



Economic and Social Council

Distr.: General
27 July 2020

Original: English

Economic Commission for Europe

Committee on Urban Development, Housing and Land Management

Eighty-first session

Geneva, 6–8 October 2020

Item 4(b) of the provisional agenda

Review of the implementation of the programmes of work 2018-2019 and 2020: sustainable smart cities

Economic Commission for Europe Protocol on the Evaluation of City Performance Against the Key Performance Indicators for Smart Sustainable Cities

Economic Commission for Europe Protocol on the Evaluation of City Performance Against the Key Performance Indicators for Smart Sustainable Cities

Prepared by the Bureau of the Committee

Summary

The implementation of the Key Performance Indicators for Smart Sustainable Cities is based on the “Collection Methodology for Key Performance Indicators for Smart Sustainable Cities”.

In the absence of established official procedures to evaluate the performance of a city using the Key Performance Indicators for Smart Sustainable Cities standard, the secretariat developed the Economic Commission for Europe Protocol on the Evaluation of City Performance against the Key Performance Indicators for Smart Sustainable Cities, with a view to improve the quality and transparency of the evaluation process.

The draft Protocol was reviewed by the Bureau of the Committee on Urban Development, Housing and Land Management and is submitting it to the Committee for endorsement.

The Committee is invited to endorse the Protocol to provide guidance to the work of the Economic Commission for Europe secretariat on Key Performance Indicators for Smart Sustainable Cities evaluation.

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I. Introduction

1. The Economic Commission for Europe (ECE) is one of the 16 United Nations¹ members of the United for Smart Sustainable Cities (U4SSC) initiative. U4SSC is coordinated by the International Telecommunications Union (ITU), ECE and the United Nations Human Settlements Programme (UN-Habitat) and supports countries in the ECE region to achieve Sustainable Development Goal 11: “Make cities and human settlements inclusive, safe, resilient and sustainable”. ECE activities within the U4SSC initiative are implemented as part of the annual programme of work of the Committee on Urban Development, Housing and Land Management and are reviewed at the Committee’s annual sessions.
2. The U4SSC initiative supports the evaluation of cities’ performance using the Key Performance Indicators (KPIs) for Smart Sustainable Cities (SSC)² and the implementation of smart sustainable cities solutions through the development of guidelines, studies, city action plans and capacity building events. The KPIs for SSC is a United Nations standard on smart sustainable cities, which was developed by ECE and ITU in 2015.
3. The KPIs for SSC standard was endorsed by the ECE Committee on Urban Development, Housing and Land Management in 2016 (ECE/HBP/2016/4). The Committee, at its eightieth session in October 2019, took note of the ongoing and planned activities on smart sustainable cities under the U4SSC initiative as described in the report of activities on smart sustainable cities in 2018-2019 (ECE/HBP/2019/4) and invited national and local governments to use the KPIs for SSC to evaluate the smartness and sustainability of cities.
4. The KPIs for SSC³ consists of 91 indicators at the intersection of three dimensions of sustainability (economy, environment, and society) and the Information and Communication Technologies. A full list of the indicators can be found in Annex 1.
5. The KPIs for SSC provide cities with a consistent and standardised approach to the collection of data and for measuring performance and progress towards:
 - (a) Achieving the Sustainable Development Goals (SDGs) and the 2030 Agenda for Sustainable Development;
 - (b) Becoming a smarter city;
 - (c) Becoming a more sustainable city⁴.

¹ Convention on Biological Diversity (CBD), Economic Commission for Latin America and the Caribbean (ECLAC), Food and Agriculture Organization of the United Nations (FAO), United Nations Development Programme (UNDP), United Nations Economic Commission for Africa (UNECA), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Environment Programme (UNEP), United Nations Environment Programme Finance Initiative (UNEP-FI), United Nations Framework Convention on Climate Change (UNFCCC), United Nations Industrial Development Organization (UNIDO), United Nations University - Electronic Governance (UNU-EGOV), UN-Women and World Meteorological Organization (WMO).

² Available at <https://www.unece.org/fileadmin/DAM/hlm/documents/Publications/U4SSC-CollectionMethodologyforKPIfoSSC-2017.pdf>

³ Review of the Key Performance Indicators for Smart Sustainable Cities can be carried out only by the 16 United Nations agencies associated within the U4SSC, based on the feedback of experts from countries and cities in the ECE region.

⁴ “A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects”. See <https://www.unece.org/housing-and-land-management/areas-of-work/housingurbandevlopment/sustainable-smart-cities.html>

6. The evaluation of the performance of a city performance against the KPIs for SSC supports the review and implementation of urban policies, projects and programmes, and allows a city to achieve its development targets and objectives included in, for instance, national sustainable development policies and strategies, local development plans and master plans.

7. The KPIs for SSC have been tested and implemented globally in over 150 cities worldwide⁵. In the period 2019 to 2023, ECE foresees the evaluation of 17 Norwegian cities, Grodno (Belarus), Bishkek (Kyrgyzstan), Tbilisi (Georgia), Tirana (Albania), Podgorica (Montenegro), Almaty (Kazakhstan), Nursultan (Kazakhstan) and others.

8. To date, the implementation of the KPIs for SSC standard is based on the “Collection Methodology for Key Performance Indicators for Smart Sustainable Cities” (Collection Methodology)⁶, which includes the:

- (a) The description of the 91 indicators of the KPIs for SSC;
- (b) The rationale for the selection of the KPIs;
- (c) The interpretation of the indicators;
- (d) Information on what indicator trends are considered desirable;
- (e) The methodology of each indicator for calculating the value to be reported;
- (f) Selected sources of data for the KPIs for SSC⁷.

9. With a view to improving the quality and transparency of the evaluation process, the secretariat to the Committee on Urban Development, Housing and Land Management developed the “ECE Protocol on the Evaluation of City Performance against the Key Performance Indicators for Smart and Sustainable Cities”.

10. The Protocol can be amended in the future, as appropriate⁸.

II. Glossary

11. **Data** – facts, symbols or numbers, which are collected, analysed and used in decision-making. Data on its own does not provide information about a phenomenon or its characteristics.

12. **Evaluation**⁹ (of city performance against the KPIs for SSC) –the processes comprising data collection, verification, benchmarking and development of recommendations.

13. **Government** – a central or a local government that commissions the evaluation of a city’s performance against the KPIs for SSC.

⁵ This includes for instance, Voznesensk (Ukraine), Goris (Armenia), Pully (Switzerland), Dubai (United Arab Emirates), Singapore (Singapore), Shanghai (China), Buenos Aires (Argentina), Moscow (Russia) and many others.

⁶ Available at <https://www.unece.org/fileadmin/DAM/hlm/documents/Publications/U4SSC-CollectionMethodologyforKPIfoSSC-2017.pdf>

⁷ Available at <https://www.unece.org/fileadmin/DAM/hlm/documents/Publications/U4SSC-CollectionMethodologyforKPIfoSSC-2017.pdf>

⁸ KPIs for SSC are used by various United Nations agencies. Therefore, the protocol can be subject to modifications resulting from the alignment of organizational approaches to the KPIs for SSC.

⁹ ITU, a member of the secretariat for U4SSC uses the term “verification” to describe the evaluation process.

14. **Evaluator**¹⁰ – a trained expert who carries out the evaluation of city performance against the KPIs for SSC on behalf of the ECE secretariat and independent from the government that commissioned the evaluation.

15. **Official statistics** – statistics produced by national statistical offices (NSOs) and/or other organizations comprising national statistical systems¹¹, based on the Fundamental Principles of Official Statistics.

16. **Verification (of data)** – the process of verifying the accuracy of data that will be used for the evaluation.

III. Aim of the Protocol

17. The aim of the Protocol is to improve the quality, efficiency and transparency of the evaluation of city performance against the KPIs for SSC.

18. The Protocol introduces a clear and transparent evaluation procedure, outlines the roles and responsibilities of the key stakeholders involved in the process: the ECE secretariat, evaluator, and the government concerned; and provides guidelines on how to carry out the evaluation.

19. The Protocol supports the realization of the 2030 Agenda for Sustainable Development in the ECE region and the localization of SDGs, by:

- (a) Raising awareness on the role of cities in the implementation of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals;
- (b) Establishing standards for measuring progress towards SDGs at the local level;
- (c) Defining urban development priorities at all levels of governance.

IV. Key stakeholders

20. The key stakeholders involved in the evaluation process are the ECE secretariat, the evaluator and the government in one of the ECE countries.

21. The evaluation of a city's performance against the KPIs for SSC is commissioned by a national or a local government. The ECE secretariat, as a neutral and independent stakeholder, evaluates the performance of the city against the KPIs for SSC. An evaluator,¹² carries out the evaluation on behalf of ECE.

22. The national or the local government who commissioned the evaluation and ECE are accountable for the implementation of the Protocol. The succeeding sections defines the roles and responsibilities of the key stakeholders.

¹⁰ International Telecommunications Union (ITU) uses the term 'verifier' to signpost a as a third-party entity or individual who is not an internal UN agency staff member or a consultant and who is responsible for verification of data for the KPIs for SSC).

¹¹ The national statistical system is a system comprised of a national statistical office (a leading agency mandated with production of official statistics), all the departments and agencies of the central government and other organizations with responsibilities to produce official statistics on behalf of the government.

¹² In order to maintain the neutral character of the evaluation process, the evaluator cannot be hired directly by the government, which commissioned the evaluation. The evaluator can be an ECE staff or an external expert contracted by ECE.

23. In order to implement the Protocol, the government is encouraged to establish (i) a “focal point”: a representative of the central or local government who will act as intermediary between ECE and the evaluator on the one side and the government which commissioned the evaluation on the other side, and (ii) an internal task force, consisting of representatives of relevant ministries and a municipality, the NSO and other organizations of the national statistical systems, and other parties who will be involved in the collection and use of data that is used for the KPIs for SSC. The task force is expected to increase the efficiency of the evaluation process and improve institutional learning.

V. Evaluation procedure

24. The evaluation of a city’s performance against the KPIs for SSC consists of four phases: data collection, data verification, benchmarking and recommendations (see figure 1). The steps for each phase are discussed in the sections below.

Figure 1
Phases of the evaluation of city performance against the KPIs for SSC

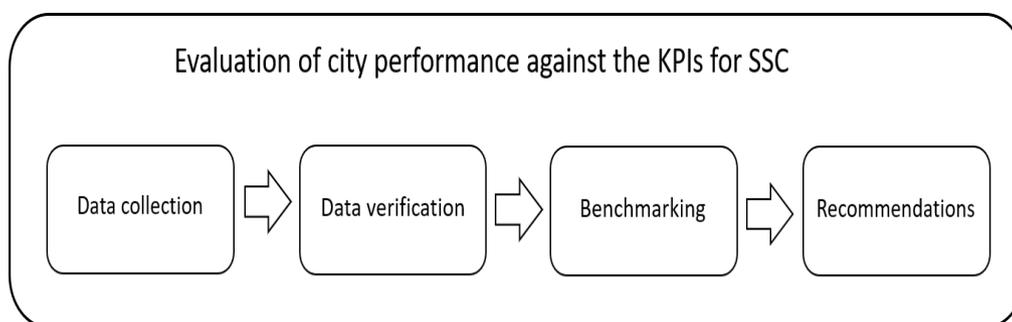
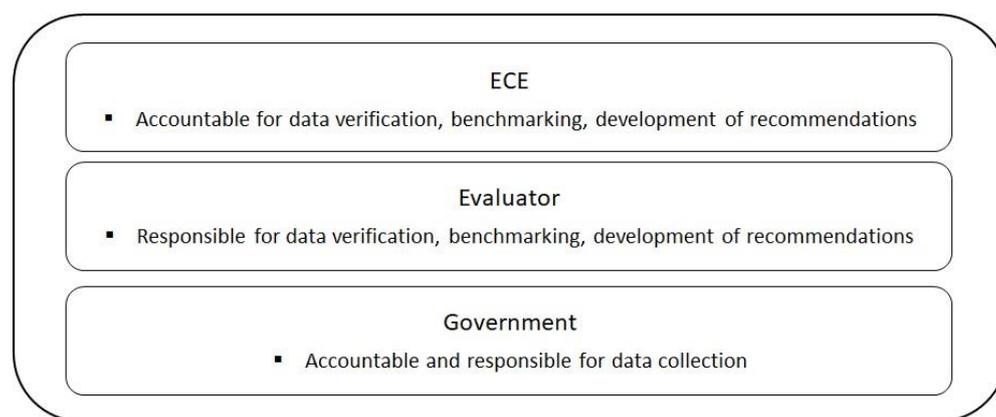


Figure 2
Roles of the ECE, the evaluator and the government across the four phases of the evaluation process¹³



¹³ A responsible party has a duty to carry out and deliver a particular task. An accountable party is the party that is ultimately held accountable for the delivery of the task.

A. Data collection

25. The collection of data for the 91 indicators of the KPIs for SSC is at the heart of the evaluation and has a critical impact on the viability of the evaluation process.

26. Data collection is the responsibility of the government. The following sources of data can be used:

(a) Official statistics - data produced by the NSOs¹⁴ and other members of the national statistical systems based on the Fundamental Principles of Official Statistics¹⁵;

(b) Other sources of data, for instance, data produced by the municipality or the central government (administrative data), international organizations (e.g. United Nations Statistics Division, European Union institutions, Organisation for Economic Co-operation and Development and others), non-governmental organizations, the academia and others.

27. However, the government is particularly encouraged to use official statistics as the source of data. Additional information about sources of data can be found in the Collection Methodology.

28. When collecting data, the government should be guided by the definition of the indicators as outlined in the Collection Methodology and should ensure that all data are well-referenced. In referencing the source, the government should provide the name of the organization which produced the data, the title of the source document and/or name of the database, the year when the document was published, and a link to the relevant web page or to the digital version of the publication. The lack of information on the data sources prevents the “verification of data” (more information on this can be found in the following section).

29. The government transfers the collected data for all KPIs to the evaluator and the ECE secretariat only. The data submitted cannot be re-submitted, modified and/or deleted. Upon completion of the evaluation process, the data could be shared with other parties and the public.

30. The government should collect the most recent data. However, in the absence of more recent data, the evaluator could accept data produced within five years preceding the year of the evaluation.¹⁶ Data forecasts should not be used in the evaluation.

31. Given how the national statistical systems in ECE countries differ, the organization of data collection will be at the discretion of the government. However, the government is encouraged to collaborate with the main producers of official statistics: NSOs (including their regional/local offices) and other organizations comprising the national statistical systems, and other relevant data producers.

32. Data collection depends on the availability and access to data and can take up to six months. The timeline for data collection is defined by the evaluator, the ECE secretariat and the government. This timeline can be extended at the discretion of ECE secretariat upon submission of relevant justification¹⁷.

¹⁴ NSOs are independent and trusted provider of high-quality statistics to the public. See <https://www.unece.org/fileadmin/DAM/stats/publications/2017/ECECESSTAT20172.pdf>

¹⁵ <https://www.unece.org/stats/fps.html>

¹⁶ In exceptional cases, the evaluator accepts the data produced within 10 years preceding the year of the evaluation, to include the data produced in the context of population and housing censuses that take place every ten years.

¹⁷ Additionally, if the government is unable to provide the sources of data used to inform the KPI within the established timeline, the government is responsible for providing a statement, where it endorses the values of the KPI submitted to the evaluator. A new timeline for the submission of the sources of data is agreed.

B. Data verification

33. The evaluation process should use only accurate data. Therefore, verification of data process is essential to assess whether the data submitted by the government could be used for the evaluation. The evaluator is responsible for verifying the accuracy of the collected data.

34. During the verification process, the data is frequently reviewed by the evaluator and the government. The evaluator considers the data submitted as “verified” if the government (i) submitted the required reference information on the sources of data; and (ii) reported the correct data values based on the references. If any of these two criteria is not met, the data is considered as “not verified”.

35. This implies that the corresponding data of the KPIs for SSC are considered as “verified” only if (i) the data used for each is “verified” according to the criteria set above; and (ii) the calculations¹⁸ performed by the government to derive at the value of a KPI are correct.

36. The evaluator communicates the outcomes of the verification through a report detailing the following: total number of data sources that were considered as ‘verified’ and ‘not verified’; and how many of the 91 KPIs for SSC were considered as ‘verified’ and ‘not verified’, also in a disaggregated view (in relation to the three pillars of the KPIs for SSC: economy; environment; society and culture) and with relevant argumentation.

37. There is no minimum number of KPIs that need to be verified for the evaluation process to proceed. However, (i) the government is encouraged to collect data to inform as many KPIs for SSC as possible; and (ii) only ‘verified’ KPIs for SSC can be a subject of benchmarking (see section on Benchmarking below).

38. The timeline for data verification can take up to three months.

C. Benchmarking

39. Benchmarking is the process of assigning a target value – a ‘benchmark’ – for each of the KPIs for SSC.¹⁹ The process is carried out by the evaluator in collaboration with the government, experts (including ECE) and stakeholders in the field.

40. Benchmarks should be derived based on existing and/or prospective development objectives and targets, included in, for instance, already existing local/regional/ national policies, plans, programmes, projects, strategies, or standards. Standards could be national sustainable development strategies and national plans (for example, water quality, masterplans, local development plans, etc.). International standards produced by ECE, for example, can be used as the sources of benchmarks.

41. The role of the government is to submit a list of proposed benchmarks (including the reference information to the sources) to the evaluator. The benchmarks are then discussed between the government, the evaluator²⁰ and other experts. The government is also encouraged to organize a consultation process with relevant public sector authorities, local civil society organizations, academia, local businesses, international experts (including the ECE secretariat) and many others to review and validate proposed benchmarks.

42. The participation of civil society organizations representing the interests of vulnerable populations (children and youth, elderly, disabled persons, etc.) in the process should be ensured. It is the role of the government to submit the final list of benchmarks to the evaluator.

¹⁸ Most of the KPIs for SSC are constructed based on a nominator and denominator.

¹⁹ The benchmarking can be carried out only for “verified” KPIs.

²⁰ The evaluator can also propose benchmarks.

43. The role of the evaluator is to compare the values of the KPIs for SSC with the benchmarks. The evaluator reports if the performance is “below average” (KPI value falls between 0 and 33 per cent of the benchmark value), “average” (KPI value is between 33 per cent and 66 per cent of the benchmark value) or “good” (KPI value is more than 66 per cent of the benchmark value) The evaluator recommends whether higher/lower values of the KPIs for SSC are desirable or not desirable for the city (as outlined in the Collection Methodology). The evaluator takes note of the KPI to which the government cannot provide a benchmark or to which deriving a benchmark is not possible.

44. The process of benchmarking takes approximately up to three months²¹.

D. Development of recommendations

45. The evaluation procedure concludes with recommendations.

46. Recommendations are developed by the evaluator, based on the lessons learnt from data collection and verification, benchmarking; and additional information provided by the government and other data sources (such as the Country Profiles on Urban Development, Housing and Land Management²²).

47. The evaluator uses a survey to put the values of the KPI4SSC in the context of development priorities and objectives and to have a better understanding of the processes taking place in a city and in a country. Additional information on the city may include, for instance, location; political, administrative and socio-economic conditions; the legal and institutional framework for urban development; and relevant social, economic and environmental policies, programmes, and strategies with their corresponding development targets.

48. The evaluator can recommend the following to the government: develop policies, strategies, programmes or new sustainable infrastructure projects; review existing policies, strategies, programmes or projects; improve statistical capacities of the institutions comprising their national statistical system and other data producers; improve coordination and collaboration between data producers and data users; improve data management practices; and others.

49. Draft recommendations are submitted to the governments for comments. The evaluator reviews the comments and produces the final draft of recommendations. The recommendations are then incorporated into the draft Sustainable Smart Cities Profile (SSCP)²³, the output of the evaluation of city performance against the KPIs for SSC. The draft SSCP is sent to the government for comments. The evaluator discusses and agrees with the government on the comments and proposed revisions. Once an agreement has been reached, the final version of the SSCP is submitted for publishing. Additional information on SSCPs can be found in Annex II.

50. The implementation of recommendations is the responsibility of the government. It is considered a good practice for the government to discuss the implementation of the recommendations with experts and stakeholders.

²¹ If possible, the process of consultation of benchmarks takes place in parallel with the process of collection of data.

²² More information at <https://www.unece.org/housing-and-land-management/areas-of-work/housingcountryprofiles.html>

²³ Outputs from the evaluation can differ across United Nations agencies involved in the U4SSC. For instance, as a result of the verification of data for KPIs for SSC, ITU produces City Factsheets.

Resources:

The Collection Methodology for Key Performance Indicators for Smart Sustainable Cities
<https://www.ECE.org/fileadmin/DAM/hlm/documents/Publications/U4SSC-CollectionMethodologyforKPIfoSSC-2017.pdf>

Guidelines on evidence-based policies and decision-making for sustainable housing and urban development (ECE/UN-Habitat)

Conference of European Statisticians Road Map on Statistics for Sustainable Development Goals (2017) <https://www.ECE.org/fileadmin/DAM/stats/publications/2017/ECECESSTAT20172.pdf>

The fundamental principles of official statistics https://unstats.un.org/unsd/dnss/hb/E-fundamental%20principles_A4-WEB.pdf

Annex I

The Key Performance Indicators for Smart Sustainable Cities

Information about the definition of the Key Performance Indicators for Smart Sustainable Cities can be found in the Collection Methodology for the Key Performance Indicators for Smart Sustainable Cities at <https://www.ECE.org/fileadmin/DAM/hlm/documents/Publications/U4SSC-CollectionMethodologyforKPIfoSSC-2017.pdf>

1. Household Internet Access
2. Fixed Broadband Subscriptions
3. Wireless Broadband Subscriptions
4. Wireless Broadband Coverage
5. Availability of WIFI in Public Areas
6. Smart Water Meters
7. Water Supply ICT Monitoring
8. Drainage / Storm Water System ICT Monitoring
9. Smart Electricity Meters
10. Electricity Supply ICT Monitoring
11. Demand Response Penetration
12. Dynamic Public Transport Information
13. Traffic Monitoring
14. Intersection Control
15. Open Data
16. e-Government
17. Public Sector e-Procurement
18. R&D Expenditure
19. Patents
20. Small and Medium-Sized Enterprises
21. Unemployment Rate
22. Youth Unemployment Rate
23. Tourism Industry Employment
24. ICT Sector Employment
25. Basic Water Supply
26. Potable Water Supply
27. Water Supply Loss
28. Wastewater Collection
29. Household Sanitation

30. Solid Waste Collection
31. Electricity System Outage Frequency
32. Electricity System Outage Time
33. Access to Electricity
34. Public Transport Network
35. Public Transport Network Convenience
36. Bicycle Network
37. Transportation Mode Share
38. Travel Time Index
39. Shared Bicycles
40. Shared Vehicles
41. Low-Carbon Emission Passenger Vehicles
42. Public Building Sustainability
43. Integrated Building Management Systems in Public Buildings
44. Pedestrian infrastructure
45. Urban Development and Spatial Planning
46. Air Pollution
47. GHG Emissions
48. Drinking Water Quality
49. Water Consumption
50. Freshwater Consumption
51. Wastewater Treatment
52. Solid Waste Treatment
53. EMF Exposure
54. Noise Exposure
55. Green Areas
56. Green Area Accessibility
57. Protected Natural Areas
58. Recreational Facilities
59. Renewable Energy Consumption
60. Electricity Consumption
61. Residential Thermal Energy Consumption
62. Public Building Energy Consumption
63. Student ICT Access
64. School Enrolment
65. Higher Education Degrees

66. Adult Literacy
67. Electronic Health Records
68. Life Expectancy
69. Maternal Mortality Rate
70. Physicians
71. In-Patient Hospital Beds
72. Health Insurance/Public Health Coverage
73. Cultural Expenditure
74. Cultural Infrastructure
75. Informal Settlements
76. Expenditure on Housing
77. Gender Income Equality
78. Gini Coefficient
79. Poverty Share
80. Voter Participation
81. Child Care Availability
82. Natural Disaster Related Deaths
83. Disaster Related Economic Losses
84. Resilience Plans
85. Population Living in Disaster Prone Areas
86. Emergency Service Response Time
87. Police Service
88. Fire Service
89. Violent Crime Rate
90. Traffic Fatalities
91. Local Food Production

Annex II

The Sustainable Smart Cities Profile

1. The output of the evaluation of city performance against the Key Performance Indicators for Smart Sustainable Cities is the Sustainable Smart Cities Profile.
2. The Sustainable Smart Cities Profile (SSCP):
 - (a) Presents the outcomes of the evaluation of city performance against the Key Performance Indicators for Smart Sustainable Cities;
 - (b) Supports evidence-based policymaking at all levels, including the development, review and implementation of sectoral and integrated urban development policies, programmes and projects, and others;
 - (c) Demonstrates the contribution of a city to the implementation of the 2030 Agenda for Sustainable Development.
3. The SSCP consists of five parts, complemented by a Preface/Acknowledgements, Executive Summary, and Annexes:
 - Part I – General Overview;
 - Part II – Legal and Institutional Framework for Urban Development;
 - Part III – Analysis of the Key Performance Indicators for Smart and Sustainable Cities;
 - Part IV – Financial Framework for Urban Development;
 - Part V – Summary and Recommendations.
4. A survey is used in order to source information for the SSCP. The purpose of the SSCP survey is to gather information about the geo-political, social, economic and environmental context of a city; achievements of the city; and potential areas for improvement. The structure of the survey mirrors the four main parts of the SSCP: (i) General overview and background; (ii) Legal and institutional framework for urban development, (iii) Analysis of the indicators, and (iv) Financial framework for urban development.
5. The draft Profile is prepared by the evaluator and shared with the government for comments. The evaluator reviews the comments and prepares a second draft of the profile, without making changes or modifications to the values of the verified KPIs for SSC. After the revisions, the final draft of the SSCP is prepared.
6. The final version of the Profile is published in the English language, an official United Nations language, and is made available to the public through the ECE website. Official translation into another official language of the United Nations like French or Russian is possible, subject to availability of financial resources. The government who requested the Profile can translate the draft at its own expense. This translation will be marked as “unofficial translation”.