

Inputs on STI to Preparatory Process for the 4th UN Conference on Financing for Development (FFD4)

***Submitted by the UN 10-Member-Group of High-level Representatives¹,
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Part 2: Key STI trends, messages, and proposals for consideration

The world is at a crucial turning point in its quest for sustainable development, with both encouraging progress and daunting obstacles shaping the path ahead. Scientific research has increasingly become globalized, with a significant rise in the contributions from low- and middle-income countries (LMICs). Since 2022, authors from LMICs have published more scientific articles than their counterparts in high-income countries (HICs), marking a historic shift in the production of scientific knowledge. This trend reflects the growing academic and research capabilities in some LMICs, driven by rising numbers of PhD graduates and a commitment to SDG-related research. However, these nations still face challenges in international research visibility, collaboration, and resource allocation, particularly in private sector R&D. The global research community must address these disparities to ensure that LMICs have an equal stake in solving global challenges.

Despite advances in research, both the health of the planet and the wellbeing of its people are deteriorating due to the accelerating degradation of Earth's natural systems. This deterioration poses a grave threat to global stability, as the safe and just Earth-system boundaries, which safeguard both human life and the planet's life-support systems, have already been exceeded. These boundaries include critical systems like climate, freshwater availability, and nutrient cycles, all of which are essential for maintaining stable ecosystems and human societies. And they are closely linked with wider challenges, in particular conflicts, poverty, and inequalities. Urgent action is required to prevent further crossing of these boundaries, which risks causing immense harm to humans and ecosystems and eventually pushing the planet beyond tipping points that could irreversibly harm future generations. This includes action to better leverage science, technology and innovation.

Harnessing science, technology and innovation (STI) for SDG implementation

The transition to a sustainable future necessitates systemic transformations across key sectors, particularly energy and food systems and the built environment, which are at the heart of both environmental and socio-economic crises. Such a future must ensure that all humans have access to basic necessities to enable them to meet their human rights. A key element of this transformation is the global phase-out of fossil fuels, a measure essential to meeting climate targets and stabilizing the climate. However, efforts toward this goal remain insufficient and are frequently hampered by entrenched economic, political, and financial interests, as well as the costs of stranding fossil fuel assets and resources. Although investments in green technologies and renewable energy surpassed fossil fuels in 2022, the pace of change is still too slow to meet the required

¹ The UN Group of Ten High-level Representatives of Civil Society, Private Sector and Scientific Community to Promote Science, Technology and Innovation for the SDGs (10-Member-Group) is a General Assembly-mandated Group (Addis Ababa Action Agenda and the 2030 Agenda on Sustainable Development) and forms an integral component of the UN Technology Facilitation Mechanism.

timelines. Moreover, there is a significant lack of coherence in international financial flows, including rising debt, especially between rich and poorer countries. This financial imbalance threatens to slow progress in the regions that are most vulnerable to climate change, particularly in Africa and Latin America, where socio-environmental justice must be a key component of sustainable development strategies.

Justice, particularly in the form of fair resource distribution, must be central to addressing these challenges. For example, the global housing crisis, especially in the Global South, illustrates the need for sustainable solutions. By 2030, an estimated 600 million new housing units will be needed, and the construction industry's reliance on traditional materials like cement—which accounts for 8% of global carbon emissions—must be addressed. Decarbonizing cement production and embracing alternative, sustainable building materials are critical steps to lowering the carbon footprint of this sector. Additionally, efforts to reduce embodied carbon throughout the entire lifecycle of buildings are necessary to mitigate climate impacts. Fossil free shared and public transport within these new urban areas is critical. Systemic changes, such as circular economy practices and life-cycle assessments, can help ensure that resource efficiency and sustainability are prioritized from production to disposal.

In parallel with transformations in material use and construction, emerging technologies offer powerful tools for tackling sustainability challenges across a variety of sectors. Artificial intelligence (AI), quantum computing, biotech, and synthetic biology are already revolutionizing fields such as agriculture, healthcare, and urban planning, helping optimize resource use and improve efficiency. In agriculture, for instance, AI is enhancing food security by improving crop yields and enabling precision farming, while biotech innovations are contributing to more resilient and sustainable food systems. These technological advancements are particularly important in the Global South, where food security and agricultural productivity are critical to achieving the SDGs.

However, while these technologies offer great promise, they also come with challenges that must be carefully managed. The rapid growth of AI, for example, has significantly increased water and energy consumption, particularly in regions already facing scarcities. Data centers, which require large amounts of water for cooling, and the production of hardware for AI systems, have heightened pressure on water resources. This trend is especially concerning in vulnerable regions, where water scarcity poses a direct threat to livelihoods. Most importantly, AI has widened the gaps in access and capacity across countries and population groups. The World Economic Forum ranked misinformation and disinformation as the number one threat to human society today, and it is thus critical that such technologies promote healthy societies. As AI and other technologies continue to expand, it is essential to develop governance frameworks that ensure these innovations are deployed ethically, sustainably, and inclusively, with mechanisms in place to hold actors accountable and protect public interests.

Equally important is addressing the persistent gender gap in STEM fields, which remains a significant barrier to achieving inclusive sustainable development. While the number of women entering STEM fields has increased, there is still a notable gender disparity in research leadership and career progression. Many women leave the workforce as they age, particularly in STEM-related careers, highlighting the need for stronger retention policies and more equitable access to research funding. Policies promoting gender diversity, such as balanced hiring practices in universities, have shown some success but must be expanded and enhanced to achieve true gender parity in academia. Ensuring equal opportunities for women in STEM is not just a

matter of fairness—it is essential for addressing talent shortages, driving innovation, and fostering inclusive growth.

Creating an enabling environment for STI toward 2030

Science, technology, and innovation (STI) are fundamental tools for achieving the SDGs, particularly in addressing poverty, food security, and climate change. This is especially true in Africa, where targeted STI initiatives can play a transformative role in overcoming socio-economic challenges and building climate resilience. However, there are still substantial gaps in infrastructure, finance, and coordination that hinder the effective implementation of STI projects across the continent. Strengthening STI governance and fostering international research collaborations are crucial to overcoming these barriers. By building partnerships between research funders, governments, and the United Nations, Africa can harness the power of STI to drive progress toward the SDGs.

Beyond Africa, the global STI landscape also faces significant challenges. The uneven distribution of R&D funding leaves many low-income countries lagging behind in their ability to innovate and address critical development issues. The COVID-19 pandemic starkly revealed these inequalities, as scientific breakthroughs, while unprecedented, were often inaccessible to the world's poorest communities. In addition to exposing the gaps in research funding and infrastructure, the pandemic highlighted the rise of misinformation and distrust in science, which further complicates global efforts to achieve the SDGs. Addressing these challenges requires a holistic approach that considers the political, social, and economic dimensions of STI governance, particularly in the context of future pandemic preparedness and global crisis management. Support is needed to national governments to develop their own STI4SDG roadmaps, in order to anticipate change and chart a clear way forward that is transparent and also accessible to all stakeholders in private sector, civil society and scientific communities.

Emerging technologies, such as generative AI and biotechnology, offer hope for advancing sustainable development in sectors like agriculture and healthcare. However, the rapid pace of technological change necessitates careful planning and governance to ensure these innovations are used responsibly and for the public good. For example, AI's potential to revolutionize climate modeling and energy transitions is immense, but its growth must be matched by the expansion of digital infrastructures, governance frameworks, and policies that address access, data privacy, and environmental impacts. A coordinated One-UN program on digitalization and sustainability, aimed at supporting developing countries, would be a critical step in ensuring that the benefits of these technologies are shared equitably and that vulnerable regions are not left behind in the digital revolution.

Moreover, global efforts to achieve the SDGs must prioritize a fossil fuel phase down and carbon dioxide removal (CDR) technologies, which are essential for accelerating emissions reductions and potentially reversing temperature increases. In addition to scaling fossil fuel replacement and CDR, investments in energy storage technologies and sustainable material provision are key to supporting the transition to a low-carbon economy. A global fossil fuel and CDR fund and market could provide the necessary financial support to scale these technologies.

Achieving the SDGs by 2030 requires institutional innovation, global collaboration, and equitable access to technology. Governments and research funding organizations must commit to increasing global R&D funding

for the SDGs by 20% over the next five years to accelerate progress. International financial institutions must increase public investment in global public goods to at least 0.2% of gross national income, as recommended by the Expert Working Group on Global Public Investment.

At the same time, national STI4SDG roadmaps should be developed to guide stakeholders, with expert support provided for strategic STI governance in vulnerable regions, such as small island developing states (SIDS), least developed countries (LDCs), and Africa. Establishing a global sustainability science center, supported by a significant financial investment, can drive large-scale demonstration projects in energy, food, climate, biodiversity, health, and sanitation. Additionally, a UN collaborative hub for a sustainable built environment could foster the innovations needed to achieve the SDGs. A complementary is to network of innovation funds, ethical councils, and a bank of ideas.

In conclusion, while the road to sustainable development is complex and fraught with challenges, it is also rich with opportunity. Science, technology, and innovation have the power to address the most pressing issues of our time—from climate change and food security to gender equality and social justice. However, achieving a sustainable future requires more than just technological breakthroughs; it requires systemic transformations, resource redistribution, and a commitment to justice and equity. With bold action, global cooperation, and inclusive governance, we can create a better world for all by 2030. The time for change is now, and the tools we need to achieve it are within reach.

List of specific proposals and recommendations by the 10-Member-Group of High-level Representatives, 2023-2024

- 1. High impact actions are needed on STI for the SDGs. Successive 10-Member-Groups have worked cumulatively to define such actions. In 2023 and 2024, the 10-Member-Group identified the following proposals and recommendations for high-impact policies and initiatives which might be considered in the FFD4 preparatory process:**
2. Sustainability science and technology cooperation for future generations:
 - a) Building a UN collaborating hub/network for a sustainable and safe Built Environment to support decent living standards. The hub could focus on decarbonizing building materials, provide strategic foresight/roadmaps on infrastructure transformations and materials, public transport in the shared environment and provide information on tech options, social and institutional innovations, and help understand synergies and trade-offs, and monitor progress. **(2024)**
 - b) Global network of banks of ideas, funds for innovation, and ethical councils for innovation. **(2023)**
 - c) Collaborative, global sustainability science centre and training network across geopolitical divides (with demonstration projects at scale in energy, food, climate, biodiversity, health, and sanitation). Allocate funds that are commensurate with the challenges, and as significant as other major international science initiatives (e.g., CERN). **(2023)**
 - d) Share technologies and skills to solve the basic health issues of water, sanitation, and food security. Prioritize investing in the first 1,000 days of a child's life particularly in the poorest

- settings within and between countries (providing modern medical and nutritional support for all children before 2030). **(2023)**
- e) Develop and implement national STI4SDG roadmaps, as strategic guideposts for all stakeholders. Providing expert support and training on strategic STI governance, regulation, and institutions for STI policy, especially in SIDS, LDCs, and Africa. **(2023)**
3. Financing and funding STI4SDGs:
 - a) Developing innovative ideas and practical partnerships for cooperation on funding R&D for the SDGs. **(2024)**
 - b) Global governmental research funders to boost spending on SDGs by 20% over the next five years **(2023)**.
 - c) Create a fossil fuel phase out and global carbon dioxide removal (CDR) fund and market to facilitate the sustainable deployment of fossil fuel replacements and CDR technology options. **(2023)**
 - d) Boost global public investment in global public goods to reach (0.2% of GNI) and consider implementing the recommendations of the Expert Working Group on Global Public Investment. **(2023)**
 4. AI, biotech, digitalisation and Web 3.0:
 - a) Track and assess emerging applications and their benefits brought about by the convergence of AI and biotech, especially for agriculture and food security. **(2024)**
 - b) Encourage action to ensure that AI promotes correct news and information in democracies. **(2024)**
 - c) Governments to commit to put in place policies, regulations, initiatives, and funding to build the next generation Web 3.0 distributed system and make it work for all by 2027. **(2023)**
 - d) Build worldwide capacity for using, developing, and understanding the impacts of generative AI, while ensuring that AI has minimum impact on nature. **(2023)**
 - e) Create a One-UN programme on digitalisation and sustainability in support of developing countries. **(2023)**
 5. Synthetic and disaggregated data on SDG implementation – possibilities and progress
 - a) Documenting best practices and develop reliable and fine-grained data on advancing gender equality in STI. **(2024)**
 - b) Synthetic (technology-enabled) data production to monitor SDG progress in agriculture, built environment, oceans, and on poverty and socio-economic development, leveraging AI, satellite and remote sensing data, among others. **(2024)**
 - c) Science-policy advice on safe and just targets, boundaries and transformations (in follow-up to the Earth Commission’s findings), including on minimum access indicators, climate commitments, and just and inclusive energy transitions. **(2024)**