

Journal

RWANDA

STANDARDS

ISSUE 12-AUGUST 2018 | NOT FOR SALE

FOCUS ON STANDARDS IN URBAN PLANNING

KEY STANDARDS
FOR SMART
SUSTAINABLE
CITIES

THE ROLE OF
STANDARDS IN
ACHIEVING
SMART URBAN
PLANNING







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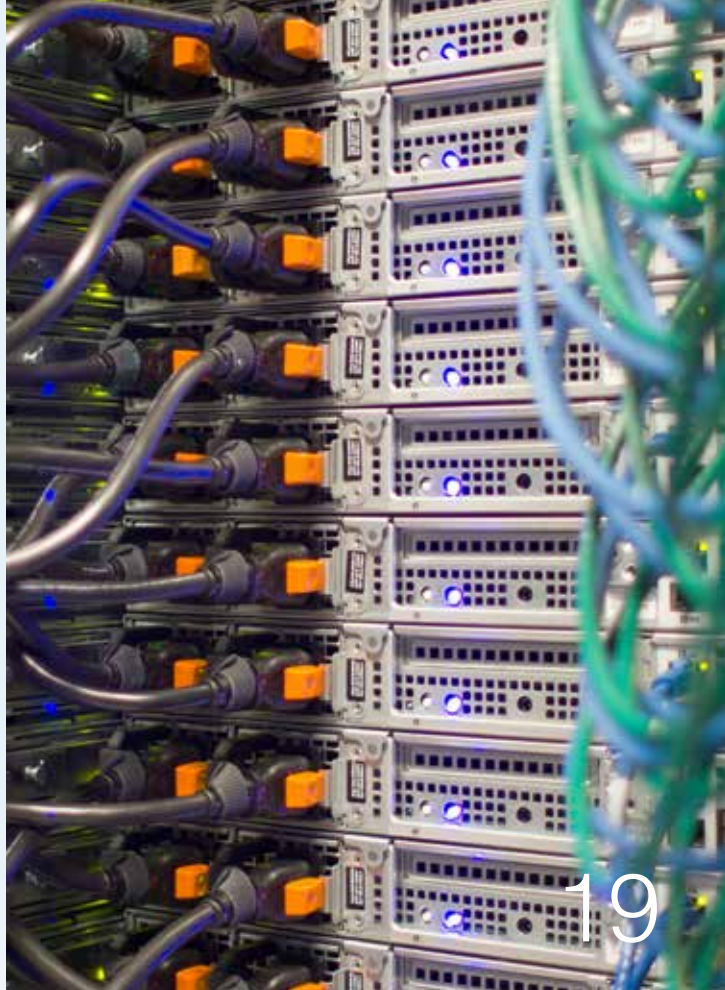
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RSB CERTIFICATION MARKS



FOREWORD



Welcome to this edition of the Standards Journal

This edition focuses on smart urbanization in Rwanda. We bring to you an array of stories and insights on standards in urban planning. It comes at an exciting time, when we started yet another bold journey in our country's long standing commitment to achieving sustainable urbanization.

Urbanization can accelerate progress towards good living conditions for the citizens, but needs good planning in all aspects from physical planning to provision of utilities and services. They must be anchored on set Standards. The City of Kigali and all secondary cities, the policymakers and all stakeholders provide us with a challenge to make them conducive and habitable to all Rwandans.

In this edition, you will find the available standards on the various components of planning for an urban settlement. Standards are part and parcel of Urban Planning.

We have also endeavored to explain the requisite standards for sustainable development, Environmental Management, Energy efficiency Performance, Public Transport Management, Information security, City Indicators, Construction, Information Technology, Waste Management to mention a few.

You will find express justification of adhering to respective standards in these key ingredients of urbanization in the face of rapid population increase, improved lifestyles and high paced advances in technology.

We are thankful to our partners namely Ministry of Infrastructure, Ministry of Local Government, Rwanda Housing Authority, Rwanda Environment Management Authority, Rwanda Energy Group, City of Kigali, Rwanda Utilities Regulatory Authority, Water and Sanitation Corporation, Rwanda National Police, Institute of Engineers in Rwanda, the business community and the general public whom we work together in developing and applying Standards as we strive to having a Smart Rwanda with Smart Cities.

I hope you enjoy reading this edition.

Raymond Murenzi

Director General, Rwanda Standards Board

STANDARDS ARE A KEY COMPONENT OF URBANIZATION

FOR A SMART RWANDA WITH SMART CITIES



Rwanda Standards Board has various standards for Smart Urbanization to spur sustainable economic growth. A lot has been done and more still needs to be done. We caught up with Rwanda Standards Board Director General, Mr. Raymond Murenzi to understand the role of standards in enabling urban planning. Below are the excerpts.

Q// What are the key components that characterize a smart city, and what is the role of standards in achieving a smart city?

A// From a standards point of view, a smart city is an integrated approach where you have services such as Transportation, Environment Protection, Health Centers, Utilities to mention a few. It is there to meet aspirations of the citizens.

Building a smart city involves a number of activities including urban planning policies and strategies, developing smart buildings, roads, energy, protecting the environment, IT and smart services.

All these aspects rely on Quality and Safety Standards, thus every component is accompanied with Standards. Standards provide the right conditions and innovations, they help to remove barriers.

Q/ Rwanda is urbanizing at a good level of speed thus our physical urban planners have laid plans to guide construction of buildings, roads, utility facilities, recreation centres, name it. Does Rwanda have compulsory standards that guide urbanisation?

A/ Standards are not only compulsory, we also have a Building Code that is robust enough to cater for them.

The legal instrument and standards are dynamic, we still have standards to develop to make the Code strong enough. There is a lot to do but also a lot has been done to ensure that infrastructure development policies set are matched with relevant standards that work as reference materials for engineers and other actors in urban planning.

Q/ What is your opinion on the legal instruments that enforce standards in Rwanda's urbanisation agenda?

A/ When standards are published as mandatory, they work as legal instrument themselves.



Regulatory Bodies work to enforce them in addition to other existing technical regulations. In Rwanda, enforcement of standards is conducted in collaboration with relevant regulators and consumer association.

Q/ How is RSB assisting in ensuring building plans and their execution meet requisite standards to enable sustainable urbanisation?

A/ RSB has mandate to develop standards and disseminate them. We conduct workshops with engineers to explain and create awareness for these standards. Some of our engineers have studied British Standards in their respective Engineering colleges / school, other have studied German Standards, to mention a few; so they needed to adjust to our local Rwandan context.

We also test materials used in construction, RSB has a hi-tech laboratory to test materials used in construction. This laboratory is open to anyone at a fee. We also certify materials used in construction. The metrology laboratories perform calibration and verification of construction materials and equipment.

Q// If you look at the spread and distribution of services such as banks, hospitals, schools and others in Rwanda, are they aligned to smart city principles?

A// When talking about a smart city you are also talking about a standard urban planning protocol on what should be located where. Smart services are a key component of a smart city, for instance IT is taking the lead in service delivery in Rwanda. And, while not all services are digitalized, I commend the progress made so far.

Q// Soon Kigali will have a centralized sewerage systems for the Central Business District and some suburbs. How is RSB ensuring relevant standards are incorporated in the design and implementation of this project?

A// We have different standards on water engineering, sewerage and waste management. Others are being developed but the primary ones are in place. We are working with relevant Government institutions to ensure these standards are reflected in industry laws.

Q// Kigali experiences a kind of a perennial shortage of water supply, and also quality of water. What do you think of the aspect of water in a smart city setting?

A// We monitor water supply and water being supplied meets the requisite standards. We also check the water equipment. We have a special laboratory for water which tests metering devices. These devices are verified and calibrated before being released into the market.

We are supporting Water and Sanitation Corporation Ltd (WASAC) to have an appropriate laboratory to test water. It will be a special designated laboratory with full capacities.

Also, WASAC water quality testing laboratory is in design process to attest its conformance with international standards for laboratory offering conformity assessment services.

Q// A few years ago, Kigali experienced a lot of fire outbreaks, it was attributed to the substandard electric cables used. What is your take on this?

A// That was the case then, but that now stopped. We did thorough follow up and found out that some unscrupulous traders were deliberately importing substandard electric materials / cables. We took measures in collaboration with other institutions, and this vice has been stopped.

Also, some fires were a result of poor workmanship by some engineers who did not refer to relevant standards in their work. RSB is continuously working with the Institute of Engineers of Rwanda to train stakeholders and raise awareness on applying the relevant standards.

Q// Most of the time there are road repairs/upgrades in Kigali, Utilities like water supply are often interrupted. What do you make of this?

A// Some of these occurrences are unavoidable in the course of expansion of a city. However, we have standards which should be referred to when doing this. City engineers are trying to minimize this as much as possible because every time it happens it puts Government at financial loss.

Q// Any parting shorts?

A// Yes, IT is important for Smart Urbanization. We rely on IT systems to communicate and make payments. If you are talking about compatibility, RSB has standards in place to guide in this.

Also the quality of air we breathe is important to achieve Smart Urbanization. In collaboration with institutions like Rwanda Environment Management Authority and City of Kigali, we are setting up a facility at University of Rwanda-Kigali Campus to measure the quality of air in and around Kigali. To achieve this, there are standards guiding this process. The quality of air in an industrial zone should be different from that in office/household setting.







Blue lab coat with reflective white stripes on the sleeve.

KEY STANDARDS

FOR SMART SUSTAINABLE CITIES.



World Bank projections indicate that by 2050, the world will have undergone the largest and fastest period of expansion in human sustainability. A bigger percentage of the population will be living in urban areas. This therefore calls for building cities that are resilient and sustainable.

Developments need to meet the demands of the present without compromising the ability of future generations to meet their own needs.

Hence the need for innovative city that uses Information and Communication Technologies (ICTs) and other means to improve quality of life,



By
2050 

The world will have undergone the largest and fastest period of expansion in human sustainability



efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to the economy, society and the environment.

“

Developments need to meet the demands of the present without compromising the ability of future generations to meet their own needs.

BELOW ARE STANDARDS IN URBAN PLANNING

1. ISO16346: 2013 ENERGY PERFORMANCE



Adherence to various standards makes cities resilient and sustainable. Rwanda Standards Board advises city planners to adhere to is ISO 16346:2013 Energy Performance. The standard defines the general procedures to guide in the assessment of energy performance in buildings.

With towers coming up in Kigali and secondary cities, Rwanda is aspiring to become a smart country with smart cities, which makes adhering to this Standard important.

This Standard computes the use of energy for specific functions within a building. It gives a picture of overall use of energy in the building, in cases of excess of energy, it may be export supplied to another facility.

In line with Rwanda's National Policy on Energy, adherence to Standards in energy performance goes a long way in providing ratings on carbon dioxide emissions and other limitations. It provides guidelines in determining primary energy factors and carbon dioxide emission coefficients.

ISO16346:2013 Energy Performance defines energy services to be taken into account for setting energy performance ratings for planned and existing buildings and provides for method to compute the standard calculated energy rating, a standard energy use that does not depend on occupant behavior, actual weather, and environmental conditions.

The standard provides a formula to improve confidence in the building calculation model by comparison with actual energy use and to assess effectiveness of possible improvements in energy.

2. // ISO 37101:2016 SUSTAINABLE DEVELOPMENT MANAGEMENT



Rwandans participating in Community Based Service (Umuganda). Umuganda is one of Rwanda's Home grown solutions that have helped Rwanda achieve Sustainable development. Through Umuganda, Schools, Hospitals, Roads to mention a few have been built.

This standard helps in establishment of the requirements for a management system for sustainable development in communities, including cities. It uses a holistic approach, with a view to ensuring consistency with the sustainable development policy of communities.

The intended outcomes of a management system for sustainable development in communities include but not limited to:

- Managing sustainability and fostering smartness and resilience in communities, while taking into account the territorial boundaries to which it applies
- Improving the contribution of communities to sustainable development outcomes

- Assessing the performance of communities in progressing towards sustainable development outcomes and the level of smartness and of resilience that they have achieved
- Fulfilling compliance obligations.

It helps communities become more resilient, smart and sustainable, through the implementation of strategies, programs, projects, plans and services, and demonstrate and communicate their achievements.

ISO 37101:2016 Sustainable Development Management standard aims at being implemented by an organization designated by a community to establish the organizational framework and provide resources necessary to support the management of environmental, economic and social performance outcomes.

A community that chooses to establish the organizational framework by itself is considered to constitute an organization as defined in this standard and is applicable to communities of all sizes, structures and types in developed or developing countries, at local, regional or national levels and in defined urban or rural areas at their respective level of responsibility.

Also, it can be used in whole or in part to improve the management of sustainable development in communities. Claims of conformity to this standard, however, are not acceptable unless all its requirements are incorporated into an organization's management system for sustainable development in communities and fulfilled without exclusion.

3. // ISO 37120:2018 SUSTAINABLE DEVELOPMENT OF COMMUNITIES-INDICATORS FOR CITY SERVICES AND QUALITY OF LIFE



Irembo is an online platform where Rwandans can access government services like Health Insurance commonly known as *Mituelle de Sante*, applications for Marriage Certificates, Birth certificates, National ID, Certificate of Celibacy, payment of traffic fines, application for driving permits to mention a few.

Rwanda intends to become a smart country with smart cities. Realizing this aspiration requires that Kigali City and other secondary cities start now to incorporate and implement this standard.

According to the International Telecommunications Union (ITU), a smart city is a safe, adaptable, reliable, measured, and has easily accessible ICT infrastructure usage that increases society life qualities, economic growth, public welfare, environmental responsibility, government performance, physical infrastructure, and minimizes the impact of natural disasters.

It is an Urban Development vision to integrate Information and Communication Technology (ICT) and Internet of things (IoT) technology in a secure fashion to manage a city's assets where leaders and citizens use data, information and knowledge to ensure an efficient and sustainable future.

ISO 37120:2018 Sustainable development of communities-indicators for city services and quality of life Standard is about sustainable development of communities-indicators for city services and quality of life. It applies to cities, municipalities or local governments that undertake to measure their performance in comparison to demonstrable manner, irrespective of size and location and is applied regardless of whether a city is smart or not.

Building and maintaining a Smart City requires a long term and continuous relationship between the citizens and the Government; the bridge that allows these two parties to interact with each other efficiently is technology which ultimately is backed with Standards so as to have a common ground for its usefulness.

4. // ISO 20000-1:2011 INFORMATION SERVICE MANAGEMENT SYSTEMS



ISO 20000-1:2011 Information Service Management systems is another important standard in information technology service management. It is an international standard for IT service management. It describes an integrated set of management processes for the effective delivery of services to the business and its customers.

It aligns IT strategy with business strategy, enables meeting business and user needs, coping with change, management of costs, budgets and resources. It further enables keeping up with technology, recruitment and retention of staff; time and resource management; infrastructure management and maintenance of skills and knowledge.

ISO 20000 certification offers numerous and valued benefits such as; improved quality of service, increased business and customer confidence, improved reputation, consistency and interoperability, continuous improvement is assured, optimized and controlled costs, enables management and staff to understand their business, roles and processes better.

It demonstrates superiority over competitors, gives ability to meet requirements for bids, makes it easier to justify or combat outsourcing, enforces movement from “should” to “shall”, impartial and external audit and the certification is recognized internationally.

5. ISO 50001:2011 ENERGY MANAGEMENT SYSTEM



ISO 50001:2011 Energy Management Systems standard specifies requirements for establishing, implementing, maintaining and improving an energy management system, whose purpose is to enable an organization to follow a systematic approach in achieving continual improvement of energy performance, including energy efficiency, energy use and consumption.

It guides on requirements that are applicable to energy use and consumption, including measurement, documentation and reporting, design and procurement practices for equipment, systems, processes and personnel that contribute to energy performance.

And, applies to all variables affecting energy performance that can be monitored and influenced by the organization. It however does not prescribe specific performance criteria with respect to energy.

It has been designed to be used independently, but it can be aligned or integrated with other management systems.

This Standard is applicable to organizations wishing to ensure conformity to their stated energy policy and is desirous of demonstrating this to third parties.

Such conformity is confirmed either by means of self-evaluation and self-declaration of conformity, or by certification of the energy management system by an external organization. This standard is reviewed every five years.

6. // ISO/IEC 27001:2013 INFORMATION SECURITY MANAGEMENT SYSTEMS

This standard provides techniques for management of information security management systems, information security, preservation of confidentiality, integrity and availability of information and a framework or process for developing an information security management system.

ISO/IEC 27001:2013 Information Security standard gives an organization competitive advantage. Certification against this standard is increasingly required or positively encouraged by potential clients. It assists in establishing compliance with other standards and requirements, encourages a culture change, and increases awareness of importance of information security in an interconnected world. Expenditure on information security increasingly seen as business investment and enabler rather than technical overhead that inhibits achievement of business goals.

Information security management is increasingly seen as everyone's responsibility and not solely within the purview of the IT department.

It gives an organization confidence that it is meeting its ethical, legal and contractual responsibilities

This standard gives a formal specification of an Information Security Management System (ISMS), It is a suite of activities concerning the management of information risks also referred to as information security risks in the standard.

The ISMS is an overarching management framework through which the organization identifies, analyzes and addresses its information risks. It ensures that the security arrangements are fine-tuned to keep pace with changes to the security threats, vulnerabilities and business impacts.

The standard covers all types of organizations such as commercial enterprises, government agencies, non-profit organizations - all sizes businesses from micro-businesses to huge multinationals – and industries or markets; retail, banking, defense, healthcare, education and government.

This standard gives a systematic description of managing information risks, specifies generic ISMS requirements suitable for organizations of any type, size or nature and provides normative references.

The standard does not formally mandate specific information security controls since the controls that are required vary markedly across the wide range of organizations adopting the standard.

Therefore, organizations adopting it are free to choose whichever specific information security controls are applicable to their particular information risks, drawing on those listed in the menu and potentially supplementing them with other options.

7.

ISO 14001:2015 ENVIRONMENTAL MANAGEMENT SYSTEMS



REMA engages various stakeholders in environmental protection

The International Organization for Standardization (ISO) defines an environmental management system as “part of the management system used to manage environmental aspects, fulfil compliance obligations, and address risks and opportunities.”

ISO 14001:2015 Environmental Management standard is an international standard that specifies requirements for an effective

Environmental Management System (EMS). It provides a framework that an organization can follow, rather than establishing environmental performance requirements.

ISO 14001:2015 Environmental Management is a voluntary standard that organizations can certify to, while Integrating it with other management systems standards, most commonly ISO 9001 and can further assist in accomplishing organizational goals.

Who should implement ISO 14001:2015?

ISO 14001:2015 environmental management can be used by any organization that wishes to set up, improve, or maintain an environmental management system to conform to its established environmental policy and requirements.

The requirements of the standard can be incorporated into any environmental management

system, the extent to which is determined by several factors including the organization's industry, environmental policy, products and service offerings, and location.

ISO 14001:2015 is relevant to all organizations, regardless of size, location, sector, or industry.

Benefits of ISO 14001:2015

Environmental Management

Implementing ISO 14001:2015 Environmental Management standard has a wide range benefits for organizations with environmental management systems. Organizations and companies find that using the standard helps them:



Improve resource efficiency



Reduce waste



Drive down costs



Meet legal obligations



Improve overall environmental impact



Provide assurance that environmental impact is being measured



Gain competitive advantage in supply chain design



Increase new business opportunities



Increase stakeholder and customer trust

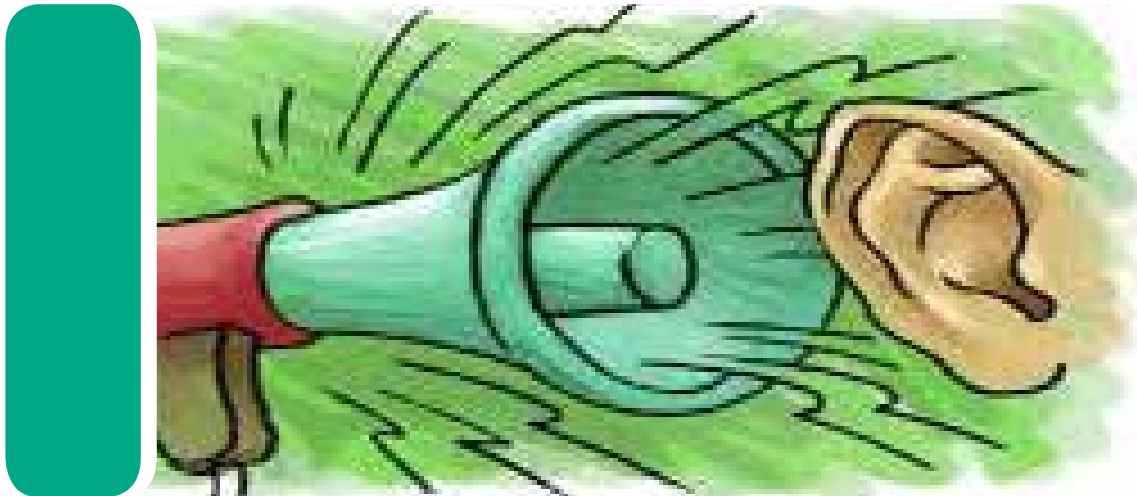


Manage environmental obligations with consistency

8.

RS 236:2014 STANDARD DETAILS

ACCOUSTICS – NOISE POLLUTION AND VIBRATION
TOLERANCE LIMITS



Noise and vibrations are currently among the most important environmental and ecological burdening factors for employees and the population as a whole. Disturbances and stress caused by noise are not only increasing at work but also in leisure time. The lack of regeneration due to high and long noise pollution, however, leads to exhaustion and loss of performance and can even make people ill. Public protests, delays in construction, planning corrections and cost-intensive noise reduction measures can, however, also have economically adverse effects for the operator of a plant with correspondingly high noise emissions.

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The effects of noise induced hearing loss can be profound, limiting one's ability to hear high frequency sounds, understand speech, and seriously impairing one's ability to communicate.

”

// Acoustic noise pollution- tolerance limits

Exposure to high levels of noise can cause permanent hearing loss. Neither surgery nor a hearing aid can help correct this type of hearing loss. Short term exposure to loud noise can also cause a temporary change in hearing (your ears may feel stuffed up) or a ringing in your ears (tinnitus). These short-term problems may go away within a few minutes or hours after leaving the noise. However, repeated loud noise can create physical and psychological stress, reduce productivity, interfere with communication and concentration and contribute to workplace accidents and injuries by making it difficult to hear warning signals. Horns of cars, musical instruments within churches and cars, different machines, etc. are found in different places producing excessive noise.

The effects of noise induced hearing loss can be profound, limiting one's ability to hear high frequency sounds, understand speech, and seriously impairing one's ability to communicate. Exposure to loud noise can lead to permanent tinnitus and/or hearing loss.

// Sources of noise pollution

Broadly speaking, the noise pollution has two sources, i.e. industrial and non- industrial. The industrial source includes the noise from various industries and big machines working at a very high speed and high noise intensity. Non- industrial source of noise includes the noise created by transport/vehicular traffic and churches. The increasing use of loudspeakers and amplified music can cause complaints about high noise levels in the neighborhood.

Several institutions have been showing their efforts of collaboration to fight against noise pollution. The National Police pledges to take serious measures to avoid exaggerated noise in public places or to prevent biodiversity from being disturbed. Even indoor places of entertainment such as dance halls and discotheques can cause noise nuisance to nearby residents, especially late in the evening. A growing number of complaints regarding the neighborhood noise arise from the activities of the construction industry, e.g., demolition, building construction, road construction work, etc.

In that context, Rwanda Standards Board developed and published a national standard for acoustics, noise pollution and detailing tolerance limits.

RS 236:2014 Acoustics — Noise pollution — Tolerance limits;

This standard prescribes maximum allowable noise limits in industrial, commercial, residential and silence zone areas in respect to human beings. It also lay down sound level requirements for indoors for non-industrials buildings.

Control of noise pollution

Engineering controls involve modifying or replacing equipment, or making related physical changes at the noise source or along the transmission path to reduce the noise level at the worker's ear.



Administrative controls are changes in the workplace or schedule that reduce or eliminate the worker exposure to noise and environmental specialists to be harmful to the hearing sense of human beings as well as for the life of the entire biodiversity



Vibration- tolerance limits

Vibration is a mechanical phenomenon whereby oscillations occur about an equilibrium point. The oscillations may be periodic, such as the motion of a pendulum—or random, such as the movement of a tire on a gravel road. In many cases, however, vibration is undesirable, wasting energy and creating unwanted sound.

The vibrational motions of engines, electric motors, or any mechanical device in operation are typically unwanted. However, vibration is undesirable, wasting energy and creating unwanted sound.

Car Suspension: designing vibration control is undertaken as part of acoustic, automotive or mechanical engineering.

The studies of sound and vibration are closely related. Sound or pressure waves, are generated by vibrating structures (e.g. vocal cords); these pressure waves can also induce the vibration of structures (e.g. ear drum). Hence, attempts to reduce noise are often related to issues of vibration.

Vibration, which is commonly referred to as noise, can be segregated into three main categories: seismic (ground) vibrations, acoustic vibrations, and forces applied directly to the load on the working surface. Seismic vibrations include all sources that make the floor under the experimental setup vibrate. Common seismic vibration sources are foot traffic, vehicular traffic, wind blowing the building, and building ventilation fans, to name a few. Many of the sources that generate seismic vibrations also generate acoustic vibrations.

RS 237, Vibration — Tolerance limits, is one of the tools to fight against noise and vibration in order to protect human beings. The standards specify limits for general vibration, including occupational environment and air overpressure. Tolerance limits are given in view to protect people against risks to their health and safety and to minimize annoyance to people in residential premises and other sensitive areas exposed to vibration.

9. // ISO 15270:2008 PLASTICS RECYCLING



The Jardin Meubles Plastic Recycling plant. Plastic Waste is recycled to make Plastic chairs, Basins, Cups to mention a few.

Urbanization generates different kinds of waste that are harmful to environment, and one of these are plastics. These solid wastes need to be removed from where they.

Therefore, ISO 15270:2008 Plastics Recycling standard provides guidance for the development of standards and specifications covering plastics waste recovery and recycling. It establishes the different options for the recovery of plastics waste arising from pre-consumer and post-consumer sources.

It further establishes the quality requirements that should be considered in all steps of the recovery process, and provides general recommendations for inclusion in material standards, test standards and product specifications.

The process stages, requirements, recommendations and terminology presented in the standard are intended to be of general applicability

10.

ISO 24014-1:2007 PUBLIC TRANSPORT FARE



Kigali Town Taxi park

Mobility of people is a key function in cities. People need to move seamlessly as they go to work or attend to other activities of their lives.

Today, cities are striving towards achieving intelligent transport systems and smart Mobility for the traffic management system of the future where vehicles are able to effectively communicate with one another and with roadside systems.

To this regard, Rwanda Utilities Regulatory Agency in collaboration with bus operators and AC Group Ltd, an IT firm introduced Tap and Go system.

ISO 24014-1:2007 Public Transport Fare advocates for more efficient transportation systems and promotes new social attitudes towards vehicle usage, ensuring that citizens have access to local and public transportation, and that ICT is integrated to increase efficiency.

Smart cities seek to increase how efficiently people and goods are transported in an urban environment.

THE ROLE OF STANDARDS IN ACHIEVING SMART

URBAN PLANNING AND SMART URBAN MOBILITY



According to the world bank, it is projected that by 2050, the world will have undergone the largest and fastest period of urban expansion in human history. Urban population will double, while at the same time, the total urban area is projected to triple. City dwellers in emerging and developing countries, and their resource-intensive lifestyles, are increasingly going to create challenges in supporting many aspects of daily life.

More urban dwellers require more resources such as water, land, food, and energy. These increases in demand put pressure on natural ecosystems in supporting cities



By
2050 

The world will have undergone the largest and fastest period of urban expansion in human history



Part of Kigali Central Business District

In addition, climate change, rising sea levels, or extreme weather events pose additional threats to cities. Infrastructure failure, such as electricity grid disruptions, flooding, diseases, and large-scale pollution, are some of the potential consequences.

To be prepared for the future, cities must develop to be resilient in the face of risks both known and imaginable.

Smart urban planning must take into account changing climate, changing societal demands, and the limited energy landscape going forward. It must ensure optimal living conditions and benefits to everyone in the society where economic development is sustainable and rationally incremental.

“

To be prepared for the future, cities must develop to be resilient in the face of risks both known and imaginable.

It should incorporate Information and Communication Technology (ICT) and Internet of things (IoT) Technology in a secure fashion to manage the city's assets where leaders and citizens use data, information and knowledge to ensure an efficient and sustainable future.

Building and maintaining a Smart City requires long term and continuous relationships between the citizens and the Government. It is the bridge that allows these two parties to interact with each other efficiently with technology backed by Standards so as to have a common ground for its usefulness.

It should be noted that Smart Cities are not built from scratch in one go. They gradually evolve and become smarter and use technical rules that are embodied in Standards.

The following are pillars of a Smart city

1. Smart Buildings and Homes

Cities need to substantially increase the efficiency in which they operate and use their resources. Major efficiency improvements in buildings and homes can be achieved by horizontally interconnecting individual systems such as electricity, water, sanitation and waste management, transportation, security and environmental monitoring or weather intelligence.

Such an approach allows increased information sharing and coordination and helps manage incidents in one sector that impact the others. It also offers considerable opportunities in terms of cost reduction and the creation of new value-added services.

However, interconnection is easier said than done. Many of the currently deployed systems in cities originate from different suppliers and they are maintained by various agencies that generally work in isolation. To connect them both physically and virtually, standardized interfaces need to be put in place.

Standards provide many of the solutions that are needed to safely connect and automate much

of the city infrastructure that generates or uses electricity and contains electronics.

The use of Standards also facilitates the long-term maintenance and repair of city infrastructure.

2. Environment

Clean and safe drinking water, effective wastewater treatment, clean air, and proper waste disposal are basic elements for a high quality of life for people living in cities across the country. There should also be clean air to breathe as air pollution seriously affects human health and damages our ecosystems. The management and disposal of waste is a major challenge for our cities and towns.

In addition, the environment should be free from hazardous substances with a potential to harm human health. Moreover, green spaces, quiet streets and recreational parks are important for relaxation, health and sport, nature watching and social activities.

In order to preserve environment, RSB has developed a wide range of standards. They include but not limited to standards for;

- Drinking water
- Tolerable limits for air emissions
- Collection and disposal for solid waste and e-waste
- Noise pollution
- Environmental management systems

These standards can among others guide policy makers and regulators in setting up appropriate

regulations to protect consumers' health and safety and environment to achieve objectives of smart cities.

Smart and Sustainable Cities should strive to be pollution free and respect urban heritage so as to remain unique and competitive, continuous monitor air quality and provide solid and liquid waste management solutions for its residents.

3. Utilities

Smart Utilities focuses to improve efficiency and reliability of power, water and gas distribution across cities with an aim to deliver qualitative supplies with unmatched consumer experience and reduced losses.

4. Smart Grid

Electricity and electronics are an integral parts of all cities' systems. All the systems depend on electric power and hardware to move people and things, collect data and exchange information.

Without electricity, modern city management, the Internet of Things, and all resulting city services remain wishful thinking. It is simply impossible to build an efficient urban infrastructure without reliable energy access. Energy is the golden thread that allows cities and economies to prosper.

Standards help to tackle safety, efficiency, energy metering, grid monitoring, and energy billing to mention but a few. Without Standards, electricity can turn into a disaster for users. Livelihood in cities that is from water pumping, transportation, education, health communication to industrial activities is dependent on electricity.

Standards cover all aspects of energy generation, distribution, electrical installations and use.

They ensure power generation, effective transportation of electricity over long distances across cities, use of various devices and systems in buildings, offices, medical facilities, shopping centers, factories, public institutions or the utilities that supply water and electricity or remove household waste.

Rwanda Standards Board has a set of national and regional standards especially; East African Community (EAC) and African Standards (ARSO) and African Electro- technical Commission (AFSEC), as well as International Standards from ISO and IEC to facilitate the integration of energy generation, buildings, transportation, lighting, healthcare, safety/security and a multitude of city and financial services.

Smart Grids are public electrical grids that include ICT (Information and Communication Technologies) functions. The objective is to ensure a balance between electricity supply and demand at any time and to offer consumers a safe, sustainable and competitive electricity supply.

Smart Grid therefore modifies in-depth the interaction and communication between various stakeholders to mention;

- Energy suppliers
- Energy transportation and distribution network managers
- Consumers (communities, commercial buildings, individuals)
- Actors in the field of telecommunications and ICT (for data exchange and storage between all systems and actors).



Source: ISO website

The introduction of new technologies in the processes of billing and collection, operation and maintenance, brings substantial changes that need to be controlled when managing electricity, water, and gas, among others.

Residents in smart city should easily have access to safe and clean cooking energy that guarantees not only efficiency but also safeguarding health of users. Therefore, Rwanda Standards Board has developed standards that are meant to ensure good quality supply of cooking gas, gas cylinders as well as good practice for installation and use of Gas in our homes.

5. Smart Water

Water is life, and therefore one of a city's most important pieces of critical infrastructure is its water system. With populations in cities growing, it is inevitable that water consumption will grow as well.

Therefore, Smart Water refers to water and wastewater infrastructure that ensures water and the energy used to transport it is managed effectively. A smart water system is designed to gather meaningful and actionable data about the flow, pressure and distribution of a city's water.

RSB offers standards on water supply systems and water quality which can guide in providing water of required quality, at an affordable price and maintenance of water infrastructure.

Rwanda Standards Board has further adopted a number standards for drinking water and wastewater.

ISO 24523:2017 provides guidelines on good benchmarking practice of drinking water and wastewater utilities. It describes the basic framework and methods associated with benchmarking in the water sector.

ISO 24521:2016 provides guidance for the management of basic on-site domestic wastewater services and the use of appropriate technologies in their entirety at any level of development.

It includes the following:

- Guidelines for the management of basic on-site domestic wastewater services from the operator's perspective, including maintenance techniques, training of personnel and risk considerations;
- Guidelines for the management of basic on-site domestic wastewater services from the perspective of users;
- Gives guidance on the design and construction of basic on-site domestic wastewater systems;
- Guidance on planning, operation and maintenance, and health and safety issues.

This standard applies to both publicly and privately operated basic on-site domestic wastewater (black and grey water) services, for one or more dwellings.

ISO 24510:2007 specifies the elements of drinking water and wastewater services of relevance and interest to users. It also provides guidance on how to identify users' needs and expectations and how to assess whether they are being met.

The scope of this standard are:

- The definition of a language common to the different stakeholders
- The definition of key elements and characteristics of the service to users
- The objectives for the service with respect to users' needs and expectations
- Guidelines for satisfying users' needs and expectations
- Service to users assessment criteria
- Introduction to performance indicators
- Examples of performance indicators.

6. Waste Management

Lifestyle of city dwellers and economic activities creates a lot of solid and liquid waste, thus there has to be a mechanism for collecting and disposing off this waste in way that does not harm environment.

This process involves collection, transportation, and recycling or disposal of waste.

Thus there has to be a standardized mechanism that entails management processes and resources that ensure proper handling of waste products. Management of resources involves maintenance of the waste transportation and the dumping facilities so that they comply with the environmental regulations as well as health codes.

The primary motive is to avoid the adverse effects of wastes to human health and natural environment. Waste materials can also be in all forms of matter, which are gaseous, liquids, radioactive matter, and solid.

Samuel Mporanzi the Director of Engineering and Urban Planning at RSB notes that "Much as E-waste is hazardous to the environment, they are also of great economic importance if put to proper use". The total value of all raw materials present in e-waste is estimated at approximately 55 Billion Euros in 2016, which is more than the 2016 Gross Domestic Product of most countries in the world.

United Nations University estimates that in 2016, domestic e-waste generation in Africa was approximately 2.2 Mt, with contributions from Egypt (0.5 Mt), South Africa and Algeria (each 0.3 Mt) ranking highest. The top three African countries that have the highest e-waste generation per inhabitant are: Seychelles (11.5 kg/ inh), Libya (11 kg/inh), and Mauritius (8.6 kg/ inh).



Samuel Mporanzi-Director of Engineering and Urban Planning Standards Unit

STANDARDS PROVIDE INFORMATION ON E-WASTE MANAGEMENT

REASONS WHY YOU SHOULD RECYCLE YOUR ELECTRICAL AND ELECTRONIC WASTES



Electrical and Electronic waste (commonly referred to as E-waste) essentially refers to old technology no longer in use as it is broken, obsolete or has been replaced by a newer model. This encompasses everything from fax machines to printers or video game consoles. The demand on Electrical and Electronic Equipment (EEE) is increasing significantly in the world and in Rwanda in particular as a result of the country's rapid economic development.

Global initiatives to enhance building the economy and people's welfare on Information and Communication Technologies (ICT) requires a variety of ICT tools such as computers, mobile phones and other electrical and electronic appliances. As a result, there has been an enormous increase in ICT products and most often leading to high demand of the newer and more technologically advanced products.



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Rwanda being no exception has grown dependence on the use of modern technologies in all sectors of economy and social welfare, which has led to an increase of EEE.

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Rwanda being no exception has grown dependence on the use of modern technologies in all sectors of economy and social welfare, which has led to an increase of EEE. The discarded EEE contains hazardous substances such as lead, mercury, arsenic, cadmium, and selenium, among others, which poses peculiar threats and risks to human health and to the environment if not properly handled and disposed of.

The world's endemic E-Waste problem is becoming more serious as people continue to incorrectly dispose of their old electronics. E-Waste at landfills tends to contaminate the soil and water with harmful toxic materials such as cadmium, mercury and lead. Apart from polluting landfills, E-Waste also creates serious health implications to humans due to chemicals which affect water and agricultural produce.



The combustion that results from burning E-Waste produces particulate matter, which can be a precursor to cardiovascular and pulmonary diseases. Exposure to toxins affect health in different ways, among others, it causes problems in the nervous and reproductive systems and delays physical growth.

The E-Waste policy was developed to provide a comprehensive guidance for the efficient and effective management of E-Waste through an appropriate legal and regulatory framework, which promotes green growth and ensures a sustainable economic development for the country.

Adequate E-Waste management allows the recovery of precious metals such as gold, silver, platinum, palladium, copper and tin from disposed components, and also creates new businesses and new job opportunities, while reducing environmental burden to landfills.

Rwanda has put in place policies, legal and regulatory framework to address the E-Waste issue. E-Waste is currently taken care of under the hazardous waste control and management regulations. The Environment Organic Law

N° 04/2005 of 08/04/2005 determining the modalities of protection, conservation and promotion of environment in Rwanda states that collection, transport, treatment and disposal of waste should be done in an environmentally friendly manner; and thus covers the E-Waste management. However, in the absence of standards, the regulatory and statutory instruments are still wanting.

To contribute in holistically addressing the issue, Rwanda Standards Board developed and published two standards on E-waste management, which provide the code of practice on handling, collection, transportation and storage, treatment and disposal of various categories of Electrical and Electronic waste (e-waste) to ensure the environment and human health is protected against the potential adverse impacts of e-waste in the country:

1. **RS 276:2016 Part1, Electrical and electronic waste — Handling, collection, transportation and storage — Code of practice; and**
2. **RS 276:2016 Part 2, Electrical and electronic waste — Treatment and disposal — Code of Practice.**

The information contained in these standards will help consumers prevent their old, broken and outdated EEE from becoming another E-waste by recycling it.

The provisions in these standards also assist E-Waste Recycling Facilities and other stakeholders involved in the E-Waste management. The recycling facilities are expected to save the country from environmental hazards and to create thousands of green jobs.



Rwanda has put in place policies, legal and regulatory framework to address E-Waste issue.



Enviroserve Rwanda Green Park Ltd e-waste recycling plant

AIR POLLUTION CONTROL AND AIR

QUALITY STANDARDS DEVELOPED

AIR POLLUTION CONTROL, AN IMPORTANT TOOL OF HUMAN AND ENVIRONMENT PROTECTION



Recent studies have confirmed that air pollution is becoming a reality in Rwanda especially in the City of Kigali. Though, it is not at a very alarming level as it is in some cities in the world, a need to start acting on this issue was deemed important as the problems shows signs to extend.

The Government of Rwanda's commitment to preserving the air quality and preventing air pollution has led to the adoption of a number of laws and regulations to address the problem of air pollutions; those including the Ministerial

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A study conducted by the Rwanda Environment Management Authority (REMA) in 2012 identified vehicular emissions as the main driver of this increasing pollution.

Order N°003/16.01 of 15/07/2010 on prevention of activities that pollute the atmosphere, among others.

A study conducted by the Rwanda Environment Management Authority (REMA) in 2012 identified vehicular emissions as the main driver of this increasing pollution. This is intensified by the fact that some very old vehicles are imported and most of those not meeting the requirements of air emissions.

However, vehicles are not the only agents of the pollution but also other economic activities such as industrial processes, indoor pollution caused by cooking, open burning; just to cite a few make the list. All those activities lead to the degradation of air quality.

Industrial effluents into the air or water bodies can cause environmental pollution when not treated properly prior to exposure. Some of these effluents are toxic and can directly or indirectly endanger the human lives and destroy the environment.

Continued Government efforts to curb the situation include establishing diversified strategies to tackle the issue, and the adoption of laws and regulations that address the problem of air pollutions. Also, Prime Minister's instructions to prevent air pollution caused by vehicular emissions and machines using petroleum products in Rwanda were developed, and published in the Official Gazette of January 2016.

Vehicular emissions control is not sufficient for effective preservation of air quality. Rather, a need to have an integrated and inclusive control of all sources of air pollution, which must start with a regulatory framework that sets the basis for an efficient control of all kinds and sources of pollution is indispensable.

In that collaboration spirit, Rwanda Standards Board developed standards on air quality and air pollution control. Those standards aim to ensure that the environment and human life are protected from pollutions from various sources.

The standards are intended to list the commonly encountered pollutants in cement factories. They detail the reasons behind emissions and give possible options of mitigation as well as permissible limits of common substances found in polluted air. The set of baseline parameters on air quality and emissions given in the standard are based on a number of considerations so as to come out with practical and acceptable limits.

The following standards were adopted as Rwanda standards to help the country in protection of human lives and environment by mitigating the air pollution:

EAS750: 2010 Air quality — Emissions to the air by cement factories — Guidelines,

EAS 751: 2010 Air quality — Specification and

EAS 752: 2010 Air quality — Tolerance limits of emission discharged to the air by factories

Development of these standards is an opportunity for beneficiary stakeholders such as industrialists to keep abreast with environmentally friendly technologies. RSB urges industrialists and other concerned stakeholders to make use of and implement requirements of the standards in order to minimize the adverse effects on the environment.

STANDARDS FACILITATE

SUSTAINABLE SMART CITIES



Organized housing estate in Kigali

Today, cities consume around 70% of all energy produced globally, while generating 70% of world GDP and by 2050, 66% of the world's population is expected to live in urban areas. In Rwanda estimates show that about 80% of the Rwandan population would be living in cities by 2050.

With this population shift, a challenge will be to supply those populations with basic resources like safe food, clean water and sufficient energy, while also ensuring overall economic, social and environmental sustainability.



Rwanda estimates show that about

80%

of the Rwandan population would be living in cities by

2050





The world today is faced with an ever changing environment, fast evolving and dynamic technological innovations, deeper and greater integration among countries hence the need for a fast, efficient and effective communications coupled with the need for compatibility and interoperability between electronic and electric appliances, work tools and consumer's goods. There is therefore need to have access to products and services of the best quality and that are easily accessible, safe for the consumers and with less adverse effect on the environment.

Standards contribute to achieving the above objectives. They are rules, norms, guidelines and technical specifications established for the purpose of making life easier, simpler while ensuring order in society, the economy, and cultures and to the environment.

They are indispensable in our lives and without them it is not possible to perform any economic activity as they facilitate exchange of goods and services, support sustainable and equitable economic growth, promote innovations and protect health, environment and safety.

Standards further contribute in tackling global challenges such as Water and Energy Deficiency, Food Safety and Security, Urbanization and Climate change and contribute in building Smart and Sustainable Cities.

According to statistics, cities make up to two percent of the earth's surface, yet they are home to over half of the world population, Hence people need to have sufficient fresh water, Universal access to cleaner energy, the ability to travel efficiently from one point to another, a



Road network in Kigali

sense of safety and security. These promises must be fulfilled by modern cities if they are to stay competitive and provide a decent quality of life to their citizens.

However, some cities bring a lot of challenges due to various factors such as air pollution, overcrowding, traffic pollution, noise and industrial emissions. These factors have to be

constantly monitored and addressed to achieve a high quality of life of citizens and preserve the environment.

As Rwanda envisages to become a knowledge based and middle income economy by 2020 and to provide a better, faster, and more secure

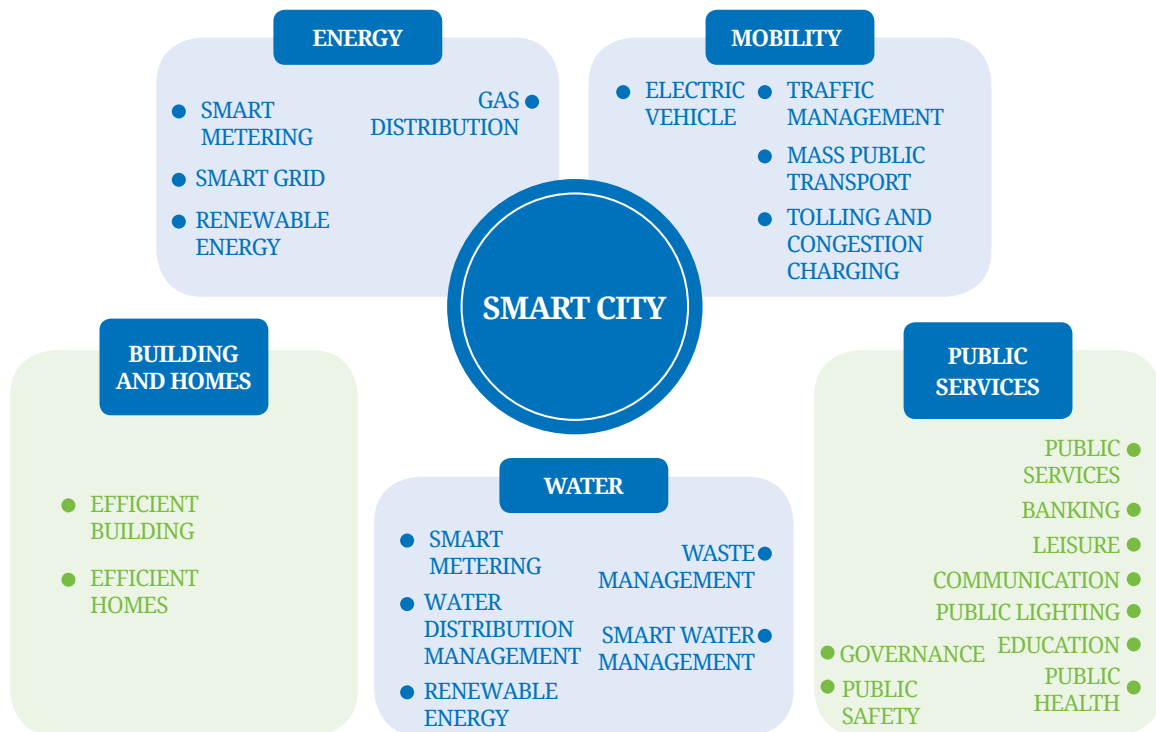


services as stipulated in the Vision 2020 and the Smart Rwanda master plan respectively, standards are tools which can enable to achieve that vision.

Rwanda Standards Board plays a key role in providing standards based solutions through developing and publishing relevant and market driven standards that are needed to safely connect, automate and maintain much of Rwanda's infrastructure.

SMART SERVICES ARE A SMART

SUMMARY OF SMART CITY ELEMENTS



KEY INGREDIENTS IN URBAN SETTING

Smart Services are key to Rwanda becoming a smart country with smart cities. Below are some of the examples of smart services in Rwanda



Communication: A set infrastructures and mechanisms enabling easy and fast flow of information; FIBER OPTICS; 4GLTE



Education: E-learning, smart classes, ICT use, E-library, One laptop per child



Governance: Online services (Irembo target: over 100 services by the end of 2017), Service charters, Umucyo, E-citizen complaints tracking systems, Toll free, inquiry portal and feedback,



Finance: Cashless policy; petrol stations, E-banking, E-payment, E-money transactions, Smart Cards, ATM, VISA, E-Procurements



E-Commerce: Jumia, safe moto



Health care: Distance medical treatment/surgery, drones, rescue mechanisms, drones



Public lighting: infrastructure maintenance- increase of working hours



Public safety: Peace, Pride,



Leisure: Green space, Recreational zones,



RSSB

Green Tower

Advertisement sign featuring a map and a photograph of people.

BRIOCHE

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CITY OF KIGALI:

TOWARDS A SMART CITY



Marie Chantal Rwakazina Mayor City of Kigali

The World Bank projects 7 billion people to be living in cities and urban centres. In Rwanda, according to National Institute of Statistics, rural urban migration is at a rate of 4% – which is on a high end.

Eng. Mugisha Fred the Head of Urban Planning and Construction at City of Kigali says Rwanda Country Smart City Plan has been developed, and in case of Kigali it entails initiatives to attain a smart city. This includes the smart green city project being implemented by the City of Kigali in collaboration Rwanda Housing Authority. The goal is to have a city that is smart in all corners of



Rwanda, according to National Institute of Statistics, rural urban migration is at a rate of

7B  which is on a high end



life, the ongoing review of master plan has put all these into consideration.

As Eng. Mugisha emphasizes, the new Master Plan will be aligned to these developments. It will be participatory, Rwandan, people centered and will cater for the Rwandan culture.”

It is encouraging developers to have green buildings, where for instance during day a building uses natural lighting systems other than electricity and have good lighting around buildings. In collaboration with Water and Sanitation Corporation, City of Kigali is creating conditions that reward economic use of water in buildings, homes and industries.

Leisure and recreation facilities is are also being developed in partnership with Rwanda Environment Management Authority.

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**the new Master Plan
will be aligned to these
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cater for the Rwandan
culture**



E-Public Transport payment system in Kigali

Solid Waste Management.

Currently solid waste is dumped in Nduba dumping site. This is a short term solution, City of Kigali plans to have a comprehensive smart waste management system. Eng. Mugisha says there are plans to recycle and transform solid waste into other useful products such as energy.

There are efforts in place geared to promoting a circular economy by encouraging businesses to make business out of this challenge of solid waste.

Storm water management

Before issuing of a construction permit, City of Kigali makes sure the developer has an elaborate plan on how to manage storm water. Storm water should be harvested within one's individual property.

The City Council is also undertaking greening initiatives as a way of curbing storm water and curb eventual flooding.

Public Transport Management

City of Kigali has a grand vision for efficient transport management in the city, a transport system driven by goals like having a city characterized with green transport. Efforts are being made to make public transport the preferred mode of transport in Kigali.

STRENGTHENING FASTER WITH 42.5R CIMERWA BULK CEMENT.



The **CIMERWA bulk cement** innovative service came as an alternative to bagged cement, which is of particular advantage to large consumers of cement.

The **CIMERWA bulk cement** comes as a **42.5R** product which:

- Has high-Strength, low shrinkage, superior durability corrosion resistance and mostly anti-crack.
- Has wide applications and is ideally suited where high concrete strengths and fast construction speeds are of essence. Its high strength performance makes it suitable for structural concrete applications.
- Can extend the working time, improve the concrete workability, early strength, rapid hardening, freeze-resistance, impermeability and little expansion.



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WASAC: TOWARDS A ROBUST AND RELIABLE WATER SUPPLY SYSTEM IN RWANDA



Eng. Aime Muzola, CEO WASAC, explaining the water distribution system in Kigali

To date, WASAC is executing water, sanitation and capacity building projects totaling United States Dollars 300 million (Rwf257 billion) meant to extend water to un serviced areas, upgrade aged forwarding infrastructures for areas like Nyamirambo and Gikondo.

The Chief Executive Officer at WASAC Eng. Aime Muzola notes that these investments, in the short run shall reduce water shortages, and in the long run do away with water rationing.



WASAC is executing water, sanitation and capacity building projects totaling

\$300m Rwf257 billion



Nzove water treatment plant

WASAC is also undertaking the construction of Kigali Centralized Sewerage System, installation of sewers to existing buildings, construction of four faecal sludge treatment plants and four modern solid waste landfills in satellite cities of Rubavu, Rusizi, Karongi and Musanze.

In the Financial Year (FY) 2015/6 (when Nzove II was commissioned), 25 000 cubic meters of water was added on the network, in FY 2016/7, 8 000 cubic meters was added, in FY 2017/8, another 15 000 cubic meters was produced while in FY 2018/9 it is projected at 20 000 cubic meters and 19 000 cubic meters in FY 2019/20.

These increases in volumes of piped water are meant to meet the rising demand for water in Kigali and Rwanda at large.

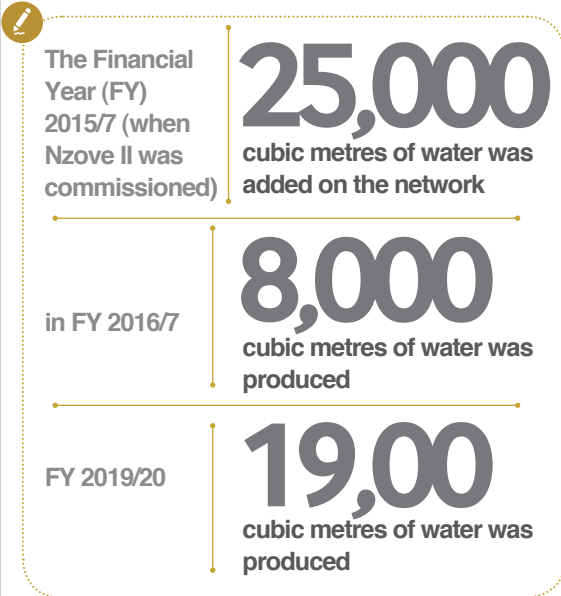
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With these investments, in the short run we shall reduce water shortages say from a week to three days, and in the long run we shall do away with water rationing



WASAC has adopted improved technologies in the treatment and pumping of water hence a reduction in costs. The utility pays Rwf 226 to treat one cubic meter at Nzove water treatment plant, which supplies most of the water consumed in Kigali. Previously, it was costing Rwf260 – it reduced with improvement in technology.

These high costs for treatment are occasioned by high turbidity which can go as high as 25 000 NTU during rainy seasons and reduce to 300 NTU during dry seasons. This is particular with water sources located in valleys surrounded with steep hills which receive a lot of silt when it rains.





Nzove water treatment plant

Also, because of the high terrain, WASAC spends Rwf 126 exclusive of VAT to pump one cubic meter of water in Kigali (1.3kwh per 1 cubic meter). Yet, in low lying terrain like Nyagatare it costs some 0.6kwh per 1 cubic meter.

Faced with high operating costs of delivering water to Rwandans, WASAC has become innovative. The technology deployed at Nzove, officials say will be replicated to other plants has cut treatment costs from Rwf 260 to Rwf 226 per one cubic meter.

Nzove plant is built in a way that additional water will be treated and pumped with less or no adjustments to the existing infrastructure. The facility is further equipped with modern technology which enables the utility staff to detect any incident be at treatment or transport stage. This real time information enables fast intervention to correction of any anomaly.



A SMART CITY MUST

BE GREEN; **RWANDA ENVIRONMENT
MANAGEMENT AUTHORITY**



Eng. Coletha U. Ruhamy Director General REMA

Smart Urbanization goes hand in hand with Green Urbanization. REMA has been at the forefront of having green villages in Rwanda. These have been set up in Gicumbi and Muhanga to act as demonstrations how a green village should look like.

According to Mr. DUHUZE Remy, Director Environmental Regulations and Pollution Control at REMA, REMA is working with other Government agencies to set up initiatives that will go a long

way for Rwanda to realize Smart Urban Centres. Components like Transport (Roads, Vehicles with less greenhouse emissions), Energy, Water, Waste Management and Green Spaces.

There are also initiatives to promote Green Buildings; that use less Water, minimal use of air conditioners, promotes the use of natural energy and allow natural light.



Waste Recycling plant built through a partnership between REMA and Rwanda Correctional Services

// Waste Management:

According to REMA, Waste management is one big component of attaining a smart city. The main concern should be how to minimize waste other than disposing it, For example, waste materials like metals which years back formed a lot of waste are now being used as raw materials in industries.

Sorting of solid waste at source is another component being encouraged by REMA. Together with other government Institutions like City of Kigali, new guidelines for garbage collection are being set up.

Under the new guidelines, garbage collectors will be required to sort waste, say one day they collecting degradable and the following they collect non-degradable.

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Together with other government Institutions like City of Kigali, new guidelines for garbage collection are being set up.



ENVIROSERVE RWANDA GREEN PARK LTD;

RWANDA'S EFFORT TO BUILD A CIRCULAR ECONOMY



Enviroserve Rwanda Green Park Ltd e-waste recycling plant in Bugesera District

Launched in 2017 in Bugesera District, Enviroserve Rwanda Green Park Ltd is making circular or regenerative economy work in Rwanda. According to Mr. Mbera Olivier the Facility Manager, Enviroserve Rwanda Green Park Ltd is extending lifetime of electronics disposed as waste through refurbishment while others are transformed into raw materials for Industries.

The plant started with a focus on e-waste which had accumulated in Government and private sector offices. These institutions had a lot of e-material disposed off. They hence required extra space to house waste material.

Enviroserve Rwanda Green Park is in line with the National E-waste Management Strategy that seeks to establish Sustainable Recycling Industries with the objective of offering an “end – of-life” solution for e-waste. To achieve this objective, circular economy designs out waste and pollution, keeps products and materials in use and regenerates natural system.

Mr. Mbera is optimistic that by the end of the year (2018), the company will have established collection centres across the country and with support from stakeholders, incentives will be given out to encourage those holding various kinds of electronic waste to bring it at the centres.

Also, the company is raising awareness by educating people on dangers of the materials at home or workplaces.

To date, Enviroserve Green Park Rwanda Ltd has dismantled, recycled and refurbished over 500 tonnes of E-Waste. This is far below their target of 3000 tonnes, they attribute this partially to legal constraints related to disposal of public assets.

The company dismantles and refurbishes E-Waste materials. Upon obtaining the materials, they are checked and segregate what is to be refurbished or dismantled. In case of computers, those refurbished are sold to Rwanda Education Board to distribute to schools under one laptop per child program. Mr. Mbera notes that ten percent of computers collected can be refurbished.

During dismantling of E-waste materials, they are depolluted by removing hazardous components, stored in appropriate containers where valuable materials such as plastics, metals, aluminum, copper, silver, paradium and gold are extracted and sold to steel industries, CIMERWA to be burnt to produce energy and companies that manufacture plastics to make plastic chairs.



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To achieve this objective, circular economy designs out waste and pollution, keeps products and materials in use and regenerates natural system.



AC GROUP REVOLUTIONALISING

PASSENGER TRANSPORT PAYMENT SYSTEM

In 2015, AC Group introduced Tap & Go card payment system / product, an innovation that aimed at closing the gap that existed between the Public /Commuters, Government and Bus Operators in as far as passenger transport management is concerned.

Before introduction of Tap & Go card payment system in passenger transport in City of Kigali, commuters were experiencing delays at bus stops partly occasioned by the cash payment system which was slow. It was marred by a lot of inconveniences, delays and risks.

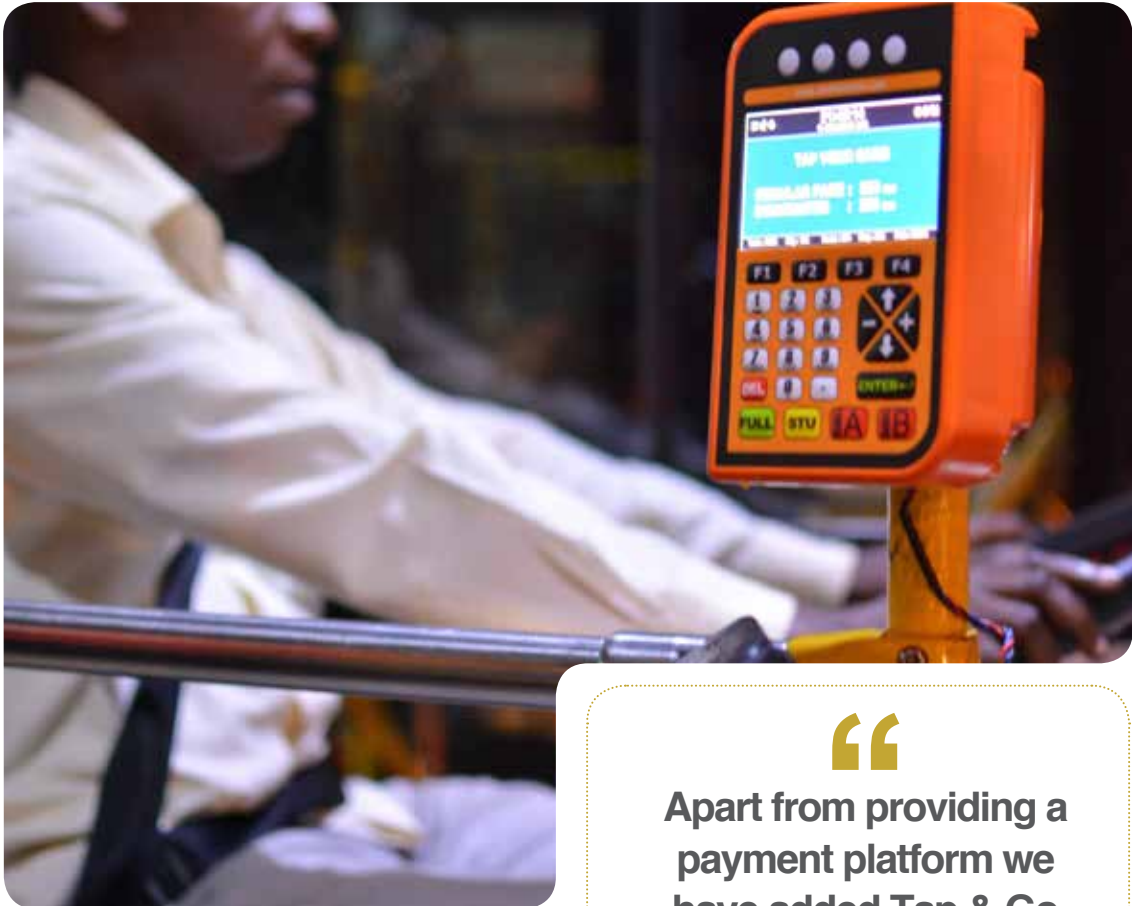
Also, government needed data; on passenger behavior, where to add more routes. Data is vital for effective government planning, it could not do right analytics without it.

Bus operators needed to close leakages of money; their accounting was based on assumptions other than true position because cash money went through many hands. They also needed data to do planning and projections.

All these past challenges have been solved by Tap & Go card system. AC group has further added the Tap & Go WIFFI product to Kigali's public transport system. Passengers on public transport in Kigali can now surf the internet freely.



Tap & Go passenger fares payment system



Ms. Teta Sharon, Sales and Marketing Manager AC group emphasis notes that “Apart from providing a payment platform we have added Tap & Go WIFFI. You cannot talk about smart transport without internet. And, as a result of accurate data new routes have been added,” Ms. Teta adds.

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Apart from providing a payment platform we have added Tap & Go WIFFI. You cannot talk about smart transport without internet. And, as a result of accurate data new routes have been added





