GLOBAL INFORMATION SOCIETY WATCH 2020

Technology, the environment and a sustainable world: Responses from the global South

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ETHIOPIA

CLIMATE TECHNOLOGIES IN ETHIOPIA: TOWARDS A CLIMATE-RESILIENT GREEN ECONOMY

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Introduction

Ethiopia is the fastest growing economy in the region, and, with over 112 million people (as of 2019),[1] the second most populous nation in Africa after Nigeria. The government's Climate-Resilient Green Economy (CRGE) Strategy, adopted in 2011, aims for Ethiopia to be a middle-income country by 2025, resilient to the impacts of climate change and with no net increase in greenhouse gas (GHG) emissions from 2010 levels. The strategy is based on four pillars: reducing agricultural emissions, protecting and expanding forests, expanding renewable electricity generation, and adopting energy-efficient technologies in transport, industry and the built environment.[2]

Political leaders worldwide realise the need for immediate and effective action to respond to climate change. These responses include actions to reduce GHG emissions as well as adaptation initiatives to reduce the vulnerability of the population and the economy to the effects of climate change.

In this regard, in March 2017 Ethiopia ratified the Paris Agreement, which is a 2016 agreement under the United Nations Framework Convention on Climate Change (UNFCCC) dealing with GHG emissions mitigation, adaptation and finance. The same day it ratified the Paris Agreement, Ethiopia also submitted its intended nationally determined contribution (INDC), turning its INDC into its NDC. Derived from its CRGE Strategy, Ethiopia's NDC intends to limit the country's net GHG emissions in 2030 to 145 Mt CO_2e[3] or lower, which would reduce 2030 business-as-usual emissions by about 64% and represent an absolute emission reduction of 5 Mt CO_2e relative to 2010 emissions, according to the NDC. This means Ethiopia aims to lower the GHG level of 1.8 in 2010 to 1.1 by 2030.[4]

Ethiopia's NDC in 2017 divided emissions sectors into six categories: agriculture (livestock and soil), forestry, transport, industry (including mining), power, and buildings (including waste and green cities). It projects a significant increase of emissions until 2030 in almost all sectors, the three highest contributors being agriculture, forestry and transport.[5]

This report therefore looks at climate technologies in Ethiopia and their role towards reducing greenhouse gas emissions. It showcases selected examples in the three above areas, and highlights policy actions that can enhance the contribution of climate technologies in enabling the country to meet its intended mitigation objectives.

The climate change and digital context

Ethiopia's current contribution to the global increase in GHG emissions since the Industrial Revolution has been practically insignificant. Even after years of rapid economic expansion, today's per capita emissions of less than 2 t CO_2e are modest compared with the more than 10 t per capita on average in the European Union and more than 20 t per capita in the United States and Australia. Overall, Ethiopia's total emissions of around 150 Mts CO_2e represent less than 0.3% of global emissions.[6]

Of the 150 Mt CO_2e in 2010, more than 85% of GHG emissions came from the agricultural (50%) and forestry (37%) sectors. They are followed by transport, power, industry and buildings, which contributed 3% each.[7]

On the digital technology sector front, Ethiopia's National Information and Communication Technology (ICT) Policy and Strategy (2016), aims, among others, to implement the use of ICTs to mitigate climate change, and for emergency communication

1   https://data.worldbank.org/indicator/SP.POP.TOTL?locations=ET

2   Federal Democratic Republic of Ethiopia. (2011). *Ethiopia's Climate-Resilient Green Economy Strategy*. https://www.adaptation-undp.org/sites/default/files/downloads/ethiopia_climate_resilient_green_economy_strategy.pdf

3   Carbon dioxide equivalent, a way of expressing all the different greenhouse gases as a single number.

4   Wang-Helmreich, H., & Mersmann, F. (2018). *Implementation of Nationally Determined Contributions: Ethiopia Country Report*. Umweltbundesamt. https://www.umweltbundesamt.de/en/publikationen/implementation-of-nationally-determined-4

5   Ibid.

6   Federal Democratic Republic of Ethiopia. (2011). Op. cit.

7   Ibid.

and disaster relief.[8] The country has demonstrated some growth and development in the ICT sector over the last couple of decades, although it is still far behind several African countries.

As of 2018, the total telecom service subscribers reached 43.6 million, which is an increase of 15% from the previous year. The country has 41.92 million mobile voice subscribers and 22.3 million data and internet users. After years of low uptake due to high pricing, Ethio telecom reduced tariffs ranging from 40% to 50% in 2018, resulting in an increase in the use of data and voice traffic. The increase has been at a remarkable rate: 130% in data usage and 19% in voice.[9]

Ethiopia's climate mitigation, adaptation and resilience efforts are rooted in its CRGE Strategy, issued in 2011. Its implementation is currently overseen and coordinated by the Ministry of Environment and Climate Change.[10] This strategy, along with its NDC from the Paris Agreement, is currently under revision. In June 2020, Ethiopia disclosed its first-ever 10-year economic development plan called "Ethiopia: An African Beacon of Prosperity". According to the prime minister, the 10-year plan aims to bring quality-based economic growth; increase production and competitiveness; build a green and climate-resilient economy; realise institutional transformation; ensure fair and equitable opportunities for women and youth; and guarantee private sector-led growth.[11]

Going forward, Ethiopia has also recently launched its "Digital Ethiopia 2025: A Digital Strategy for Ethiopia Inclusive Prosperity" strategy for the next five years. This is based on its home-grown economic reform agenda of realising digital transformation in the country. This would be done by creating a digitally enabled society focusing on four strategic sectors, namely agriculture, manufacturing, building IT-enabled services, and tourism.[12]

Therefore, digital transformation will be at the centre of realising the economic reform agenda of the next five years.

Climate technologies in Ethiopia

ICTs provide solutions to monitor, mitigate and adapt to the challenges of climate change. Several climate technology initiatives in the country demonstrate the range of measures that are being deployed by the different stakeholders to reduce greenhouse gas emissions, build resilience to the climate crisis, and contribute to the country's 2030 targets.

For the agricultural and agro-pastoral sectors, a change in the climate means that traditional techniques and knowledge may no longer work. The change in weather events that may lead to changes in the environment requires new solutions, and better information for farmers. In this regard, ICTs play an important role through the use of mobile applications and mobile services including SMS and interactive voice response (IVR). To this end, Ethiopia has launched a digital agro-climate advisory platform, called EDACaP, which is composed of four complementary elements: an agro-climate database hub, climate modelling, crop modelling and a dissemination platform. The data is then interpreted, and advisories are produced on yield forecasts, agro-climate and climate scenarios that have targeted elements including the selection of crop fields and varieties, timing for planting and harvesting, ideal irrigation approaches, as well as measures to prevent pests and diseases. The advisories are delivered through SMS, IVR and radio to development agents and farmers in local languages. This helps smallholder farmers to manage climate risks, enhances their adaptive capacity, and builds their resilience.

The pilot phase of EDACaP has already reached 82,000 smallholder farmers across the country and is expected to reach 16.7 million farmers once it is scaled up by the Ministry of Agriculture. This includes reaching the nation's more than 60,000 agricultural agents in specific geographies and agricultural value chains. The translation of this complex science into a form that smallholder farmers can understand would help improve their decision making on diverse areas from production to ensuring market access for their produce.[13] The EDACaP platform is expected to reach 86 targeted districts (woredas) under the Agricultural Growth

8   Federal Democratic Republic of Ethiopia. (2016). *The National Information and Communication Technology (ICT) Policy and Strategy: Final Draft*. https://mint.gov.et/docs/the-national-information-and-communication-technology-ict-policy-and-strategy-2/?lang=en

9   Ethio telecom. (2019). *Ethio telecom 2018/2019 Ethiopian Fiscal Year Business Performance Report*. https://www.ethiotelecom.et/2018-19-efy-p-reporte/

10 Federal Democratic Republic of Ethiopia. (2016). *Growth and Transformation Plan II (GTP II) (2015/16-2019/20). Volume I: Main Text*. https://ethiopia.un.org/en/download/2447/15231

11 Ethiopian Monitor. (2020, 11 June). Ethiopia Unveils 10-Year Development Plan. https://ethiopianmonitor.com/2020/06/11/ethiopia-unveils-10-year-development-plan

12 Ministry of Innovation and Technology. (2020). *Digital Ethiopia 2025: A Digital Strategy for Ethiopia Inclusive Prosperity*. https://www.pmo.gov.et/media/other/b2329861-f9d7-4c4b-9f05-d5bc2c8b33b6.pdf

13 Samuel, S. (2019, 16 November). Launching digital agro-climate advisory platform in Ethiopia. *The Reporter*. https://www.thereporterethiopia.com/article/launching-digital-agro-climate-advisory-platform-ethiopia

Programme (AGP), covering eight regional states, and 25 agricultural research centres (17 federal and eight regional).[14]

A similar service called YeZaRe,[15] developed by the social enterprise Echnoserve, is a digital mobile system that provides weather and market data to smallholder farmers, as well as connecting these farmers to markets to boost both their livelihood incomes as well as their climate resilience. The service currently has over 35,000 registered users, including farmers, cooperatives, extension workers and wholesalers.[16] As the sector strategy indicates, the agriculture and forestry sectors are the most vulnerable to the impacts of climate change. They also play a major role in Ethiopia's economy, given that they contribute 43% to the country's GDP, around 80% to employment and approximately 75% to export commodity value.[17]

In this context, reinforcing previous initiatives, a mega reforestation initiative led by the prime minister in a bid to plant 20 billion trees during a four-year period began in 2019 with more than four billion seedlings planted. This included close to 350 million planted in one 12-hour period in July 2019,[18] which would be a world record. In August 2020 the government announced that it had reached the target of planting five billion trees.[19]

During the planting and in the future maintenance of the trees, the Ministry of Innovation and Technology and the Ethiopian Space Science and Technology Institute were tasked to ensure the sustainability of the planted trees using a digital system. The two institutions have used GPS coordinates to map the planting sites. This initiative was expected to significantly increase the national forest coverage from 15.5% in 2019 in to 20% in 2020.[20]

Ethiopia's recent NDC report for the transport sector shows that its contribution could reach 12.2 Mt CO2e in 2030 relative to business as usual, which is still slightly above the targeted emission reduction contribution envisaged for the transport sector in Ethiopia's NDC (10 Mt CO2e). This means that additional mitigation measures are required.

It is estimated that about 90% of transportation in the export and import sectors as well as 95% of public transport services are handled by road transport, which was responsible for emissions of 5.5 Mt CO2e in 2013.[21] The total number of vehicles registered in Ethiopia currently, including motor bicycles and locally assembled vehicles, is 1,071,345, with over half of the total registered located in the capital Addis Ababa (55.63%). This is followed by Oromiya (15.98%), Amhara (8.7%), Southern region (8.7%), Tigray (4.9%), Dire Dawa (2.04%), Somali region (1.4%), Benishangul (0.82%), Harar (0.74%), Afar (0.61%), and Gambella (0.51%).[22] As the sector is primarily powered by fossil fuels, it is responsible for environmental externalities such as greenhouse gas emissions.

In this regard, among the mitigation potentials identified by national strategies are improving public transit through a light-rail transit system, a bus rapid transit system using electronic trolley buses, fuel efficiency standards for vehicles, and alternative fuels and propulsion systems such as increasing the share of hybrid and plug-in electric vehicles.

To this end, small pilot projects for battery-charged electric cars have been set up. Among others, an electric cars initiative was introduced by the Japanese electric auto manufacturing company Mitsui, which successfully trialled its three-wheel electric car (E-Trike) and launched an assembly plant in Ethiopia in April 2019. An E-Trike consumes 7.3 kilowatts of electric power per hour and can travel 80 kilometres after fully charging its battery for six to seven hours.[23] Prior to this initiative, with support from the United Nations Development Programme (UNDP), an electronic vehicle pilot project was implemented by the Environmental Protection Authority and dVentus Technologies in 2013, introducing 12 e-taxis to serve four cities in Ethiopia. Designed to use batteries, this e-taxi can cover more than 50 kilometres once fully charged.[24] Both

14 Ibid.

15 https://yezare.info/index.php

16 https://yezare.info/PublicMarket.php

17 Federal Democratic Republic of Ethiopia. (2015). *Ethiopia's Climate Resilient Green Economy – Climate Resilience Strategy: Agriculture and Forestry*.

18 Myers, J. (2020, 5 June). Ethiopia wants to plant 5 billion seedlings this year. *World Economic Forum*. https://www.weforum.org/agenda/2020/06ethiopia-is-going-to-plant-5-billion-seedlings-this-year

19 FBC. (2020). Ethiopia Successfully Finalises Planting of 5 billion trees: PM Abiy Ahmed. *FBC*. https://www.fanabc.com/english/ethiopia-successfully-finalizes-planting-of-5-billion-trees-pm-abiy-ahmed

20 Hailemariam, B. (2019, 27 July). Tree Planting Campaign: Audacity or a Pipe Dream? *Addis Fortune*. https://addisfortune.news/tree-planting-campaign-audacity-or-a-pipe-dream

21 Wang-Helmreich, H., & Mersmann, F. (2018). Op. cit.

22 The total number of vehicles that the country imported and registered during the 2018-2019 fiscal year (which ended 7 July 2019) surpassed the amount Ethiopia had imported the previous year by 30,834 to become 135,457 vehicles in a year. New Business Ethiopia. (2019, 3 August). Ethiopia imports 135,457 vehicles in a year. https://newbusinessethiopia.com/trade/ethiopia-imports-135-457-vehicles-in-a-year

23 Behailu, M. (2019, 27 April). Japanese company introduces electric car in Ethiopia. *The Ethiopian Herald*. https://www.press.et/english/?p=5145#

24 UNDP. (2013, 29 March). Ethiopia Pilots Electric Vehicles. https://www.et.undp.org/content/ethiopia/en/home/presscenter/articles/2013/03/29/ethiopia-pilots-electric-vehicles-.html

of these have been introduced in support of the Ethiopian green economic policy to demonstrate the huge potential that they have in reducing environmental pollution.

Besides these pilot initiatives, a fully-fledged all-electric car assembling plant has been set up by Marathon Motor Engineering, a joint venture between the great long distance runner Haile Gebreselassie and Hyundai. The Hayundai Ioniq electric car is a compact hatchback with a trio of powertrains which can travel up to 200 kilometres on a single charge.[25] Studies show that driving the Hyundai Ioniq would be six times cheaper than the cost of the same trip in a Toyota Corolla.[26]

Finally, one of the areas that climate technologies have great impact in is the energy sector, which contributes a share of about 15% of the total emissions in Ethiopia, or 22 $MtCO_2e$.[27] The country's strategy towards emission reductions to achieve its mitigation goal for 2030 in this area includes leapfrogging to modern and energy-efficient technologies.

One example that has great potential to ensure energy efficiency is the use of smart energy meters. In this regard, dVentus Technologies provides a smart grid system which can be customisable to different operating environments.[28] The system improves energy efficiency, increasing access to power and reducing waste. The system is also available in both single and three phase, enabling two-way communication through Wi-Fi, WLAN or GSM/GPRS, allowing remote connection or disconnection. dVentus Technologies has also secured a grant under the African Development Bank's Sustainable Energy Fund for Africa programme to establish a local manufacturing facility of smart meters in Ethiopia.[29]

Each of these initiatives will support one or several of the four pillars of the green economy mentioned above, and will complement existing programmes and policy measures aimed at increasing resource efficiency. However, for the country to meet its 2030 targets for the green economy, further improvements are necessary, including reduced emission intensity (in the industrial sector given Ethiopia's ambition of becoming the manufacturing hub in Africa) and fossil fuel share (in the national energy mix), and enhancing climate-smart agriculture.

Conclusion

The report highlights how ICTs can be harnessed to mitigate, adapt to and monitor the impacts of climate change. This includes the different areas of applications for climate monitoring and weather forecasting which are crucial in early-warning and disaster relief communications and advisories as showcased in the implementation of EDACaP. Furthermore, ICTs and other technologies in the form of smart electricity grids have demonstrated great potential in addressing climate change by helping distribute and use power more efficiently, and to integrate renewable sources of energy in their systems. For example, the dVentus Technologies smart electric meters have a direct impact in efficient billing and load management, resulting in smaller power losses, including fewer power outages.

The current aggressive reforestation programme in Ethiopia holds great promise in realising the possible negative emissions of -40 Mt CO_2e in forestry[30] that could enable overall achievement of the intended nationally determined contribution by 2030. On the other hand, the transport sector is expected to have increased its emissions contribution from 10 Mt CO_2e to 30 Mt CO_2e. In this context, some of the initiatives with regard to efficiency standards and the increased adoption of electric vehicles could play a significant role in limiting the emissions. This is particularly the case given the various incentives and regulations for increased adoption of environmentally friendly transport means in the next decade to meet the intended targets.

Finally, on one hand the government's next five-year digital strategy for Ethiopia should enable increased digitalisation and the adoption of digital technologies to help mitigate climate change. On the other hand, Ethiopia's ambition in becoming a manufacturing hub in Africa needs to be aligned with promoting green technology and realising the digital transformation of industrial processes by progressively adopting industry 4.0 technologies that respond to the challenge of climate change.

25 Tekle, T. (2020, 28 July). Ethiopia unveils locally-assembled electric car. *The East African*. https://www.theeastafrican.co.ke/tea/business/ethiopia-unveils-locally-assembled-electric-car-1907430

26 Kuhudzai, R. J. (2020, 27 July). First Ethiopian-Assembled All-Electric Hyundai Ioniq Rolls Out of Haile Gebreselassie's Marathon Motor Engineering Plant. *CleanTechnica*. https://cleantechnica.com/2020/07/27/first-ethiopian-assembled-all-electric-hyundai-ionic-rolls-out-of-haile-gebrselassies-marathon-motor-engineering-plant

27 Wang-Helmreich, H., & Mersmann, F. (2018). Op. cit.

28 http://www.dventus.com/SmartElectricMeter.html

29 African Development Bank Group. (2014, 16 December). SEFA to support dVentus Technologies in the manufacturing of smart meters in Ethiopia. https://www.afdb.org/en/news-and-events/sefa-to-support-dventus-technologies-in-the-manufacturing-of-smart-meters-in-ethiopia-13864

30 Wang-Helmreich, H., & Mersmann, F. (2018). Op. cit.

Action steps

Although countries face an uncertain future path in economies when it comes to long-term development, it is apparent that the COVID-19 pandemic will catalyse digital transformation and the adoption of technology. The pandemic is also an opportune time to align development objectives with climate change targets. In this context, the following action steps are recommended for consideration by policy makers and other stakeholders:

- Improve access to infrastructure, including the internet links to the global network, and national and inter-regional networks.

- Create enabling policy frameworks and incentives, including building on the current reform in the telecom market that allows for new entrants.

- Invest in skills and training in order to maximise the benefit of digital infrastructure. This includes investing in education through continued learning and promoting digital and other new technology skills.

- Create public-private sector partnerships to facilitate exchange between policy makers and digital service providers through designated innovation hubs and incubators to promote innovation in climate technologies.

Technology, the environment and a sustainable world: Responses from the global South

The world is facing an unprecedented climate and environmental emergency. Scientists have identified human activity as primarily responsible for the climate crisis, which together with rampant environmental pollution, and the unbridled activities of the extractive and agricultural industries, pose a direct threat to the sustainability of life on this planet.

This edition of Global Information Society Watch (GISWatch) seeks to understand the constructive role that technology can play in confronting the crises. It disrupts the normative understanding of technology being an easy panacea to the planet's environmental challenges and suggests that a nuanced and contextual use of technology is necessary for real sustainability to be achieved. A series of thematic reports frame different aspects of the relationship between digital technology and environmental sustainability from a human rights and social justice perspective, while 46 country and regional reports explore the diverse frontiers where technology meets the needs of both the environment and communities, and where technology itself becomes a challenge to a sustainable future.

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