Can investing in connectivity help combat climate change?

Benin, regional supervisors used to monitor their village's water supply mostly by instinct. But in 2007, a Senegalese software company introduced water supply managers in Benin, and across Africa, to the mWater platform. Now thanks to these information and communications technologies (ICTs) water supply managers can track the entire lifecycle of their supply at their fingertips through a smartphone app.

This convergence between utilities and telecommunications is opening up countless connectivity opportunities around the world. In Cuba for instance, thanks to an innovative early warning system that taps into the country-wide text messaging service, communities are forewarned when a cyclone's approaching, so they can get themselves and their families to safety.

In Kigali, Rwanda, young students had no choice but to stop studying once the sun set because their home had no electricity. In recent years the government and its private sector partners have brought bio gas into homes, a small yet significant part of an overall plan to replace charcoal and firewood with renewables and which now fulfills 85 percent of the Rwanda's energy needs. Thanks to ICTs monitoring the grid, homes now have more energy for light and school grades have improved.

These cases illustrate some important ways that ICTs are transforming peoples' lives by improving their environment and existing services. ICTs can play a transformative role in securing a sustainable and efficient future, and will be a frontline tool in the fight against climate change. However, it is important to understand that we cannot progress further on this without adequate guidance in the form of credible international standards.

The standardization activities related to role of ICTs in dealing with climate change has been extensively dealt with by ITU within the ITU-T Study Group 5 on Environment, Climate Change and Circular Economy. This Study Group has been developing standards, guidelines and best practices on the ICT environmental aspects of electromagnetic phenomena and climate change. It also studies issues related to resistibility, human exposure to electromagnetic fields, circular economy, energy efficiency and climate change adaptation and mitigation. ITU-T Study Group 5, has been continuously working with the ICT Sector to attain the sustainability Goals within the Connect 2020 Agenda. Some of the main ITU-T Recommendations and Supplements developed by ITU-T SG5 are:

- ITU-T L.1500: Framework for information and communication technologies and adaptation to the effects of climate change
- ITU-T L.1501: Best practices on how countries can utilize ICTs to adapt to the effects of climate change
- ITU-T L.1502: Adapting information and communication technology infrastructure to the effects of climate change
- ITU-T L.1503: Use of information and communication technology for climate change adaptation in cities
- ITU-T L.1504: ICT and adaptation of agriculture to the effects of climate change
- L Suppl. 24: ITU-T L.1500 - Overview of climate change effects and possible impacts
- L Suppl. 25: ITU-T L.1502 - Best practices for infrastructure adaptation to climate change

These international standards provide a feasible procedural framework for the implementation of ICTs in climate change related activities and also aim to set the basis for the achievement of the Sustainable Development Goals (especially Goal 13 on Climate Action).

Heavy investment needed

With 180 member states having signed (and 26 countries having ratified) the Paris Agreement is now moving towards entry into force. In preparation for this moment, most countries are already looking at how to implement at the national level, in particular with regards to reaching their National Determined Contributions (NDCs), which reflects the commitment made by each country to reduce significantly their Green House Gas (GHG) emissions.

As this process moves ahead it is important to recognize how broadband infrastructure and ICT technologies can drive the transformation needed to move towards a low carbon future, or even a carbon-free future.

Radiocommunications has always been a robust resource for climate monitoring. Efficient management of the radio spectrum and harmonization of new wireless technologies enable us to conduct observations and long-term monitoring of solar activity to improve the world's knowledge and understanding of the influence of the electromagnetic radiation from the sun on earth's environment, including climate, right down to regional, country and local levels. It makes possible continued observations to characterize changes in the atmosphere, oceans, and land surface, and the use of such information for climate change modeling; as well as continued observations of the change in the ozone layer and its effects on the environment and human health.

International agreement in ITU on the efficient management, allocation and protection of the radio spectrum for such applications is essential to its successful operation and development.

Terrestrial and satellite radiocommunication systems, and telecommunication networks, in particular the Internet of Things, will crucially allow sustainable management of natural resources, environmental protection, food security, climate change and humanitarian programmes and contribute to the monitoring of carbon emissions, the changing of ice in polar caps and glaciers, and temperature changes. They increase productivity, optimize energy consumption and cut transportation costs leading to reduced levels of CO2 emissions.

Smarter and more sustainable cities

Smart Sustainable Cities is increasingly becoming a strategic area for further investment on ICTs.

With over half the world population now living in cities, ICTs are becoming ever more important as a means of addressing the consequent challenges of rapidly growing urban areas, such as providing efficient mass transport and green energy. In today's cities much of the infrastructure is installed by a diverse set of suppliers and maintained by different agencies that have traditionally worked apart. The interconnection and interoperability of city systems will demand standardized interfaces, and this is where standards organizations such as ITU will have an important role to play. For city planners, utilities and technology providers, standards are essential enablers in achieving efficient, cost-effective and scalable levels of performance and quality. Such an approach will also provide massive potential to tap

into the Big Data generated from such connected systems, and provide improved understanding to manage and mitigate climate change challenges.

In keeping with the need for a definition for the term smart sustainable cities, ITU developed an international definition with United Nations Economic Commission for Europe. This international definition is part of ITU-T Y.4050-Y.4099- "Smart sustainable cities - An analysis of definitions", which was approved within ITU-T Study Group 20 on Internet of Things and Smart Cities and Communities. It was prepared following an in-depth analysis of the major aspects of smart sustainable cities and eco-cities. Over a 100 definitions were analyzed for this purpose.

"A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects".

Since its development, this would also provide a basis for understanding the most common features of smart sustainable cities.

Keeping in mind the importance of information sharing the smart city domain, ITU created the United for Smart Sustainable Cities (U4SSC) initiative together with 15 other UN agencies, programmes and funds. The U4SSC has received an overwhelming response from across the globe with 150 participants at first meeting and over 900 participants at its second meeting. The U4SSC has completed its first phase with 24 output documents, which provide extensive guidelines to cities on achieving their smart city goals while attaining the targets set out in the Sustainable Development Goals. The second phase of the U4SSC started in April 2017, with ITU receiving requests for participation from around the globe.

To further provide guidance to cities on establishing smart cities within their territories, ITU together with 15 other United Nations agencies, funds and programmes including United Nations Commission for Europe (UNECE), Convention on Biological Diversity, Food and Agriculture Organization of the United Nations (FAO), UN-Women, United Nations Commission for Africa, Economic Commission for Latin America and the Caribbean (ECLAC), United Nations Convention to Combat Desertification (UNCCD), UN-Habitat, United Nation Environment Programme-Finance initiative, United Nations Environment (UNEP) Programme, United Nations Framework Convention for Climate Change (UNFCCC), United Nations Industrial Development Organization (UNIDO) United Nations University-Institute for the Advanced Study of Sustainability (UNU-IAS), World Meteorological Organization (WMO), World Trade Organization (WTO), has developed a comprehensive list of key performance indicators (KPIs) to facilitate smart sustainable city transitions.

As a part of a unique collaboration with ITU-T, urban stakeholders have initiated the implementation of these KPIs for smart cities through over 50 pilot projects in cities like Dubai, Singapore, Manizales, Montevideo, Kairouan, Pully and Valencia. The pilot projects being conducted in these cities helped refine the existing KPIs and will help foster the establishment of the first Global Smart Sustainable City Index.

The main standardization work on smart cities is conducted within the ITU-T Study Group 20 (SG20) on Internet of Things and Smart Cities and Communities. SG20 is in charge of developing international standards to facilitate the coordinated development of IoT related technologies, including machine-to-

machine communications and ubiquitous sensor networks. SG20 has also been closely involved in the development of standards that leverage IoT to address urban development challenges and needs, including those highlighted in the New Urban Agenda and the Sustainable Development Goals.

Empowering communities

The increasing investment in ICTs confirms the power of connectivity and the technologies as a positive force for effective international development. By 2020, it is expected that up to 1.5 billion more people will be connected. Developing relevant e-services for those online, and those who will eventually get connected, is vital if we are to effectively combat climate change, carry out effective disaster management and encourage environmentally-friendly behaviors through access to best practices, localized content and knowledge sharing.

Eliminating the digital divide between developed and developing countries must be a policy priority, and for this to happen ever more innovative investment models are needed to achieve the global roll out of broadband infrastructure.

Affordability is critical for universal access and it is positive to note that average prices for all types of mobile broadband services are falling globally and fell by more than 25% in Least Developed Countries in 2016. Encouraging consistent and relevant regulatory policies and frameworks that create an enabling environment for affordable access remains a priority pillar of ITU's work.

These are just a few instances of the incredible potential of ICTs. Fulfilling this potential will require mobilizing the right investment. In my role as Secretary-General of ITU, I will continue to work with all our membership and stakeholders from the ICT sector – including governments, municipalities, private sector, academia, civil society, entrepreneurs and investors – to mobilize partnerships and investments so that the world can benefit from the powerful potential of broadband and ICTs to address climate change.