



FRAMEWORK FOR REDUCTION OF CARBON EMISSIONS IN THE ICT SECTOR

2025

Version 1.0

Table of Contents

Definitions	ii
Abbreviations and Acronyms	iii
1. Introduction	1
2. Background to CO ₂ Reduction Efforts	1
4. Principles of the Framework.....	3
5. Objectives of the Framework	3
6. Classical Sources of Carbon Emissions in the ICT Sector.....	3
7. Emerging Sources of Carbon Emissions in the ICT Sector.....	5
8. ICT as Part of the Solution to Carbon Emission Reduction	6
9. ICT Standards and Guidelines on Carbon Emissions Reduction	6
10. ICT Carbon Emission Reduction Efforts.....	7
11. Monitoring and Reporting on Reduction of Carbon Emissions	9

Definitions

Carbon Footprint refers to the total amount of greenhouse gas emissions, primarily carbon dioxide (CO₂) and other carbon compounds, emitted directly or indirectly into the atmosphere, caused by a specific action by an individual, an event, an organization, or a product, usually indicated as CO₂e.

Greenhouse Gas (GHG) any of various vaporous states of matter that possess the capacity to absorb infrared radiation, thereby trapping heat in the atmosphere, and contribute to the greenhouse effect, leading to increased temperatures on the planet's surface and subsequent global warming.

Greenhouse Effect refers to the process through which rays from the sun reflected back into the atmosphere are trapped near the Earth's surface, leading to an increase in temperature, a phenomenon known as global warming

Global Warming refers to the gradual increase in the average air temperatures observed near the Earth's surface since the pre-industrial period, and occasioned primarily by human activities, that eventually lead to climate change

Climate Change refers to long-term shifts in temperatures and weather patterns experienced across various regions of the globe.

Abbreviations and Acronyms

CO ₂	Carbon Dioxide
GHG	Green House Gases
GGOM	Greenhouse Gas Global Overview and Mitigation Project
GeSI	Global eSustainability Initiative's
NFC	Near Field Communication
ICT	Information and Communications Technology
ISO	International Organization for Standardization
ITU	International Telecommunication Union
IoT	Internet of Things
KPIs	Key Performance Indicators
RFID	Radio Frequency Identifier
OSCAR	Online Solution for Carbon Analysis and Reporting
SDGs	Sustainable Development Goals
UPU	Universal Postal Union

1. Introduction

The Communications Authority of Kenya (CA) is the statutory body responsible for regulating the communications sector in Kenya, established in 1999 by the Kenya Information and Communications Act (KICA), 1998. The Authority oversees the development and regulation of various sub-sectors within the Information and Communications Technology (ICT) sector, including broadcasting, cybersecurity, multimedia, telecommunications, electronic commerce, postal and courier services.

The Authority fulfills its mandate through the licensing of ICT systems and services, managing telecommunication resources required by the licensed operators, empowering and protecting consumers, and ensuring effective competition in the ICT sector.

In the execution of its duties, the Authority is guided by the KICA, which requires the Authority to have due regard to the country's relevant policy guidelines, both local and international, including any international treaties or agreements regarding the provision of telecommunications, radio, and postal services.

2. Background to CO₂ Reduction Efforts

The United Nations, established in 1945, has set forth global goals for a more sustainable world. With 193 Member States, including Kenya, the UN seeks to address global challenges, such as the climate change, by promoting international peace and security, fostering friendly relations among nations, and coordinating collective actions to preserve the Earth's resources.

As part of the UN's broader sustainability efforts, the 2030 Agenda for Sustainable Development was adopted, comprising 17 Sustainable Development Goals (SDGs), aimed at promoting peace and prosperity for people and the planet, while tackling climate change and preserving oceans and forests, among other natural ecosystems.

The landmark 2015 United Nations Climate Change Conference in Paris saw the adoption of an international treaty addressing climate change mitigation, adaptation, and financing. As a signatory to this agreement, Kenya, along with other members of the United Nations, became signatories to the accord and committed to reducing Greenhouse Gases emissions.

Following the adoption of the Paris accord in 2015, the International Telecommunication Union (ITU), the United Nations specialized agency for Information and Communication Technologies (ICTs), to which Kenya is a Member State, developed the L.1400 Series standards on Assessment Methodologies of ICTs CO₂ trajectories.

The standards provide among others: General principles of methodologies for assessing the environmental impact of ICTs; Methodology for environmental life cycle assessments of ICT goods, networks and services; Methodologies for the assessment of the environmental impact of the ICT sector; Greenhouse gas emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement; and, Framework and functional requirements of a greenhouse gas emissions management system using digital technology for the public sector

Notably, one of the L-1400 series standards, L.1470, requires the Information and Communication Technology (ICT) sector to reduce greenhouse gas (GHG) emissions by 45 per cent between the years 2020 to 2030. The standard therefore supports ICT companies in reducing GHG emissions at the rate necessary to meet the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement's goal of limiting global warming to 1.5°C above pre-industrial levels.

In the postal sector, the Universal Postal Union (UPU), which is the primary forum for cooperation between postal sector players, through its Greenhouse Gas Global Overview and Mitigation Project (GGOM) during its 24th Universal Postal Congress, adopted Recommendation C27/2008 inviting the designated postal operators to promote initiatives aimed at reducing the negative effect of their activities on the environment, in addition to endorsing Resolution C34/2008 recognizing the importance of adopting a programme for the postal sector to reduce greenhouse gas emissions.

In actualizing the adopted recommendations, the UPU developed a specific programme, the Greenhouse Gas Global Overview and Mitigation Project (GGOM), designed to measure the postal sector's carbon footprint and encourage initiatives to reduce its impact on climate change, particularly through the exchange of sound environmental practices.

The UPU has consequently developed OSCAR – the Online Solution for Carbon Analysis and Reporting – a tool provided by the UPU to measure and analyze the postal sector's carbon footprint. The tool enables interactive data collection and provides a detailed report on emissions to postal operators by scope, source, and product. Comparisons with previous years to highlight the results of their mitigation efforts is also possible with the tool.

3. Role of the Communications Authority of Kenya

Given its pivotal role as the lead agency for the Information and Communication Technology Sector in Kenya, the Authority spearheads Kenya's representation at ITU and UPU meetings and assumes responsibility for implementing global resolutions affecting the ICT landscape.

Furthermore, at the national level, the National Environmental and Management Coordination Act (EMCA) No. 8 of 1999, mandates the National Environmental and Management Authority (NEMA) to coordinate the various environmental management activities, collaborating with lead agencies vested with regulatory functions of control or management of any element of the environment or natural resources.

The law vests the functions of ICT regulation to the Authority. Therefore, the Authority has in place a framework of cooperation between itself and NEMA on matters regarding to impact of ICT on the environment.

Acknowledging the substantial contribution of carbon dioxide (CO₂) to the greenhouse gas effect, which accounts for approximately eighty percent (80%) of the total, the Authority commits to environmental conservation efforts, aiming to curtail the ICT sector's carbon footprint. The other greenhouses gases are Water Vapor(H₂O), Carbon Dioxide(CO₂), Methane(CH₄), Nitrous Oxide(N₂O), and Ozone(O₃).

This framework, therefore, is one of the measures the Authority is fronting towards environmental conservation aimed at reducing the ICT carbon footprint.

4. Principles of the Framework

This framework is underpinned by the following foundational guidelines:

- | | |
|--------------------------------------|---|
| a) Innovation | ICT sector players are encouraged to be innovative in the way they deploy and provision their services to help in reducing the ICT carbon footprint |
| b) Industry Driven Effort | This framework will as much as possibly encourage the ICT sector players to set their own targets for carbon emission reduction and aim to achieve them |
| c) Technology Neutrality | This framework will be as neutral as possible with regards to roll out of any technology by service providers |
| d) Progressive attainment of targets | This framework recognized the need for step-by-step attainment of targets by each ICT sector player at their pace towards the UN set target of net zero emission by the year 2050 |

5. Objectives of the Framework

This framework aims to:

- a) Identify sources of Carbon dioxide (CO₂) emissions in the ICT sector,
- b) Explore avenues through which ICTs can be used to mitigate CO₂ emissions,
- c) Establish targets for reductions of ICT CO₂ emissions, and,
- d) Assign responsibilities for the reduction of CO₂ emissions to the various stakeholders in the ICT sector.

6. Classical Sources of Carbon Emissions in the ICT Sector

The ICT sector contributes significantly to the global carbon emissions, both as part of the problem and as part of the solution, both for the telecom and postal sub-sectors.

a) Telecom Sub Sector

As part of the problem, ICT sources of carbon emission from the telecom subsector are tri-fold: user devices, networks, and data centres. This occurs during the production, use, and disposal of the said equipment in the three listed use cases.

This is depicted pictorially as in Figure 1.

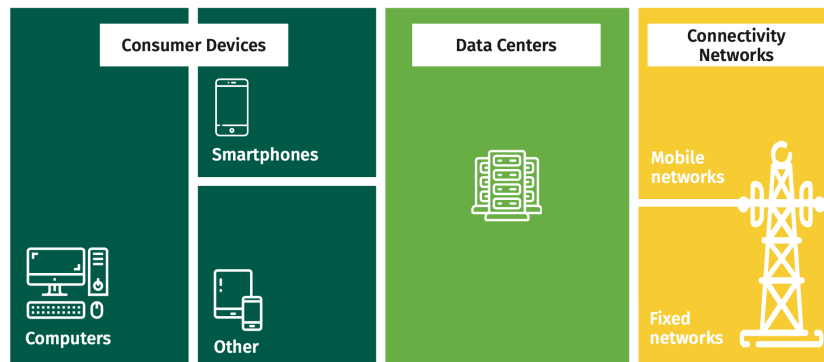


Figure 1 : Sources of ICT carbon emissions [Source: A Joint ITU/WB Report 2023]

According to the data from the United Nations Environment Program, Data centres contributed 45% of the ICT carbon footprint, networks 24% and user devices 31%, as in Figure 2.

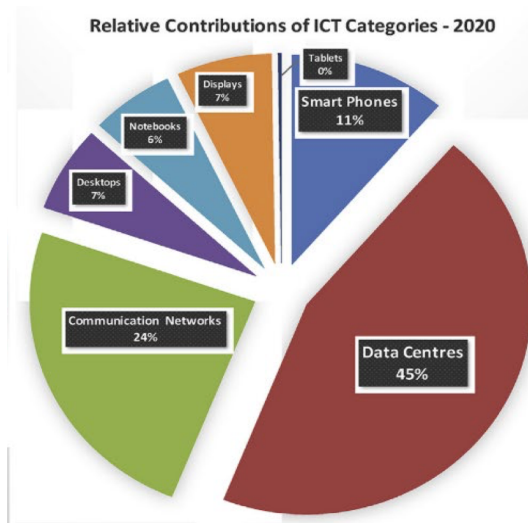


Figure 2: Percentage contribution per value chain [Source: Joint ITU/World Bank report 2023]

Reports from the International Telecommunications Union indicate that the ICT sector contributes about three percent (3%) of the global carbon emissions, equivalent to roughly one (1) metric gigatonne of carbon emissions.

There is a growing trend in Carbon emissions in the telecom sub-sector occasioned by:

- i.) Proliferation of ICT service users
- ii.) The trend in the use of multiple devices by ICT users due to reduced prices,
- iii.) Rising device/equipment processing and transmission power, case in point being third-generation (3G) mobile phones, which operate at higher frequencies and need more power than 2G phones
- iv.) A trend towards “always-on” usage modes
- v.) A tendency to store rather than delete older material

a) Postal Sub Sector

The postal subsector contributes to Carbon emissions through production and disposal of packaging materials, electricity, and generator power in postal/courier offices, parcels sorting machines, transportation of parcels, and production of stamps.

The various functions in the postal sub-sector that contribute to CO₂ are:

- i.) Transportation of letters and parcels, during combustion of fossil fuels in delivery vehicles and cargo airplanes, which emit carbon dioxide.
- ii.) Operational Logistics, where power is used for lighting in postal/courier facilities, powering of automated sorting machines, conveyor belts, and powering general office electronics, contributes to carbon emissions.
- iii.) Procurement of postal consumables like stamps and packaging materials results in carbon emissions during extraction and manufacturing of the consumables, and during their transportation to various postal/courier outlets.
- iv.) Waste management through transportation and the ultimate burning /destruction of non-reusable postal/courier packaging materials, which emits carbon dioxide

Diagrammatically, this is depicted as in Figure 3.

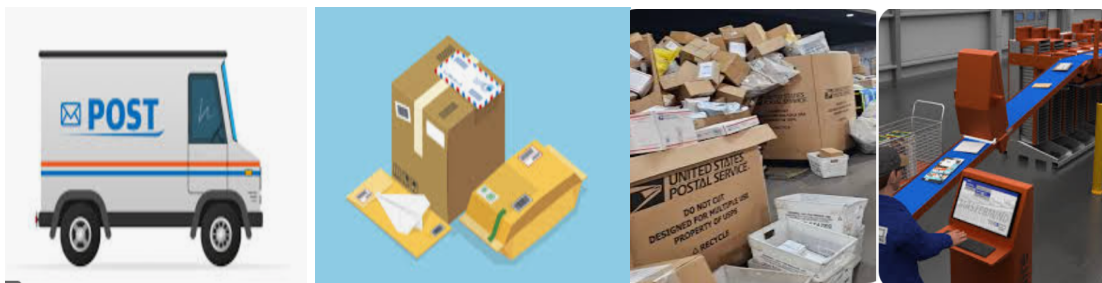


Figure 3: Sources of CO₂ in Postal/Courier sub-sector

7. Emerging Sources of Carbon Emissions in the ICT Sector

Emerging trends exacerbating carbon emissions in the ICT sector include the proliferation of ICT users, increased use of multiple devices by ICT users due to decreasing prices, escalating processing power and transmission power demands, case in point third-generation (3G) mobile phones operate at higher frequencies and need more power than 2G phones, and a shift towards “always-on” usage modes, and data retention practices.

8. ICT as Part of the Solution to Carbon Emission Reduction

Various ICT enabled activities have contributed to carbon emission reduction, with examples such as:

- a) e-commerce, e-working, e-learning, e-government, and e-banking, where the online services reduce the fuel consumption needed to travel to the place of service.
- b) Smart cities, Smart buildings, and Smart manufacturing that use energy efficient technologies to control energy consumption and provide remote monitoring services.
- c) Mechanisation, where franking machines are used in place of physical stamps.
- d) Virtualisation, where demand for physical systems is reduced by creating more than one computing platform to be used by various entities as if the physical entities were separate.
- e) Cloud computing, where demand for infrastructures, software, and development platforms are accessed as a service and metered based on usage.

9. ICT Standards and Guidelines on Carbon Emissions Reduction

Contemporary ICT standards related to carbon emission reduction are shown in Table 1.

Table 1: Contemporary ICT standards related to carbon emission reduction.

No.	Standard	Source	Description
1.	ITU-T L.1400 series	International Telecommunications Union	Assessment methodologies of ICTs and CO ₂ trajectories
2.	ISO/IEC 30134: Information Technology – Data center energy efficiency metrics	International Organization for Standardization	Focuses on energy efficiency metrics for data centers.
3.	ISO/IEC 14001 Environmental Management System	International Organization for Standardization	ISO 14001 is the internationally recognized standard for environmental management systems (EMS). It provides a framework for organizations to design and implement an EMS, and continually improve their environmental performance
4.	OSCAR Online Solution for Carbon Analysis and Reporting	Universal Postal Union	Online Solution for Carbon Analysis and Reporting for the postal and courier sector. Has 20 Carbon Key Performance Indicators Accessible by postal service providers after registration

No.	Standard	Source	Description
5.	Guidelines-for-Undertaking-ICT Infrastructure-Works	Communications Authority of Kenya	The guidelines encourage design and implementation for use of energy efficient solutions (smart), use of green power (solar), sharing of power sources, and utilizing the circular economy principles (sharing, leasing, reusing, repairing, refurbishing and recycling)
6.	Guidelines for Network Redundancy, Resilience and Diversity for ICT Networks in Kenya	Communications Authority of Kenya	The Guidelines encourages service providers to make use of, as possible, green power, infrastructure sharing, and utilize commercial data centers

10. ICT Carbon Emission Reduction Efforts

When new ICT projects, e.g., new transmission sites, new cable laying, new equipment type approval, among others, are presented to the Authority for approval, the Authority will consider efforts made to reduce carbon emissions.

Among the measures encouraged are:

i. Use of Green Power

Design of ICT projects with the use of green power integrated in the design, e.g., solar and wind, use of energy efficient equipment, will be considered in the approval of new ICT projects. Postal and courier operators are encouraged to use solar panels as their main source of power in outlets.

ii. Use of Smart Technology

All new ICT projects will be required to embrace smart technology insofar as power consumption is concerned. Smart lighting systems, smart ICT data centers, smart buildings that host ICT equipment and systems, smart ICT sites, etc.

iii. Disposal of Obsolete and Damaged ICT Equipment

When new ICT projects, e.g., new transmission sites, new cable laying, new equipment type approval, among others, are presented to the Authority for approval, the service provider will include a disposal plan that has the least impact on the environment, insofar as carbon emissions are concerned. This can include re-use, recycle, and refurbishment.

Packaging materials used in delivery of postal articles and parcels should be made of easily biodegradable materials and be capable of being recycled for as long as possible, and re-used for other activities beyond delivery and posting of articles.

iv. **Use of Cloud Technology, Virtualization, and Public Data Centers**

Due to the emerging need to store data for longer periods due to legal requirements, the Authority will encourage the use of cloud technology to store data for longer periods and use of public data centers as opposed to private acquisition of servers by each and every institution. This will reduce power consumption and carbon emissions due to production of new servers, transportation to places of use, and their disposal. Firms with private servers will be encouraged to use virtualization and therefore reduce on the server count.

v. **ICT Infrastructure Sharing**

For New ICT projects, service providers will be required to co-locate and share facilities in areas where there is existing infrastructure. Approval for new ICT projects that are not co-located/shared will only be granted where it is not feasible to share or there is no existing infrastructure.

vi. **Postage Stamps Replacement**

The postal subsector is encouraged to adopt the use of Franking Machines, as opposed to physical stamps, where posting envelopes are sold at postal outlets pre-franked, with different prices based on the sizes of the articles to be posted.

vii. **Use of Alternative Modes for Last Mile Postal Articles Delivery**

For last mile delivery of postal articles, it is encouraged that electric vehicles /scooters, bicycles, in addition to use of vehicles with emission control technologies like catalytic converters and diesel particulate filters, exhaust gas recirculation, among other technologies.

viii. **Optimization of Delivery Routes for Postal/Courier Articles**

In delivery of postal and courier articles, service providers are encouraged to plan routing of posted articles in a way that reduces the distance travelled between delivery points, to reduce emissions due to transportation.

ix. **Use of OSCAR Platform**

Postal and courier service providers are encouraged to register on the free Online Solution for Carbon Analysis and Reporting (OSCAR) platform, which uses questionnaires with a set of questions to compute CO₂ contribution of each postal/courier, and then generates the impact by scope, product, and source of the service provider.

The results can also be used to compare the service provider's performance with industry reported averages. The tool also, based on the responses to the questionnaire, highlights the results of the mitigation efforts reported in the questionnaire over the years.

11. Monitoring and Reporting on Reduction of Carbon Emissions

Service providers will on an annual basis, report on their efforts to reduce their individual carbon footprint.

The reporting template will be embedded in the quarterly compliance returns form, but will be reported on an annual basis. The reporting template for the telecom and postal subsectors will be as shown in Tables 2 and 3.

Table 2: Dimensions for evaluation of telecom sub-sector CO₂ footprint reduction.

No	Metric	Total Number	Metric Number	Percentage of Metric to Total Number	percentage for previous year (N/A for first year of reporting)
1.	Green ICT sites				
2.	Shared ICT sites				
3.	Smart ICT sites				
4.	Cloud /Public Data Center hosted Services				
Definitions: <i>Green ICT Sites: - Refers to a site that is purely off grid and uses renewable energy like wind and solar</i> <i>Shared ICT Sites: - Refers to telecommunication installations where service providers either co locate or shares passive/active infrastructure.</i> <i>Smart ICT Sites: - These are telecom/broadcast installations with sensors that are used for controlling site utilities and enabling remote monitoring and control.</i>					

Table 3: Dimensions for evaluation of postal/courier subsector CO₂ footprint reduction.

No	Metric	Total Number	Metric Number	Percentage of Metric to Total Number	percentage for previous year (NA for first year of reporting)
1.	Outlets using green power				
2.	Green power Last mile delivery vehicles/scooters/bicycles				
3.	Letters/articles sent using Franked envelopes or non physical stamps				
Definitions: <i>Green power: - Energy produced from solar/wind.</i>					

Note: The Authority will verify the reported data on efforts to reduce the ICT carbon footprint from time to time.