Task Force 7
Towards Reformed Multilateralism: Transforming Global Institutions and Frameworks

THE ENVIRONMENTAL AND ETHICAL CHALLENGES OF ARTIFICIAL INTELLIGENCE

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Abstract

Artificial Intelligence (AI), including deep and machine learning, is deeply embedded in the physical world and presents governance issues related to environmental impact, governance structures, transparency and accountability, and education and awareness-raising. Thus, AI's future development implies increasing demands for energy and rare-earth metals and other resources. Increasing energy demands will put a strain on the green transition and renewable energy supplies. The mining and processing of the necessary raw materials can damage the environment, disproportionately in the global South. The G20 should ensure that AI's benefits do not accrue to the global North while the costs fall disproportionately on the global South. It should convene a commission of experts and government and industry representatives to explore AI's energy and environmental costs. The commission should make recommendations on ensuring an equitable share of costs and benefits between the global North and the global South, underlining globally acceptable environmental and ethical standards.

The Challenge

1

Artificial Intelligence (AI) offers significant benefits for humankind in terms of education and scientific research as well as economic and social development. At the same time, however, it poses serious challenges to global governance, protection of privacy and data, and promotion of social and economic equity at both national and international levels. There is a tendency to see AI, like other digital technologies, as a technical issue, which resides largely in cyberspace and the 'cloud', with limited physical manifestations. This underestimates the extent to which the challenges posed by AI are political and geopolitical instead of being only technical. It also underestimates the serious environmental impact of AI, both in environmental damage and consumption of energy.[1] The key challenges of AI involve not only how to protect citizens' data and guarantee equitable access to its benefits, but also how to ensure that its development takes into account its physical and environmental impacts. The primary challenge for the G20 is to ensure that the benefits of AI do not accrue only to the global North while the environmental costs are left to the global South to bear.

AI does not exist in a virtual world; it depends on the physical infrastructure which supports its operations, including the computer systems that operate its programmes, the physical networks of internet cables and switching stations that connect these computers, the power stations and the networks that generate the energy allowing AI programmes to be executed, and the mining operations that provide the rare-earth metals and other materials essential to AI hardware. While the initial focus was on the cyber vulnerabilities of the computing systems on which AI depends – the risk of cyberattacks to information systems – in recent years, increasing attention has been paid to the physical vulnerabilities of the internet's physical infrastructure, especially the vulnerability of the transoceanic cables carrying internet data. However, less attention has been paid to the energy needed to power AI or to the economic and environmental damages caused by the mining and processing of rare-earth metals and other materials, essential for the machines on which AI runs. Both the increasing energy requirements of AI and the environmental damages its development implies risk disadvantaging countries of the global South disproportionately.[2]

Computational power or AI compute is the key to the future development of artificial intelligence. The main limitation on AI compute is the energy it consumes. According to a 2022 OECD report, Google estimates that 15 percent of its overall energy consumption is dedicated to AI.[3] One bitcoin transaction requires the same amount of energy as that consumed by an average household in the global North in a month.[4] The technology for Metaverse has not yet been fully developed, but some analysts have already warned against the energy consumption it will imply.[5,6] Of particular concern is the energy consumption required by the billions of training examples that are needed by machine and deep learning. Although the International Energy Agency (IEA) stresses that the energy consumption of data centres has remained stable at around one percent of the global energy consumption, this is likely to change radically as the demands for AI compute grow. As one analyst has pointed out, AI's demands for computational power will always exceed what is available, implying an endless demand for energy to run it.[7] AI's growing demand for energy poses serious problems in terms of carbon emissions and the transition to green energy, especially when energy production is under severe pressure from other geopolitical factors. It poses particular problems for equitable access to AI and its benefits. Successful development of AI requires not only access to technology and technical skills, but also the ability to generate the energy necessary to meet the demands of AI compute. This can further increase the AI divide between the global North and the global South.[8]

The OECD report also points to the wider environmental impact of AI. The hardware on which AI systems operate require rare-earth metals and other raw resources, which need to be mined and processed before their use in manufacturing. Mining of such resources is disproportionately concentrated in the global South. This does not necessarily reflect the geographical concentration of such resources but shows the tolerance of the countries concerned for the environmental damage such mining causes.[9] For example, deposits of lithium in Europe, essential for batteries of electrical vehicles, have been largely undeveloped because Europe's environmental regulations will make their exploitation economically unviable. Such regulatory frameworks are largely absent in much of the global South. The

processing of rare-earth metals and other raw materials essential to AI, is even more concentrated than mining. This is largely attributed to similar factors – above all, the willingness of the processing countries to tolerate the environmental damage such processing causes.

This poses two challenges. First, the overdependence on a limited number of countries for the mining and processing of AI-essential raw materials calls into question the geopolitical reliability of fragile supply chains. Second, the concentration of mining and processing in the global South risks creating a situation in which the global North gains disproportionately from the benefits of AI while the global South suffers inordinate environmental costs.

The energy and environmental implications of AI and its associated technologies of deep and machine learning also impact the 2030 Agenda. New digital technologies, along with the green transition and the increasing use of renewable energies, especially in the global South, are seen as essential for delivering the SDGs. This will, however, be called into question if the accelerated development of AI results in energy demands that outstrip the ability of renewable energies to supply and if the raw material demands lead to increasing environmental degradation of countries in the global South. As the OECD has pointed out, successful attainment of the SDGs requires an audit of the energy and raw material requirements of AI, and a clear approach to supplying these in sustainable ways.[10]

Although the energy requirements of AI compute and the growing need for rare-earth materials may appear to be two separate issues, they are connected in two ways: both have severe impacts on the environment, and they risk widening the economic and social divide between the North and South. All digital technologies place demands on the supply of energy and raw materials. It is AI, however, seen by many governments as essential to economic development and geopolitical competition, which is driving the exponential growth in the demand for both. Failure to secure equitable access to these physical requirements for successful AI development for all, risks fuelling geopolitical instability as the more AI developed countries seek to secure cheap energy supplies and protect the supply chains for key raw

materials (similar to the existing conflict over supplies of microchips). It will result in a world in which a small number of countries reap the benefits of AI while the majority pay the environmental costs.

The G20's Role

2

The G20 represents the leading economies from both the South and the North. The new digital technologies, particularly AI in its deep learning and machine learning forms, are essential to the future economic development of both regions, and the G20 countries as a whole. Given the importance of these technologies, it is vital that the G20 ensures equitable access to these technologies, and, above all, avoids the situation wherein the benefits of AI disproportionately accrue to the North while the heavier costs, especially the environmental ones, are incurred by the South. Such a development can ultimately threaten the coherence of the G20 and its relevance in the global promotion of sound environmental, social, and corporate governance (ESG) standards.

Recommendations to the G20

3

The G20 should establish a commission to investigate the resource implications of AI and its associated machine learning and deep learning technologies. The commission and its work should be complementary to the other kinds of work, undertaken in the G20, on the broader international governance issues associated with AI. The commission should bring together academics, specialising in AI, environment, and energy, and industry and government representatives. A multidisciplinary approach will be essential for an effective response to what has so far been a relatively neglected aspect of technology in general, and AI in particular.

The commission should be assigned the following tasks:

- Investigating the current energy requirements for AI and how these are likely to grow over the next five years. The commission should relate the energy requirements to the likely developments in machine and deep learning, focusing on data training requirements and the needs of increased AI compute.
- Exploring the options for reduction in or limitation on AI's energy consumption, both through the ways in which AI is developed and the application of AI to broader energy production and consumption.
- Relating the forecast of AI-related energy consumption to that of renewable energy production to better understand the implications of AI for the realisation of the 2030 Agenda, the energy-related SDGs, and the climate change carbon emission targets.
- Identifying the key rare-earth metals and other raw materials needed for the electronic hardware and other infrastructure required to run AI programmes. Exploring the likely future raw resource requirements of AI-related infrastructure and the possibility of reducing or substituting for the consumption of the most polluting or rarer materials.
- Establishing the geographical location of the rare-earth materials and other resources essential for AI, focusing on where they are mined and where they are processed. Identifying the key supply chains connecting mines, processing, and manufacture/production of AI-related equipment and infrastructure.
- Identifying the environmental impact of the mining and

processing of rare-earth metals and other key AI resources, including the impact on local communities, and the measures that can be adopted to mitigate those effects.

The commission should be tasked with producing a report for the G20 countries on the energy and environmental implications of AI, including the equitable development of AI in the global South as well as the global North. A first draft of the report should be delivered to the G20 at its summit in 2024. The report should include:

- an energy audit for AI, establishing the additional energy requirements for the future development of AI, identifying where and how those demands will be met; the audit should also include an evaluation of the implications for the green transition to renewable energies;
- a raw material audit for AI, identifying the key raw materials in the development of AI and the geographical locations of the mining and processing of those materials; the audit should include an evaluation of the environmental implications for local communities in places where mining and processing take place;
- an evaluation of the implications of the energy and raw material requirements of AI for the G20 members' commitments under the SDGs and the 2030 Agenda;
- recommendations on how the G20 may integrate climate-oriented industry consortia, such as the Green Grid can be integrated into developing sustainable AI;
- recommendations on measures the G20 should take, in relation to the energy and raw material requirements of AI, to ensure that the South and the North equitably share the benefits and costs of the future development of AI; this should include the best practices identified in the reduction in the energy and environmental impacts of AI, both in terms of the development of AI and the production of the energy and raw materials it requires; and
- identification of circular economy models that will prioritise resource conservation and material reuse, minimising negative environmental effects; recommendations should equitably address issues and propose solutions to correct distortions of the technological revolution, based on AI, in the way it affects societies and economies around the world while paying particular attention to supply

chain optimisation, corporate governance, and investing in impact aspects that adhere to ESG standards.

Upon receipt of the report, the G20 should develop and publish an action plan to ensure equitable access to AI benefits as well as equitable sharing of costs of future AI development. This should include the energy and environmental impacts as well as other global governance issues relating to AI.

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Endnotes

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