United 4 Smart Sustainable Cities

Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

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- Key Performance Indicators for Smart Sustainable Cities
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United 4 Smart Sustainable Cities (U4SSC)

USSC is a United Nations Initiative coordinated by ITU and UNECE and supported by other 14 UN agencies to respond to the **Sustainable Development Goal 11: "Make cities and human settlements inclusive, safe, resilient and sustainable.**

It advocates for public policy to encourage the use of ICTs to facilitate and ease the transition to smart sustainable cities.

Supported by:

Convention on Biological Diversity

United Nations ECLAC

FAO

ITU

United Nations Economic Commission for Africa

UNDP
Empowered lives.
Resilient nations.

UNECE

UNESCO
United Nations Educational, Scientific and Cultural Organization
Montevideo Office
Regional Bureau for Sciences in Latin America and the Caribbean

UN environment
United Nations Environment Programme

UNEP FINANCE INITIATIVE

United Nations Framework Convention on Climate Change

UN-HABITAT
FOR A BETTER URBAN FUTURE

UNIDO

UNITED NATIONS UNIVERSITY
UNU-EGOV
Operating Unit on Policy-Driven Electronic Governance

UN WOMEN

World Meteorological Organisation

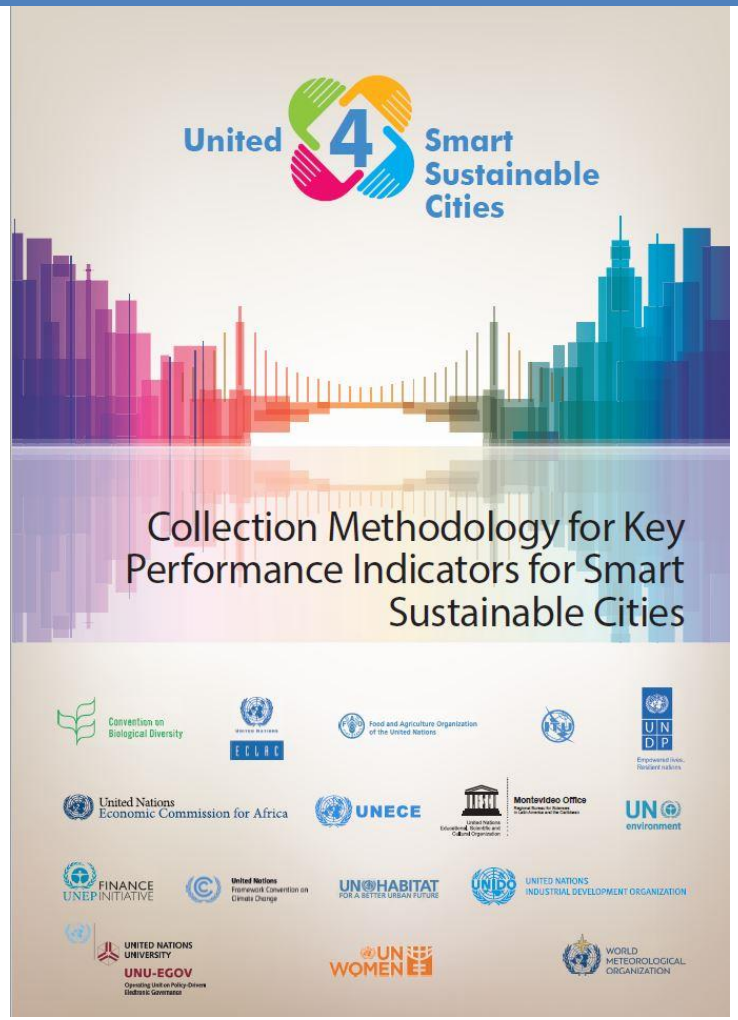
U4SSC publications

Available for free on the U4SSC website:
http://itu.int/go/U4SSC

U4SSC current work

- Guidelines on tools and mechanisms to finance SSC projects
- Guidelines on strategies for circular cities
- City science application framework
- Blockchain 4 cities
- Guiding principles for artificial intelligence in cities - New
- The impact of Artificial Intelligence and cognitive computing in Cities - New
- The impact of data processing and computation in cities - New
- The impact of sensing technologies and IoT in cities - New

U4SSC Key Performance Indicators for Smart Sustainable Cities



https://www.itu.int/en/publications/Documents/tsb/2017-U4SSC-Collection-Methodology/index.html

U4SSC Key Performance Indicators for Smart Sustainable Cities

The U4SSC Initiative has developed a set of international **key performance indicators (KPIs) for Smart sustainable cities (SSC)** to establish the criteria to evaluate ICT´s contributions in making cities smarter and more sustainable, and to provide cities with the means for self-assessments.

Over 50 cities worldwide are already implementing these KPIs

Convention on Biological Diversity

United Nations ECLAC

FAO Fiat Panis

ITU

United Nations Economic Commission for Africa

UNDP Empowered lives. Resilient nations.

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Implementing Key Performance Indicators for Smart Sustainable Cities Worldwide

Over 50 cities are implementing these KPIs

Objectives

These indicators have been developed to provide cities with a consistent and standardized method to collect data and measure performance and progress to:

- Achieving the Sustainable Development Goals
- Becoming a smarter city
- Becoming a more sustainable city

Cities will be able to:

- Compare their progress over time
- Compare their performance to other cities
- Through analysis and sharing allow for the dissemination of best practices
- Set standards for progress in meeting the SDGs

KPIs Principles

- **Comprehensiveness:** The set of indicators should cover all the aspects of SSC.
- **Availability:** The KPIs should be quantitative and the historic and current data should be either available or easy to collect.
- **Simplicity:** The concept of each indicator should be simple and easy to understand for the urban stakeholders.
- **Timeliness:** This refers to the ability to produce KPIs with respect to emerging issues in SSC construction.

KPIs Structure

54 Core Indicators + 37 advanced Indicators

20 Smart + 32 Structural + 39 Sustainable

132 Data Collection Points

3 Dimensions

Dimension	Economy	Environment	Society and Culture
Sub-dimension	▪ ICT ▪ Productivity ▪ Infrastructure	▪ Environment ▪ Energy	▪ Education, Health and Culture ▪ Safety, Housing and Social Inclusion

KPIs Structure (2)

Dimension	Economy	Environment	Society and Culture
Sub-dimension	▪ ICT ▪ Productivity ▪ Infrastructure	▪ Environment ▪ Energy	▪ Education, Health and Culture ▪ Safety, Housing and Social Inclusion
Category	▪ ICT Infrastructure ▪ Water and Sanitation ▪ Drainage ▪ Electricity Supply ▪ Transport ▪ Public Sector ▪ Innovation ▪ Employment ▪ Waste ▪ Buildings ▪ Urban Planning	▪ Air Quality ▪ Water and Sanitation ▪ Waste ▪ Environmental Quality ▪ Public Space and Nature ▪ Energy	▪ Education ▪ Health ▪ Culture ▪ Housing ▪ Social Inclusion ▪ Safety ▪ Food Security

KPI Examples

Description and Categorization of the KPI

Rationale – why we included it
Benchmarking – what are good trends

Sources – where we found it

How to calculate and units

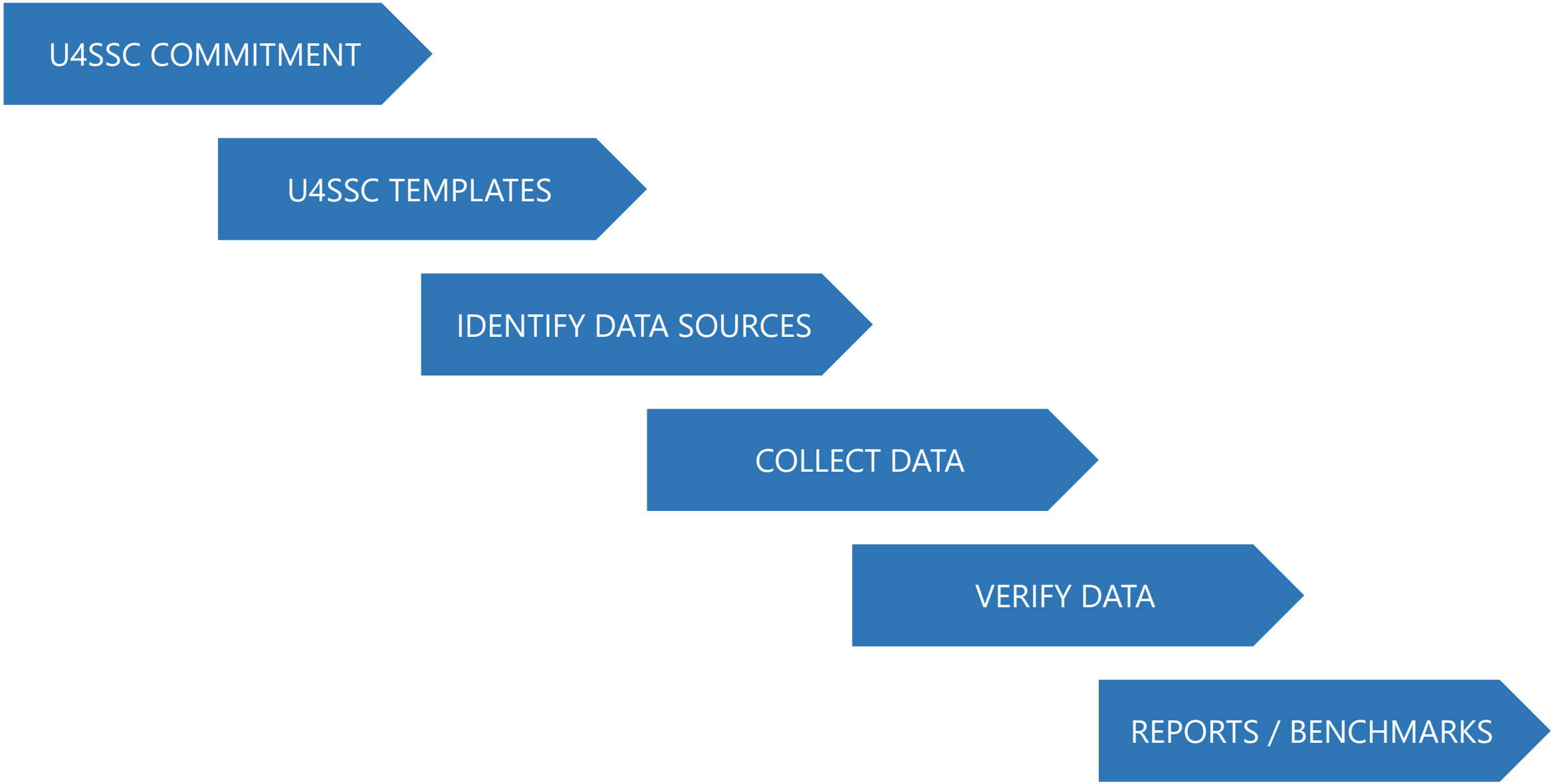
Sources and SDG

Dimension	Society and Culture				
Sub-Dimension	**Safety, Housing and Social Inclusion**				
Category	**Safety**				
KPI Name	**Traffic Fatalities**				
KPI No.	**SC: SH: SA: 9C**	**Type:**	**Core**	**Type:**	**Structural**
Definition / Description	Traffic fatalities per 100,000 inhabitants.				
Rationale / Interpretation / Benchmarking	Road traffic injuries claim more than 1.2 million lives each year and have a huge impact on health development and overall quality of life. They are the leading cause of death among the youth (15 -29 years), and cost governments approximately 3% of overall national GDP. Despite this massive and largely preventable human and economic toll, action to combat this global challenge has been insufficient. The definition of a road traffic fatality for harmonization of surveillance is "any person killed immediately or dying within 30 days as a result of a road traffic injury accident". (WHO, 2015) The choice of 30 days is based on research which shows that most people who die as a result of a crash succumb to their injuries within 30 days of sustaining them. A declining trend should be pursued with lower percentages indicating better road safety.				
Source(s)	WHO Global status report on road safety 2015. Retrieved from <http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/> WHO Global status report on road safety 2009. Retrieved from <http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/>				
Methodology	Calculate as: Numerator: Number of traffic fatalities. Denominator: One 100,000th of the city's population.				
Unit	Number / 100,000 inhabitants				
Data Sources / Relevant Databases	Data can be collected from local transportation and emergency departments and local hospitals. The World Health Organization can also provide adequate data on traffic fatalities.				
SDG Reference(s)	SDG Indicator 3.6.1: Death rate due to road traffic injuries.				

U4SSC KPIs Advantages

- The **first and only** International Standard supported by **16 United Nations Agencies and Programmes**;
- **Policy tool;**
- **General screening** of the city that allows to identify the **areas of improvement** and give cities the opportunity to **assess its own progress**;
- Allows cities to develop **better strategies** for the management of the city;
- Provide cities with the possibility to compare itself with other cities allowing an **International Collaboration;**
- Help cities to **achieve the Sustainable Development Goals.**

U4SSC KPIs Implementation



Implement these KPIs now and measure the smartness and sustainability of your city

"You cannot manage what you cannot measure"

-Peter Drucker

Therefore……

You cannot improve it!

Implementing ITU-T International Standards to Shape Smart Sustainable Cities

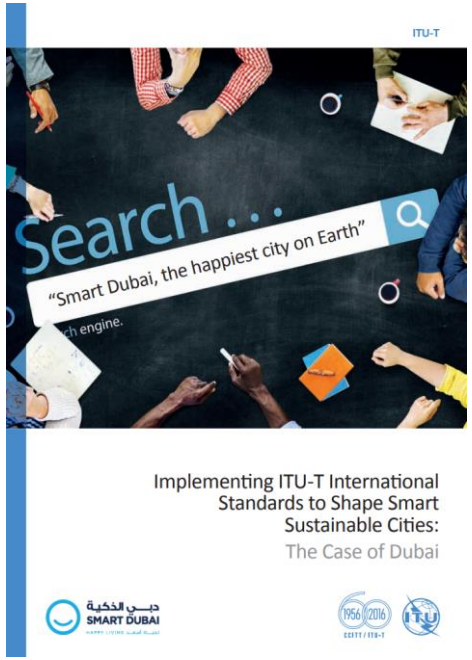
Case Study - Dubai

Implementing ITU-T International Standards to Shape Smart Sustainable Cities – Case Study - Dubai

- First City to Pilot Test KPIs
- These indicators are contained in Recommendation ITU-T L.1601: *Key performance indicators related to the use of information and communication technology in smart sustainable cities*, and in Recommendation ITU-T L.1602: *Key performance indicators related to the sustainability impacts of information and communication technology in smart sustainable cities*.
- Provided Feedback to Improve KPIs
- Updated KPIs a Direct Result of Dubai Feedback

Implementing ITU-T International Standards to Shape Smart Sustainable Cities – Case Study - Dubai

The case of Dubai



Dubai Reports Results from Implementing ITU's Key Performance Indicators for Smart Sustainable Cities

New case study shares insight into the experience of the Smart Dubai initiative

IoT/Smart Cities

Geneva, 21 December 2016

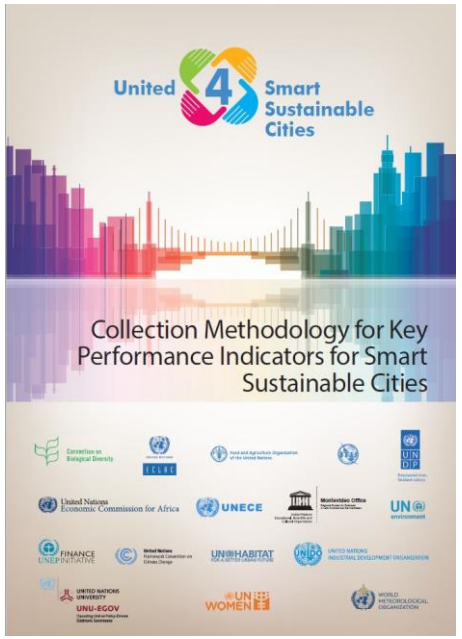
The Case of Dubai" details Dubai's ambitious and trailblazing journey towards becoming a smart city, a venture worthy of emulation by other aspiring smart cities around the world.

Available for free on the ITU-T SSC website: http://itu.int/go/ITU-T-SSC

Implementing ITU-T International Standards to Shape Smart Sustainable Cities

Case Study - Singapore

Implementing ITU-T International Standards to Shape Smart Sustainable Cities - Case Study - Singapore



87%

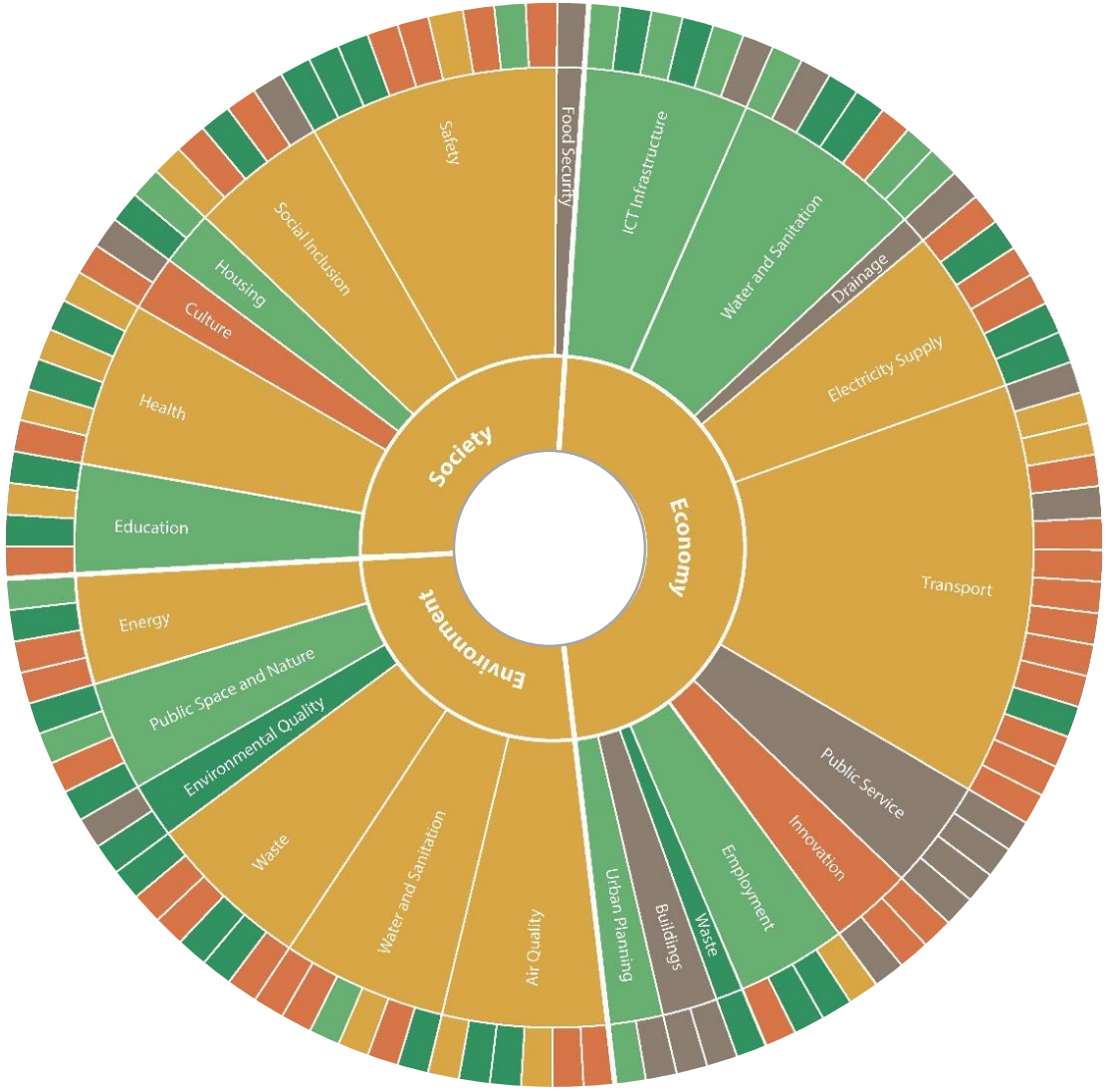
of the KPIs verified

	Total	% KPIs Verified of Total KPIs
Economy		
Core KPIs	23	100%
Advanced KPIs	22	82%
Environment		
Core KPIs	12	100%
Advanced KPIs	5	60%
Society & Culture		
Core KPIs	20	90%
Advanced KPIs	9	56%
Overall		
Core KPIs	55	96%
Advanced KPIs	36	72%
Total	**91**	**87%**

Implementing ITU-T International Standards to Shape Smart Sustainable Cities - KPI Reporting and Verification

	Total	Reported	Verified	% KPIs Verified
Economy				
Core KPIs	23	23	23	100%
Advanced KPIs	22	22	22	100%
Environment				
Core KPIs	12	11	11	92%
Advanced KPIs	5	5	5	100%
Society & Culture				
Core KPIs	19	19	19	100%
Advanced KPIs	10	9	9	90%
Overall				
Core KPIs	54	53	53	98%
Advanced KPIs	37	36	36	97%
Total	**91**	**89**	**89**	**98%**

Implementing ITU-T International Standards to Shape Smart Sustainable Cities - Benchmarking



Performance to Benchmarks – Dimensions

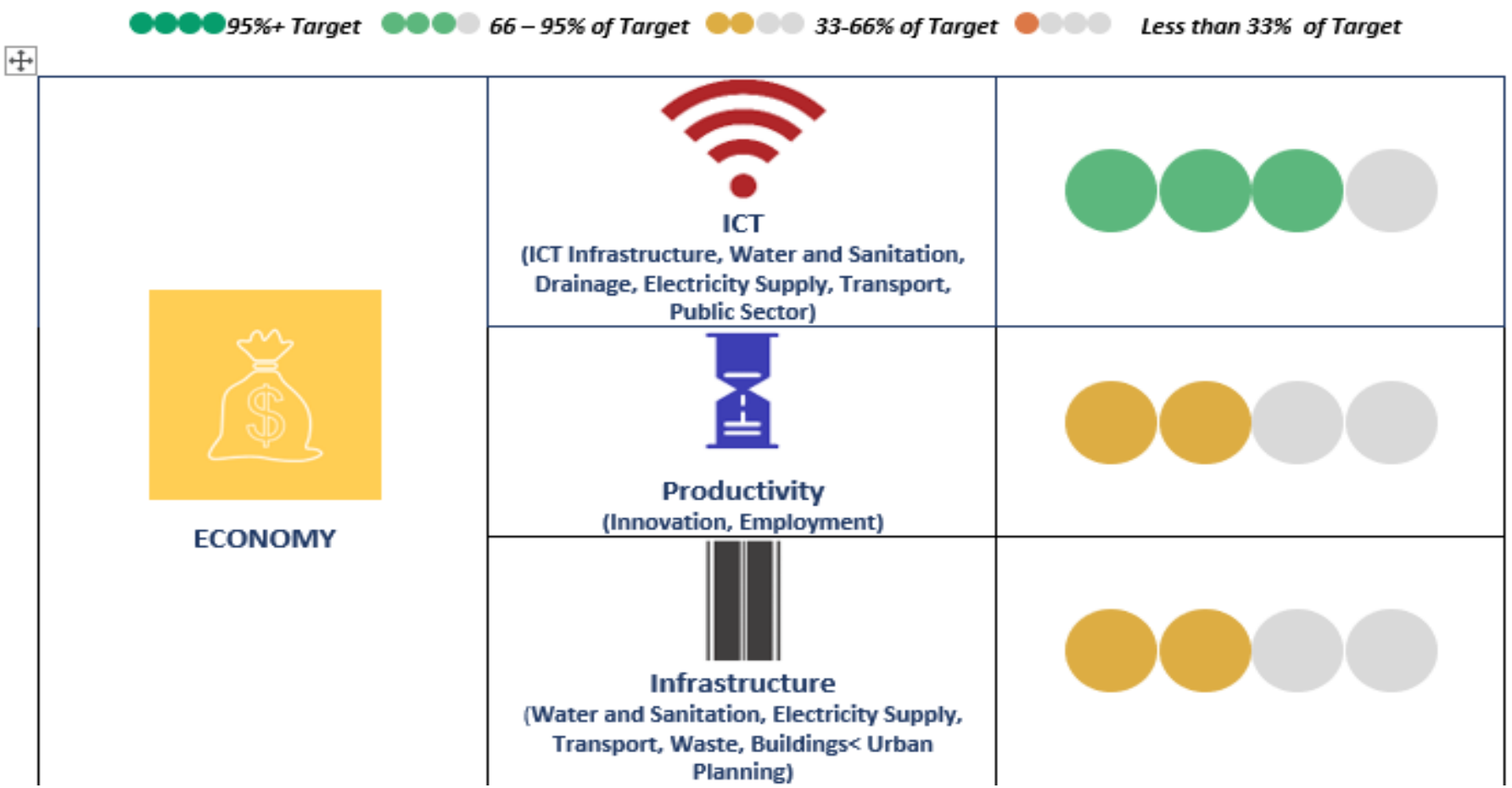
- Categories

- KPIs

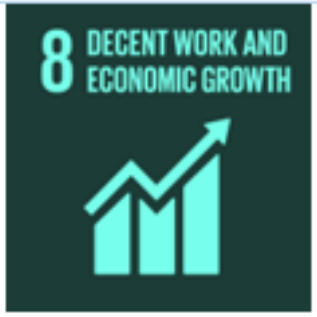
- 95+ % of Target
- 66 - 95 % of Target
- 33 - 66 % of Target
- Less than 33 % of Target
- No Data or No Target
- Data Reported - No Targets Yet Available

Implementing ITU-T International Standards to Shape Smart Sustainable Cities - Snapshot Report

Performance to Benchmarks – Sub Dimensions



Implementing ITU-T International Standards to Shape Smart Sustainable Cities - Fact Sheet

SDG Goal	KPI	Result	Performance to Benchmark
	Informal Settlements	0.04 %	
	Housing Expenditure	13.93 %	
	Gender Income Equity (ratio of Female : Male)	0.62	
	Gini Coefficient	0.23	

How to Get Involved

U4SSC Call for Experts

- The impact of Artificial Intelligence and Cognitive Computing in Cities
- The impact of Data Processing and Computation in Cities
- The impact of Sensing Technologies and IoT in Cities
- Blockchain 4 cities
- https://www.itu.int/en/ITU-T/ssc/united/Pages/default.aspx

KPIs Project for Smart Sustainable Cities to Reach SDGs

- To support cities in the implementation and use of the SSC KPIs
- To test and verify the applicability of SSC-KPIs in several cities of the world.
- To develop a global **Smart Sustainable Cities (SSC) Index**.

Join this Project now!

Dubai

Montevideo

Singapore

Maldonado

Valencia

Manizales

Wuxi

Pully

Foshan

Guangshan

Kairouan

Bizerte

Moscow

and many others…

Thank you!

More information can be found at:

https://www.itu.int/en/ITU-T/ssc/united/Pages/default.aspx

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Appendix

KPIs in Detail

ECONOMY

ICT – Core Indicators

Household Internet Access
Percentage of households with Internet access.

Fixed Broadband Subscriptions
Percentage of households with fixed (wired) broadband.

Wireless Broadband Subscriptions
Wireless broadband subscriptions per 100 000 inhabitants.

Wireless Broadband Coverage
Percentage of the city served by wireless broadband (3G and 4G).

Dynamic Public Transport Information
Percentage of urban public transport stops for which traveller information is dynamically available to the public in real time

Traffic Monitoring
Percentage of major streets monitored by ICT.

Smart Water Meters
Percentage implementation of smart water meters.

Smart Electricity Meters
Percentage implementation of smart electricity meters.

ECONOMY

ICT – Advanced Indicators

Availability of WIFI in Public Areas
Number of public WIFI hotspots in the city.

Open Data
Percentage and number of inventoried open datasets that are published.

e- Government
Number of public services delivered through electronic means.

Public Sector e-Procurement
Percentage of public sector procurement activities that are conducted electronically.

Intersection Control
Percentage of road intersections using adaptive traffic control or prioritization measures.

Water Supply ICT Monitoring
Percentage of the water distribution system monitored by ICT.

Drainage / Storm Water System ICT Monitoring
Percentage of drainage / storm water system monitored by ICT.

Electricity Supply ICT Monitoring
Percentage of electricity supply system monitored by ICT.

Demand Response Penetration
Percentage of electricity customers with demand response capabilities.

ECONOMY

Productivity – Core Indicators

R&D Expenditure
Research and Development expenditure as a percentage of city GDP.

Unemployment Rate
Percentage of the total city labour force that is unemployed.

Patents
Number of new patents granted per 100 000 inhabitants per year.

Youth Unemployment Rate
Percentage of the city youth labour force that is unemployed.

Productivity – Advanced Indicators

Small and Medium-Sized Enterprises
Percentage of small and medium-sized enterprises (SMEs).

Tourism Sector Employment
Percentage of the city labour force working in the tourism sector.

ICT Sector Employment
Percentage of the city labour force working in the ICT sector.

ECONOMY

Infrastructure – Core Indicators

Basic Water Supply
Percentage of households with access to a basic water supply.

Potable Water Supply
Percentage of households with a safely managed drinking water service.

Water Supply Loss
Percentage of water loss in the water distribution system.

Electricity System Outage Frequency
Average number of electrical interruptions per customer per year.

Electricity System Outage Time
Average length of electrical interruptions.

Access to Electricity
Percentage of households with authorized access to electricity.

Public Transport Network
Length of public transport network per 100 000 inhabitants.

Bicycle Network
Length of bicycle paths and lanes per 100 000 population.

Solid Waste Collection
Percentage of households with regular solid waste collection.

Wastewater Collection
Percentage of households served by wastewater collection.

Household Sanitation
Percentage of households with access to basic sanitation facilities.

ECONOMY

Infrastructure – Advanced Indicators

Public Transport Network Convenience
Percentage of the city population that has convenient access (within 0.5 km) to public transport.

Shared Bicycles
Number of shared bicycles per 100 000 inhabitants.

Public Building Sustainability
Percentage area of public buildings with recognized sustainability certifications for ongoing operations.

Pedestrian Infrastructure
Percentage of the city designated as a pedestrian / car free zone.

Transportation Mode Share
Percentage of people using various forms of transportation to travel to work (public transportation, personal vehicles, bicycles, walking, paratransit)

Shared Vehicles
Number of shared vehicles per 100 000 inhabitants.

Integrated Building Management Systems in Public Buildings
Percentage area of public buildings using integrated ICT systems to automate building management

Urban Development and Spatial Planning
Existence of urban development and spatial planning strategies or documents at the city level

Travel Time Index
Ratio of the travel time during the peak periods to travel time at free flow periods.

Low-Carbon Emission Passenger Vehicles
Percentage of low-carbon emission passenger vehicles.

ENVIRONMENT

Environment – Core Indicators

Air Pollution
Air Quality Index based on reported value for: Particulate matter (PM2.5) ;
NO2 (nitrogen dioxide);
SO2 (sulphur dioxide); and,
O3 (ozone).

Drinking Water Quality
Percentage of households covered by an audited Water Safety Plan.

Wastewater Treatment
Percentage of wastewater receiving treatment.

Green Areas
Green areas per 100 000 inhabitants.

GHG Emissions
Greenhouse gas (GHG) emissions per capita.

Water Consumption
Water consumption per capita.

Solid Waste Treatment
Percentage of solid waste.

EMF Exposure
Percentage of mobile network antenna sites in compliance with EMF exposure guidelines.

Freshwater Consumption
Freshwater consumption.

ENVIRONMENT

Environment – Advanced Indicators

Noise Exposure
Percentage of inhabitants exposed to excessive noise levels.

Green Area Accessibility
Percentage of inhabitants with accessibility to green areas.

Protected Natural Areas
Percentage of city area protected as natural sites.

Recreational Facilities
Area of total public recreational facilities per 100 000 inhabitants.

ENVIRONMENT

Energy – Core Indicators

Renewable Energy Consumption
Percentage of renewable energy consumed in the city.

Electricity Consumption
Electricity consumption per capita.

Residential Thermal Energy Consumption
Residential thermal energy consumption per capita.

Public Building Energy Consumption
Energy consumption of public buildings.

Society and Culture

Education, Health and Culture – Core Indicators

Student ICT Access
Percentage of students with classroom access to ICT facilities.

School Enrollment
Percentage of school-aged population enrolled in schools.

Higher Education Degrees
Higher level education degrees per 100 000 inhabitants.

Adult Literacy
Adult literacy rate.

Life Expectancy
Average life expectancy.

Maternal Mortality Rate
Maternal deaths per 100 000 live births.

Physicians
Number of physicians per 100 000 inhabitants.

Cultural Expenditure
Percentage expenditure on cultural heritage.

Society and Culture

Education, Health and Culture – Advanced Indicators

Electronic Health Records
Percentage of city inhabitants with electronic health records.

In–Patient Hospital Beds
Number of in-patient public hospital beds per 100 000 inhabitants.

Health Insurance/Public Health Coverage
Percentage of inhabitants covered by basic health insurance or a public health system.

Cultural Infrastructure
Number of the cultural institutions per 100 000 inhabitants.

Society and Culture

Safety, Housing and Social Inclusion – Core Indicators

Informal Settlements
Percentage of inhabitants living in slums, informal settlements or inadequate housing.

Police Service
Number of police officers per 100 000 inhabitants.

Fire Service
Number of firefighters per 100 000 inhabitants.

Violent Crime Rate
Violent crime rate per 100 000 inhabitants.

Gender Income Equity
Ratio of average hourly earnings of female to male workers.

Gini Coefficient
Income distribution in accordance with Gini coefficient.

Poverty
Percentage of inhabitants living in poverty.

Voter Participation
Percentage of the eligible population that voted during the last municipal election.

Natural Disaster Related Deaths
Number of natural disaster related deaths per 100 000 inhabitants.

Disaster Related Economic Losses
Natural disaster related economic losses as a percentage of the city's GDP.

Emergency Service Response Time
Average response time for Emergency Services.

Traffic Fatalities
Traffic fatalities per 100 000 inhabitants.

Society and Culture

Safety, Housing and Social Inclusion – Advanced Indicators

Housing Expenditure
Percentage expenditure of income for housing.

Resilience Plans
Implementation of risk and vulnerability assessments for disaster mitigation.

Local Food Production
Percentage of local food supplied from within 100 km of the urban area.

Child Care Availability
Percentage of pre-school age children (0-3) covered by (public and private) day-care centres.

Population Living in Disaster Prone Areas
Percentage of inhabitants living in a zone subject to natural hazards.

For more information, please contact: u4ssc@itu.int