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## Sustainable cities and communities — Indicators for smart cities

*Villes et communautés territoriales durables — Indicateurs pour les  
villes intelligentes*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

The committee responsible for this document is ISO/TC 268, *Sustainable cities and communities*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

The indicators detailed in ISO 37120 have quickly become the international reference point for sustainable cities. ISO/TC 268/WG2 experts have identified the need for additional indicators for smart cities.

This document complements ISO 37120 and establishes indicators with definitions and methodologies to measure and consider aspects and practices that dramatically increase the pace at which cities improve their social, economic and environmental sustainability outcomes.

This document, when used in conjunction with ISO 37120, helps cities to identify indicators for applying city management systems such as ISO 37101 and to implement smart city policies, programmes and projects to:

- respond to challenges such as climate change, rapid population growth, and political and economic instability by fundamentally improving how they engage society;
- apply collaborative leadership methods, work across disciplines and city systems;
- use data information and modern technologies to deliver better services and quality of life to those in the city (residents, businesses, visitors);
- provide a better life environment where smart policies, practices and technology are put to the service of citizens;
- achieve their sustainability and environmental goals in a more innovative way;
- identify the need for and benefits of smart infrastructure;
- facilitate innovation and growth;
- build a dynamic and innovative economy ready for the challenges of tomorrow.

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# Sustainable cities and communities — Indicators for smart cities

## 1 Scope

This document specifies and establishes definitions and methodologies for a set of indicators for smart cities.

As accelerating improvements in city services and quality of life is fundamental to the definition of a smart city, this document, in conjunction with ISO 37120, is intended to provide a complete set of indicators to measure progress towards a smart city. This is represented in [Figure 1](#).



**Figure 1 — Sustainable development of communities — Relationship between the family of city indicators standards**

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For updated references, the latest edition of the referenced document (including any amendments) applies.

ISO 37101, *Sustainable development in communities — Management system for sustainable development — Requirements with guidance for use*

ISO 37120, *Sustainable cities and communities — Indicators for city services and quality of life*

## 3 Terms and definitions for cities

For this document, the terms and definitions in ISO 37101 and ISO 37120 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1 gigajoule

measure of the energy that is equivalent to 1 billion joules (J), where 1 J is the amount of energy required to send an electrical current of one ampere through a resistance of one ohm for one second

Note 1 to entry: One gigajoule (GJ) is equivalent to 277,8 kilowatt hours (kWh)

### 3.2 per 100 000 population

for every 100 000 of the city's population

Note 1 to entry: The choice of 100 000 population was made to enable cities of different sizes to compare results with each other relatively easily and effectively. It should be noted that in some countries the statistic per 1 000 capita is collected and a slight mathematical adjustment might be necessary to reflect this difference to obtain an accurate comparison. The measure of per 1 000 population might be a more applicable measure for small cities.

### 3.3 public building

government-owned or leased building that functions as a municipal and administrative office, library, recreation centre, hospital, school, fire station or police station

Note 1 to entry: Ownership of buildings (public or private) is variously defined according to region and political system. The restrictive definition used here permits global comparability across cities.

### 3.4 smart city

city that increases the pace at which it provides social, economic and environmental sustainability outcomes and responds to challenges such as climate change, rapid population growth, and political and economic instability by fundamentally improving how it engages society, applies collaborative leadership methods, works across disciplines and city systems, and uses data information and modern technologies to deliver better services and quality of life to those in the city (residents, businesses, visitors), now and for the foreseeable future, without unfair disadvantage of others or degradation of the natural environment

Note 1 to entry: A smart city also faces the challenge of respecting planetary boundaries and taking into account the limitations these boundaries impose.

Note 2 to entry: There are numerous definitions of a smart city; however, the definition that is used within TC268 is the official one agreed to by the ISO Technical Management Board.

### 3.5 biosolid

mixture of water and solids separated from various types of water as a result of natural or artificial processes

## 4 City indicators

This document is designed to assist cities in steering and assessing the performance management of city services as well as quality of life. It considers sustainability as its general principle and “smart city” as a guiding concept in the development of cities. Indicators shall be reported on an annual basis. Depending on their objectives in term of smartness, cities will choose the appropriate set of indicators from this document to be reported.

For data interpretation purposes, cities shall take into consideration contextual analysis when interpreting results. The local institutional environment can affect the capacity to apply indicators. In some cases, services can be delivered by the private sector or the community itself.

The list of indicators is based on the following criteria:

- Completeness: indicators should measure and balance all relevant aspects for evaluation of the smart city.
- Technology neutral: not favouring one technology over another, existing or future.
- Simplicity: indicators can be expressed and presented in an understandable and clear way.
- Validity: indicators are an accurate reflection of the facts and data that can be collected using scientific techniques.
- Verifiability: indicators are verifiable and reproducible. Methodologies are rigorous enough to give certainty to the level of implementation of the criteria.
- Availability: quality data are available, or it is feasible to initiate a secure and reliable monitoring process that will make them available in the future.

When interpreting the results of a particular service area, it is important to review the results of multiple types of indicators across themes; focusing on a single indicator can lead to a distorted or incomplete conclusion. Elements of aspiration should also be taken into consideration in the analysis.

Users can also consider the following aspects which shall be clearly stated in the report and justified: indicators can be aggregated to larger administrative areas (e.g. region, metropolitan area); indicators can be grouped for analysis when taking into consideration the holistic characteristics of a city; and, this set of indicators can be complemented by other indicator sets in order to have a more comprehensive holistic approach for the analysis of smart and sustainable cities.

Furthermore, it is also important to acknowledge potential antagonistic effects of the outcome of particular indicators, either positive or negative, when analysing results.

Data sources can vary depending on the cities and can be different from the ones indicated in this document. However, data shall be verifiable, auditable, trustworthy and justified. Cities might not have access to all data required for indicators within this document as the services are performed by a third party. However, it is still important for cities to obtain this data. An important component of smart cities is the role of public/private partnerships and this collaboration, including sharing of data, should be encouraged.

Cities using this document shall report at least 50 % of the indicators in this document as it is meant to be used in conjunction with ISO 37120. “Smart cities” is a relatively new and evolving concept that cities worldwide are addressing and it is important that cities report progressively more indicators in this document over time.

Moreover, for each indicator, the correspondence with the issues of ISO 37101 is noted [for consistency with [Annex A](#) and with the United Nations Sustainable Development Goals (SDGs) ([Annex B](#))].

## 5 Economy

### 5.1 Percentage of service contracts providing city services which contain an open data policy

#### 5.1.1 General

Those implementing this document should report on this indicator in accordance with the following requirements.

NOTE 1 An open data policy demonstrates a city's commitment to better manage business information throughout the information lifecycle. Identifying and making data accessible helps to ensure that the public is informed and engaged through a transparent, accountable and accessible government.