoperability and defining policies. We also put them in practice in vertical application domains with societal and economic relevance.

AIOTI is a partner for the European Commission on IoT policies and stimulus programs, helping to identifying and removing obstacles and fast learning, deployment and replication of IoT Innovation in Real Scale Experimentation in Europe from a global perspective.

AIOTI is a member driven organisation with equal rights for all members, striving for a well-balanced representation from all stakeholders in IoT and recognizing the different needs and capabilities. Our members believe that we are the most relevant platform for connecting to the European IoT Innovation ecosystems in general and the best platform to find partners for Real Scale Experimentation.