T20 INDONESIA 2022 THINK

Policy Brief

TOWARDS A GLOBAL AGENDA FOR DIGITALIZATION WITHOUT GREENHOUSE EMISSIONS

Task Force 2

Meaningful Digital Connectivity, Cyber Security, Empowerment

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Abstract

Reconciling digitalization with decarbonization is one of the essential elements of the global agenda that has not been appropriately addressed, neither at the G-20 nor the COPs levels. Addressing this problem requires national and global measures, both in terms of measuring and raising the awareness among users, citizens, businesses, and public administrations, with regulations that do not strangle the development possibilities of the Global South. This Policy Brief proposes: first, setting up a center to measure and analyze the energy evolution of both ICTs and digitalization. Second, new governance should incorporate environmental regulation responsibilities to the digital sector. Third, acknowledge and respond to the existing gap on global investment in renewable energy and low carbon technology. Fourth, propose the G20´s recognition of the carbon footprint of digitalization. By 2040, non-OECD countries will account for 70% of energy demand; the Global South will be central to this issue and should not be left behind in digitalization.

Challenges

As Information and Communication Technologies (ICT) become ubiquitous, so does their environmental impact (Martín and Ortega, 2021; Le Monde, 2022). The world needs to get to 2030 with its homework done to reach the goal of net zero by 2050. Digitalization has a lot to do with this, both in terms of facilitating the technologies that will make this possible, and not causing more greenhouse gases through its growing electricity consumption. If we miss the 2030 deadline, we will miss the 2050 one as well. This deadline also applies to the ICT sector in its manufacture, use, and elimination of obsolete devices. With improvements in computational efficiency and the greater sophistication of new peripherals, the manufacturing phase is increasingly crucial in the sector´s environmental impact (Freitag, Ch. et al. t, 2021).

Digitalization, however, entails a hard choice in its adoption. While it is advanced in the industrialized economies, it is much less so in the Global South and constitutes a necessity for this part of the world. Hence, digitalization must be treated as a common good (Ortega, 2021), and this common good must avoid generating more joint damage in environmental terms. This challenge requires global solutions that reconcile digitalization and decarbonization, as new technologies simultaneously help to provide solutions and use more electricity.

Solutions cannot be the same for the Global north and the Global south, and neither are the contexts within the G20. G20 countries play an important role in digitalization and climate change impact, yet they are responsible for around 75% of global greenhouse gases (GHGs), including land-use change and forestry (Climate Transparency Report, 2021). The G20 countries are not homogeneous; their greenhouse contributions, energy sources, mitigation actions, and compromises vary. The Environmental Performance Index from Yale Center for Environmental Law & Policy is an accurate proxy to understand those differences. It is possible to see G20 countries in top positions and others in much lower positions as 165/166.

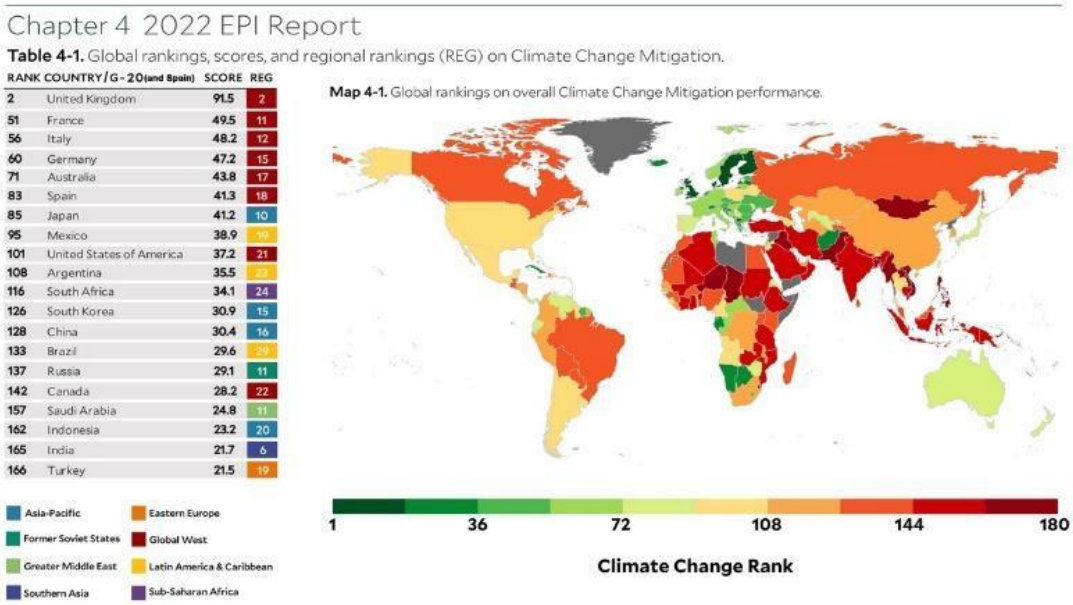

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Table 4-1. Global rankings, scores, and regional rankings (REG) on Climate Change Mitigation.

RANK	COUNTRY / G-20 (and Spain)	SCORE	REG
2	United Kingdom	91.5	2
51	France	49.5	11
56	Italy	48.2	12
60	Germany	47.2	15
71	Australia	43.8	17
83	Spain	41.3	18
85	Japan	41.2	10
95	Mexico	38.9	19
101	United States of America	37.2	21
108	Argentina	35.5	23
116	South Africa	34.1	24
126	South Korea	30.9	15
128	China	30.4	16
133	Brazil	29.6	29
137	Russia	29.1	11
142	Canada	28.2	22
157	Saudi Arabia	24.8	11
162	Indonesia	23.2	20
165	India	21.7	6
166	Turkey	21.5	19

Asia-Pacific
Eastern Europe
Former Soviet States
Global West
Greater Middle East
Latin America & Caribbean
Southern Asia
Sub-Saharan Africa

Map 4-1. Global rankings on overall Climate Change Mitigation performance.

Figure 1. Global ranking, scores, and regional ranking (REG) on Climate Change Mitigation

Source: Wolf, M. J, Emerson, J. W., Esty, D. C., de Sherbinin, A., Wendling, Z. A., et al. (2022). 2022 Environmental Performance Index. New Haven, CT: Yale Center for Environmental Law & Policy. epi.yale.edu

It is possible to observe a similar situation on the digitalization side. In this case, the Digital Competitiveness Ranking works as a proxy to understand the digitalization status of each country. We can also observe different degrees of penetration of digitalization in each of the G20 countries.

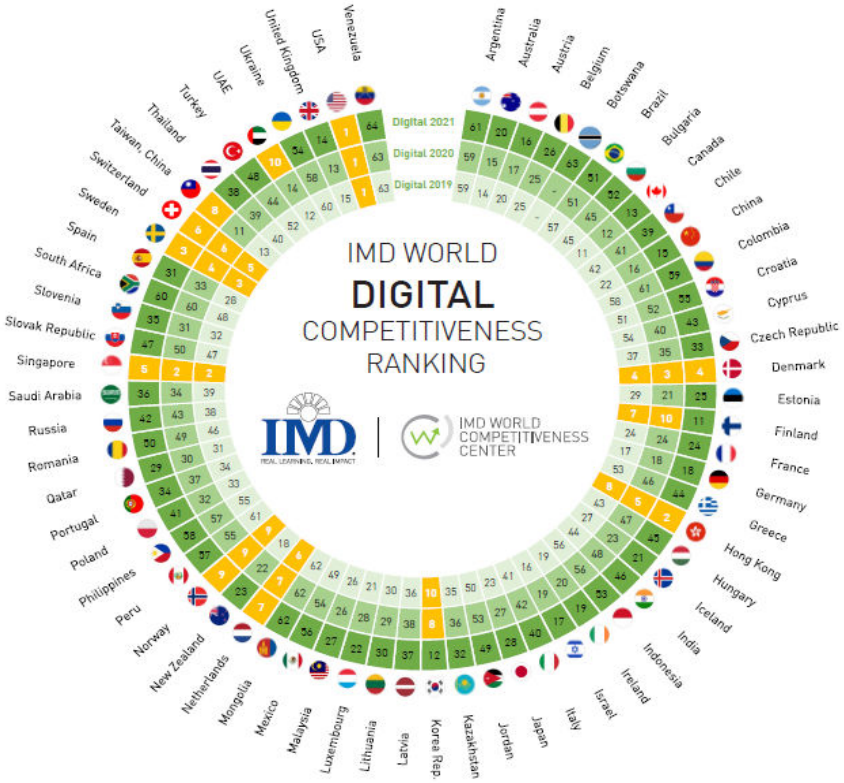

Figure 2. Digital Competitiveness Ranking 2019,2020 and 2021
Source: IMD World Digital Competitiveness Ranking 2021

While G20 countries are at the center of the scene, it is projected that 70% of the future energy demand will come from non-OECD countries in 2040 (IEA, 2018). Therefore, developing countries will be central to this issue too. The Global South must not be left behind in digitalization, and it also has to be able to go through a just green and energy transition.

For the Global South, the challenge is multiple. First, improving access to and opportunities for digitalization for all is a pending matter. Second, at the same time, countries in the Global South are facing a green transition, but with less capacity and time. Moreover, patents of critical technologies for a low-carbon economy (Goldthau et al., 2020) are held almost exclusively by OECD countries and China (China Chinese Academy of ICT, 2021). Furthermore, low-carbon global capital allocation primary destinations are Northern America, Europe, and China (Goldthau, A., Eicke, L., Weko, S. 2020). In other words, the Global South must face these changes with a dependency on access to technologies and capital.

Addressing these problems requires national and global actions (Longaretti and Berthoud, 2021), both in terms of measuring and raising the awareness among users/citizens, businesses, and public administrations, with regulations that do not strangle the development possibilities of the Global South.

The 26th UN Climate Change Conference held in Glasgow in November 2021 partially addressed the issue of reconciling digitalization and decarbonization; it set a precedent and the opportunity to be addressed by the G20. One of the first problems to highlight and solve is how to measure these effects. An initial solution is to build a neutral and professional body, such as the Cambridge Centre for Alternative Finance (CCAF), an ongoing project created and maintained by the Digital Assets Programme (DAP) at the Cambridge Centre for Alternative Finance, dedicated to analyzing the Bitcoin network power demand.

Proposals for G20

One of the most significant challenges of our time is reconciling the progress of ICTs and ICT-based applications—known as digitalization—with efforts to achieve a green economy (Langer et al., 2020; Knowles et al. 2022). The first problem is that there is no general agreement on how to consider and build statistics in this respect, nor on whether to include entertainment or the devices, their manufacture, and their disposal as waste when they become obsolete. Furthermore, there is no agreement on the conversion rate of kW/h used by ICTs into tons of CO2 emitted. Estimates of the current and future carbon footprint in different economic sectors and different regions and countries present worrying divergences. It is important to highlight that the G20 in the last years (Argentina and Saudi Arabia Summits) acknowledged the problem of measuring the digital economy and have made substantial contributions[1] to develop common frameworks to try to produce answers to that issue[2]. However, countries have not yet implemented homogeneous measures and there is still a lack of guidelines on environmental dimensions.

The global digital ecosystem is estimated to be responsible for 3% of global primary energy and 7% of electricity consumption. It implies 2% to 4% of greenhouse gas emissions worldwide and the emissions of 15 million to 25 million CO2 equivalents, that is twice as much as emissions from air transport (80% associated with travel)[3]. In 2019, for example, CAPEX (Computers and

[1] G20 Toolkit for Measuring the Digital Economy (G20 Argentina, 2018)
A roadmap toward a common framework for measuring the digital economy (G20 Economy Task Force Saudi Arabia, 2020)

[2] The G20 incorporated the importance of measuring the digital economy in the next declarations:
G20 Digital Economy Ministerial Declaration, annex 3, Argentina 2018, http://www.g20.utoronto.ca/2018/2018-08-24-digital.html
G20 Digital Economy Ministers Meeting, annex 3, Riyadh Summit, http://www.g20.utoronto.ca/2020/2020-g20-digital-0722.html

[3] Stefan Gossling, Andreas Humpen (2020) "The global scale, distribution and growth of aviation: Implications for climate change", Global Environmental Change 65.
D.S. Lee,(2021) "The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018", Atmospheric Environment 244, n° 1, 2021. It is always difficult to compare two sectors that do not provide the same services, but the growing use of the carbon indicator sometimes encourages comparison. However, are carbon or greenhouse gas emissions calculated on the same perimeter in these two sectors? According to reference publications, aviation (domestic and international, commercial and cargo) accounted for 1.9% of global greenhouse gas emissions in 2016, 2.5% of carbon emissions in 2018, and 3.5% of radiative forcing in the same year. In absolute terms, aviation carbon emissions were just over 1 Gt CO2 in 2018. It does not appear that these estimates include the impacts of the aircraft manufacturing phase. It seems that the studies "just" account for fuel consumption, related greenhouse gas emissions and contrails. In terms of usage, it would appear that 11% of the world's population flew in 2018, 4% of whom flew internationally. It would appear that frequent flyers, 1% of the world's population, account for 50% of the sector's emissions. It is also easy to define the perimeter of use of air transport as the route is so segmented (going to the airport, taking the plane, leaving the airport)

Devices, Hardware, Servers, Real Estate, Equipment) and supply chain activities accounted for 23 times more carbon emissions than OPEX (Equipment Maintenance, Salaries, Licenses, Administrative Fees, Cloud Services activities on Facebook).

The first step is to properly measure the origins of the electricity used, which is a key factor in this approach (IEA 2018). The problem is significantly mitigated if the energy is clean (i.e. not emitting greenhouse gases, or essentially solar, wind, or even nuclear). It is therefore important to ensure and promote the use of clean energy in ICTs, and in turn, digitalization—especially Artificial Intelligence—can be of great help.

In the meantime, large technology companies are increasingly aware of the need and their own responsibility to reconcile the ecological and digital transitions, not only as a consequence of pressure from public policy, changes in the price of clean energy, and internal developments in the companies themselves, but also in response to public opinion (Hook and Lee 2021).

The growing role of ICTs is not geared towards reducing emissions as underlying efficiency improves. Quite the opposite: their footprint has steadily increased despite becoming much more efficient at transmitting and storing data over the last 50 years. Increased efficiency almost always leads to increased carbon emissions, as efficiency gains are quickly met by the desire to do and use more ICTs. Hence, we see global emissions rising decade after decade, despite continued efficiency gains in all sectors.

ICTs and digitalization are evolving with extraordinary efficiency gains, but this is not preventing their innovation from lowering their impact on global emissions. The new energy-guzzling development is pressing more on the sector's carbon emissions because blockchain, Machine Learning in Artificial Intelligence, or metaverses, require substantial data centers and high levels of electricity consumption for their operations and cooling (ACM Tech Brief, 2021; Knowles et alt, 2022).

Unless we act and take corrective measures, the emissions will continue growing while we need to reduce them. Economic geography plays an essential role in the ITC systems locations, as shown by the current installations of cloud data centers and cryptocurrency mining. Both relate to using energy, refrigeration, and regulations (Ch Freitag et alt 2021).

This poses a problem in general terms but particularly for the Global South. This evolution is not homogeneous: for instance, only 28% of sub-Saharan Africa's population has access to the internet (Jackson, 2021) and 200 million people lack access to digital infrastructure in Latin-American (Celis, J. P., & Mendes, M. P. 2021).

Regulation should not strangle its development in its digitalization. Digitalization is needed for all, especially for emerging and developing economies. The impact of regulations and new standards related to the carbon footprint of ICTs and other environmental effects of digitalization need to be measured and understood, considering the asymmetry between the Global South and the Global North. Those changes should contemplate instruments to reduce footprint while reducing the digital divide in the global south to pursue inclusive development.

Digitalization, and especially connectivity as its basis, should be considered and treated as a shared or public good (even if provided by private companies) (Ortega (2021). However, the provision of clean energy is essential for them, and is a source of income for countries lacking hydrocarbons.

From 2017 to 2019, software and hardware optimizations focused primarily on maximizing performance, bypassing the trend of carbon footprint growth. Governments and industries must adress the carbon footprint of ICTs, (Data Centers, digital networks, user devices) and the climatic pros and cons of digitalization in the global economy.

Both assessments are complex and should become a global issue, with global targets and instruments. In many cases, companies are ahead in addressing this challenge as they propose new technologies and applications (big data, machine learning, blockchain, Internet of Things, among others) while only in part incorporating the energy demands they entail.

Complementarity—not conflict—should be generated between the digital and green transitions, while reducing the digital divide requires public, private and public-private policies and collaboration.
Green and digital transitions are inseparable. The ICT footprint in terms of greenhouse emissions must be reduced, yet it is increasing. Thus, the problem should be recognized, measured, and addressed—through better use of ICTs and energy consumption, and in the way devices are manufactured and disposed of—and the digital divide should be tackled with a complementary approach to digital and green transitions.
There is a lack of evidence and policy mechanisms to enforce climate targets across the ICT sector, an issue that was not considered at the G20 Rome Summit, nor at Glasgow COP26.
Public awareness has raised in recent years, with consequences for businesses (which have started to take action) and public administrations (which have started to address it) albeit with approaches still too general. There is knowledge compartmentalization and a lack of connections among the agents responsible for tackling the problems. A change in culture and governance is required. For instance, are proximity data centers, rather than large ones in

Northern countries, alternatives to save electricity consumption while contributing to local ICT industries in Southern countries?

The ability of authorities to manage the environmental footprint of digital technology can only be improved by developing tools to measure developments more accurately. Rigorous metrics need to be developed through an environmental barometer to promote best practices across the digital ecosystem nationally and globally.

We propose the following lines of actions:

Measurement

A center to analyze the energy power and consumption evolution of both ICTs and digitalization. One case study to consider is the Cambridge Centre for Alternative Finance (CCAF). A takeaway to replicate from that center is the creation of a knowledge network of regional resources and capabilities for policymakers, regulators and industry. It allows them to navigate the digital transformation of the global financial system and enables the unacceptable energy costs of bitcoin to be detected (Cambridge Centre for Alternative Finance. Cambridge Judge Business School 2022).

Governance and users' cultures

It is a priority to incorporate a mechanism of coordination between digitalization and environmental policies. There could be other examples, but the French government developed an attractive policy design to make both types of policies interact. From 2022, the French telecommunications regulator has incorporated responsibility for environmental regulation of the digital sector. The Electronic Communications and Posts Regulatory Authority (Arcep) has new powers over all players in the digital ecosystem in France. Nevertheless, despite the carbon neutrality objective that France has set for 2050, the law does not (yet) require them to reduce their environmental footprint (Laubier, 2022). It is an example to be followed in global terms.

Guarantee better access to consumption information for citizens and users. Improving citizens' and users' cultures is also a requirement. Information related to the relationship between the use of data and greenhouse emissions can impact people's behaviour. A French law from 2020 requires telecommunications operators to inform their fixed broadband and mobile subscribers of "the amount of data [they have] consumed and it is equivalent in greenhouse gas emissions". Similar laws could be passed in most of the countries of the North, but also the Global South.

The imperative of aligning the digital and environmental transitions means expanding the ethical focus from human-centered AI and digitalization to an eco-centric approach as part of a reference framework for public policy on digitalization and sustainability at a global level.

Investment and knowledge

Acknowledge the existing gap in global investment in renewable energy and work on multilevel funding through international organizations and governments. There exist significant differences in the distribution of global investment in renewable energy. While in the developing world, significant global investments go to China, India and Brazil, only 12% of the total investment goes to the rest of the developing countries (Goldthau, A., Eicke, L., Weko, S. 2020). Therefore, the global community must acknowledge the gap and work on multilevel funding through international organizations and governments to ensure the required investment.

Push for the reduction of low carbon technological gaps produced by the concentration of patents through technological exchange. Climate policies progress; therefore, new regulations and standards push for more sustainable production methods. A low-carbon footprint ensures a country's products stay competitive in the global market (Goldthau, A., Eicke, L., Weko, S. 2020). Moreover, successful sustainable development and successful energy transition are attached to innovative low-carbon tech (Ockwell et al. 2010; Zhou 2019). Therefore, the G20 should acknowledge the asymmetry between the Global North and Global South and push for a mechanism to exchange and facilitate low-carbon technology.

IPCC, COPs and international institutions including the G20.

Propose the G20's recognition of the carbon footprint of digitalization. The last IPCC (Intergovernmental Panel on Climate Change) Report (April 2022) is explicit: "The existing digital divide, especially in developing countries, and the lack of appropriate governance of the digital revolution can hamper the role that digitalization could play in supporting the achievement of stringent mitigation targets (...)Digital technologies have significant potential to contribute to decarbonization due to their ability to increase energy and material efficiency, make transport and building systems less wasteful, and improve the access to services for consumers and citizens. Yet, if left unmanaged, the digital transformation will probably increase energy demand, exacerbate inequities and the concentration of power, leaving developing economies with less access to digital technologies behind, raise ethical issues, reduce labour demand and compromise citizens' welfare. Appropriate governance of the digital transformation can ensure that digitalization works as an enabler, rather than as a barrier and further strain in decarbonization pathways."

This issue of digitalization without carbonization should be given a priority focus in the next COPs, in particular at the one in Egypt later this year. The issue, that was missing only two years ago, has been given a more prominent treatment, at least in terms of principles, by, for instance, the European Commission in its proposal for the establishment of a "European Declaration on Digital rights and principles for the Digital Decade", in which it states that "to avoid significant harm to the environment, and to promote a circular economy, digital products and services should be designed, produced, used, disposed of and recycled in a way that minimizes their negative environmental and social impact" (European Commission 2022).

The next step should be recognition by the G20 through a similar declaration. The G20 has developed relevant achievements acknowledging digital and energy transition policy agendas. However, the carbon footprint of digitalization has yet to be considered.

CONCLUSION AND SUMMARY OF POLICY RECOMMENDATIONS

G20 countries have committed to leading in shaping a strong, sustainable, balanced, and inclusive world (Riyadh 2020) and have recognized ICT as a path to enhance energy security and market stability through improved energy planning (Rome 2021). Therefore, it is crucial to acknowledge ICT carbon footprint with a north-south impact perspective and establish multilateral dialogue for a policy and cooperation agenda to develop integrated digital and green policies while reducing the global digital divide. In order to do it, it will be essential to build the capacity to measure and analyse the energy evolution of both ICTs and digitalization, incorporate new governance to include responsibility for environmental regulation to the digital sector, and finally, acknowledge and work to close the capital and technological gap in renewable energy and low carbon technology.

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