International Telecommunication Union

ITU and Climate Change

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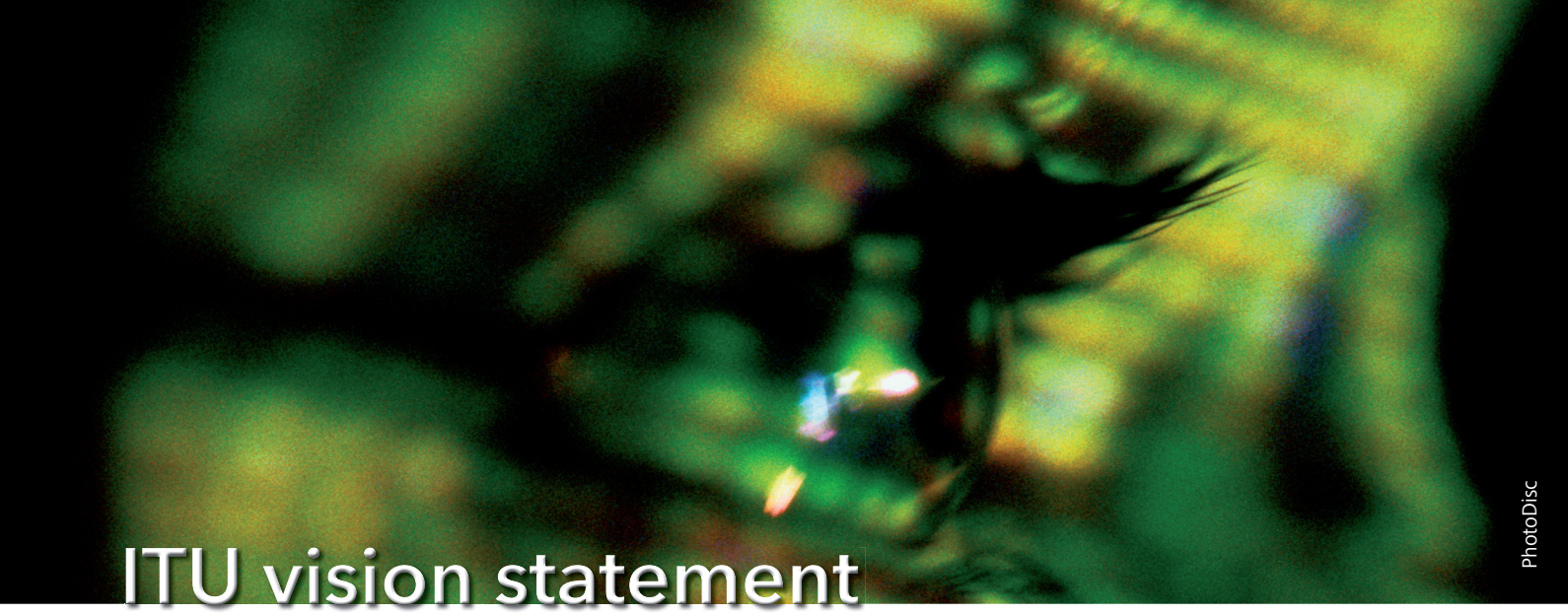
Committed to connecting the world



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ITU vision statement

ITU: Committed to connecting the world

By connecting the world and fulfilling everyone's fundamental right to communicate, we strive to make the world a better and safer place.

Among technological developments, national and international policies, and the many diverse interests of commercial businesses, there needs to be an organization that safeguards everyone's fundamental right to communicate.

The ITU is that organization. With 191 Member States and over 700 Sector Members and Associates, ITU puts great emphasis on its accountability and transparency. Communication is not only the subject of our efforts, it is, increasingly, the means by which we achieve our goals. Working with partners and members from around the world, what we do affects everyone on the planet – our work is truly global. And we believe that communicating openly and honestly is the only way to get the job done.

It is our task to ensure that people around the world can communicate with each other in an efficient, safe, easy and affordable manner. It is our responsibility to be proactive about what the world might need in the future, not just what it needs right now. We will do our utmost to get everyone to work together – government and industry alike – to come up with solutions that work: for sharing knowledge, developing tools, and building and safeguarding networks.

There are serious challenges facing us. The growing role for information and communication technologies (ICT) holds great promise, but it can be abused. Breakthroughs in communications bring not only benefits, but also new dangers. Global cooperative agreements have never been more necessary, yet at the same time, the sheer speed of development makes this all the more difficult. This means we must not only work hard, we must work smart: creating effective partnerships, making efficient teamwork central, and finding ways to do more with less. When doing things better proves not enough, we'll show the courage to do things differently.

In the coming years, ITU must take the lead in many areas: ensuring **security in cyberspace**, the efficient use of **radio-frequency spectrum** and satellite orbits, promoting appropriate strategies and policies, encouraging infrastructure development to **bridge the digital divide**, and the use of ICT to mitigate **climate change**. We are the first and last stop for establishing **workable standards** to provide global telecommunications for everyone, including the **disabled** and **disadvantaged**. To realize all this, we know that it is not enough to be only communication specialists; we also have to be specialized in communicating.

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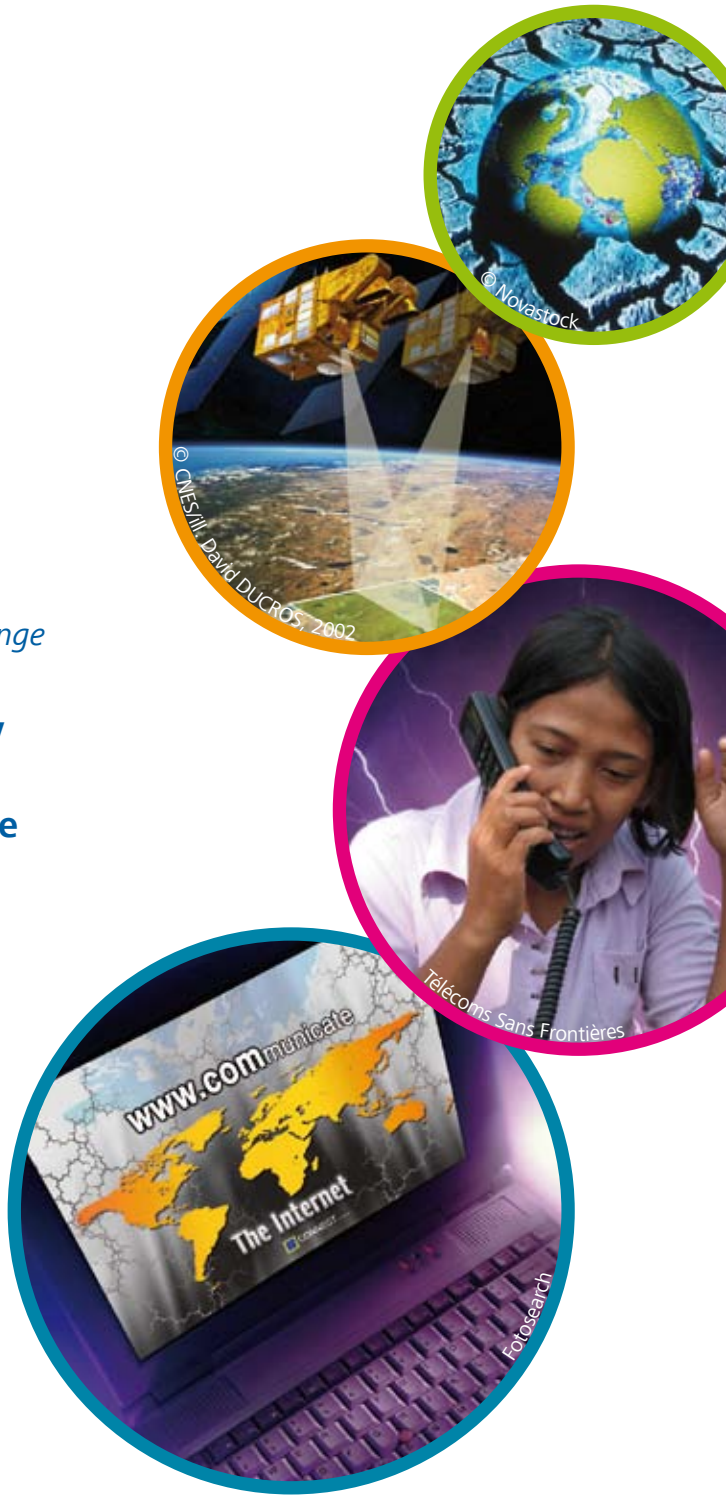
Contents



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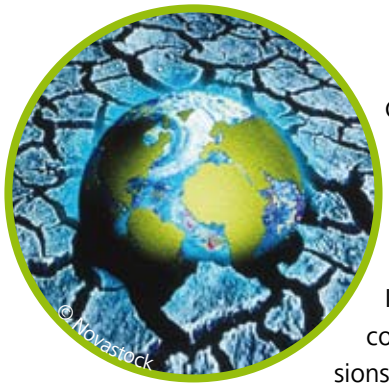
Foreword



Clear scientific evidence, extreme weather events, and an increased public awareness have elevated climate change to the top of the political agenda — globally, regionally and at national levels. At ITU, combating climate change is also a major priority.

It is estimated that information and communication technologies (ICT) contribute around 2 to 2.5 per cent of global greenhouse gas (GHG) emissions every year. This percentage is likely to grow as ICTs become more widely available. But at the same time, ICTs are a linchpin in the effort to combat climate change. They are a potent, cross-cutting tool that can help to limit, and ultimately reduce, GHG emissions across other sectors of the economy, notably through the development and introduction of more energy-efficient devices and networks and the safe disposal of equipment at the end of its life cycle. Efforts should be focused on more standardized power supplies and batteries, smart devices and buildings, new low-consumption devices, research and development on consumption and power supplies, use of ICTs in travel management and paperless meetings.

As a global organization with 191 Member States and more than 700 Sector Members and Associates, ITU will work in close partnership with its membership to achieve a climate-neutral ICT industry.

As the steward of the global framework for spectrum, ITU will provide the necessary radio-frequency spectrum and orbit resources for satellites that monitor the climate and conduct remote sensing of the Earth.

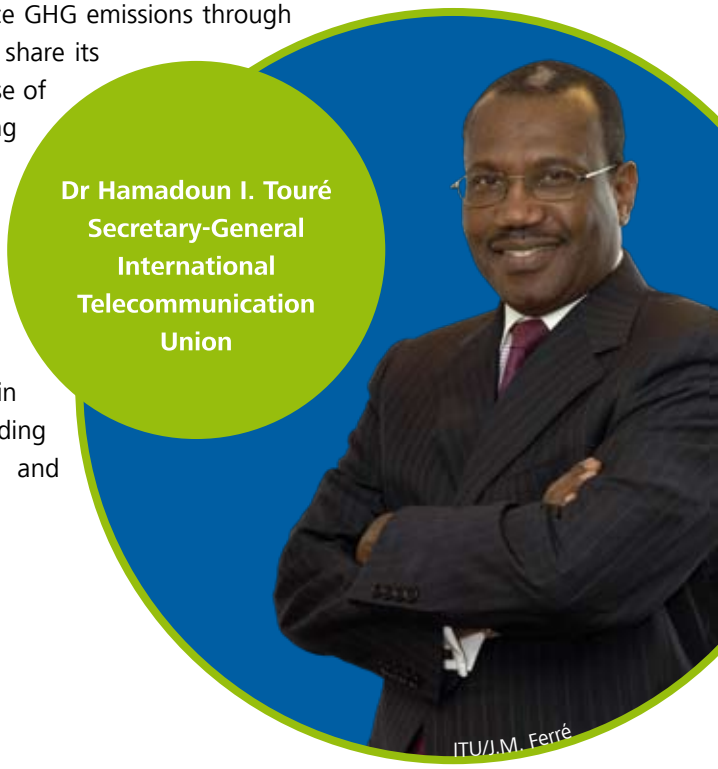
As the pre-eminent global body for standardization in the field of ICTs, ITU will work to limit and reduce GHG emissions and promote the use of more energy-efficient devices and networks and the development of corresponding technical standards.

As a core function of its development mission, ITU will assist Member States to take full advantage of ICT applications for environmental management and sustainable development and to use telecommunication/ICTs to adapt to, and mitigate the effects, of climate change.

As the specialized agency of the United Nations responsible for telecommunications/ICTs, ITU is committed to working with other organizations in combating climate change. ITU will continue to play a leading role in developing an integrated approach to examining the relationship between ICTs and climate change, focusing on such key issues in the global framework as technology, climate data collection and monitoring, adaptation and mitigation.

As a responsible member of the global community, ITU will join the UN commitment to lead by example through achieving climate-neutral status within three years. In its own activities, ITU is pioneering the use of ICTs to reduce GHG emissions through paperless meetings and virtual conferencing. It will share its expertise with other institutions in optimizing the use of ICTs as a vital component of energy-efficient working methods. ITU will continue to promote the use of ICTs to strengthen and develop scientific and industrial tools in all areas, to the fullest extent possible, to combat climate change.

Climate change is a global challenge that the world community cannot lose. I invite you to join ITU in making ICTs a major part of the solution, and in building an information society that is energy efficient and sustainable.



Dr Hamadoun I. Touré
Secretary-General
International
Telecommunication
Union

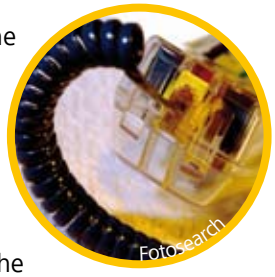
ITU/J.M. Ferré

Dr Hamadoun I. Touré

ICTs and climate change

Information and communication technologies have a critical role to play in combating climate change through the reduction of greenhouse gas (GHG) emissions. The increased use of ICTs is undoubtedly part of the cause of global warming, as witness the hundreds of millions of computers and more than one billion television sets that are never fully turned off at night in homes and in offices. But ICTs can also be a key part of the solution, because of the role they play in monitoring, mitigating and adapting to climate change.

There are a number of different causes of climate change, many of which are naturally generated (such as variations in solar radiation, and volcanic activity). However, it is man-made climate change that is of major concern because it appears to be leading to a progressive and accelerating warming of the planet, as a result of the release of greenhouse gases, primarily carbon-based emissions. The work of the United Nations Intergovernmental Panel on Climate Change (IPCC) shows that global greenhouse gas emissions have risen by 70 per cent since 1970.



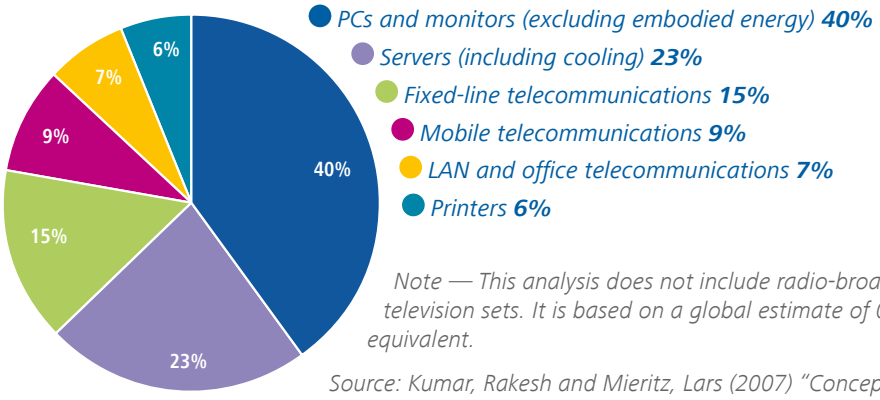
The ICT sector itself (in this definition, telecommunications, computing and the Internet, but excluding broadcasting transmitters and receivers) contributes around 2 to 2.5 per cent of GHG emissions, at just under 1 Gigatonne of CO_2 equivalent. The main constituent (40 per cent) of this is the energy requirements of personal computers and data monitors, with data centres contributing a further 23 per cent (see Figure 1). Fixed and mobile telecommunications contribute an estimated 24 per cent of the total. As the ICT industry is growing faster than the rest of the economy, this share may well increase over time. ICTs have the potential to assist in finding a solution to reducing the remaining 97.5 per cent of global emissions from other sectors of the economy.

ICTs contribute to global warming. This comes from a number of sources, including:

- the proliferation of ICT users (for example, the number of mobile phone users rose from 145 million in 1996 to more than 3 billion in August 2007, and is expected to reach 4 billion by the end of 2008);

- many ICT users now own multiple devices;
- rising processing power and transmission power (for instance, third-generation (3G) mobile phones operate at higher frequencies and need more power than 2G phones);
- a trend towards "always-on" usage modes, and a tendency to store rather than delete older material.

Figure 1 — Estimated distribution of global CO_2 emissions from ICTs



Note — This analysis does not include radio-broadcasting equipment or television sets. It is based on a global estimate of 0.9 Gigatonne of CO_2 equivalent.

Source: Kumar, Rakesh and Mieritz, Lars (2007) "Conceptualizing "Green IT" and data centre power and cooling issues", Gartner Research Paper No. G00150322.

ICT use will keep growing, and so it is important that the industry takes steps now to curb, and ultimately reduce, its carbon emissions.

To further examine the link between ICTs and climate change, ITU is organizing a number of major meetings on this topic. ITU and its membership and partners launched two international symposia on "ICTs and Climate Change" that took place in Kyoto, Japan, on 15–16 April 2008, co-organized and hosted by the Ministry of International Affairs and Communications (MIC); and in London, United Kingdom, on 17–18 June 2008, supported and hosted by BT plc. Also, at the High-Level Segment of the ITU Council session in November 2008, ministers and delegates will discuss this important issue.

ITU and climate change

Objectives and orientations

Developing an effective response to climate change calls for action in virtually all of ITU's fields of competence. An integrated approach is essential to address the range of technological, scientific, policy, organizational, economic and social issues involved.

Within the United Nations system, ITU's competence in the telecommunications/ICT sector enables it to contribute to nearly all of the main pillars of work under the Bali Roadmap and framework for negotiations, namely science and data monitoring, adaptation, mitigation and technology. At the same time, ITU will reach out to its membership to assist them in combating climate change and in adapting to it, and will engage more fully with other organizations active in this effort.

ITU activities on climate change are oriented around four main objectives.

Objective 1: Develop a knowledge base and repository on the relation between ICTs and climate change

While new technologies and ICT applications can contribute to the reduction of GHG emissions, the rapid uptake in ICT devices, notably in developed countries, increases energy consumption and the need to manage the environmentally sound disposal of e-waste. ITU is engaged in efforts to demonstrate that ICTs are a clean technology for sustainable development and can be a key part of the solution to climate change. The adoption of clean technologies and their safe disposal can assist developing and developed countries alike in their economic and social development. ITU studies can also show how new technologies can be designed to be more energy efficient and can develop further evidence of the beneficial role that ICTs can play in combating global warming.

Main orientations


Cisco

- Promote a focused approach to the development of products and services in areas where ICTs can readily contribute to reductions in GHG emissions, including more standardized power supplies and batteries, smart devices and buildings, new low-consumption devices, research and development on consumption and power supplies, use of ICTs in travel management and paperless meetings.

- Conduct a systematic review of ITU treaties, resolutions and recommendations in the light of climate change and identify requirements for future work.

- Conduct more research into the relation between ICTs and energy efficiency and issue appropriate materials (for instance, a handbook on ICTs and their impact on climate change, or a national e-environment toolkit) and organize meetings/symposia on this issue.

- In partnership with one or more developing countries, develop and submit projects under the Clean Development Mechanism of the Kyoto Protocol, for reducing carbon emissions through the use of ICTs.

Objective 2: ITU as a strategic leader on ICTs and climate change

ITU, through its membership, can demonstrate leadership in showing how ICTs can assist in monitoring, mitigating and adapting to climate change. ITU should also assist its membership in combating climate change, in particular through environmental monitoring, through adoption of energy efficient, dematerialization and disposal standards, through carbon abatement (for example, by using videoconferencing to reduce business travel) and by helping countries to adapt to climate change (for instance by using ICTs for managing natural resources, environmental protection, and for monitoring natural and man-made disasters through emergency telecommunications).

Main orientations

- Develop, through the membership, a normative framework for addressing the issue of ICTs and climate change. This may include adopting resolutions at the World Telecommunication Standardization Assembly 2008 (WTSA-08) on ICT standardization requirements for combating climate change, and other relevant resolutions at the World Telecommunication Development Conference (WTDC-10) and at the Plenipotentiary Conference (PP-10).

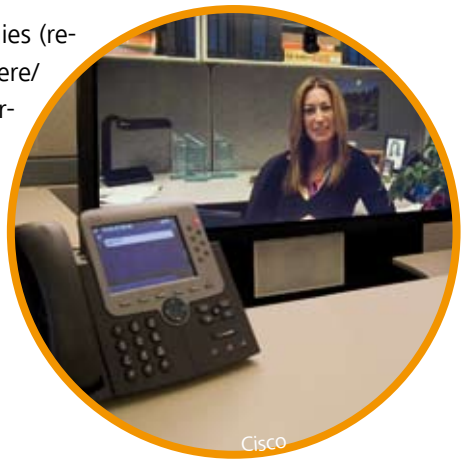
- Implement existing ITU instruments, such as Plenipotentiary Resolution 35 (Kyoto, 1994) relating to climate change, as well as relevant resolutions of WRC, RRC, WTDC-06 and PP-06.

- Develop strategic partnerships with Member States, Sector Members, and other organizations (such as GeSI, WEF, ETNO, WWF, UNEP, WMO) with an interest in using ICTs to combat climate change.

- Encourage more Member States to sign and ratify the Tampere Convention on Emergency Telecommunications.

- Promote the positive effect of introducing new ICT technologies (reduction of power consumption, and reduction of atmosphere/ionosphere heating by very powerful transmitters, videoconferencing, etc.).

- Provide assistance to ITU Member States through technical cooperation and through sharing of information on ITU activities and other relevant resources via online tools.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Objective 3: Promote a global understanding of the relation between ICTs and climate change

As a follow-up to the Bali Conference of December 2007, negotiations will continue towards new global agreements and arrangements on climate change. This year, climate change was one of the main topics of the G8 meeting in Japan. ITU followed this work to ensure that the important role of ICTs is properly reflected and to promote an understanding of the link between technology and climate change.

Main orientations

- Take an active role in efforts to deliver a "One UN" approach to climate change.
- Follow ongoing global negotiations on climate change and participate actively in meetings planned under the Bali Roadmap; organize side events on ICTs and climate change.
- Take an active role in other UN inter-agency mechanisms dealing with climate change.
- Strengthen strategic partnerships with FAO, UNEP, WMO, IPCC and other UN agencies, the World Bank, the European Commission, international and national agencies and organizations (for example, meteorological agencies, the Group on Earth Observations, EUMETSAT, ESA, the Space Frequency Coordination Group, JAXA, NOAA, NASA and RSA), NGOs and the private sector involved in combating climate change.
- Promote the link between ICTs and climate change at other inter-governmental meetings where the issue is discussed.

ITU and the UN

Delivering as one on climate change

United Nations Secretary-General Ban Ki-moon has described climate change as the "moral challenge of our generation". ITU will join in the efforts of the UN system to "deliver as one" to address climate change and will act to deepen the global understanding of the relation between ICTs and climate change.

During his visit to ITU headquarters, the Secretary-General remarked that "ITU is one of the most important stakeholders in terms of climate change".

Objective 4: Achieve a climate-neutral ITU within three years

The UN Secretary-General has committed to making the UN climate-neutral. The UN Chief Executive Board (CEB) unanimously adopted a statement in 2007 committing all entities in the system to work towards that objective.

"ITU is one of the most important stakeholders in terms of climate change."
UN Secretary-General Ban Ki-moon

ITU is committed to attaining climate neutrality in its main activities and has already taken steps to reach this objective. By pioneering the use of remote participation tools in its own work and lending that expertise to others, ITU can be a role model for the UN system and also assist in bridging the standardization gap.

In October 2007, the Chief Executive Board (CEB) of the UN system adopted a joint statement and the following commitment towards moving to climate neutrality by the end of 2009:

- Estimate greenhouse gas emissions
- Undertake efforts to reduce greenhouse gas emissions to the extent possible
- Analyse cost implications of purchasing carbon offsets to eventually reach climate neutrality.

Main orientations

- Appoint a project team and focal point to coordinate all climate change activities at the Union.
- Engage all staff to generate ideas and initiatives towards a climate-neutral ITU.
- Conduct a carbon audit of ITU's premises and activities (both internal and external) and intensify efforts to use ICTs to reduce the carbon footprint of ITU.
- Seek approval from the ITU Council for a programme of carbon offsets, if needed, to achieve carbon-neutral status. To this end, propose a strategy on acquisition of carbon offsets through ITU activities in country projects, focusing on using ICTs for carbon emission reduction (including under the Clean Development Mechanism of the Kyoto Protocol).
- Assist the ITU membership and other organizations in using ICTs as a tool to become more energy efficient.
- Assist the ITU membership, UN agencies and other stakeholders in implementing programmes on sustainable production and consumption as well as in disposing ICT components in an environmentally sound manner to mitigate globally generated and discarded e-waste.

ICTs as a clean technology

The key to combating global warming is to stabilize and eventually reduce GHG emissions. The main output of the ICT sector is information rather than physical goods ("bits", not "atoms"), a concept sometimes referred to as "dematerialization". Thus, ICTs can contribute greatly to developing new efficient technologies and to reducing the global GHG emissions that emanate from other sectors of the economy.

Reducing carbon emissions will require changes in lifestyle and behaviour, but changes in management practices can also have a positive impact. ICTs can help with this, either:

- **directly,** by reducing the ICT sector's own energy requirements;
- **indirectly,** through using ICTs for carbon displacement, or
- **in a systemic way,** by providing the technology to implement and monitor carbon reductions in other sectors of the economy.

ITU has already demonstrated its interest in climate change and environmental issues, for example with the approval, in 1996, of Recommendation ITU–T L.24: "Classification of outside plant waste". This Recommendation recognizes the effects which "exotonic" waste products could have on human beings and nature, and suggests studies of alternative materials that would respect the environment.

In December 2007, ITU–T's Telecommunication Standardization Advisory Group (TSAG) advised the Director of the Telecommunication Standardization Bureau (TSB) to provide, in a systemic way, the necessary standards to implement and monitor climate change, including through carbon reduction in other sectors of the economy. Moreover, TSAG encouraged the drafting of a Question relating to the reduction of GHG emissions through the implementation of ITU–T Recommendations for the 2009–2012 quadrennial, together with a draft resolution on ICTs and climate change, for consideration by the World Telecommunication Standardization Assembly in October 2008.

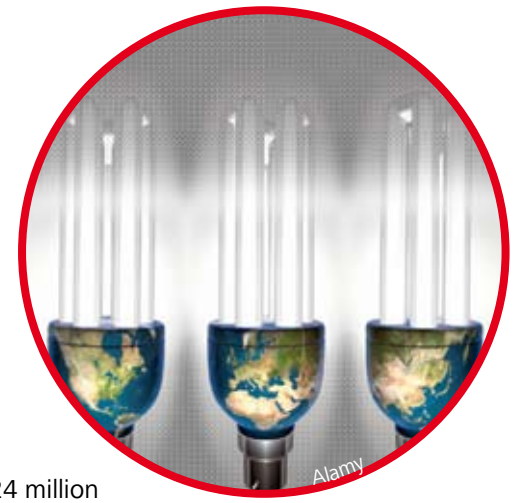
All ITU–T study groups are encouraged to evaluate existing and new Recommendations to identify their impact on climate change and demonstrate, in a way that is measurable, how such Recommendations contribute to the reduction of GHG emissions in the production and use of equipment.

One good example is provided by next-generation networks (NGN), a new type of communications network that has been a major focus of ITU's work in recent years. NGN are expected to reduce energy consumption by 40 per cent, compared to today's PSTN technology. The savings will be achieved in a number of ways, including:

- A significant decrease in the number of switching centres required.
- More tolerant climatic range specifications for NGN switching locations.
- Implementation of standards, such as the "very high speed digital subscriber line transceivers 2", or VDSL2 (also known as Recommendation ITU–T G.993.2) which recognizes the need for devices to have three power modes (full, low and "sleep"), rather than being fully powered all the time.

The ICT industry is already taking steps to reduce CO_2 emissions. For instance:

- BT plc, the host of the second of the two ITU symposia on "ICTs and Climate Change", has already achieved a 60 per cent reduction in 1996 CO_2 emissions, an annual saving of almost one million tonnes of CO_2, and has committed to reducing them by 80 per cent by 2016.
- Members of the European Telecommunication Networks Operators' association (ETNO) have succeeded in reducing their overall carbon emissions by 7 per cent and their carbon intensity (per unit of turnover) by 14 per cent between 2000 and 2003.

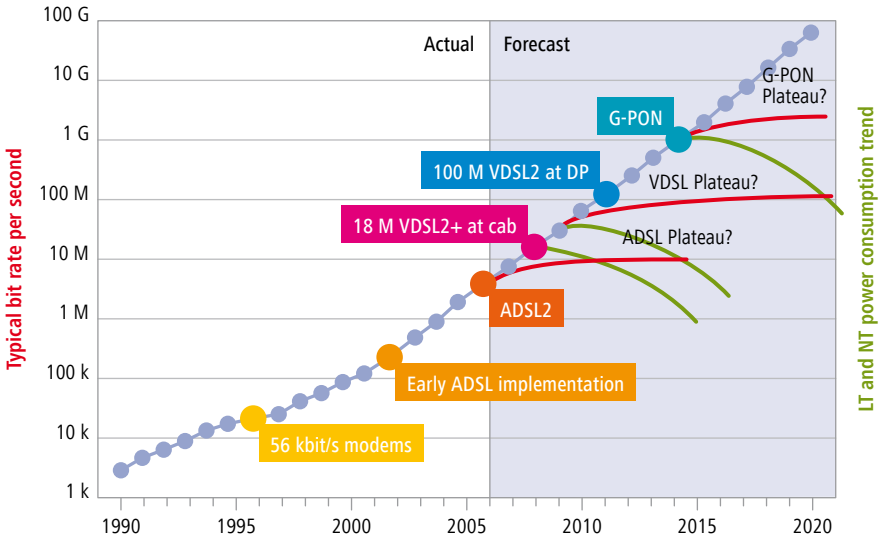


➔ The Japanese incumbent operator, NTT, saved some 124 million kWh of electricity during 2007. It is also converting its vehicle fleet to low-emission vehicles and is experimenting with growing sweet potatoes on the roofs of its offices in order to reduce heat loss in winter and reduce heat absorption in summer.

The application of ITU Recommendations, especially those that relate to energy saving in ICT equipment, can go a long way to generating savings of greenhouse gas emissions in the ICT sector. ITU–T Study Group 15 has developed an energy-saving checklist for standards development. As shown in Figure 2, the transmission capacity of different generations of access network technology is doubling almost every year. The challenge is to achieve continually rising transmission capacity while stabilizing, or reducing, the power requirements.

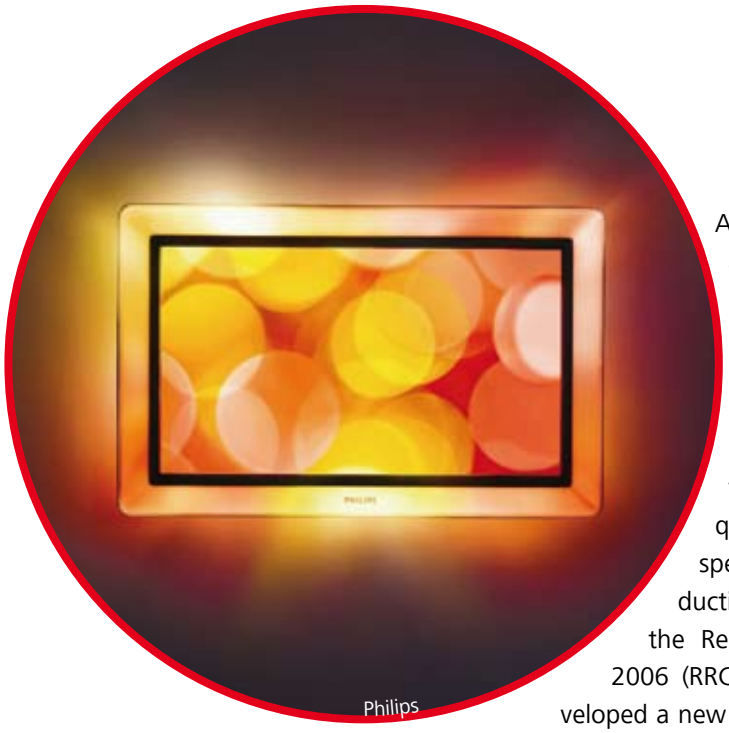
Figure 2 — Relationship between bit rate and power consumption over time

Can we increase speed while saving power?



Note — LT stands for line termination and NT for network termination.

Source: Faulkner, David, et al *(2008) "ITU-T SG15 WP/1 access network transport, energy-saving checklist, available at: http://www.itu.int/dms_pub/itu-t/oth/09/05/T09050000010007PDFE.pdf.*



Already, new radio technologies — such as digital modulation for broadcasting and ultra-wideband (UWB) employing extremely low power, smart antennas — are reducing power requirements and, consequently, greenhouse gas emissions. All ITU–R study groups are concentrating their studies not only on increasing service quality and the efficient use of the radio spectrum, but also on energy saving and reduction of power consumption. For instance, the Regional Radiocommunication Conference 2006 (RRC-06), which involved 120 countries, developed a new digital broadcasting Plan GE06. The Plan envisages significant reduction (almost 10 times) of transmitter power due to the use of digital modulation. Moreover, the number of transmitters (there are tens of thousands of transmitters around the world with power of up to 100–150 kW each, most of them operating 24 hours a day) may be reduced due to the possibility of transmitting several television and sound programmes in one channel (instead of one television programme per radio-frequency channel).

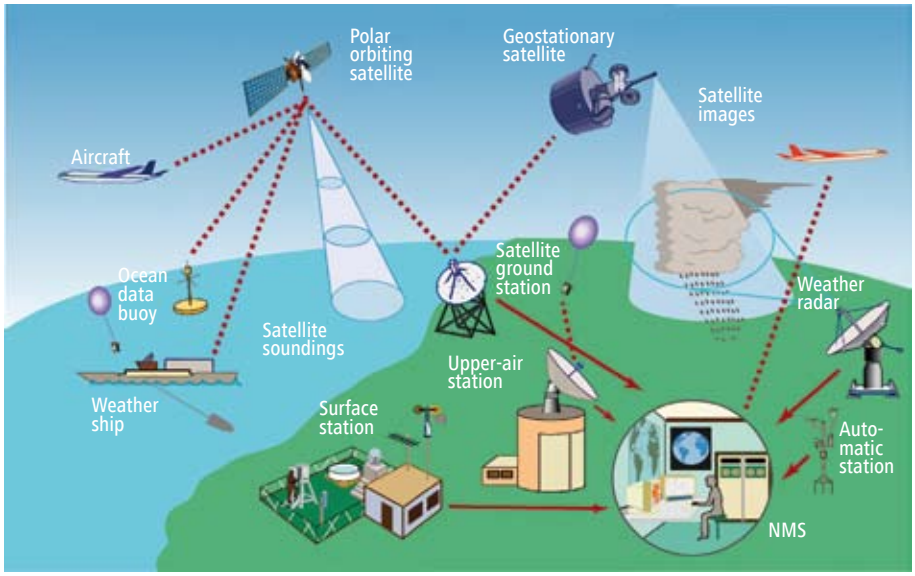
Monitoring climate change

The science of climate change, which has developed over the last century or so, has benefited greatly from the parallel development of ICTs. ITU work in this area focuses on the use of ICTs (including radio and telecommunication technologies, standards and supporting publications) for weather forecasting, climate monitoring, predicting, detecting and mitigating the effects of natural disasters. The role of ICTs in weather and climate monitoring is clearly shown in the structure of the World Meteorological Organization's (WMO) World Weather Watch (WWW), which comprises three integrated core system components as follows:

- The Global Observing System (GOS) provides observations of the atmosphere and the Earth's surface (including oceans) from the globe and from outer space (see Figure 3). The GOS uses remote sensing equipment placed on satellites, aircraft, radiosondes and relay data to environment control centres.

- The Global Telecommunication System (GTS) — radio and telecommunication networks for real-time exchange of a huge volume of data between meteorological centres.

Figure 3 — WMO Global Observing System



Note — NMS stands for national meteorological service.

Source: WMO and ITU Handbook, "Use of Radio Spectrum for Meteorology.

➔ The Global Data Processing System (GDPS) — thousands of linked mini, micro and supercomputers, processes an enormous volume of meteorological data and generates warnings and forecasts.

The majority of countries use the WWW system. It saves thousands of lives every year. ICT form the backbone of the WWW. All ITU Sectors contribute to the development and implementation of the core system components.

The Global Observing System is based on the use of satellite and ground-based remote sensors (active and passive) employed by the meteorological satellite, Earth-exploration satellite and meteorological aids radiocommunication services, which play a major role in climate monitoring and weather forecasting (see a sample of an application in Figure 4). It is essential that these services have sufficient spectrum and that the frequencies allocated to them remain free of interference. That is why the ITU Radiocommunication Sector (ITU–R) plays an essential role in climate monitoring. ITU–R Study Group 7 ("Science services") develops the "Remote Sensing", or "RS" series of ITU–R Recommendations and reports. These are used for the design and operation of radiocommunication systems monitoring climate change. Study Group 7, in conjunction with WMO, developed the ITU/WMO Handbook, "Use of Radio Spectrum for Meteorology". The handbook describes modern radio technologies, tools and methods employed by WWW. Study Group 5 ("Terrestrial services") produced "Intelligent Transport Systems" as Volume 4 of the ITU–R Handbook on "Land Mobile", which describes how to use cars as environment monitoring equipment (by collecting environmental data and sending them using wireless connections). Other ITU–R study groups, especially Study Group 4 ("Satellite services") and Study Group 5 develop radiocommunication standards used in the design and operation of satellite and terrestrial systems for disseminating climate monitoring information.

The studies carried out by ITU–R study groups, decisions of radiocommunication assemblies as well as the treaty-status decisions of world radiocommunication conferences provide the necessary support for the development and utilization of different systems such as:

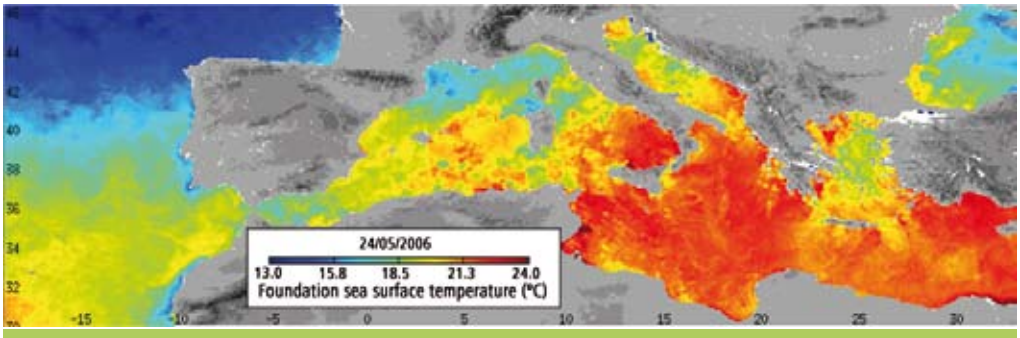
- weather satellites that track the progress of hurricanes and typhoons and weather radar for tracking tornadoes, thunderstorms, and the effluent from volcanoes and major forest fires;

- radio-based meteorological aid systems that collect and process weather data; and

- different radiocommunication systems (satellite and terrestrial) used for dissemination of information concerning different natural and man-made disasters.

The World Radiocommunication Conference in 2007 (WRC-07) recognized that the radio-frequency spectrum is a critical resource for remote sensing used by the GOS. It considered several issues related to the use of remote sensing and allocated additional spectrum, approved protection criteria for such systems and requested ITU–R to carry out new studies for the future development of remote sensing (see Resolution 673 of WRC-07 on "Radiocommunications use for Earth observation applications"). The results of the studies will be considered by the next WRC in 2011.

Figure 4 — Mediterranean sea surface temperature map from Envisat's Advanced Along Track Scanning Radiometer (AATSR) instrument

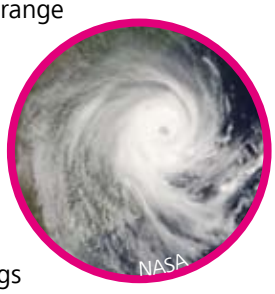


One of the key factors influencing climate change as well as violent storms and hurricanes is the increasing ocean surface temperature. The global control of the ocean temperature is being carried out by remote sensors from satellites. Modern tools measure the sea surface temperature with an accuracy of up to 0.2° C. These data are used for weather forecast, prediction of natural disasters and climate monitoring.

Source: European Space Agency (http://www.esa.int/).

The Global Telecommunication System is built on standards (or Recommendations in ITU parlance) developed by ITU–T and ITU–R. The next-generation networks (NGN) and supporting ITU–T Recommendations will facilitate data exchange between environment control centres. This should improve the quality of monitoring and forecasting.

The Global Data Processing System is used for computer modelling of the Earth's atmosphere. Meteorological services are among the most demanding users of the world's fastest supercomputers, and produce progressively more sophisticated general circulation models of the climate. For instance, the Hadley Centre for Climate Change in the United Kingdom runs a variety of climate models on a suite of NEC SX-6 supercomputers which have processing power equivalent to 1000 times that of a top-of-the-range desktop computer.



In ITU's Telecommunication Development Sector (ITU–D), work includes implementing the decisions of the World Telecommunication Development Conference of 2006 (WTDC-06). ITU–D, in cooperation with other Sectors, produces publications (including a special report on the use of remote sensing developed in accordance with Question ITU–D 22/2). It also organizes workshops, seminars and meetings on the introduction and use of ICT for climate monitoring in developing countries. During the "Global Forum on Effective Use of Telecommunications/ICT for Disaster Management: Saving Lives" in December 2007, BDT in cooperation with BR organized a "Workshop on the Role of Remote Sensing in Disaster Management". The workshop provided information on the use, and critical role, of remote sensing technologies in disaster management in general and climate monitoring in particular.

In order to improve environmental monitoring, ITU has established and strengthened strategic partnerships with WMO and other United Nations agencies, international and national organizations, as well as NGOs and the private sector involved in climate change monitoring. These include meteorological agencies, the Group on Earth Observation (GEO), EUMETSAT, ESA, the Space Frequency Coordination Group (SFCG), JAXA, NOAA, NASA and RSA.

Adaptation

The impact of global warming on the world's climate to date is relatively small compared with what can be expected in the future, even if the increase in greenhouse gas emissions is stabilized. Furthermore, the results are likely to be highly uneven in their distribution, with low-lying coastal areas (such as small island developing States, the Bangladesh delta and the Netherlands) at risk because of rising sea levels; sub-Saharan Africa at risk due to desertification; a growing number of environmental refugees and increased pressure on sources of fresh water and on vulnerable ecosystems such as coral reefs, tundra and coastal wetlands. Adaptation to climate change is thus a key necessity for the global community.

Changing global climatic conditions have an impact on ecosystems in general and on the human habitat in particular, for instance influencing access to natural resources such as drinking water and food, affecting health and migration processes, and causing severe atmospheric and oceanic disturbances. Citizens around the world are becoming more aware of the potential impact of climate change on their own lives. But the effects — and the ability to deal with these — vary from country to country. In particular, the most vulnerable countries in the developing world often do not have the technological, human, financial and governance resources needed to adapt to climate change.

ICTs can play a role in environmental protection, waste management and in environmentally-friendly supply chain management. These applications fall under Programme 3 of the Doha Action Plan of ITU–D, adopted by the Word Telecommunication Development Conference in 2006. ICTs can more than compensate for their own effects and make a substantial net contribution to combating climate change and its consequences by supporting — and, in some cases, even making possible — concerted efforts to identify and measure the extent of the problem, develop effective response strategies, apply energy-saving and improved resource management technologies and processes across all sectors, and deal more effectively with disasters and other outcomes of climate change.

ITU's mission involves assisting Member States to develop the national strategies and capacities needed to promote sustainable development through the effective use of ICT networks, services and applications. By disseminating relevant information, tools and training materials, ITU supports raising awareness, improved policy-making and concrete actions to combat and adapt to the effects of climate change. Jointly with the United Nations Environment Programme (UNEP), ITU supports the Global e-Sustainability Initiative (GeSI) — a global partnership of major players in the ICT sector promoting technologies for sustainable development. Other multi-stakeholder partnerships deal with assistance to countries to foresee, prepare for and minimize the effects of environmental disasters, and to organize the provision of disaster relief through emergency telecommunications.

Developing institutional partnerships with ITU for technical cooperation, that take into account the diversity of conditions in countries and regions around the globe, and contributing relevant specialist expertise in this area to the Union and its membership can make it possible to achieve the required success in this vital undertaking.

At the ITU Plenipotentiary Conference, held in Antalya in 2006, Member States adopted Resolution 136 on the "Use of telecommunications/ICTs for monitoring and management in emergency and disaster situations for early warning, prevention, mitigation and relief". This resolution calls upon the Directors of the Bureaux to continue their technical studies and to support the development of early-warning, mitigation and relief systems. ITU work in this field includes standardization of call priority in emergency situations (for example, Recommendation E.106 on the International Emergency Preference System for disaster relief). ITU–T has also assigned a special E.164 country code (888) to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) for the purpose of facilitating the provision of an international system of naming and addressing for terminals involved in disaster relief activities.

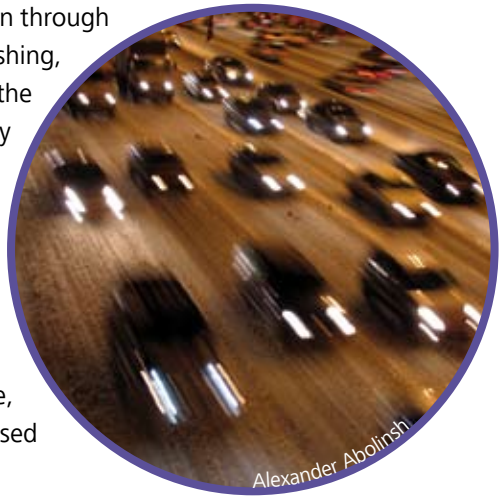
Mitigation

Although ICTs account for only around 2.5 per cent of total greenhouse gas emissions, they have the potential to be used in reducing the other 97.5 per cent of emissions in other sectors. They can do this primarily by creating opportunities for the abatement (or displacement) of existing applications that generate carbon dioxide (CO_2).

Probably the most obvious area for carbon abatement opportunities offered by ICTs is in reducing, or substituting for, travel requirements. The ICT industry offers a number of different tools and services which can theoretically replace travel, especially business travel, which range from the mundane (for example, e-mail, phone calls, text messaging) to the sophisticated (high-performance videoconferencing).

A second area where ICTs have been extensively used for reducing CO_2 emissions caused by transport is in the use of intelligent transport systems (ITS). These systems are used in applications such as "eco-driving", congestion charging, as well as for traffic management and parking optimization.

A third way is through "dematerialization", or the replacement of "atoms" with "bits". An example of this is the current shift under way in the market for pre-recorded movies and music away from physical distribution (such as DVDs and CDs) to online delivery. ITU is also making its own modest contribution to dematerialization through the long-term shift away from paper-based to online publishing, which reached its culmination in 2007 with the decision of the ITU Council to make all ITU–T Recommendations permanently free-of-charge online (see top of page 23).



Another important way in which ICTs can mitigate climate change is in the area of disaster relief. ITU has had a long-standing mission to promote the use of telecommunications for disaster relief and for emergency services. These can be particularly important in mitigating the effects of climate change, for instance from flooding due to rising sea levels, or increased

ITU–T Recommendations online and the reduction of carbon emissions

In 1995, when ITU made its first steps in the transition to electronic publishing, ITU–T printed some 368 534 copies of Recommendations, of an average size of 42 pages each. A further one million unsold copies were in stock. In 2007, ITU–T distributed more than three million Recommendations through free download, but printed only 10 000 copies. If ITU–T were still printing all its Recommendations (instead of distributing them for free online), this would require logging around 23 Douglas Fir trees per year, at an annual loss to the environment through an absorption ability of 25.3 tonnes of CO_2 over 100 years. To this should be added the cost of transporting the printed Recommendations to customers. In 1995, the level of publication sales required some 108 tonnes of CO_2 emission. By 2007, this had been reduced to just 1.5 tonnes. However, in the absence of free Recommendations online, carbon emissions would have been multiplied over twentyfold rather than decreasing.

Source: ITU, based on analysis using the GHG protocol tool (see: www.GHGprotocol.org) and carbon absorption estimates at www.carbon-info.org.

incidence of violent storms and hurricanes. Virtually all ITU–T study groups are active in this area, notably ITU–T Study Group 2 which has the lead on telecommunications for disaster relief/early warning.

Similarly all ITU–R study groups carry out studies and develop ITU–R Recommendation/reports and handbooks on the use of different radiocommunication services for warning the public early of impending disasters, as well as for planning and relief operations.


Inmarsat

In many cases, when disaster strikes, the "wired" telecommunication infrastructure is significantly or completely destroyed and only radiocommunication services can be used for disaster-relief operations — especially radio amateurs and satellite systems.

In order to facilitate the use of radio equipment for mitigating the negative effect of disaster caused by climate change and other disasters, Resolution 646 of WRC-03 strongly recommends use of the regionally harmonized bands for public protection and disaster relief in emergency situations. The Radiocommunication Assembly in 2007 (RA-07) approved Resolutions ITU–R 53 and 55 instructing all ITU–R study groups to carry out studies on the use of radiocommunication in disaster prediction, detection, response, mitigation and relief. WRC-07 further advocated the development of spectrum management guidelines for radiocommunication in emergency and disaster relief, as well as the identification and maintenance of available frequencies for use in the very early stages of humanitarian assistance intervention in the aftermath of disaster. ITU is also developing a database for frequency management in disaster situations (Resolution 647 of WRC-07).

Remote collaboration

The experience in the T Sector

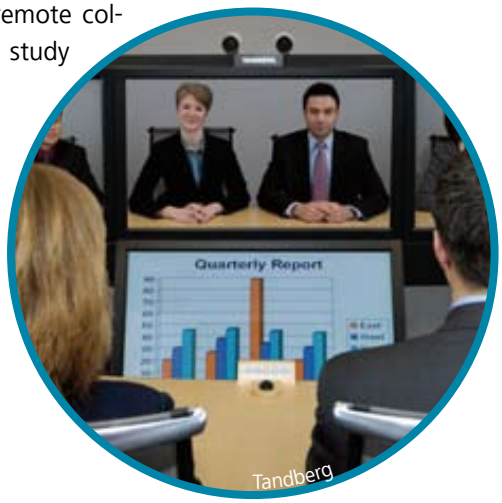
"Increase productivity, save time and money while reducing your company's carbon footprint." This is the ambitious objective of a family of tools that promise to facilitate communication, collaboration and coordination — without the requirement of physical travel. For ITU, whose basic mission is to encourage collaborative work among a global membership, remote collaboration is a daily necessity.

Remote collaboration tools are designed to help two or more participants involved in a common task to achieve their goals. To do this, they combine many different applications such as audio and videoconferencing, instant messaging and chats, multi-user editors, white boards and revision control. Collaborators remotely share access to local devices for presentation and interaction (for example, a desktop, keyboard and mouse) and software (office applications, web applications, in-house software) to view, annotate and edit content in real time, through synchronous participation from different locations.

Remote collaboration tools differentiate between two main modes of operation with variations on each according to the size of the meeting:

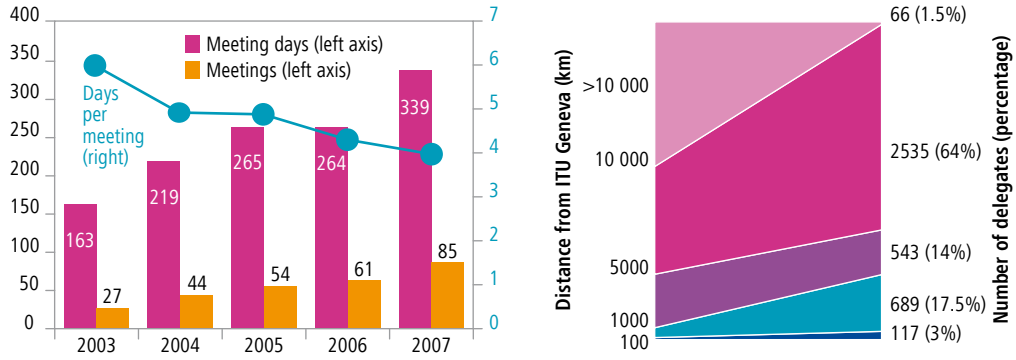
- In peer-to-peer meetings, the organizer and participants may interact (two-way communication) by following an agenda, communicating with the help of audio, video and text, and jointly editing documents. ITU is using this type of remote collaboration for some meetings of steering committees and study groups.

- Webinars (web seminars), often used for product presentations or the transmission of conferences, tend to involve mostly one-way communication, from speaker to audience. Many ITU workshops are available online as webcast. Archives for future reference, evaluation, or training purposes, and live feeds can be found at www.itu.int/ibs/.



The majority of ITU meetings take place in Geneva, Switzerland. Given the international nature of the work — with Member States, Sector Members and Associates from 191 countries around the globe — many delegates must travel long distances to participate in meetings, even though they may sometimes only be interested in one brief part of a meeting. For example, nearly two-thirds of delegates travelled round trip more than 10 000 km to participate in ITU–T meetings in 2007 (see Figure 5 for detailed ITU–T meeting statistics). Holding even a small number of those meetings online would have a significant impact on ITU's carbon footprint, considering that air travel is the world's fastest growing source of greenhouse gases like carbon dioxide, which cause climate change.

Figure 5 — Potential for remote collaboration in ITU–T's activities



Meetings, meeting days and average length of meetings, 2003–2007 (left chart) and distance travelled by delegates in 2007 (right chart)
Source: ITU.

Furthermore, ITU workshops and tutorials held online can address a wider audience, notably in reaching participants from developing countries, and non-members. For developing countries, remote collaboration tools can thus be seen as a helpful instrument in overcoming the digital divide and in "Bridging the Standardization Gap". Specific types of remote collaboration tools (for instance, facilitating remote interpretation, or remote captioning) have also allowed more ITU meetings to be held away from the headquarters in Geneva.

Events and glossary

Calendar of main events

2008		
15–16 April	Kyoto	ITU/MIC Symposium on ICT and Climate Change
17–18 June	London	ITU/BT Symposium on ICT and Climate Change
21–30 October	Johannesburg	World Telecommunication Standardization Assembly
12 November	Geneva	High-Level Segment of ITU Council
1–12 December	Poznan, Poland	UN Climate Change Conference (COP 14)

2009		
12–16 October	Geneva	World Climate Conference
30 November–11 December	Copenhagen	UN Climate Change Conference (COP 15)

List of acronyms

	2G	Second-generation mobile communications
	3G	Third-generation mobile communications
A	AATSR	Advanced Along Track Scanning Radiometer
	ADSL	Asymmetric digital subscriber line
B	BDT	Telecommunication Development Bureau
	BR	Radiocommunication Bureau
	BT	British Telecom
C	CD	Compact Disc
	CEB	Chief Executive Board (of the United Nations system)
	CO_2	Carbon dioxide
D	DP	Diagonalizing Precoder
	DVD	Digital Versatile Disc
E	ESA	European Space Agency
	ETNO	European Telecommunication Networks Operators' association
	EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
F	FAO	Food and Agriculture Organization of the United Nations
G	GEO	Group on Earth Observations
	GeSI	Global e-Sustainability Initiative
	GDPS	Global Data Processing System
	GHG	Greenhouse gas
	GOS	Global Observing System

	G-PON	Gigabit passive optical network
	GTS	Global Telecommunication System
I	ICT	Information and communication technologies
	IPCC	Intergovernmental Panel on Climate Change
	ITS	Intelligent transport systems
	ITU	International Telecommunication Union
	ITU–D	ITU Telecommunication Development Sector
	ITU–R	ITU Radiocommunication Sector
	ITU–T	ITU Telecommunication Standardization Sector
J	JAXA	Japan Aerospace Exploration Agency
K	kW	kilowatts
	kWh	kilowatt-hour
L	LAN	Local area network
M	MIC	Ministry of International Affairs and Communications (Japan)
N	NASA	National Aeronautics and Space Administration
	NGN	Next-generation networks
	NGO	Non-governmental organization
	NMS	National meteorological service
	NOAA	National Oceanic and Atmospheric Administration
	NTT	Nippon Telegraph and Telephone Corporation
O	OCHA	Office for the Coordination of Humanitarian Affairs
P	PP	Plenipotentiary Conference
	PSTN	Public switched telephone network
R	RA	Radiocommunication Assembly
	RRC	Regional Radiocommunication Conference
	RSA	Russian Space Agency
S	SFCG	Space Frequency Coordination Group
	SG	Study group
	TSAG	Telecommunication Standardization Advisory Group
T	TSB	Telecommunication Standardization Bureau
U	UN	United Nations
	UNEP	United Nations Environment Programme
	UWB	Ultra-wideband
V	VDSL	Very-high speed digital subscriber line
W	WEF	World Economic Forum
	WMO	World Meteorological Organization
	WP	Working party
	WRC	World Radiocommunication Conference
	WTDC	World Telecommunication Development Conference
	WTSA	World Telecommunication Standardization Assembly
	WWF	World Wide Fund for nature
	WWW	World Weather Watch

ITU elected officials

"Climate change is a concern for all of humanity and requires efforts on the part of all sectors of society, including the ICT sector."

Hamadoun I. Touré
Secretary-General

"ITU is working to demonstrate that clean information and communication technologies for sustainable development are key in combating climate change."

Houlin Zhao
Deputy Secretary-General

"New radio technologies are already reducing power requirements and, consequently, greenhouse gas emissions."

Valery Timofeev
Director, Radiocommunication Bureau

"We have already seen in ITU a phenomenal level of effort put into finding ways to reduce power consumption in ICT networks and devices."

Malcolm Johnson
Director, Telecommunication Standardization Bureau

A vital goal of ITU is to help the most vulnerable countries in the developing world, which often do not have the resources to adapt to climate change."

Sami Al Basheer Al Morshid
Director, Telecommunication Development Bureau

Photo credit: ITU/J. M. Ferré

ITU NEWS

Tells you what's happening in telecommunications

Every time people make a phone call, use a mobile, use e-mail, watch television or access the Internet, they benefit from the work of ITU's mission to connect the world.

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October 2008