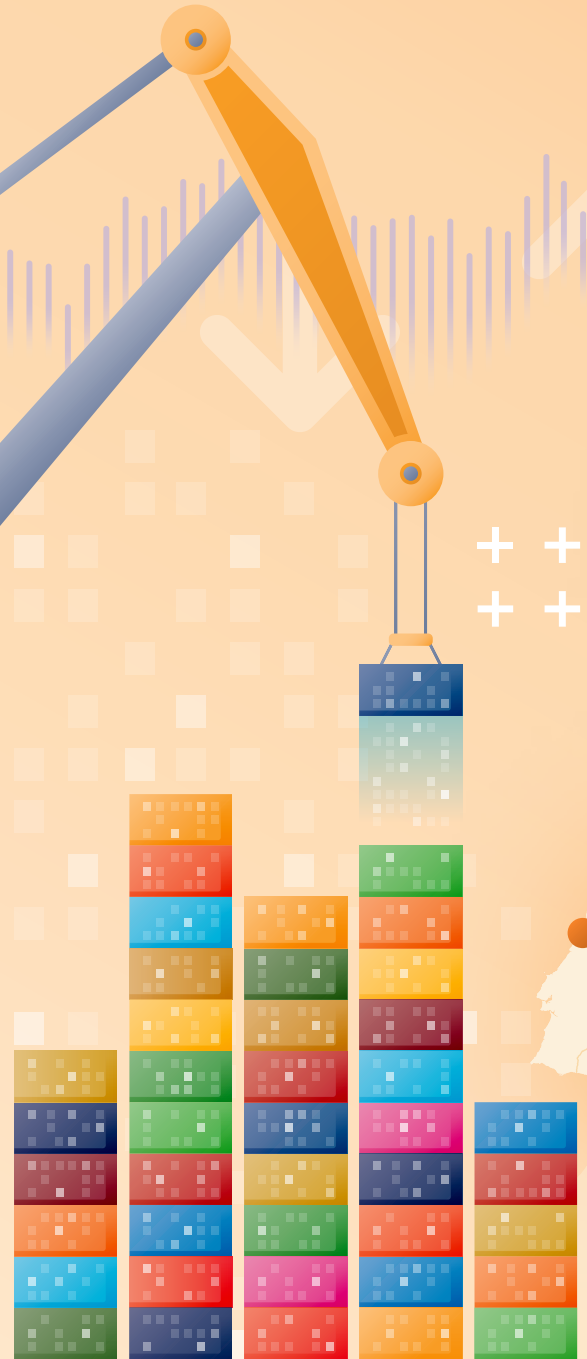
European Commission

# BUILDING URBAN DATASETS FOR THE SDGs

## *Six European cities monitoring the 2030 Agenda*



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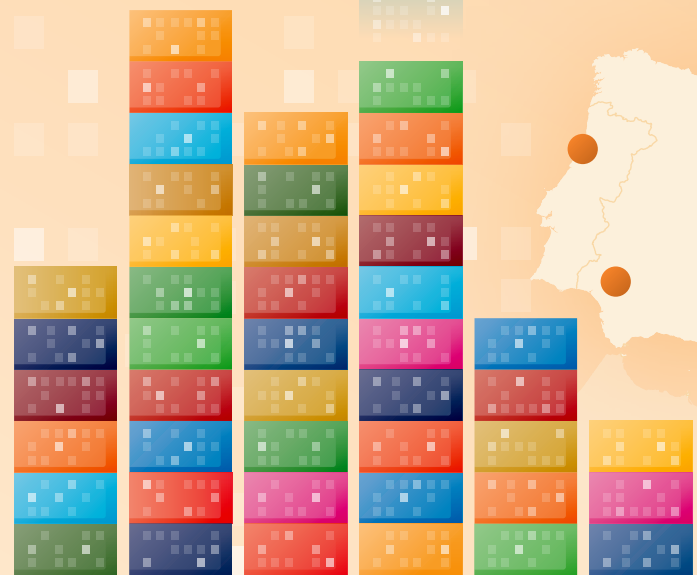

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**Contact information**
Alice Siragusa
European Commission, Joint Research Centre
Address: Edificio Expo, Calle Inca Garcilaso, 3, 41092 Sevilla, ESPAÑA
Email: *alice.siragusa@ec.europa.eu*
Tel: +39 0332785809

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# BUILDING URBAN DATASETS FOR THE SDGs

*Six European cities monitoring the 2030 Agenda*

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# ABSTRACT

Local governments stand at the frontline of social, economic and environmental challenges, and even more so in times of emergencies and disruptive changes. European local governments, and cities in particular, are increasingly using the framework of the Sustainable Development Goals (SDGs) as a support to design, monitor and evaluate their strategies and activities. Indeed, the 2030 Agenda and its SDGs have proven to be an added value for the elaboration of strategies at different geographical and institutional levels. The evidence-based approach is one of the main features characterising the 2030 Agenda, which has fostered the development of a common language when discussing sustainable development, in particular with regard to monitoring.

In this framework, the Joint Research Centre of the European Commission has developed an integrated approach that combines methodological contributions on the local monitoring of the SDGs as a valuable tool to transpose the 2030 Agenda in the local context and enhancing the creation of SDG ecosystems. This involves hands-on cooperation with cities to test and continuously improve the proposed framework so that it can properly assist municipalities willing to engage in a Local Voluntary Review.

This report is one of the building blocks of this work. It illustrates the results of the analyses performed in partnership with six European pilot cities between 2020 and 2021. The report details, for each city – Bratislava (SK), Reggio Emilia (IT), Oulu (FI), Porto (PT), Seville (ES), and Valencia (ES) – the availability of data for calculating the indicators proposed in the first edition of the *European Handbook* for SDG Voluntary Local Reviews; but also the local alternatives used when data were not available or when cities preferred to measure, in accordance with their local priorities, different indicators. In conclusion, for each city, the report illustrates the overall process of building a local SDG monitoring system and assesses the SDG monitoring capacities of the cities, identifying challenges encountered during the process, gaps to address and points of strength on which to build.

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City of Oulu

**Elisa Iori**
Comune di Reggio nell'Emilia

**Elisa Valia**
Deputy Mayor of the Valencia City Council. Cicle Integral de l'Aigua. Participació i Acció Veïnal. Transparency and Govern Obert. President of EMSHI

**Esperanza Caro Gómez and Adrián Reina Hurtado**
The City Council of Seville

**Gabriele Bollini**
Reggio Emilia

**Helena Madureira**

**María Paz Lagares Gaitán and Julima Nazabal Castellón**
City Council of Seville

**Marta Pinto**
Head of Environmental Management Office, City of Porto

**Pedro Pombeiro**
Director of the Municipal Department of Planning and Environmental Management, City of Porto

**Sara Velho**
Senior technician of the Municipal Office of Environmental Management, City of Porto

**Sauli Heino**
MayorsIndicators

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## AUTHORS

**Alice Siragusa**
European Commission, Joint Research Centre (JRC), Seville, Spain

**Paola Proietti**
European Commission, Joint Research Centre (JRC), Ispra, Italy

**Cecilia Bertozzi**
European Commission, Joint Research Centre (JRC), Seville, Spain

**Eloina Coll Aliaga**
Universitat Poltècnica de València, Spain

**Serena Foracchia**
EC expert, Reggio Emilia, Italy

**Andrej Irving**
EC expert, Bratislava, Slovakia

**Suvi Monni**
Benviroc Oy, Finland

**Maria Oliveira Pacheco**
University of Porto, Portugal

**Raffaele Sisto**
Smart&City Solutions, ITD – Universidad Politecnica de Madrid, Spain

## DISCLAIMER

Chapters 2 to 7 are not Voluntary Local Reviews and do not represent the official position of the local administrations or the officials consulted in the preparation of this report.

# EXECUTIVE SUMMARY

This report illustrates the work performed in partnership with six European Cities participating in the URBAN2030-II project, developed by the Joint Research Centre between 2020 and 2021. The report is a collaborative effort of JRC researchers and experts, aiming at assessing and improving the local statistical capacity to monitor progress towards the Sustainable Development Goals (SDGs). The research work developed with participating cities and experts had three objectives: to understand which of the indicators proposed in the first edition of the *European Handbook* for SDG Voluntary Local Reviews (hereafter *European Handbook*) were relevant and available for calculation across the various contexts; to identify local alternatives or proxy indicators; to assess the SDG monitoring ecosystems and capacities of the cities.

## *Policy context*

Local governments are increasingly recognised as key actors for the achievement of the 2030 Agenda for Sustainable Development and its Goals (United Nations 2015). On the occasion of the 2021 High-Level Political Forum on Sustainable Development, organised under the auspices of the United Nations Economic and Social Council (ECOSOC), the Council of the European Union highlighted that *'local and subnational authorities are essential actors to ensure ownership of SDGs by citizens to adopt locally applicable, contextualised implementation measures and thus to translate national development priorities into local realities, also in the context of the current pandemic'* (General Secretariat of the Council of the European Union 2021).

Responding to the need to address global challenges at different geographical and institutional levels, an increasing number of local and regional governments – both in Europe and worldwide – are engaging in SDG Voluntary Local Reviews (VLRs). These are tools for assessing local progress regarding contribution to the achievement of the 2030 Agenda for Sustainable Development, and also for monitoring and evaluating local policies and projects, and fostering policy coherence. In addition, these exercises have the potential to consolidate local democracy and participatory processes, through the engagement of the public, civil society organisations, companies and other local stakeholders.

The EU and its Member States welcome the increased efforts made at local level to increasingly perform VLRs, and recognise that local reviews can be fundamental for sustaining the transformative and inclusive action of local players towards the achievement of the SDGs.

## *Key conclusions*

The approach and criteria proposed for the selection and identification of local indicators in the first edition of the *European Handbook* are reasonably applicable in European cities. However, fine-tuning of the method is possible, in particular for addressing thematic issues and local statistical capacities. Cities collaborate with a number of local and national institutions, and

could benefit more from established collaborations for the collection and dissemination of data and indicators to measure sustainable development. Local governments should also take stock of existing monitoring frameworks and reporting systems that address thematic areas to build customised local SDG indicator sets.

## Main findings

The overall set of indicators proved to be a good reference for identifying potential proxies or complementary indicators. A considerable number of indicators included in the first edition of the *European Handbook* were found to be relevant and available in the pilot cities of the URBAN2030-II project. However, it proved hard and challenging to calculate and include certain indicators.

## Related and future JRC work

The URBAN2030-II project aims to foster the achievement of SDGs in European cities and regions by offering an inspirational framework for the design and implementation of SDG Voluntary Local Reviews. These activities allow cities to make the best use of knowledge, networking and learning from the process to localise the 2030 Agenda.

The insights provided by the six pilot cities represent an invaluable contribution to the second edition of the *European Handbook,* planned for 2022. Examples of experimental and additional indicators identified by these cities will, in fact, be considered to replace or complement the set of indicators included in the first edition of the *European Handbook,* while the lessons learned during these activities and the recommendations drawn up by the experts and the local officials will complement the methodology.

## Quick guide

The report is organised in eight chapters. The first chapter introduces the URBAN2030-II project, and anticipates some findings on the use of various data sources to monitor the SDGs locally, as well as the various approaches used by JRC experts to assess data availability and select indicators.

Chapters 2 to 7 offer a synthetic report of the work performed by JRC experts in Bratislava (SK), Reggio Emilia (IT), Oulu (FI), Porto (PT), Seville (ES), and Valencia (ES). The goals of this work were: to understand which of the indicators proposed in the first edition of the *European Handbook* were relevant and available for calculation across the six pilot cities; to identify alternative or additional data and indicators (where appropriate and possible); and to understand the specificities of the localisation process/outcome across cities.

Finally, the 8$^{th}$ and last chapter contains considerations on: (i) bottlenecks and challenges of SDG localisation and of the methods and indicators proposed in the first *European Handbook* and their localisation, as well as new methodological suggestions; (ii) local statistical capacity across cities; and (iii) specific topics regarding localisation to be further investigated (an example is the relation between the trends of the indicators and COVID-19).


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München

# 1. INTRODUCTION: THE URBAN2030-II PROJECT AND THE PILOT CITIES

**Authors:**

***Alice Siragusa, Paola Proietti, Cecilia Bertozzi***

*European Commission, Joint Research Centre (JRC)*

As mentioned in the executive summary, the JRC has cooperated with a number of European cities for the URBAN2030-II project in 2020 and 2021[1]. In particular, six cities – Bratislava (SK), Reggio Emilia (IT), Oulu (FI), Porto (PT), Seville (ES), and Valencia (ES) – were invited to test the use of the first *European Handbook for SDG Voluntary Local Reviews* (Siragusa et al. 2020) (hereafter *European Handbook*)[2].

The comments and reflections from the work carried out in cooperation with the six pilot cities are the focus of this report, and will provide an invaluable contribution to the second edition of the *European Handbook,* planned for 2022.

In the context of this report, this chapter summarises the extent to which the indicators proposed in the first *European Handbook* could be included in Voluntary Local Reviews (VLRs), and how the proposed SDG indicators proved to be useful examples for identifying additional or alternative indicators for the Sustainable Development Goals (SDGs). It also illustrates which data sources have been used to calculate indicators, and the specificities of the work performed by JRC experts to select indicators and identify data for each pilot city.

The pioneer local governments who were willing to measure their contribution and achievement of the Goals encountered difficulties adapting a monitoring system designed for application at country level. The challenges were linked to both their geographical level and powers, and also to the local relevance and availability of reliable data.

The first edition of the *European Handbook* was published in February 2020, specifically intended to help European cities and local governments to navigate the landscape of the various indicator sets designed to monitor the achievement of the SDGs [3].

The *European Handbook* describes the main components of the VLRs, as well as a number of example indicators that European cities could use to start building their SDG monitoring system. These examples include both official and experimental indicators because, unfortunately, few harmonised SDG official indicators are available for a relevant number of European

1 *https://urban.jrc.ec.europa.eu/sdgs/en*

2 For each pilot city, the JRC tasked one expert (hereafter JRC expert) to perform a data analysis and he/she produced an extensive report that has been presented to the city administrations. The results included in this report are syntheses of those analyses. The JRC experts for this project are Eloina Coll (Valencia), Serena Foracchia (Reggio Emilia), Andrej Irving (Bratislava), Suvi Monni (Oulu), Maria Oliveira Pacheco (Porto), and Raffaele Sisto (Seville).

3 The list of the SDGs and related targets is included in Annex 7.

cities. However, a number of official indicators are collected nationally or regionally, and might be available to cities. Moreover, a number of European institutions publish experimental indicators that rely on sound methodologies and might be considered proxy indicators for the production of VLRs. The *European Handbook* was designed and prepared in the period known as the first generation of VLRs (Ortiz-Moya et al. 2020), identified as between 2016 and early 2020.

(Ciambra 2021) offers an extensive analysis of the indicators used by European local governments to monitor the SDGs in the VLRs published between 2016 and early 2021. The report concludes that *'there is significant institutional and technical path-dependency on the pre-existing strategic and policy planning frameworks that were already available to local and regional governments when they approached the reviewing effort and the creation of their VLRs'* (Ciambra 2021, 50). The report also includes specific conclusions on the shift towards VLRs used as local tools, rather than outreach documents. The main scope of the report is to understand how European VLR indicators and data relate to the SDGs, and how European VLRs define their indicators and what data sources they use. However, the analysis also provides some insights as to how the European VLRs indicators relate to those proposed by the *European Handbook.* In this respect, the report concludes that a number of European VLRs had a significant share of indicators compatible or similar to those included in the first *European Handbook.*

Despite the observations included in (Ciambra 2021), it was necessary to test the use of the *European Handbook* in a number of cities. This test would enable verification of the relevance of the indicators proposed in the first edition and assess the availability of data for their calculation in selected cities. To this end, JRC experts have worked in close collaboration with local administrations to analyse which SDG indicators are relevant and feasible to calculate, and how they match the examples proposed in the *European Handbook.*

## 1.1 The URBAN2030-II pilot cities

For the URBAN2030-II, the JRC has identified six experts to cooperate with each administration in order to identify the most appropriate indicator sets and related data to monitor the SDGs, based on the methodology and examples proposed in the *European Handbook.* Starting at the same point (the Goals, the Targets and the *European Handbook*), each expert has tailored the method and specific focus of the work in agreement with the city with which they were working, also taking into consideration the existence of previous documents on the SDG city strategy, other thematic monitoring frameworks, the city data platform and databases, etc. The following paragraphs point out some specificities of the work and progress of each city analysis.

### *Bratislava (Slovakia)*

Bratislava is in the process of preparing an urban Smart Specialisation Strategy[4] and a new city strategy that will have a holistic approach in line with the 2030 Agenda.

4 Examples are available here *https://s3platform.jrc.ec.europa.eu/urban-inspirations*.

**FIGURE 1:** Map of the Pilot cities


**Source:** Authors' own elaboration

The city is particularly interested in developing a local strategy for innovation that considers societal challenges; this is reflected in the focus on the quintuple helix[5], with a significant number of indicators identified for Goals 8 and 9.

With the objective of automating the data collection process, the expert focused on sources available online[6]. The city's Open Data Portal was one of the first sources explored. However, this proved unsuitable for the purpose, as only a small share of indicators on that platform are related to the SDGs. Therefore other online data sources were analysed in order to complete

5 Public authorities, industry, academia, the public, and the natural environment.

6 This objective was reinforced by the restrictions due to the COVID-19 pandemic, which limited the possibility of organising in-person meetings and access to hard copies of documents, etc.

the data collection. The automation of the data collection proved difficult, and specific reflections on this aspect are included in Chapter 8.

All the indicators listed in Annex 2 are available with data points mainly for 2019, 2020, and 2021: this might ensure the timeliness of the data analysis and the capacity to track new phenomena and challenges.

## *Oulu (Finland)*

Finland was one of the first countries to publish a Voluntary National Review (VNR) in 2020 (Prime Minister's Office 2020). In addition, Oulu was able to benefit from the lessons learned from other Finnish cities which had already published VLRs (City of Espoo 2020; City of Turku 2020; Helsinki 2019)[7], and from participation in the Six City Strategy Network - 6Aika[8].

The JRC expert for the city of Oulu was also able to take advantage of existing monitoring frameworks, in particular with respect to the environment, and cooperation with the city statistical office. The City Strategy had already identified a set of indicators to monitor its goals, developing an approach defined as 'Leading with data'. The data collection was also facilitated by the existence of open-source data platforms such as the *MayorsIndicators*[9], where indicators at local level are collected and made available to all Finnish cities.

Cultural sustainability was recognised as an area in which further data collection would need to be developed. In June 2021, Oulu was selected as European Capital of Culture for 2026[10]. This should accelerate the development of indicators for measuring cultural sustainability.

## *Porto (Portugal)*

The work of the JRC expert for Porto highlights that the city has more than 150 local indicators at its disposal, related to the SDGs that may provide references for an evidence-based VLR. Indeed, the city is considering work on an SDG VLR to be published by 2022. In the case of Porto, whenever possible, the expert prioritised the municipal data sources over those proposed by the *European Handbook,* to ensure continuity in monitoring and consistency in the data collection methodology.

In an effort to engage the city departments, the JRC expert offered them the opportunity to propose local experimental indicators linked to their activities. This was in addition to those identified in the first stage of the analysis and based on the *European Handbook*.

In Porto, as in many other local governments, data were scattered across all the city departments and collected using various methodologies. Consequently, the work concluded that

7 Helsinki also published a second VLR in 2021, available at *https://sustainable.helsinki*.

8 Six City Strategy- 6Aika is a strategy that tackles the shared challenges of urbanisation of the six largest cities in Finland. In the Six City Strategy- 6Aika, Helsinki, Espoo, Vantaa, Tampere, Turku and Oulu tackle those challenges together and develop better services *https://6aika.fi/en/what-is-6aika*.

9 Mayors' Indicators is a private service that helps local authorities track their sustainability performance, making sustainable development accessible and comparable. This service is operated by MSDI Oy and developed with funding from Tekes Cleanweb-program.

10 *https://ec.europa.eu/culture/news/oulu-be-european-capital-culture-2026-finland*

the creation of a common database would represent a significant step towards a coherent monitoring system.

A specific template was developed for the analysis of each Goal, including the indication of trends for each indicator (when available), a specific focus on the aligned measures and projects undertaken by the city to identify local experimental indicators, and on the link between Goals, indicators and specific local policies.

## *Reggio Emilia (Italy)*

In Reggio Emilia, local policy makers decided to adopt the SDG framework for the new urban spatial planning process (drafting the city's General Urban Plan). Moreover, the collection of data for calculating indicators was part of a spatial planning process based on a sustainable city vision, which considers the 2030 Agenda and the SDGs as a reference. Therefore, the focus was on those SDGs which the strategy of the General Urban Plan might help to achieve.

The planning process is centred on participation, to reach a common understanding of local challenges and priorities among the public and local stakeholders, building on previous experiences of co-management of common goods in the city. The identification of indicators to assess the performance of the General Urban Plan enables the identification of new locally-defined measurements. These can also be used to assess the achievement of the SDGs. The process focuses on a spatial planning perspective: therefore, some SDGs receive particular attention because the strategy of the General Urban Plan might contribute to reaching those Goals specifically.

The city created a dedicated planning unit to identify policy interdependencies and collect data. The analysis of this information identified certain difficulties in finding proper data or in reaching a local common understanding of the various Goals and Targets. The use of data for providing information about strategies and policies is still not part of the everyday activities of the administration. However, this exercise represents a step towards an evidence-based decision approach.

The adoption of the SDG framework has allowed policy makers to understand and evaluate the interdependence between different policies and goals; however, the process in Reggio Emilia is still ongoing, and further findings may arise as the General Urban Plan evolves.

## *Seville (Spain)*

The analysis developed by the JRC expert for Seville focussed closely on SDG targets, not only on Goals. It relies on a robust methodology to build a matrix that takes into account several sets of indicators at global and national level: the Global Indicator Framework for the SDGs (UN); the indicators included in the first *European Handbook;* the SDSN SDG INDEX proposed by the *Red de Soluciones para el Desarrollo Sostenible* – REDS[11] (REDS - Red Española para el Desarrollo Sostenible 2020); and local indicators identified in a previous analysis of the city of Seville ('Informe Diagnóstico y Evaluación ODS Ciudad de Sevilla' 2017).

11 *https://reds-sdsn.es*

Particular attention was placed on the possible disaggregation of the indicators (from European to local level) and applicability to other contexts (cities); therefore, official European and national sources were prioritised. The works focused on 'output' or 'result' indicators, reflecting the impact of public policies on people's quality of life or on the provision of services. The work also looks at the importance of aligning the local budget with the SDGs.

### *Valencia (Spain)*

In Valencia, work on the identification of SDG indicators and on open data went hand in hand. Indeed, Valencia City Council seeks people's empowerment, by involving them in the definition of some of the objectives and key results for the city's strategy, hence the importance of open data.

One of the elements to emerge clearly from this analysis is that a wealth of data and indicators is available for the city; both from the Municipality as well as from other organisations and institutions. In recent months, Valencia City Council has further accelerated the work on specific measures to improve data collection for the SDGs. However, the coordination of all the data sources into a unique database is recommended to maximise their value.

Interdepartmental working groups have been set up under the city's Strategic Plan to incorporate the quadruple helix[12] in a long-term strategic plan to comply with the SDGs. These measures constitute some of the building blocks of the Innovation Missions, a process for social and urban innovation in Valencia that aims to enable participation.

## 1.2 SDGs indicators: matching the *European Handbook*

As seen in the results described in chapters 2 to 7, JRC experts were able to collect between 55 and 158 indicators for each city to measure the SDGs (Table 1).

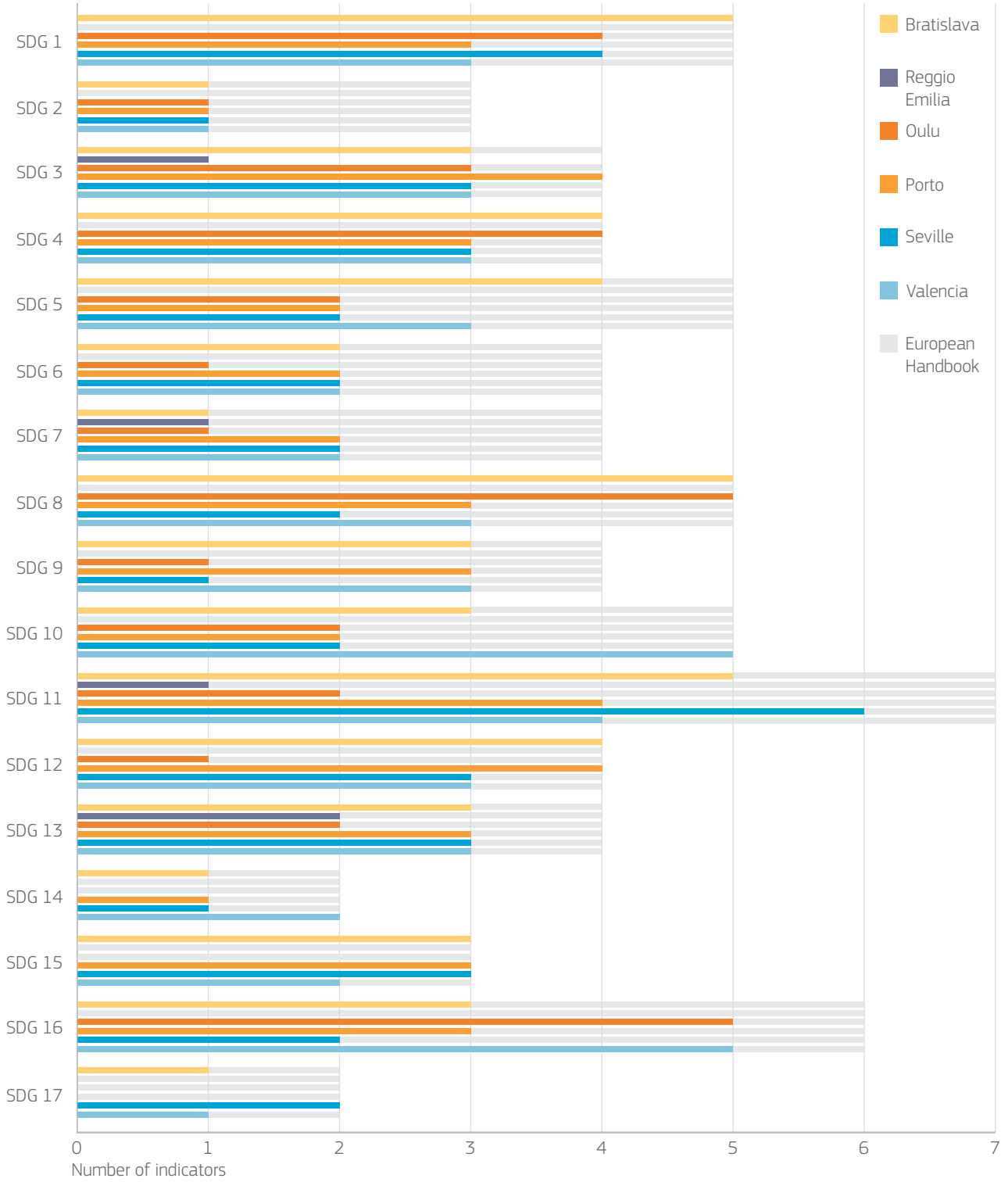
JRC experts identified 103 and 158 potential SDG local indicators for Seville and Porto respectively, in line with the numbers of indicators used in the VLRs published in Bristol, Malaga, and Mannheim (Carden-Noad et al. 2017; Fundación CIEDES 2019; City of Mannheim 2019). JRC experts in Bratislava, Reggio Emilia, Valencia and Oulu collected a similar number of indicators, between 55 and 71, comparable to the number of indicators used in the VLRs for Bonn, Stuttgart and Turku (City of Bonn 2020; State Capital Stuttgart, German Institute for Urban Studies, and Bertelsmann Foundation 2019; City of Turku 2020). JRC experts from these last four cities indicated a potential for including more indicators in a second stage of the analysis. In particular, additional indicators are expected to become available on topics such as culture and creativity (Bratislava, Valencia and Oulu), or as outcomes of local-specific projects developed by cities. Moreover, for Reggio Emilia further indicators could be identified during the drafting of the General Urban Plan, which is closely linked to the SDG framework and was still in progress at the time of publication of this report.

When looking at the availability of the indicators suggested as examples in the first edition of the *European Handbook,* and their availability in the pilot cities, a variety of results emerges.

12 Science, policy, industry, and society.

Figure 2 breaks down the availability of the example indicators from the first *European Handbook* by SDG in each pilot city. None of the pilot cities was able to collect all the indicators proposed by the *European Handbook* (represented, for each Goal, by the grey shaded area); however, some covered all of the indicators suggested for SDGs 1, 3, 4, 8, 10, 12, 14, 15, 17.

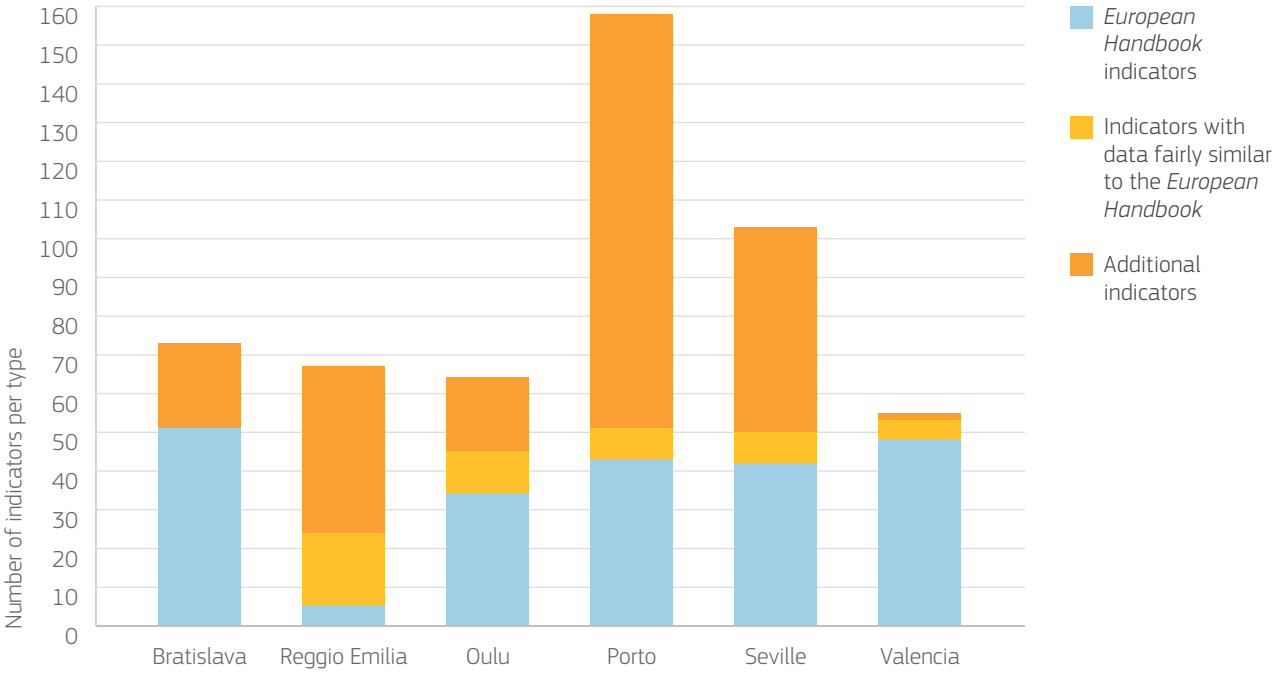
**FIGURE 2:** Comparison of pilot cities – Indicators available for the pilot cities among the examples of those in the *European Handbook*




**Source:** Authors' own elaboration

Figure 3 illustrates the proportion of matching indicators, indicators similar to those in the *European Handbook,* and additional indicators. Valencia emerges as the city with the highest proportion of indicators that match those included in the *European Handbook* (87.27% of Valencia indicators, corresponding to 48 indicators), followed by Bratislava (69.86%, corresponding to 51 indicators). When similar indicators are also considered, this figure rises to 96% for Valencia (53 indicators); it can therefore be concluded that the *European Handbook* is an excellent reference for this city. In the other pilot cities, comparable figures emerge for Seville and Oulu (42 indicators, 40.78% and 34 indicators, 51.52%, respectively), while the proposed example indicators seem to fit less well in the case of Reggio Emilia (5 indicators, 7.46%) and Porto (43 indicators, 27.22%). Porto, in this respect, is an outlier, since the expert identified many more indicators than the other cities (158).

**FIGURE 3:** Comparison of pilot cities – Number of *European Handbook* indicators, indicators with data fairly similar to that in the *European Handbook,* additional indicators




**Source:** Authors' own elaboration

The proportion of the *European Handbook* indicators over the total number of indicators indentified per pilot city is on average 47.6% (as depicted in Table 1). The *European Handbook* Adoption rate which describes the degree to which each pilot city has used indicators included in the *European Handbook,* over the total number of indicators proposed therein (= 71 indicators) is 52.6% on average, with variation between cities of between 7% and 73.2%.

As shown in Table 1, the *European Handbook* Adoption rate is considerably higher than the respective proportions for both Porto and Seville (close to 60%). This indicates that in these two cities the indicators proposed in the *European Handbook* were in fact helpful for monitoring the SDGs, although the cities felt that additional indicators were needed to reflect the local SDG context. To the contrary, the adoption rate and respective proportion for Bratislava is almost equal (73% and 71%), owing to the similarity in the total number of indicators used by this city to monitor SDGs (73) compared to that of the *European Handbook* (71). Similarly, in

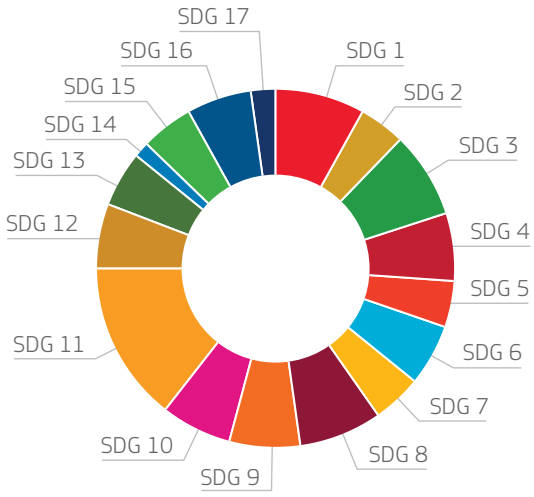
**TABLE 1:** Comparison of cities – Indicators identified by the JRC experts in each pilot city

| | Bratislava | Reggio Emilia | Oulu | Porto | Seville | Valencia | Average |
|---|---|---|---|---|---|---|---|
| Indicators identified per pilot city (nr) | 73 | 67 | 66 | 158 | 103 | 55 | 87 |
| Indicators matching the *European Handbook* examples per pilot city (nr) | 52 | 5 | 34 | 43 | 42 | 48 | 37.33 |
| *European Handbook* indicators identified in each city over the total number of indicators (%) | 71.2% | 7.5% | 51.5% | 27.2% | 40.8% | 87.3% | 47.6% |
| *European Handbook* Adoption rate (%) | 73.2% | 7.0% | 47.9% | 60.6% | 59.2% | 67.6% | 52.6% |

**Source:** Authors' own elaboration

Reggio Emilia, both the adoption rate and proportion were rather low (at 7%) as the *European Handbook* indicators were hardly used in the SDG monitoring process. The case of Valencia stands out, as the significantly high proportion of *European Handbook* indicators used in the city analysis (87%) is accompanied by a comparably high adoption rate (almost 68%); in this city, seven out of ten indicators proposed in the *European Handbook* were found relevant for monitoring SDGs.

**FIGURE 4:** Pilot cities – Average available indicators by SDG




**Source:** Authors' own elaboration

The *European Handbook* stressed the need to monitor all the SDGs as much as possible and to maintain a balance in terms of coverage, to avoid having many indicators for one SDG and none for others. Figure 4 shows the average number of indicators available by SDG across the six pilot cities. Not surprisingly, Goal 11 is on average the goal with more indicators (12.5 indicators), while Goals 14 and 17 have fewer than two indicators on average. SDGs 1, 3, 8 have between six and eight indicators per Goal on average. Table 2 illustrates the number of indicators identified by SDG for each pilot city. A detailed analysis of the availability of indicators in each of the pilot cities is discussed in the dedicated chapters.

TABLE 2: Pilot cities comparison – Indicators available by SDG

| | Bratislava | Reggio Emilia | Oulu | Porto | Seville | Valencia | Average |
|---|---|---|---|---|---|---|---|
| SDG 1 | 5 | 4 | 6 | 16 | 7 | 5 | 7.2 |
| SDG 2 | 3 | 4 | 3 | 5 | 5 | 7 | 3.5 |
| SDG 3 | 7 | 3 | 4 | 11 | 12 | 3 | 6.7 |
| SDG 4 | 4 | 4 | 4 | 11 | 6 | 3 | 5.3 |
| SDG 5 | 4 | 0 | 4 | 5 | 6 | 4 | 3.8 |
| SDG 6 | 2 | 6 | 3 | 12 | 2 | 4 | 4.8 |
| SDG 7 | 1 | 4 | 2 | 9 | 5 | 2 | 3.8 |
| SDG 8 | 6 | 6 | 5 | 10 | 9 | 3 | 6.5 |
| SDG 9 | 7 | 3 | 5 | 7 | 7 | 4 | 5.5 |
| SDG 10 | 3 | 4 | 6 | 7 | 9 | 5 | 5.7 |
| SDG 11 | 15 | 17 | 10 | 19 | 9 | 5 | 12.5 |
| SDG 12 | 4 | 4 | 3 | 12 | 4 | 3 | 5.0 |
| SDG 13 | 3 | 4 | 3 | 10 | 3 | 3 | 4.3 |
| SDG 14 | 1 | 0 | 0 | 2 | 3 | 2 | 1.3 |
| SDG 15 | 3 | 4 | 2 | 8 | 6 | 2 | 4.2 |
| SDG 16 | 4 | 0 | 6 | 9 | 6 | 5 | 5.0 |
| SDG 17 | 1 | 0 | 0 | 5 | 4 | 1 | 1.8 |
| | **73** | **67** | **66** | **158** | **103** | **55** | **87.0** |

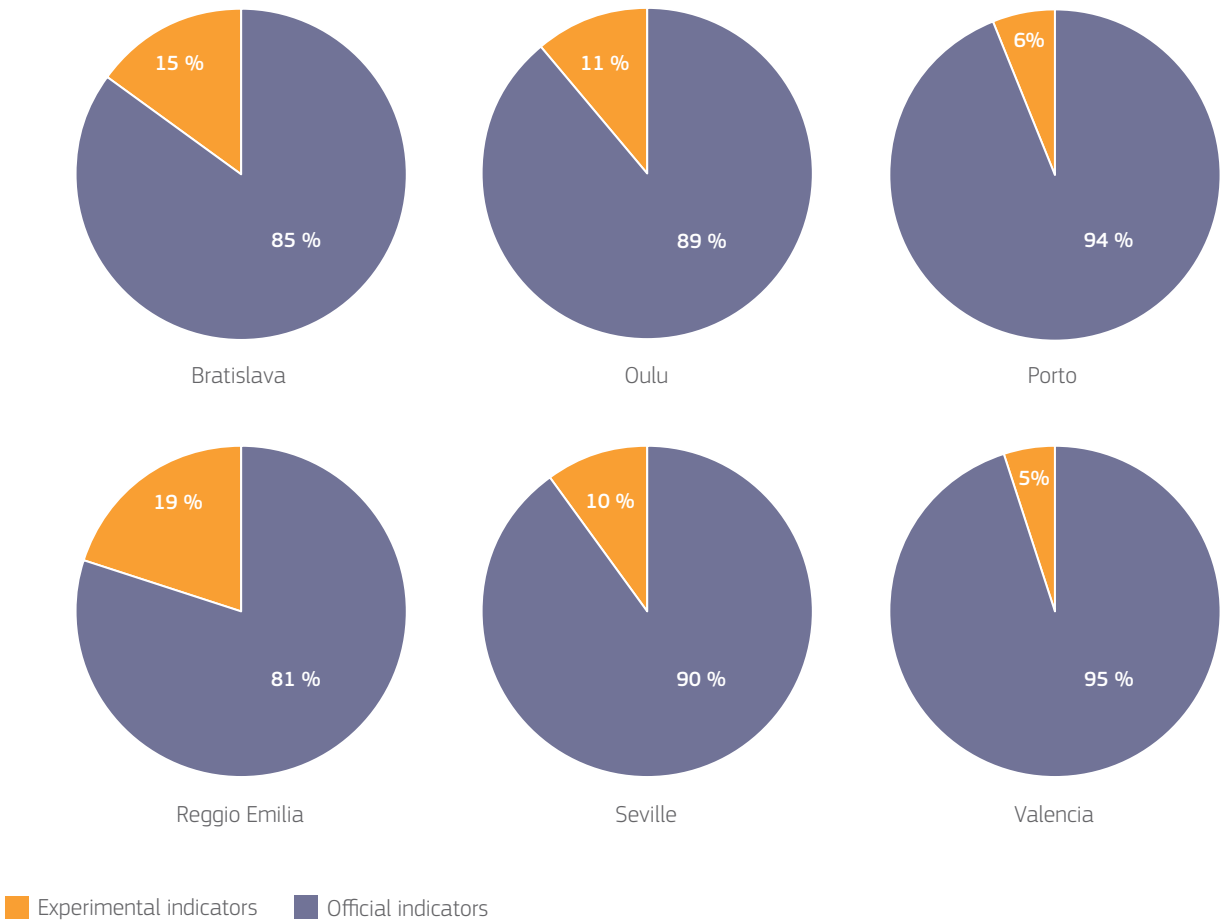
Source: Authors' own elaboration

## 1.3 SDG indicators: types and data sources

Chapters 2 to 7 include the discussion of the sources used to identify the potential SDG indicators per city. These vary across the pilot cities, depending on the availability and on the approach used for data collection.

The proportion of experimental indicators[13] for the pilot cities ranges from 5 % for Valencia to 20 % for Reggio Emilia (Figure 5). When considering these results, note that the SDG monitoring should aim to have as many official indicators as possible, in order to ensure the accountability and robustness of the monitoring exercise. However, the administration's capacity to involve stakeholders in the collection of experimental indicators, or to take advantage of local projects, should also be considered an added value in the process as it may bolster the sense of ownership of the VLR (as in the cases of Reggio Emilia[14] or Valencia[15]). Table 3 details the availability of official and experimental indicators in every city by SDG.

**FIGURE 5:** Comparison of pilot cities – Proportion of official and experimental indicators collected




**Source:** Authors' own elaboration

13 Indicators produced by individual cities or organisations/institutions through innovative and experimental methods.
14 Reggio Emilia intends to use indicators produced in the framework of European projects.
15 Valencia cooperates with the Universidad Politecnica de València on a number of indicators.

**TABLE 3:** Pilot cities comparison – Number of official (Off.) and experimental (Exp.) indicators identified

| | Bratislava | | Reggio Emilia | | Oulu | | Porto | | Seville | | Valencia | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Off. | Exp. | Off. | Exp. | Off. | Exp. | Off. | Exp. | Off. | Exp. | Off. | Exp. |
| SDG 1 | 5 | 0 | 2 | 2 | 6 | 0 | 15 | 1 | 7 | 0 | 5 | 0 |
| SDG 2 | 3 | 0 | 3 | 1 | 2 | 1 | 5 | 0 | 5 | 0 | 1 | 0 |
| SDG 3 | 5 | 2 | 1 | 2 | 4 | 0 | 11 | 0 | 12 | 0 | 3 | 0 |
| SDG 4 | 4 | 0 | 1 | 3 | 4 | 0 | 11 | 0 | 6 | 0 | 3 | 0 |
| SDG 5 | 4 | 0 | 0 | 0 | 4 | 0 | 5 | 0 | 6 | 0 | 4 | 0 |
| SDG 6 | 2 | 0 | 6 | 0 | 3 | 0 | 12 | 0 | 2 | 0 | 4 | 0 |
| SDG 7 | 1 | 0 | 3 | 1 | 2 | 0 | 9 | 0 | 5 | 0 | 2 | 0 |
| SDG 8 | 6 | 0 | 6 | 0 | 5 | 0 | 8 | 2 | 9 | 0 | 3 | 0 |
| SDG 9 | 5 | 2 | 3 | 0 | 4 | 1 | 6 | 1 | 6 | 1 | 2 | 2 |
| SDG 10 | 3 | 0 | 2 | 2 | 5 | 1 | 6 | 0 | 9 | 0 | 5 | 0 |
| SDG 11 | 10 | 5 | 17 | 0 | 7 | 3 | 17 | 3 | 5 | 4 | 4 | 1 |
| SDG 12 | 4 | 0 | 3 | 1 | 3 | 0 | 12 | 0 | 4 | 0 | 3 | 0 |
| SDG 13 | 2 | 1 | 3 | 1 | 2 | 1 | 9 | 1 | 2 | 1 | 3 | 0 |
| SDG 14 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 0 | 2 | 0 |
| SDG 15 | 2 | 1 | 3 | 0 | 2 | 0 | 6 | 2 | 3 | 3 | 2 | 0 |
| SDG 16 | 4 | 0 | 0 | 0 | 6 | 0 | 9 | 0 | 5 | 1 | 5 | 0 |
| SDG 17 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 4 | 0 | 1 | 0 |
| | **62** | **11** | **53** | **13** | **59** | **7** | **148** | **10** | **93** | **10** | **52** | **3** |

**Source:** Authors' own elaboration

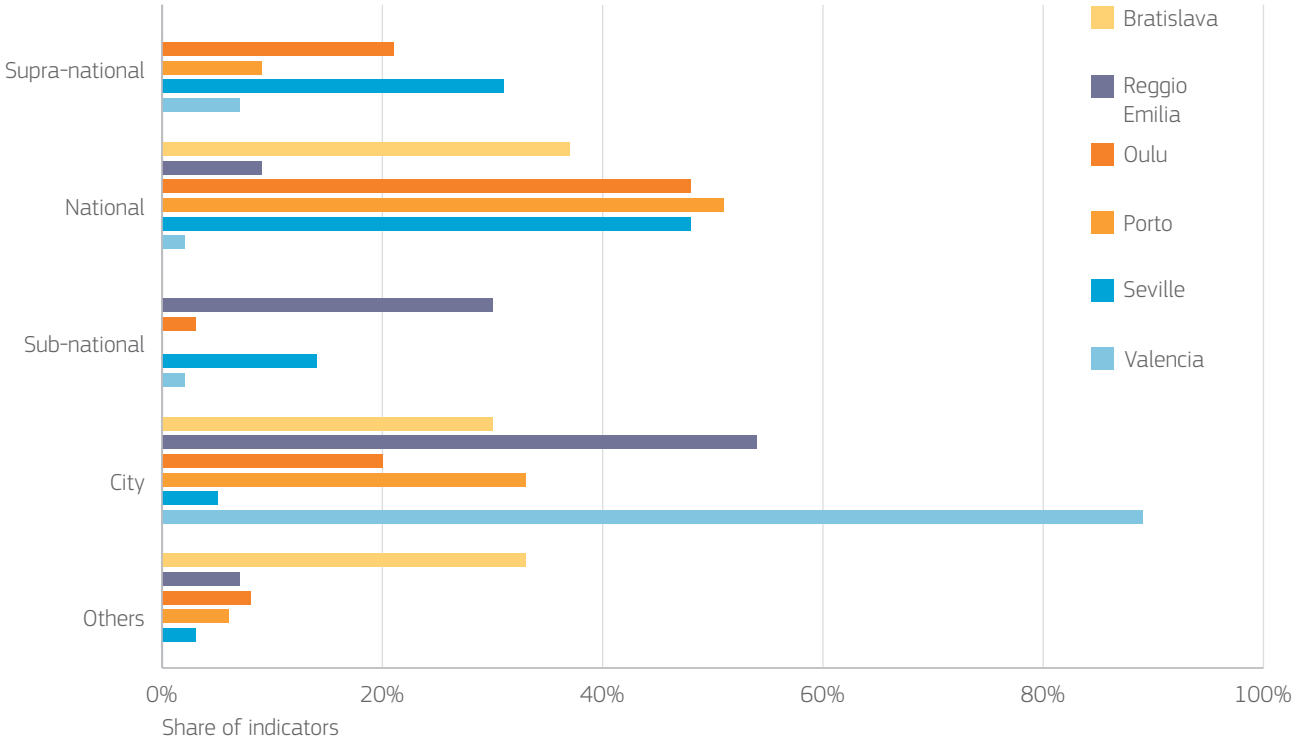
Figure 6 and Figure 7 illustrate the data sources grouped by geographical levels, respectively as a proportion of the total number of indicators, and as absolute numbers. *Supra-national* sources include data from the European Commission, OECD, etc. *National* sources include data from National Statistical Offices (NSOs), ministries, national agencies, etc. *Sub national* sources include data from regional statistical offices, regional authorities, etc. City sources include city open data platforms, city statistical offices, city service providers, etc. *Others* include external data providers or open platforms, independent institutions, NGOs, research centres and universities, etc.

It emerges from Figure 6 that the main sources of references for these local SDG monitoring efforts are *city* and *national sources,* with significant variation in the other categories (*supra-national, sub-national* and *others*).

Despite the differences, some common trends can be identified: for Valencia, 89% of all indicators are from city sources (corresponding to 49 indicators); for Reggio Emilia, most of the indicators are sourced from city or sub national sources (54% and 30%); for Porto, Seville and Oulu, approximately half of the indicators are from national sources (51%, 48% and 48% respectively), corresponding to 81, 49 and 32 indicators, respectively. Finally, in the case of Bratislava the distribution of indicators appears to be more balanced, with approximately 1/3 of indicators from city sources (30%), just over 1/3 from national sources (37%), and 1/3 from other sources (33%).

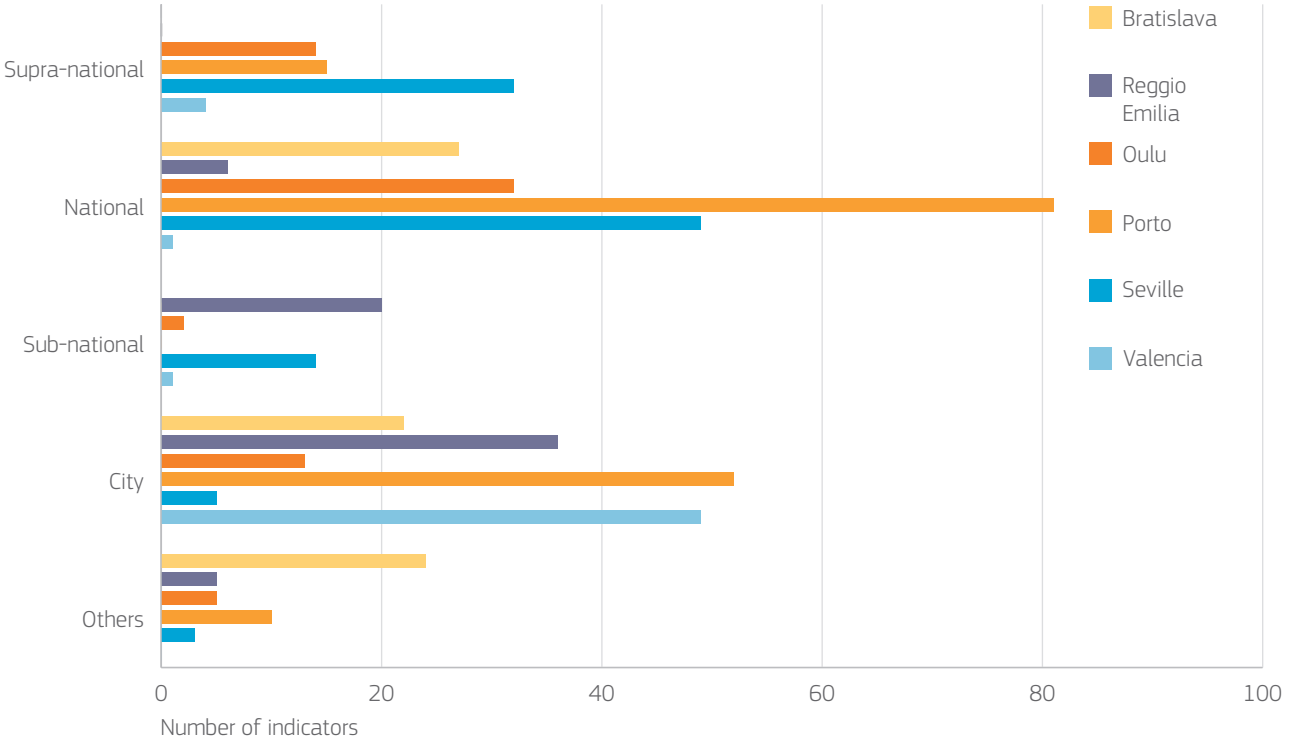
It is worth noting that some cities explicitly chose to prioritise sources at local level (Valencia), while others chose to do the opposite, to maximise comparability across cities (Seville).

**FIGURE 6:** Comparison of pilot cities – Proportion of indicator sources by geographical level




**Source:** Authors' own elaboration

**FIGURE 7:** Comparison of pilot cities – Number of indicator sources by geographical level




**Source:** Authors' own elaboration

The wide variety of indicator availability observed across the six pilot cities can be explained by factors such as the various choices in the balance between local, national and supra-national indicators, the availability of easily accessible and usable data sources, the relevance for the local context, the focus on specific sectoral strategies (such as in the case of Reggio Emilia), and the overall number of indicators identified. These specificities are further detailed in the chapters dedicated to each city.

*The aim of the strategic planning is to identify challenges based on data and empirical evidence, engaging with the key stakeholders and reaching consensus on the development and investment priorities that will be accompanied by the set-up of indicators to measure progress. SDGs are not just a theoretical concept: they are embedded in the design of public spaces that are welcoming, inclusive, and green.*

**Petra Dzurovčinová**
**Chief Innovation Officer, City of Bratislava**

# 2. BRATISLAVA, SLOVAKIA

## 2.1 The city of Bratislava: plans for the future

Author:

*Andrej Irving*

*International expert, Slovakia*

As the capital city of Slovakia, Bratislava naturally faces various challenges. On the one hand, Bratislava seems to perform well considering its high share of the Gross Domestic Product (GDP) or high Gross Value Added (GVA) per employee. On the other hand, an aging population is limiting economic performance. Moreover, a dynamic economic climate does not benefit people at risk of income poverty, not a negligible part of the population, especially nowadays. Additionally, the high cost of living in the city centre is forcing residents to relocate to the surrounding suburbs and villages. This suburbanisation puts pressure primarily on the city's transport infrastructure but also on the provision of social services.

In this context, Bratislava seeks to become a resilient and technologically developed city, able to improve the lives of its residents, to build a healthy and sustainable environment, and develop new economic opportunities. Historically the city has been a magnet for students, researchers and high-skilled workers across the country, but with growing competition from neighbouring countries and the EU in general, this attraction is disappearing. Together with the quintuple helix partners and stakeholders (public authorities, industry, academia, the public, and natural environment), Bratislava aims to become an even more attractive, resilient and prosperous city, implementing a range of initiatives including planting 10 000 trees or improving public spaces with small targeted measures. Through extensive collaborations, Bratislava aims to improve its performance in several areas, including mobility, adaptation to climate change, social affairs and economic development. Since April 2021, Bratislava has been involved in a project under the URBACT programme called Global Goals for Cities, which has created a network of 19 EU cities aimed at developing an integrated action plan. The final product is to be delivered in December 2022. The first Bratislava SDG – Voluntary Local Review will provide a starting point for a holistic approach, with relevant and sound indicators to support it.

Bratislava is considered the economic, political, educational and social hub of the country. The municipality is divided into 5 districts and 17 boroughs, and is currently home to 437 000 inhabitants with permanent residency. However, it has been estimated that an additional 200 000 people live in Bratislava without permanent residency[16]. Bratislava is also home to a high proportion of national research institutions and universities – the Slovak Academy of Sciences, the Slovak Technical University, the Comenius University, the University of Economics, the Academy of Performing Arts, the Academy of Fine Arts and Design - along with smaller private universities, colleges and research institutes. A total of 40% (53 000) of students in Slovakia studied in Bratislava in 2018.[17]

16 Programme of economic and social development (2010-2020), Bratislava

17 *https://www.cvtisr.sk*

## 2.2 Methodology

### *Selection of indicators*

The method and example indicators proposed in the *European Handbook* for SDGs Voluntary Local Reviews (Siragusa et al. 2020) have been used as the basis for the selection of indicators to be included in this assessment. A list of additional potential indicators was created, considering those relevant for the context of Bratislava. Some of the indicators included in the final list also reflect the city's goals, as set out in its strategic documents such as:

- Programme of economic and social development (2010-2020), an analysis and evaluation of the level of development of the Bratislavan territory. The aim of the programme is to establish sustainable economic, social, and territorial development. All SDGs are relevant to this document for analytical purposes.
- Innovation Strategy of Bratislava, the strategic document that sets out a vision for innovation in the city for the long-term, establishing quintuple helix collaboration with the private, academic, and public sectors.[18]
- Humans of Bratislava, a descriptive analysis of people who live or work in Bratislava and their demographics.

### *Methodology of data collection*

Due to the pandemic and the difficulties encountered in physically accessing offices and departments, data collection focused on sources available online. These include:

1. Bratislava Open Data Portal (ODP)[19];
2. city budget;
3. key web search engines;
4. potential data owners identified from among government institutions.

### *Limitations of the data collection*

Not all the indicators defined in the *European Handbook* are available and accessible for Bratislava. Several did not meet the necessary standards to be included, for one or more of the following reasons:

- The quality of data was insufficient to calculate the indicators.
- Data were not publicly accessible, or at least not on the identified platforms.
- The data necessary for the analysis of indicators have never been collected, not only at local level but also at national level. Such data collection should be performed in the future, in collaboration with relevant sub national or national institutions.

18 To do so, the city needs a notion of the current state of these sectors and thus discusses issues related to goals 13, 8, 11 and 4. Since this innovation model also focuses on social and environmental impact, Goals 2, 3, 13, 14 and 15 are relevant for this document.

19 Managed by the municipality of Bratislava, the ODP is a tool that provides free access to city data to its residents, but also to companies for commercial or non-commercial use. *https://opendata.bratislava.sk/en/page/data*

- In specific cases, such as budgeting data, data were available only in PDF format. This makes the data extraction and gathering almost impossible, because it involves a vast number of documents from which data must be extracted manually.
- Lastly, data are collected only at regional level (NUTS level 2 or level 3) and thus not suitable for the purpose of proper VLR.

## *Reporting indicators and data to the city*

Figure 8 illustrates the elements contained in the report prepared for the city of Bratislava per indicator. A short text and a synthetic table illustrate the key characteristics of the indicators. The table includes the data source (and the link in footnote), the disaggregation, the alignment with the *European Handbook*, the value for the last available year, the reference year, the unit of measurement and the frequency. Where possible, as in the example (Figure 8), a chart illustrates the values, also disaggregated by district, age, class, etc.

**FIGURE 8:** Bratislava – Example of the presentation of the indicators

SHORT TEXT →

**Indicator 4.1: Children 0-4 in day-care or school**

The indicator measures the number of children aged 0-4 who participate in early childhood education (day care or school) (Siragusa et al. 2020). In 2019, 8 488 children were in day care/school in Bratislava. When the absolute number of children is divided by the number of citizens in the given districts, the share of children in day care/school is stable. This indicates that the number of children in day care/school is growing along with the total number of people living in the given district (Figure 4.4.1).

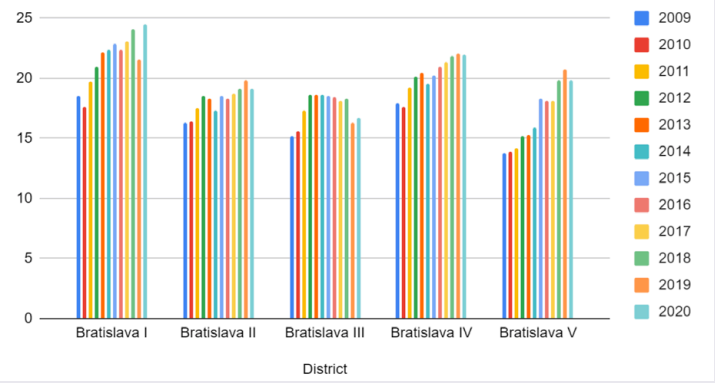
SUMMARY TABLE →

**Table 4.4.1: Number of children 0-4 in day care or school**

| **Date** | **Slovak centre of scientific and technical information** | | | | |
|---|---|---|---|---|---|
| **Disaggregation** | Districts, age, gender | | **Alignment** | *European Handbook* | |
| **Bratislava** | 8 848 | | | | |
| **Reference year** | 2020 | **Units** | Absolute value | **Frequency** | year |

CHARTS WITH MOST RECENT DATA →

**Figure 4.4.1 Number of children 0-4 in day-care per 1000 citizens in districts for years 2009 to 2020 (in permille)**




Source: Slovak centre of scientific and technical information and Statistical Office of SR.

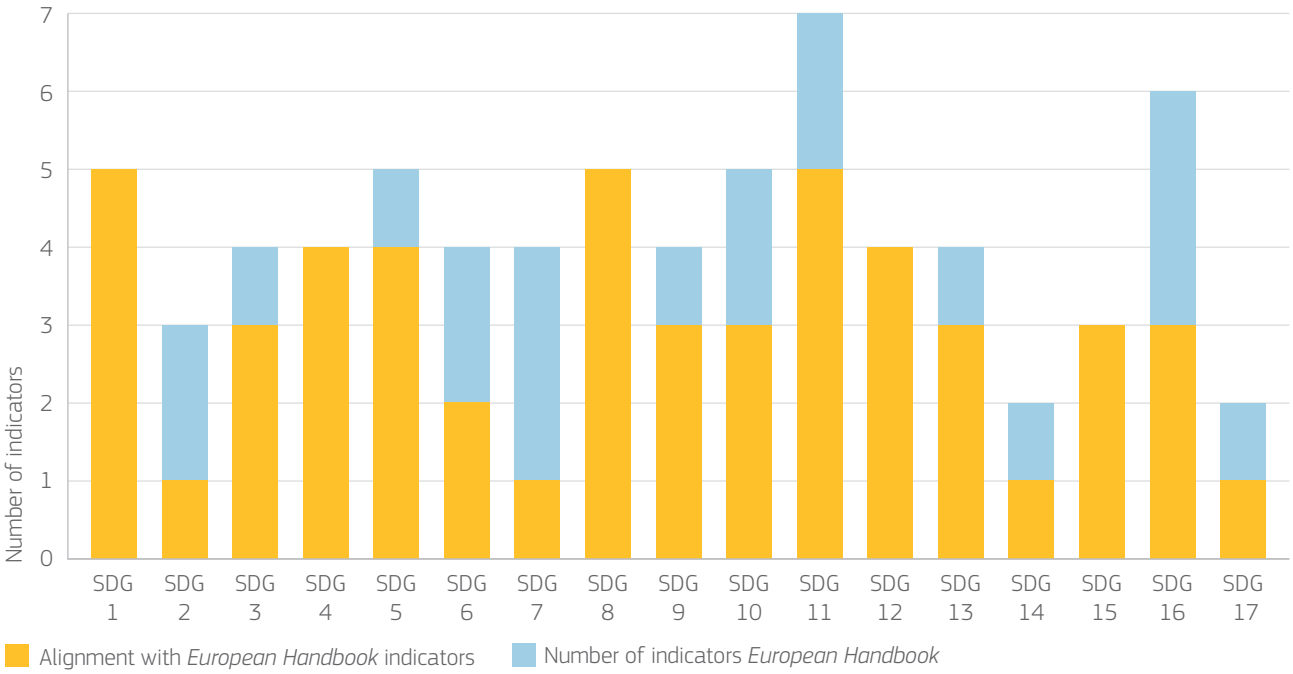
**Source:** Author's own elaboration

## 2.3 Availability of SDG indicators in Bratislava

### *Matching Indicators*

A total of 73 indicators were been identified and collected to monitor the SDGs in Bratislava. Out of the 73 indicators, 51 match those proposed as examples in the *European Handbook*. For Goals 1 and 8, all five indicators proposed in the *European Handbook* are available. For SDG 7 only one of the four indicators proposed in the *European Handbook* is available (see Figure 9).

**FIGURE 9:** Bratislava – Alignment with *European Handbook* indicators

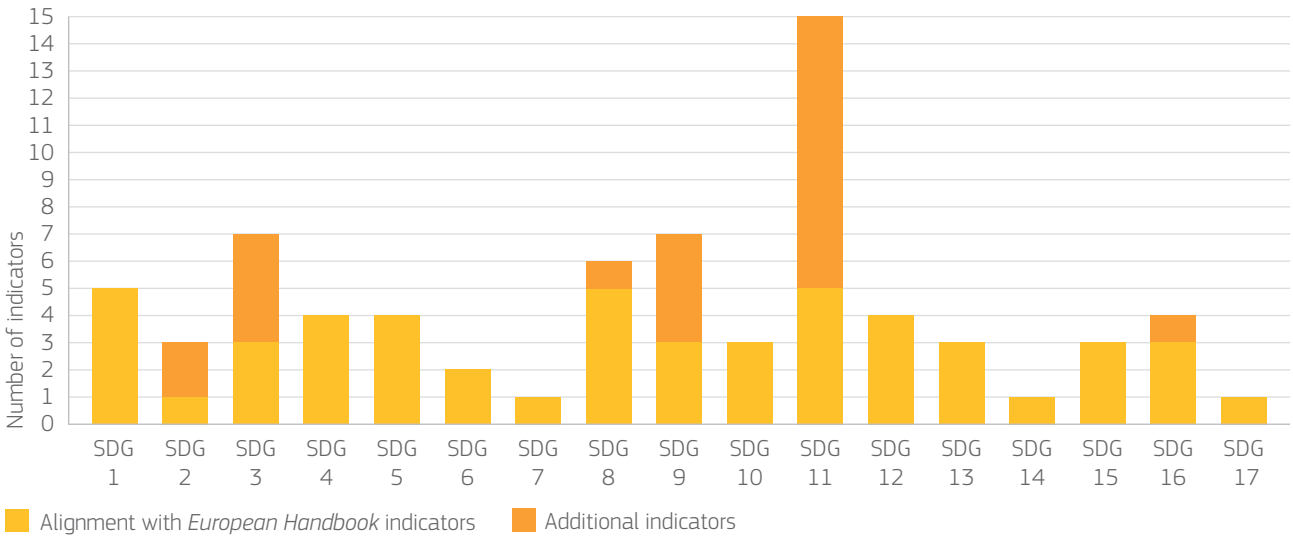



**Source:** Author's own elaboration

### *Total number of indicators by SDG*

Figure 10 shows the number of indicators proposed in the *European Handbook* and available for Bratislava, for each SDG. In addition, the figure provides an overview of the additional indicators. All SDGs are covered by the available data. Moreover, for some goals such as SDG 3, 9 and 11, a significaxnt number of local additional indicators have been identified. In particular, for SDG 11 several additional indicators on cultural activities are available.

**FIGURE 10:** Bratislava – Overview of indicator coverage and additional indicators by SDG

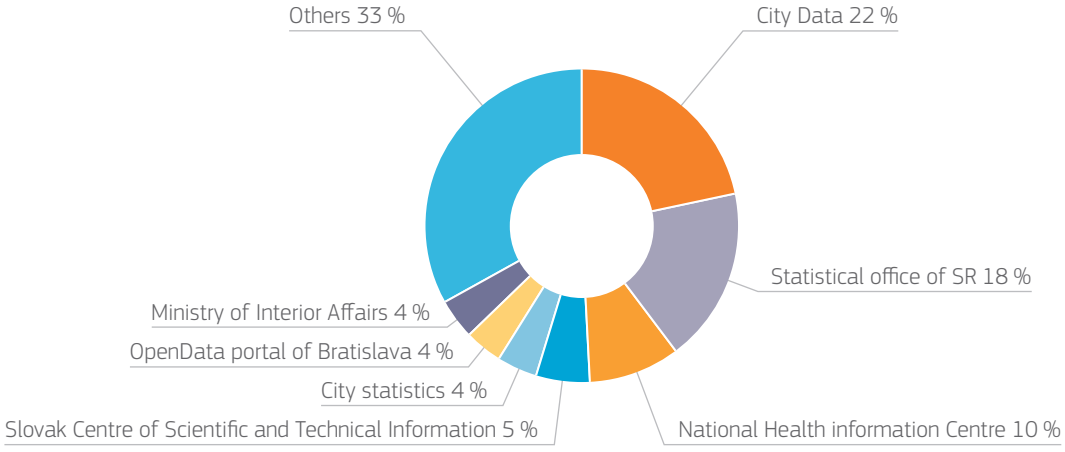



**Source:** Author's own elaboration

## *Sources and geographical coverage*

Most of the SDG indicators identified for Bratislava are collected annually (some monthly). Two indicators, *Perception about the local labour market* and *Voter turnout in municipal elections,* are updated every four years, due to their nature. For instance, the former is collected via a survey commissioned by DG REGIO and EUROSTAT (Eurobarometer); the latter is aligned with the municipal elections. Out of the 73 indicators, 62 are official and 11 experimental. The majority are available at municipal (LAU) level, only three at regional (NUTS 3) level. Out of the 73 proposed indicators for Bratislava, only six are not available at city or lower level. These are: three indicators for SDG 9 extracted from the OECD database that provides indicators per region (NUTS 3) and metropolitan area; two indicators for SDG 2 *Number of overweight people aged 0-26 and Number of patients aged 0-26 with diabetes mellitus,* collected by the National Health information centre also at NUTS 3 level; and the indicator *Land abandonment.*

**FIGURE 11:** Bratislava – Sources of the indicators




**Source:** Author's own elaboration

## 2.4 Key findings

### *Availability on open data platforms*

As mentioned in the methodology, in the case of Bratislava several sources can be used to extract meaningful indicators for measuring the SDGs. More specifically, the following sources provide a picture of the potential statistical capacity of the city, beyond the use of traditional sources:

1. The **Open Data Portal (ODP)** was initially expected to be the main source of data for SDG indicators but, unfortunately, it proved unsuitable for the purpose. While the portal provides access to more than 800 datasets on various topics, only a small proportion of these relate to SDGs and their indicators as defined in the *European Handbook*.
2. **City budget:** the data are not published on ODP and are only available in PDF format, requiring transformation into a proper database. Due to the time-consuming nature of data transformation, indicators are processed only for the interval 2016 - 2019.
3. **Key web search engines:** This approach was found to be the most efficient, since it allows the identification of potential data owners and third parties which pool data from official sources. Third party sources were preferred to national government sources, as they often provide Application Programming Interface (API[20]) access to the data and consequently, are easier to access.
4. **Potential data owners identified among government institutions:** their respective online platforms, or platforms of their affiliated institutions, were explored. As the granularity of available data was often not sufficient for data analysis, the relevant institutions were contacted with a request to localise the data. However, this approach was time-consuming and, therefore, not appropriate given the goal to automate data collection in predefined formats with a municipal level of disaggregation.

### *Some reflections on the automation of data collection*

While collecting the data necessary for the local analysis of the SDGs, it was found that a significant part of the process could be automated. Setting up automated data collection could allow a simpler and more time-efficient analysis of the indicators in the future.

However, some limitations and possible recommendations came to light:

- **Availability of some indicators at various geographical levels.** This might prevent an exact analysis of these indicators. For Bratislava, data at LAU 1 level are ideal for SDG monitoring; therefore, for this analysis requests have been made to the relevant data owners for data at that specific territorial level. However, this process is time-consuming. In the future, the city could establish a collaboration agreement with the relevant national institutions and discuss data collection focussing on the municipality of Bratislava, and not only on the region.
- **Data owners provide data in various formats.** The standardisation of formats is a time-consuming process. When establishing collaboration with relevant in-

20 API is an interface that defines interactions between multiple software applications. It defines the kinds of calls or requests that can be made, how to make them, the data formats that should be used, the conventions to follow, etc.

stitutions and data owners, predefined dataset formats should be agreed. These include static table structures and data file formats, together with precise descriptions and the naming of the datasets. This would also decrease the risk of human error resulting from the manipulation of data input.

Thus, this analysis identified five types of datasets whose collection needs to be reviewed and possibly automated in the future:

**(a) Datasets which provide API but with difficult access to more specific data**

In some cases, a bad quality API causes more problems than a simple but well executed CSV file.[21] Some registries offer the option to extract data using the API, but lack filtering possibilities. This requires the downloading of large volumes of data for filtering on a local machine, a time-consuming process. This was the case of the indicators *Start-ups over 1 000 inhabitants and Cultural Creative Cities index – C3 index.*

**(b) Datasets with web-published data files (csv, json, xml, etc.)**

When detailed and correctly prepared data files might potentially be very useful to perform data analysis, although some difficulties may emerge even with datasets with web-published data files (csv, json, xml, etc.). Data structure or granularity need to be maintained over time to avoid repeating the coding needed for automated data extraction. Some examples of this type are *Deaths in road accidents, Unemployment rate, Children 0-4 in day care or school.*

**(c) Datasets with data published in a table/graph**

The tabular format is one of the most common. For successful automation, it is important to ensure that the format of the table and its web location do not change over time. Regarding data published solely in the form of graphs, it would be difficult to automate data extraction from this kind of source. Examples of indicators are *Greenhouse gas emissions, Urban flood risk, Pollutants released from industrial facilities.*

**(d) Unpublished datasets**

When some indicators are not publicly available and easily accessible, potential data owners need to be identified. If the datasets are not collected by the city, a new collaboration needs to be established with the corresponding data owner. In the case of the city's internal data, there should be a usable and accessible system, which will collect and centralise all data generated by the city institutions (this would lead to the elimination of manual data collection). This was the case for indicators such as: *Built-up area per capita, Experimental Number of passengers transported by public transport, Population without green urban areas in their neighbourhood, Soup kitchens for people who cannot afford food,* etc.

**(e) Automation-ready datasets**

These datasets provided an easy-to-use API, with the possibility of collecting all the required data. Only datasets provided by the Statistical Office of the Republic of Slovakia, or published in the OpenData portal, could be considered automation-ready. The only issue with these datasets was the update frequency, in particular for the OpenData portal (some datasets were not updated for 3 years). Examples of this type

21 A comma-separated values (CSV) file is a delimited text file that uses a comma to separate values.

of dataset are those involving the indicators *Accidents at work, GDP per capita, Local recycling rates.*

In general, automation will require complex programming knowledge for its development, implementation, and maintenance. The complexity of the automation solution will depend on user expectations, knowledge and the way the solution is to be used. Technical requirements, such as the use of the server versus local computers, or graphical user interface versus script execution, need to be determined and agreed on by the city.

A good starting point for Bratislava would be to make use of the city's ODP, where the system can be set up to allow dataset download without any interference to the code and relatively little output from the users. However, since data need to be transferred and loaded into the ODP, the issue of data formats described above needs to be solved first.

Thus, general rules and standards should be established for national, EU and municipality data collection, with regard to:

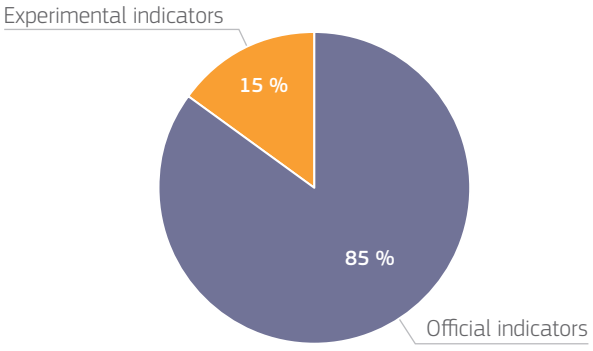
- data aggregation levels (inconsistencies in NUTS vs. LAU levels over time);
- data formats;
- data access (structured files, APIs);
- description of the datasets.

## 2.5 Additional and experimental indicators

Out of the 73 indicators identified for Bratislava, 22 are in addition to those proposed in the *European Handbook.* 14 come from official sources, for example: *Number of overweight people aged 0-26, Number of suicide attempts,* or *Budget for community foundations and funded projects.* 8 out of 14 of the additional indicators are also experimental:

- SDG 3: Number of patients with mood disorders and Respiratory diseases linked to air pollution;
- SDG 9: Entrepreneurial Satisfaction Index – ESI (illustrated below) and Sustainability of entrepreneurship by gender;
- SDG 11: Digital literacy, Free time centres and events, Number of free time centres and Number of free time events.

**FIGURE 12:** Bratislava – Indicators by type




**Source:** Author's own elaboration

## *Entrepreneurial Satisfaction Index - ESI*

Bratislava recognises entrepreneurship as the key driver towards economic growth and societal prosperity, as well as having the ability to adapt to climate change through innovative solutions.

The Global Entrepreneurship Monitor – GEM[22] is one the most extensive academic studies on entrepreneurship around the world. GEM is organised by an international consortium that co-operates with national teams based at local universities. In Bratislava, the partner university is the Comenius University. GEM has standardised the process of data collection, consisting of the representative telephone survey – Adult Population Survey – APS and the National Expert Survey – NES. The NES looks at the broader ecosystem and conditions, including the rule of law towards business creation and growth. As part of the data collection and monitoring, the GEM offers an overall Entrepreneurial Satisfaction Index (ESI), which covers: the quality of infrastructure, networking, leadership, access to finance, talent acquisition, support services, governance, entrepreneurship culture and demand. Each part of the index contains various indicators covered in Goals 8 and 9. As part of the research, the city received statistics (dis-aggregated by age and gender) on entrepreneurs, either starting up or established. This is connected to Goals 5, 8 and 10.

The ESI index maps the entrepreneurial ecosystem in Bratislava through sub-indices, organised in (i) strong factors: physical infrastructure (mostly telco, but not transport), entrepreneurship culture, networking, and demand; (ii) neutral factors: knowledge, access to talent (they feel a lack of high-skilled labour), financing; and (III) weak factors: support services, governance and policy, and leadership. The ESI in 2019 was 5.61 – average score with positive inclinations.

Together with a private partner, the city has conducted an anonymous survey asking about entrepreneurs' needs, preferences, goals and the impact of the COVID-19 crisis. By ensuring the representation of various groups, the city received an overview of the needs and plans of the business ecosystem over the next ten years.

**TABLE 4:** ESI index

| **Data Source** | **Global Entrepreneurship Monitor (GEM)** | | | | |
|---|---|---|---|---|---|
| **Disaggregation** | City | | **Alignment** | Experimental | |
| **Bratislava** | 5.61 | | | | |
| **Reference year** | 2019 | **Unit of measurement** | ESI index | **Frequency** | - |

**Source:** Author's own elaboration

22 *https://www.gemconsortium.org*

*We are looking for a systemic approach where SDGs and Voluntary Local Review could become a permanent, automised tool for leading with knowledge in the City of Oulu.*

**Anne Rännäli-Kontturi**
**International Affairs Manager, City of Oulu**

# 3. OULU, FINLAND

Author:

*Suvi Monni*

*with Emma Liljestrom*

*Benviroc Oy*

## 3.1 Oulu's engagement with SDGs

As a Member State of the European Union, Finland strives to consistently support the implementation of the 2030 Agenda, with a focus on enhancing the rights of women and girls, as well as on improving democracy and good governance. In 2016 Finland became one of the first countries to present its Voluntary National Review (VNR), to report on its plans to implement the 2030 Agenda SDGs; a second VNR was published in 2020.

Since many of the measures towards achieving the SDGs are taken at local level, cities across the world are taking the lead in the implementation of the SDGs and publishing Voluntary Local Reviews (VLRs). As of February 2021, these include three cities from Finland: Espoo, Helsinki and Turku. The City of Oulu is also considering preparing its first VLR in 2021-2022, but a formal decision was still to be made at the conclusion of this analysis (April 2021).

With over 200 000 inhabitants, Oulu is the most populous city in Northern Finland, and the fifth in the country. The city has recently been selected as European Capital of Culture for 2026, which will very likely accelerate the development of indicators for measuring cultural sustainability.

Oulu's Voluntary Local Review is expected to be concise and to focus on themes most relevant for Oulu, such as children and young people. The city's objective is twofold: to find an approach in which the VLR process would give direct input to the city strategy, as well as to city planning and development activities, and to design the review to be used as dissemination material for Oulu's residents and stakeholders.

The work carried out in the framework of the URBAN2030-II project is aimed at mapping some of the indicators and data already available, facilitating the choice of indicators for the future VLR; the Voluntary Local Review is expected to become a permanent tool for leading with knowledge in the City of Oulu.

## 3.2 Methodology

The starting point for the analysis of Oulu was the list of indicators provided in the *European Handbook* (Siragusa et al. 2020). The procedure used for selecting the indicators for Oulu (either the E*uropean Handbook* indicators, or city-specific indicators), as well as the data sources (*European Handbook,* national, local) is illustrated in Figure 13. In this context, a number of city-specific indicators were identified, to replace or complement those in the *European Handbook.*

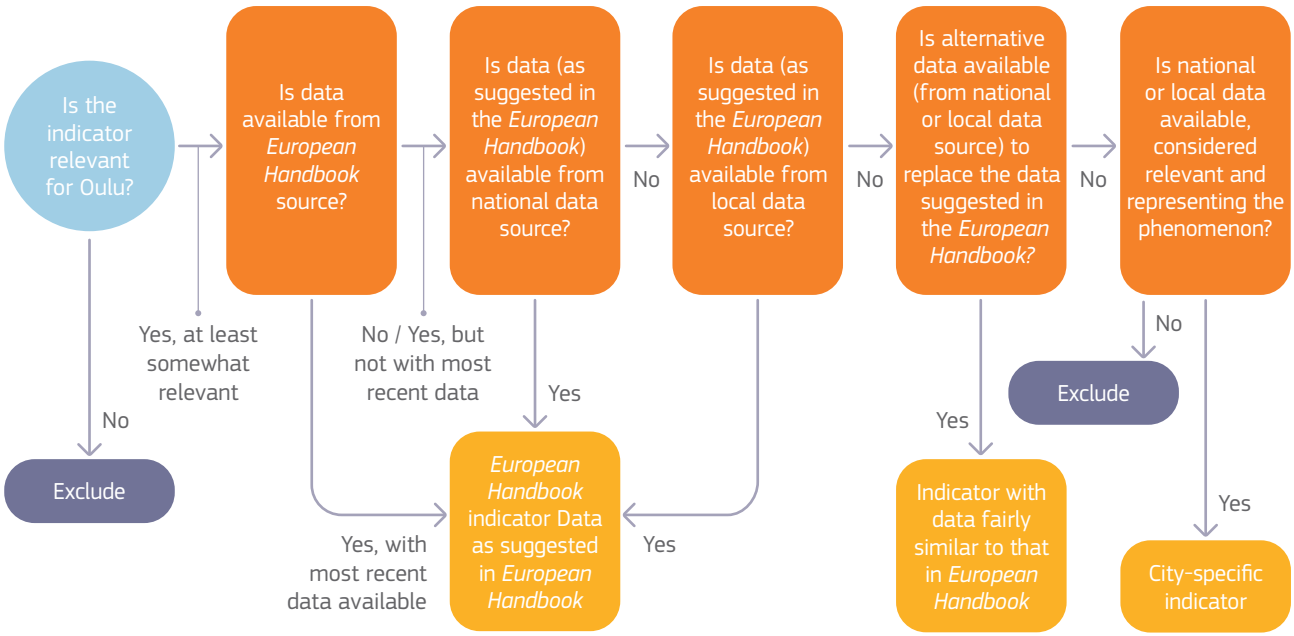
Moreover, the analysis developed suggestions for new potential indicators to be added to the VLR (presented in Annex 2), and identified certain areas that could be better covered by the *European Handbook* (see section 3.5 'Experimental and additional indicators').

National data sources covered by the data search included Statistics Finland, Sotkanet (Statistical information on welfare and health in Finland), Statistical database of Finland's Environmental Administration, Finnish Meteorological Institute, the Housing Finance and Development Centre of Finland, Police, Finnish Workers' Compensation Centre, CO2-raportti (a service that provides information about greenhouse gas emissions in cities) and Finnish Energy Industries. In addition, the *MayorsIndicators*[23] database was used to identify data and potential additional indicators. The data from national data sources are mainly available from open platforms, upon request or were collected from publicly available reports. These data sources include time-series information and also allow comparison of the data across a variety of cities and municipalities[24] in Finland. The data are usually updated annually. For the purposes of this case study, some data from the data sources mentioned above were further elaborated, for example aggregated or expressed as per capita. The data collection was mainly carried out in January 2021, and therefore reflects the latest data available at that point in time.

Local data sources were identified based on the knowledge of the JRC experts from Oulu and were based, for example, on indicators used in the City strategy, the annual Environmental Programme, UNICEF's Child Friendly City Initiative[25] or by Business Oulu[26].

Most local indicators have time-series available and are gathered annually. Many of them were already available for 2020 in January 2021. Similar local indicator data are collected also by other Finnish cities; however, data are not usually collated into a common database except in the case of the common reporting of Finland's six largest cities. Also, some local project-based indicators were used, such as the one on *soup kitchens* (SDG 2).

**FIGURE 13:** Oulu – Methodology for the selection of indicators




**Source:** Author's own elaboration

23 MayorsIndicators (https://mayorsindicators.com) is a tool for monitoring the progress of cities towards SDGs that includes readily available data for about 200 indicators. It covers 1000 cities in Finland, Sweden and the United Kingdom. See Annex 2.

24 There are 309 municipalities in Finland as of 2021, of which 107 are denoted as cities (or towns).

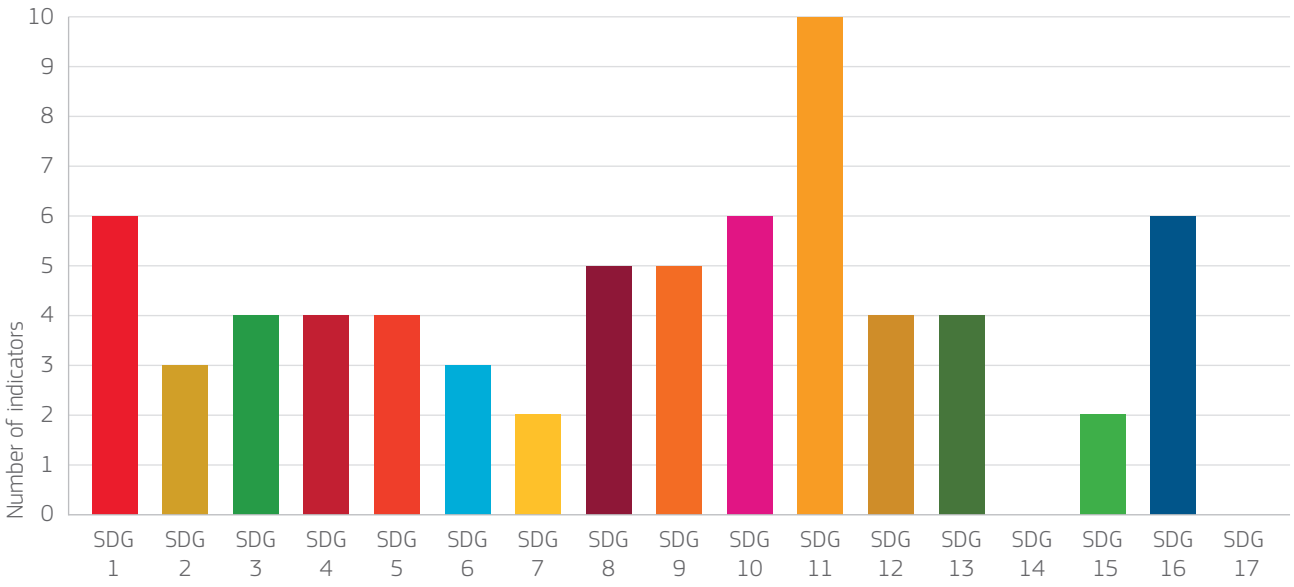
25 *https://childfriendlycities.org*

26 Business Oulu is a public utility of the City of Oulu, responsible for implementing the city's industry and employment policies by promoting activities for employment and business in the region in line with the principles agreed on by the City Board. *https://www.businessoulu.com/en*

## 3.3 Availability of SDG indicators in Oulu

A selection of 66 indicators for the city of Oulu were analysed. The selected indicators are distributed across 15 Goals, as SDG 14 and SDG 17 remained uncovered; SDG 11 is the best covered Goal in terms of quantity (10 indicators), followed by SDGs 1, 10 and 16 (six indicators). Some of the indicators are directly linked to or extracted from official city reports, either the Environmental Programme (10) or the City Strategy (three).

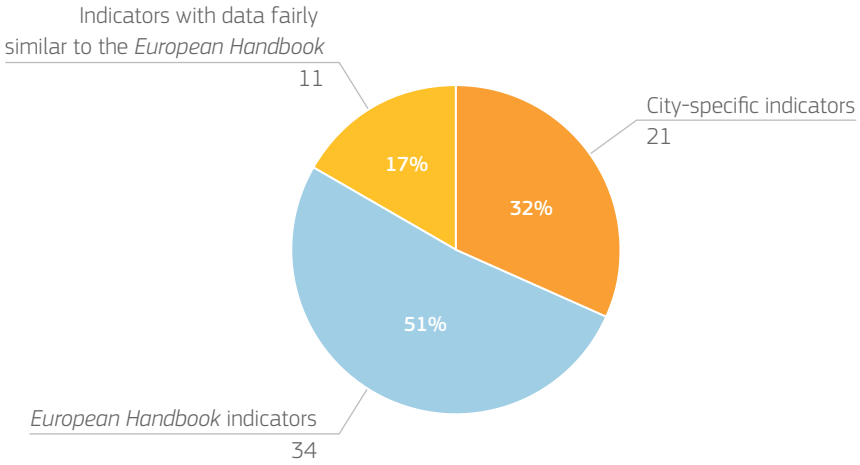
**FIGURE 14:** Oulu – Number of indicators by primary SDG[27]




**Source:** Author's own elaboration

Out of the 66 indicators for the city of Oulu, 45 are aligned or similar to the ones in the *European Handbook,* while 21 are city-specific indicators.

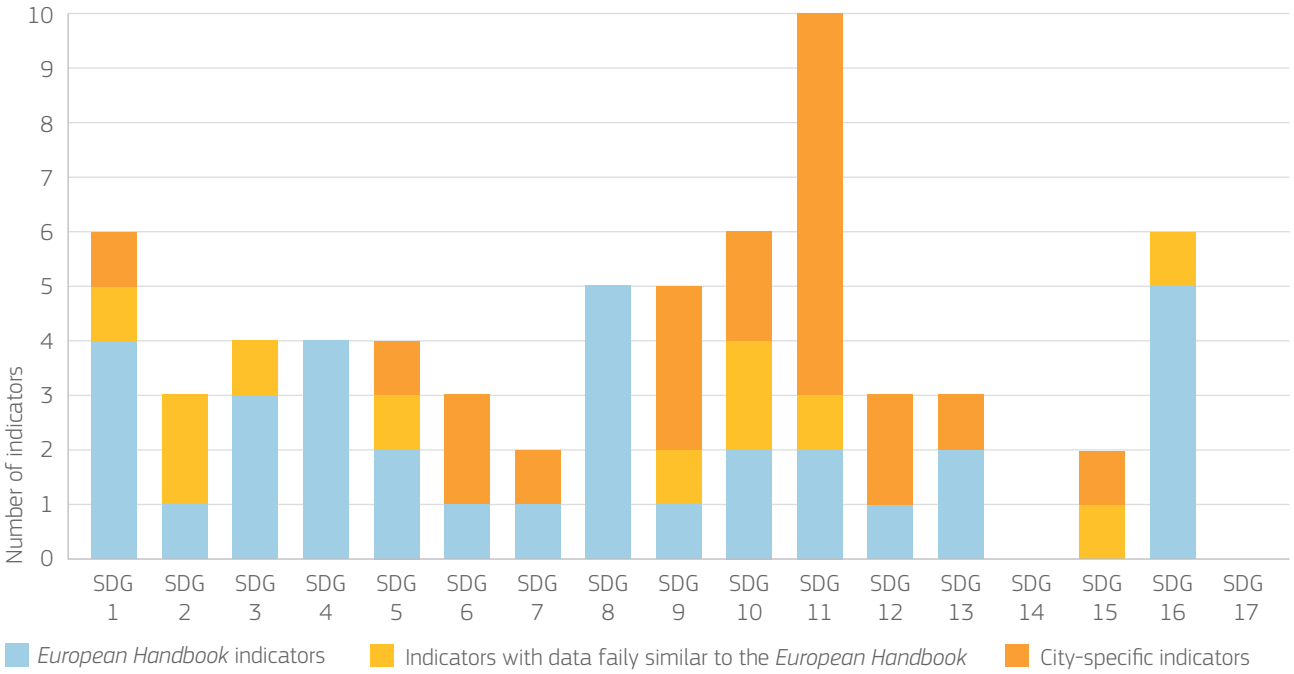
**FIGURE 15:** Oulu – Alignment with *European Handbook* indicators




**Source:** Author's own elaboration

27 In some cases, the same indicator can be used to measure several SDGs due to the interlinkages between the Goals and their targets.

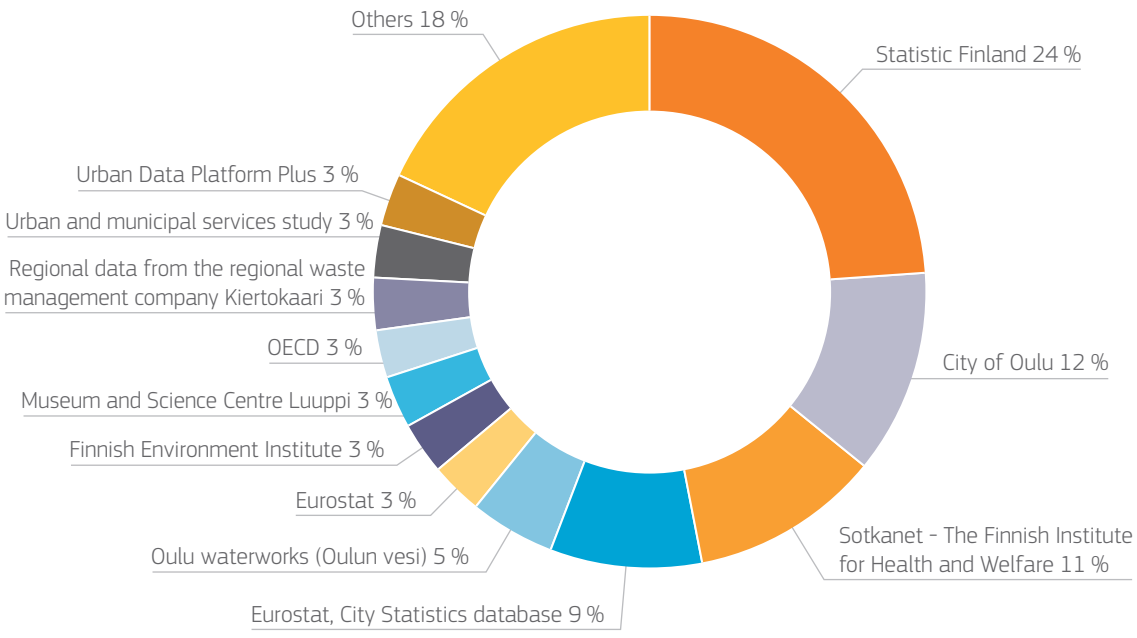
**FIGURE 16:** Oulu – Alignment with *European Handbook* indicators by SDG




**Source:** Author's own elaboration

The largest proportion of the indicators refers to national data sources (48%) such as Statistics Finland, 21% to supra-national sources like EUROSTAT or OECD, and 20% to local data sources such as city and local institutions; finally, 8% are from other sources (private companies or associations). Figure 17 illustrates the data sources more in detail, and the full list is available in Annex 2.

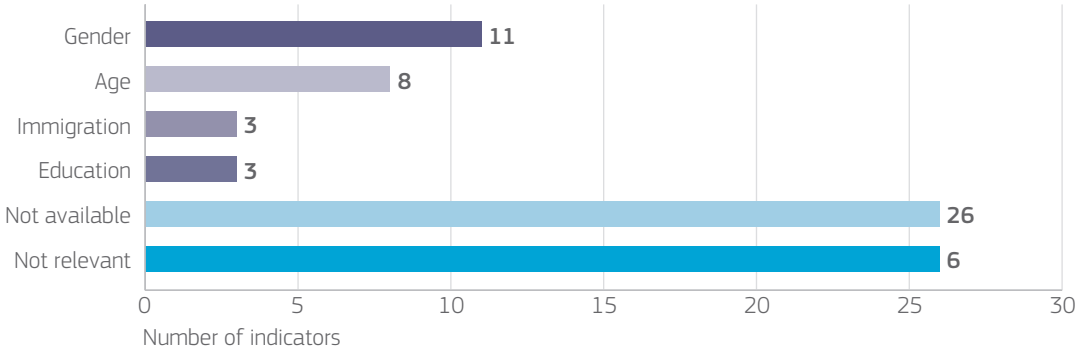
**FIGURE 17:** Oulu – Distribution of data sources




**Source:** Author's own elaboration

It is interesting to highlight that 25 indicators can be disaggregated by education level, immigration status, age or gender (Figure 18).

**FIGURE 18:** Oulu – Number of indicators by disaggregation by population group




**Source:** Author's own elaboration
(*) An indicator may be disaggregated to several groups and therefore the total number is not presented

## 3.4 Key findings

The City of Oulu has not yet made a formal decision regarding the preparation of the VLR, but plans exist for its preparation during 2021-2022. Based on the work conducted for this analysis and on the understanding of Oulu's commitment to sustainable development, the preparation of a VLR is to be recommended. Oulu may wish to consider the potential synergies of the VLR preparation and the forthcoming update of the City strategy following the municipal elections in 2021. The city may also be interested in mapping the current or future strategy and its indicators against SDGs. The selection of Oulu as European Capital of Culture 2026 will most likely accelerate the engagement of the city administration in developing specific data collection for cultural sustainability.

The SDG analysis has shown that a wide variety of indicator data is available for Oulu. It is suggested that Oulu continues its work towards selecting the VLR indicators (assuming that the preparation of the VLR continues to be likely), keeping in mind the relevance of each topic for the city, the data availability, and the comparability of the indicators with those used by its most relevant peer Cities. It is also important that Oulu analyses the most prominent areas for which good quality data are not available, and plans data collection efforts accordingly.

### *Statistical capacity of the City and its stakeholders*

The overall statistical capacity of Oulu is good. A number of indicators have been chosen to monitor the goals set in the City strategy. Data for these indicators are collected by various operators in the city organisation as well as by its stakeholders. Hence, leading with knowledge is an established way of working in the City of Oulu.

The environmental and technical sectors of the City are excellent examples of fields with established data collection and reporting. Data are used, for example, for monitoring the goals set in the City strategy and Environmental Programme. Reporting on environmental indicators has been carried out since 1997; these types of indicators often measure environmental

and ecological sustainability. Moreover, long time series and readily available data are easily useable across the whole city organisation. As a result of long-term cooperation and a culture of open data sharing, data are also available from public utilities and companies, such as Oulu Waterworks, the regional waste management company Kiertokaari and electricity and district heat provider Oulun Energia.

The indicators and data regarding economics and businesses were available through national statistics and Eurostat as well as Business Oulu, a public utility, which is responsible for implementing the city's industry and employment policies by promoting activities for business, employment and business in the region in accordance with the principles agreed on by the City Board. Information regarding the city administration was also readily available, for example regarding participatory budgeting, transparency of administration, or satisfaction of the residents.

In the field of social sustainability (e.g. education, employment, health and well-being), the national statistics and Eurostat include city-specific data which were considered sufficient for the purposes of this study. Oulu is also a member of UNICEF's Child Friendly City Initiative. Many themes of the initiative overlap with the SDGs as well as with the legally binding objectives of the City Council. The indicators used in UNICEF's Child Friendly City Initiative may also be included in the VLR.

The *MayorsIndicators* service, which offers tailor-made solutions for monitoring, comparing and reporting on sustainable development, is widely used in the City of Oulu and all employees of the city have access to the databases and tools offered by the service. The service includes about 200 readily available indicators, which are relevant for Finnish cities. The indicators' data can be compared between various cities and municipalities. The *MayorsIndicators* service was recognised as a highly potential source for indicator data considering the VLR report. Suggestions for potential indicators to be used in the VLR that are readily available in the *MayorsIndicators* service have been provided to the city.

**SOME HIGHLIGHTS**

- 'Leading with knowledge' is an established way of working in the City of Oulu.
- The environmental and technical fields of the City are excellent examples of fields with established data collection and reporting.
- Culture was identified as an area in which further data collection would need to be developed.
- Developing closer collaboration models with other Finnish cities preparing VLRs was identified as an important goal.

Oulu also collaborates in the group of the six largest cities of Finland (Espoo, Helsinki, Oulu, Tampere, Turku, Vantaa) to collect and share data on sustainability indicators. These indicators are also available through the *MayorsIndicators* service.

## *Plans and recommendations to improve the statistical capacity of the City*

Cultural sustainability was recognised as an area in which further data collection would need to be developed; the recent choice of Oulu as European Capital of Culture 2026 will very likely accelerate the development of indicators to measure cultural sustainability.

In order to ensure the continuality of the VLR evaluation and reporting, it would be advantageous to ensure that indicator data are compiled into a digital platform, such as *MayorsIndicators.* This would allow the collected data to be easily used for both the VLR and other reporting obligations of the city.

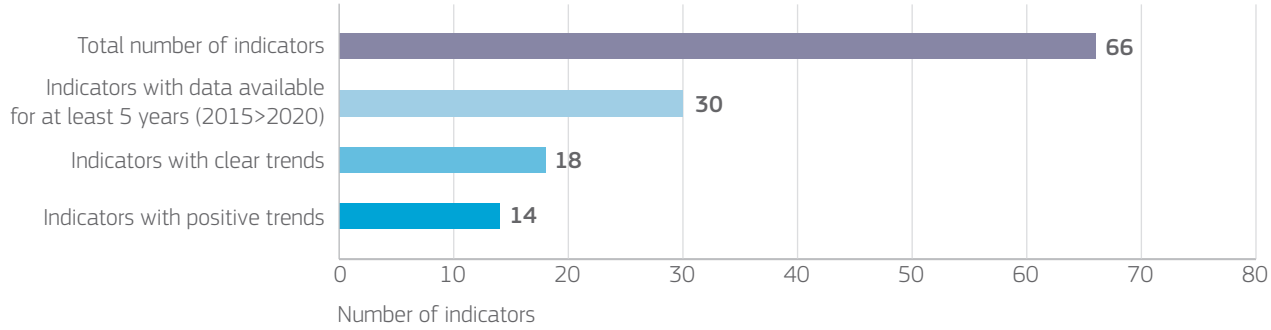
Developing closer collaboration models with other Finnish cities preparing VLRs was identified as an important goal. Choosing common indicators and developing a common data monitoring programme on a digital platform would benefit not only the cities preparing VLRs, but potentially also the preparation of the VNR at national level.

Several projects aimed at a more sustainable future are either ongoing or being planned in Oulu. Examples include the *Carbon Neutral Tourism*[28] and *Carbon Wise*[29] projects, which promote carbon wisdom in companies. Through such projects, interesting experimental indicators could be developed to complement other indicators, in order to provide a broader understanding about the efforts carried out in Oulu towards a more sustainable future. Projects also provide excellent examples of the versatile work carried out in Oulu, and could be highlighted as examples in the VLR report.

## *Brief analysis of trends*

The indicators collected for Oulu included data for a total of 66 individual indicators (see Annex 2), some of which were further disaggregated, for instance by population group, or shown in various metrics (such as absolute value and percent). Because longer time-series are needed to reveal trends in time, the indicators for which data were available for at least five years in 2015-2020 were included in the trend analysis. The number of such indicators was 30. Of these, 18 had clear trends, of which 14 were positive. The indicators which had a positive trend until 2019, and for which the negative development in 2020 could be explained by the impact of COVID-19 pandemic, were classified as indicators with a positive trend.

**FIGURE 19:** Oulu – Time availability coverage and trends for the indicators available




**Source:** Author's own elaboration

**Positive trends** include the following:

- The proportion of non-native students graduating from upper secondary school increased from 2.4% to 3.1% between 2015 and 2019. However, this trend should preferably be considered against the non-native population within a certain age group, because the proportion of the foreign population also increased.
- The gender employment gap narrowed from -3.0% in 2015 to -1.9% in 2019.

28 *https://6aika.fi/en/project/carbon-neutral-tourism-project*
29 *https://6aika.fi/en/project/carbonwise-project*

- Biological oxygen demand (BOD) and phosphorus loads from wastewater treatment vary from year to year but were at lower levels in 2020 when compared to 2015.
- The number of public transport journeys using regional public transport increased by 35 % from 2015 to 2019.
- he number of new companies increased by nearly 40 % from 2015 to 2019.
- The unemployment rate had a steadily decreasing trend from 2015 (17.2 %) to 2019 (11.4 %), but it increased to 14.5 % in 2020, which may be largely explained by the COVID-19 pandemic.
- Similarly, the number of unemployed people with disabilities had a decreasing trend until 2019. The increase in the unemployment of people with disabilities was smaller between 2019 and 2020 than the increase in the total unemployment rate.
- The population with migrant backgrounds increased by 23 % from 2015 to 2019.
- Annual average $NO_2$ concentrations have decreased since 2018, being 38 % lower in 2020 than in 2015. However, the potential impact of COVID-19 on the emissions from transportation has not been analysed.
- The total number of visitors in museums as well as the number of visitors under the age of 18 years increased by nearly 50 % from 2015 to 2019. In 2020 the numbers decreased, largely because of the closure of museums due to COVID-19.
- The annual turnover of companies in the creative sector, measured in euros, increased by 50 % from 2015 to 2019.
- The amount of biowaste collected separately per capita increased by 11 % from 2015 to 2019.
- The number of creative sector employees has increased in the past years. However, the number for 2020 was not yet available and it should be noted that COVID-19 might have an impact on this indicator.

**Negative trends** include the following:

- The share of households receiving housing allowance increased from 13 % in 2015 to 21 % in 2019, which is a negative development considering that more people are in need of this allowance.
- Drinking water consumption has continuously increased (6 % from 2015 to 2020). When considered per capita, the increase is less prominent.
- Energy consumption per capita varies annually depending for example on the weather (heating needs), but has a generally increasing trend (7 % increase between 2015 and 2019).
- The number of international congresses organised has decreased annually since 2016.

## 3.5 Additional and experimental indicators

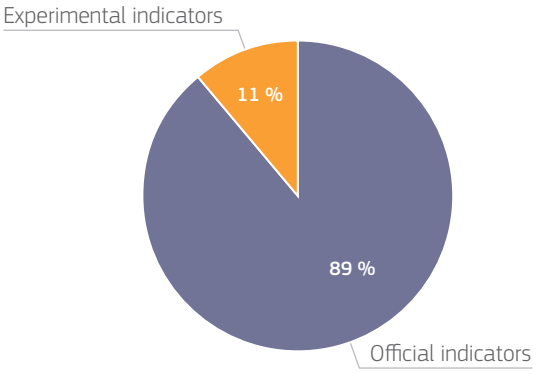
Nearly all of the *European Handbook* indicators were considered at least somewhat relevant for Oulu. While acknowledging the lack of city-specific data to measure many of the targets under the SDGs, some targets were identified, for which local data are available at least for Finnish municipalities, but which were not covered by the Handbook. Examples include:

- SDG 3: substance abuse, non-communicable diseases, well-being;
- SDG 5: shared responsibility within the household;
- SDG 7: renewable energy modes other than solar, e.g. wind;

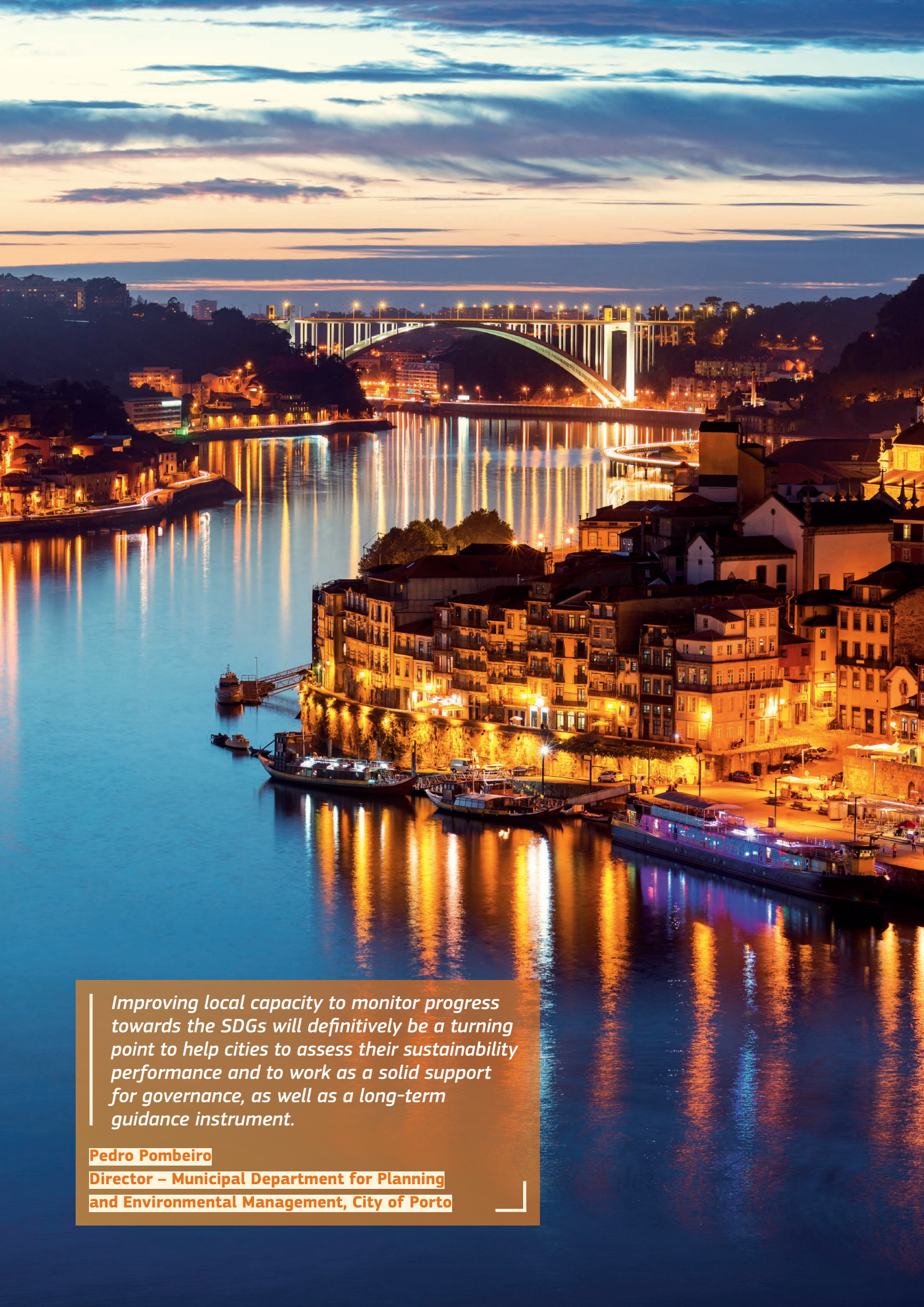
- SDG 9: research and development, access to information and communications technology;
- SDG 15: protected areas, in particular forests;
- SDG 16: corruption;
- SDG 17: cooperation in sustainability (within cities, between cities and various stakeholder groups).

Several of the data sources suggested in the *European Handbook* included data for Oulu and several other European cities, but coverage of the cities in Finland was limited. In some cases, a similar (but not the same) national indicator, for which data were available for comparison for nearly all municipalities in Finland, was considered more relevant.

**FIGURE 20:** Oulu – Indicators identified by type




**Source:** Author's own elaboration



*Improving local capacity to monitor progress towards the SDGs will definitively be a turning point to help cities to assess their sustainability performance and to work as a solid support for governance, as well as a long-term guidance instrument.*

**Pedro Pombeiro**
**Director – Municipal Department for Planning and Environmental Management, City of Porto**

# 4. PORTO, PORTUGAL

## 4.1 Transformation measures in Porto and the SDGs

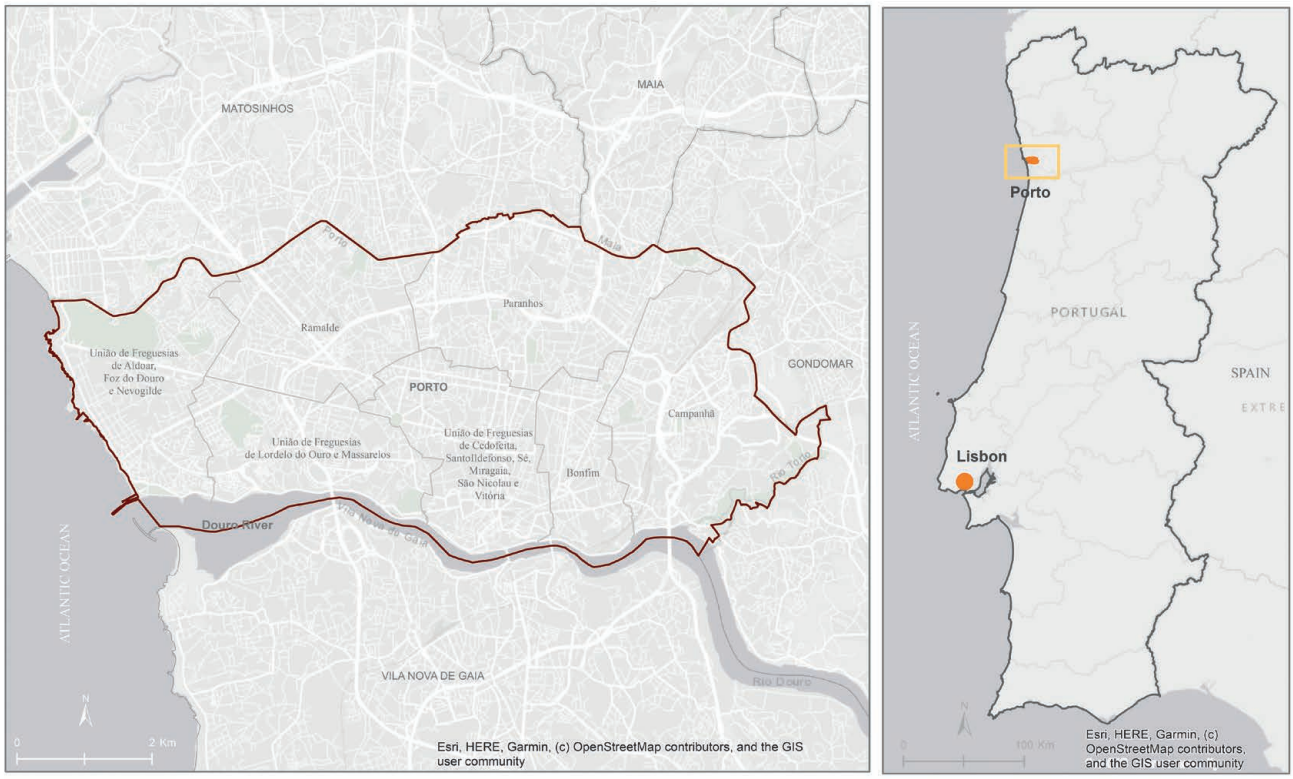
Author:

*Maria Oliveira Pacheco*

*University of Porto, Portugal*

The city of Porto, located in the northwest of Portugal and bordered to the west by the Atlantic Ocean, is home to 216 606 inhabitants (Statistics Portugal 2020). It represents one of Portugal's main urban centres, with a total area of 4.42 km$^2$ (Figure 21). Porto is one of the 17 municipalities of the Metropolitan Area of Porto (MAP) (AMP Portal 2021), where it plays a prominent role; with approximately 1.7 million inhabitants. The MAP is the second most populated area of Portugal and the structural core of the Northern region.

**FIGURE 21:** Porto – Location map of the city




**Source:** Author's own elaboration

Porto is one of the oldest cities in Portugal, and received its first UNESCO World Heritage Award in 1996 (Comissão Nacional da Unesco 2021), for the preservation and valorisation of its cultural heritage and of the city's history. Taking advantage of its geographical position, Porto was selected as the Best Destination in Europe in the '*World Travel Awards*' (Turismo de Portugal 2020), and has seen a growing number of visitors arriving in the city in recent years.

Together with the focus on local identity, Porto has supported the development of sectors such as research, entrepreneurship and innovation. The city influences neighbouring municipalities and attracts people from the surrounding areas, for both work and leisure. The wide range of services and job offers makes it an important economic centre, where industry is increasingly focussed on innovation. Porto is committed to become more innovative and resilient, keeping up with other Portuguese and European cities by supporting new innovative businesses and promoting spaces where ideas can be shared. The city has created an innovation ecosystem through the *'Porto Innovation Hub'* project, receiving the *'Smart City Innovator Award'* in 2020.

However, certain social, economic and environmental challenges have still to be overcome. While Porto is a welcoming city for visitors, the high costs of housing represent a challenge for the resident population, and the difficulties in accessing housing tend to increase at the same time as the city's international prominence as an attractive destination.

Another challenge is linked to the new and growing patterns of mobility, with a large population commuting to the city every day. Porto is developing solutions that favour soft mobility, improving the supply and quality of public transport and promoting intermodal mobility. The objective is to influence the population's mobility behaviour and significantly reduce greenhouse gas emissions. The city committed to these objectives on signing the Covenant of Mayors for Climate and Energy in 2015. Furthermore, they voluntarily raised the target for cutting carbon dioxide emissions by 50% by 2030[30], and for reducing GHG emissions by 60% by 2030 compared to 2004 levels.

From a social perspective, the ageing population is one of the major challenges for Porto; the city is expected to offer access to housing and to health care, as well as means for combating loneliness for elderly inhabitants.

Finally, the Municipality identified the need to build a city that, in addition to being attractive to people, is also able to attract activities with high added-value, while ensuring the protection of its cultural, commercial and natural heritage; to this end, the University has played a significant role with the creation of research centres.

### SOME HIGHLIGHTS

- Following this analysis, Porto is expected to launch a VLR in 2021.
- City departments were given the opportunity to suggest local indicators.
- Municipal data sources were prioritised, to ensure continuity in monitoring and consistency in the methodology for data collection.
- Special focus was given to city projects and local transformative actions.
- This assessment made by the city of Porto might be useful for other Portuguese cities for carrying out their own monitoring effort.

In forthcoming years, it will be important for Porto to maintain competitiveness at the national, European and international level by sustaining the pace of economic and social growth, and adopting sustainable development measures that work in harmony with the challenges identified.

## 4.2 Methodology

The analysis procedure followed the recommendations of the *European Handbook for SDGs Voluntary Local Reviews* (Siragusa et al. 2020) published by the JRC, and identified indicators that reflect the performance of the city of Porto in terms of SDG compliance.

30 Compared to 2004 levels, the city has already cut emissions by 36.2% following the implementation of a range of measures.

The proposed set of indicators uses three different types of sources: (1) official international sources; (2) official national sources; (3) local experimental sources.

In the process for identifying the indicators, priority was given to the 71 indicators proposed by the *European Handbook,* and their relevance in relation to the city context was analysed. In addition, a number of indicators were extracted from official city reports.

The selection of further additional indicators required an in-depth reflection in order to combine several factors in a balanced way, as they were intended to reflect:

- the challenges of the municipality, identified by the city plan (Municipality of Porto 2020b);
- the strengths of the city, compared to national and European contexts;
- the city's efforts to meet the targets set for each SDG;
- the indicators that are or will be monitored by the municipality itself;
- the indicators that were also included in other city reports (VLRs), allowing comparison of the indicators;
- time coverage and comparability over time (i.e., putting together a set of indicators that would allow trends to be calculated over time).

This exercise was conducted for all SDGs. As soon as the proposed set of indicators was completed, it was shared with all city departments, who were asked to suggest additional complementary indicators to those already identified in the previous steps. The purpose was twofold: to give an opportunity to the various city departments to propose local experimental indicators, which are part of the monitoring network and are relevant to the analysis; and to prioritise data collected by the city. In fact, whenever possible, attempts were made to obtain these data from the Municipality of Porto, as a way of ensuring that the city is able to continue monitoring the indicators using the same data-collection methodology. When this was not possible, the data were collected from the source indicated in the *European Handbook,* if available; otherwise, they were collected from other official sources.

Therefore, after clarifying which indicators could be obtained from the city departments, the following step was to request the data proposed. Whenever possible, the benchmark year for the analysis of temporal evolution was 2010, as the data collection process showed that the available data were mostly concentrated between 2010 and 2015. The geographical scale used for the indicator analysis is, whenever possible, at municipal level; the indicators measured at metropolitan or regional level were used only for comparison with the values of the municipality.

The analysis aimed to include the production of maps, whenever the level of disaggregation of the data under analysis allowed such spatialisation; however, this proved to be difficult and was one of the challenges encountered in the process.

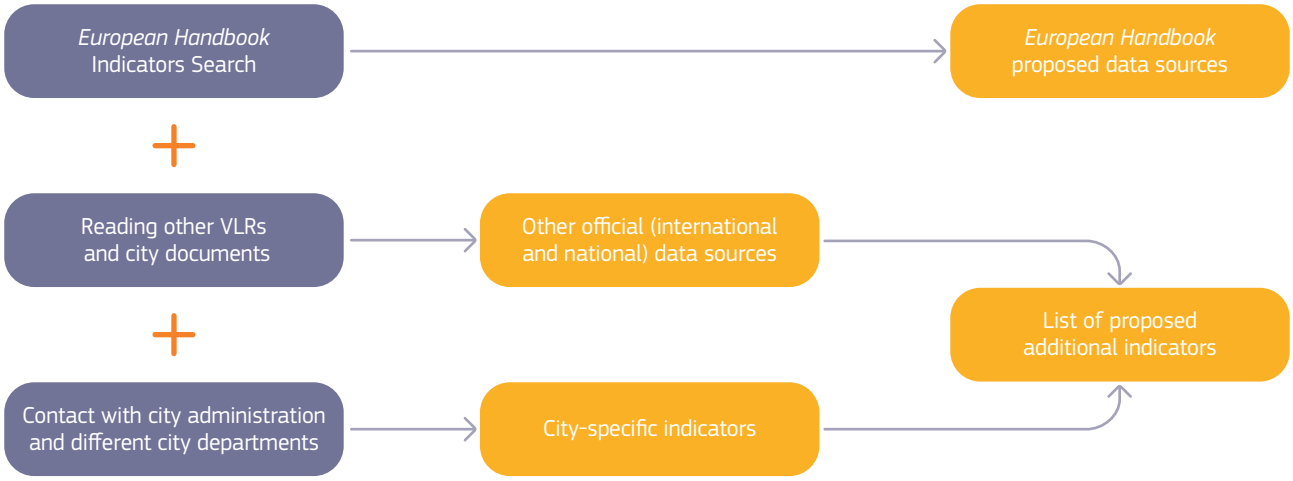
The data collection process highlights the importance of ensuring a balance between using harmonised indicators that permit comparison between cities, and measuring topics of local interest, in particular using the city's experimental indicators.

In the last stage of the work, the initiatives and projects in which the city has been involved in recent years were collated, in order to illustrate the effort the city has been making. These

initiatives may also help to explain the temporal evolution of the indicators analysed. To this end, the methodology analysed one of the city's structural documents, the Municipal Master-plan (PDM), a reference for other programmes and plans for the management of the city's territory. The PDM was published in July 2021[31], and lays down seven main strategies for the city, and their respective guidelines for action; moreover, it summarises some of the projects, programmes and initiatives developed in Porto for each SDG. This served as a baseline for highlighting a set of initiatives that may represent local transformative measures as a way of addressing the challenges identified by the city. Some of these projects have not yet produced results, as they have been implemented recently, or are still ongoing.

Finally, some of the initiatives included in the analysis were identified through desk research performed in programme reports for other cities. The Methodology is summarised in Figure 22.

**FIGURE 22:** Porto – Methodology for the selection of indicators




**Source:** Author's own elaboration

## 4.3 Availability of SDG indicators in Porto

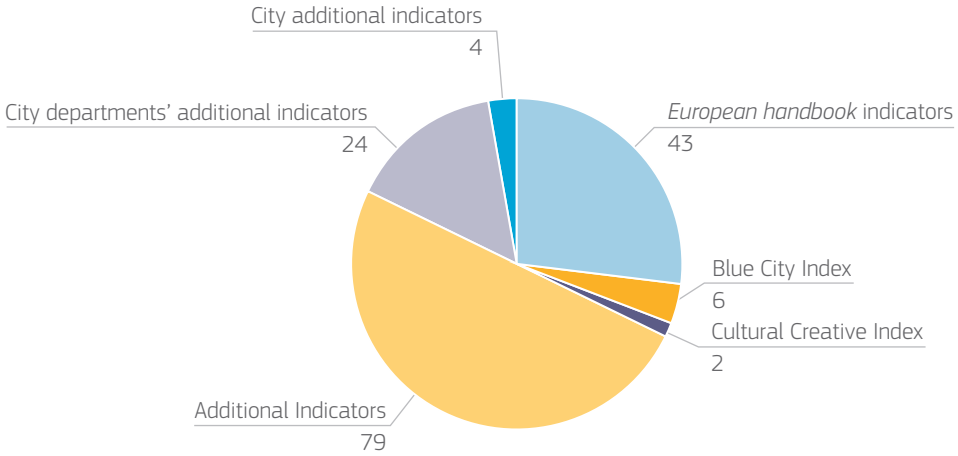
As a result of the analysis carried out for Porto, a total of 158 indicators were collected, covering all SDGs (Figure 24). This set of indicators includes:

- Indicators proposed in the *European Handbook* (43);
- Additional single indicators that were extracted from the calculation of the composite indicators of the Blue City Index and Cultural Creative Index (8)[32];
- Additional indicators that result from the combination between (i) those that were considered relevant from the analysis of reports from other cities, (ii) official documents of the municipality, and (iii) indicators that were proposed by the city departments (107).

31 *https://www.porto.pt/pt/noticia/novo-plano-diretor-municipal-da-cidade-entra-amanha-em-vigor*

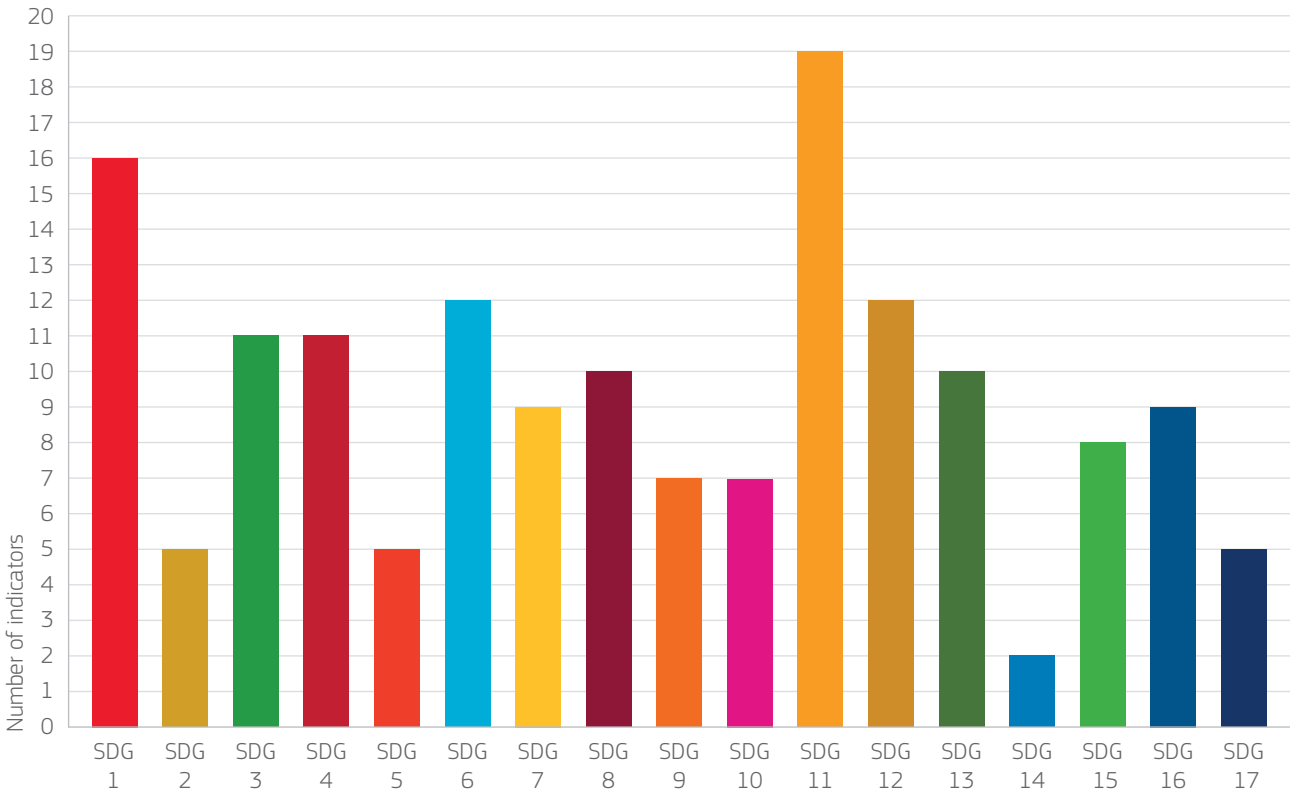
32 A synthetic description of the two indexes are included in (Siragusa et al. 2020, 90, 91, 152, 153)

**FIGURE 23:** Porto – Origin of indicators




**Source:** Author's own elaboration

**FIGURE 24:** Porto – Indicators identified and collected by SDG

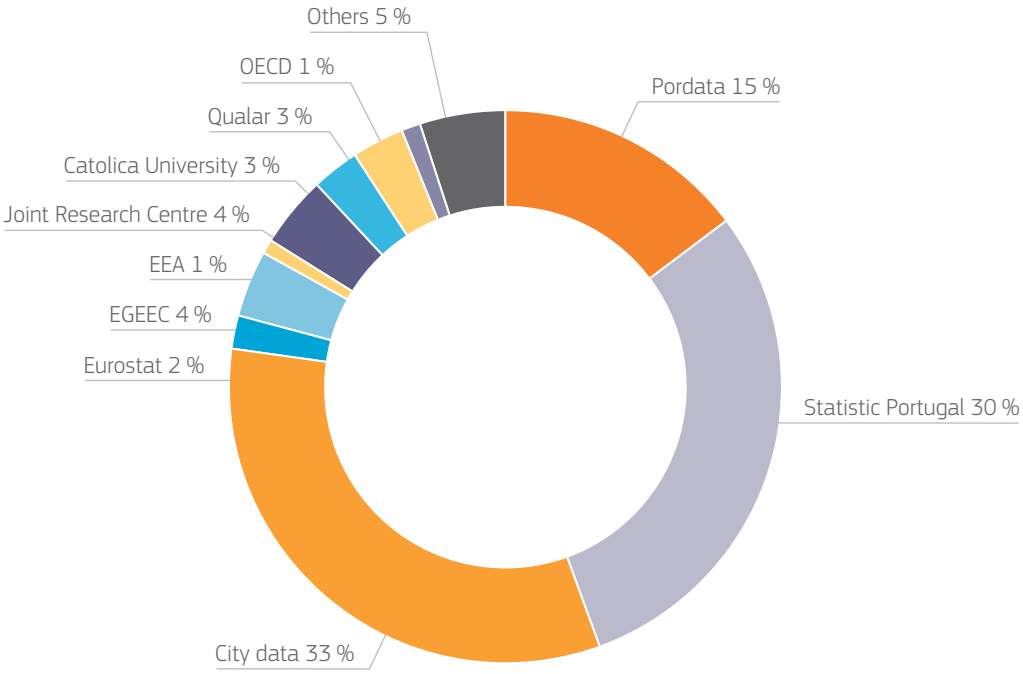



**Source:** Author's own elaboration

SDG 11 – Sustainable Cities and Communities is the goal with the largest set of indicators (19), followed by SDG 1 (16), SDG 6 (12) and SDG 12 (12). In contrast, the SDGs for which fewer indicators were collected are SDG 2, 5, 14 and 17. From the 158 indicators, 83% are available for several years, thus enabling the analysis of trends, while 12.7% are data from isolated years.

The main data source is Statistics Portugal *(Instituto Nacional de Estatística, INE)* (Figure 25), which accounts for 30 % of the indicators, followed by data provided by the city departments and the municipal companies or projects, such as *Águas do Porto, Porto Digital, Agencia de Energia do Porto and Porto Ambient*e (33 %). The third most frequent data source is Pordata (Database of Contemporary Portugal), which provides official information and accounts for 15 % of the data sources. Around 18 % of the data proceeds from sources such as Eurostat, European Environment Agency (EEA), Joint Research Centre (JRC), Organisation for Economic Co-operation and Development (OECD), *Católica University, Qualar and Direção-Geral de Estatísticas da Educação e Ciência* (DGEEC). Finally, the remaining 5 % corresponds to the Estratégia Nacional para a *Integração das Pessoas em Situação de Sem-Abrigo/Núcleos de Planeamento e Intervenção Sem-Abrigo* (ENIPSSA/NPISA), the *Direção Geral de Energia e Geologia* (DGEG), Emergency Events Database (EM-DAT), the Portuguese Water and Waste Services Regulation Authority (ERSAR), Dados e Estatísticas de Cursos Superiores, the statistical portal of the *SEF-Serviço de Estrangeiros e Fronteiras* (SEFSTAT), Copernicus and the *Gabinetes de Apoio à Vítima* of Porto (GAV Porto).

**FIGURE 25:** Porto – Data sources




**Source:** Author's own elaboration

## 4.4 Key findings

### *The relevance of the Voluntary Local Review*

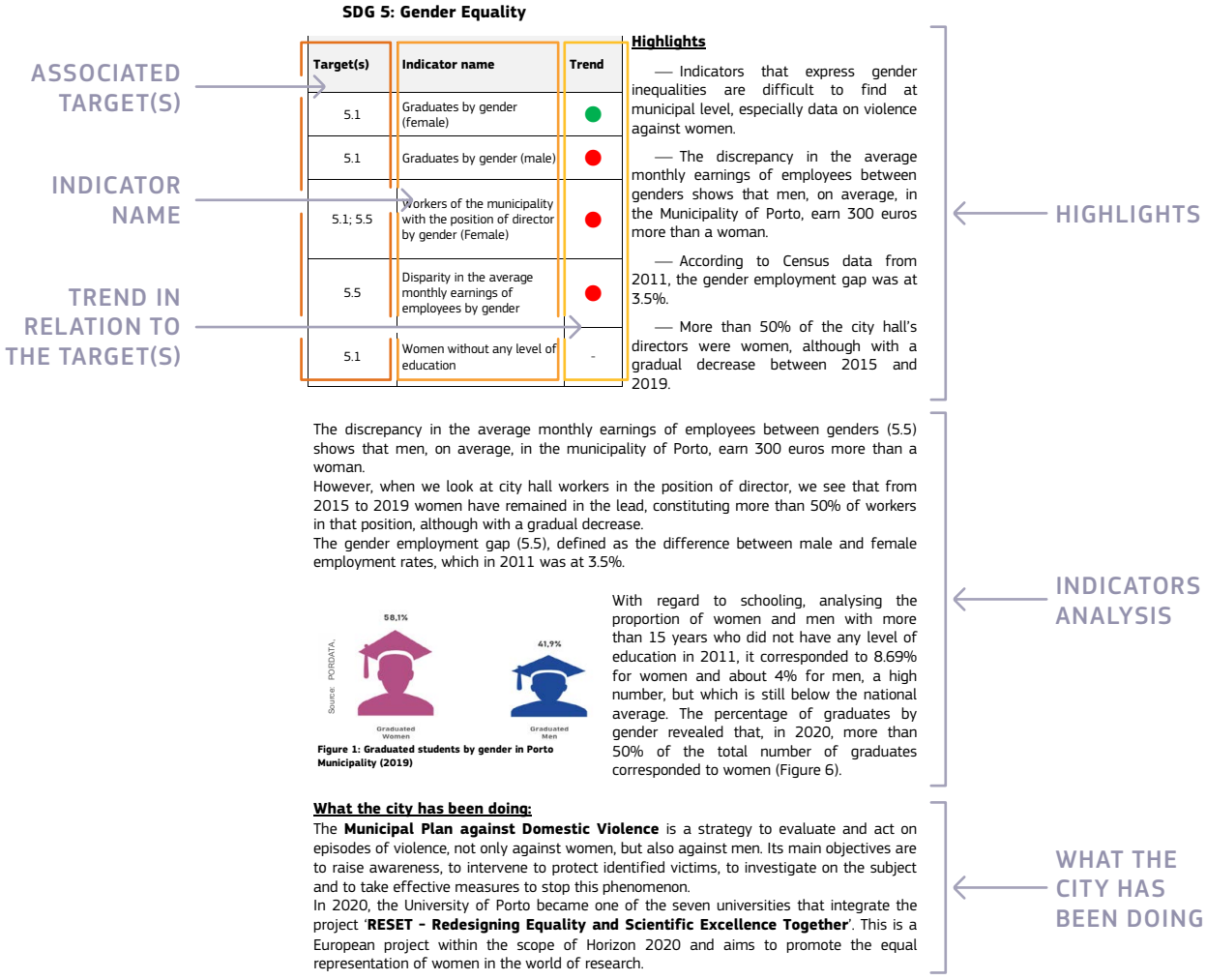
Several interesting results were achieved through this analysis. Firstly, it has been possible to assess whether the city strategy was aligned with the SDGs, and whether the correspondent lines of action fit with the fulfilment of the goals and targets. Secondly, it helped to clarify whether local transformative initiatives meet the SDG framework and the specific goals; such

projects can bring insights on the city's awareness of and the reflection on the main challenges to be faced in forthcoming years. Thirdly, it helped to connect the various city departments and reduce the barriers between them: all the city departments were involved in the process, with the common goal of assessing Porto's engagement with regard to the SDGs.

Thus, the analysis became a diagnosis document of the city's performance over the years. As a result, it could be used to support the decision-making of the city's administration and of the institutions that work in the city of Porto. It may also help to reflect on the targets that are still to be reached, to know where to find the data, and to provide suggestions about additional indicators that could be used the monitoring of the city performance.

Following this work, the Municipality of Porto has recently taken the decision to conduct a Voluntary Local Review, which should start in 2021. The structure established for the present analysis may help to support this process as it provides, for each goal, an overview on the performance of the city in the last 10 years, together with the indication of trends for each indicator (when available). It also offers a specific focus on the aligned measures and projects undertaken by the city (Figure 26).

**FIGURE 26:** Porto – Structure of each Goal in the report




**Source:** Author's own elaboration

## *Challenges identified in the process*

The city of Porto is still at the beginning of its journey for the implementation of a global information system to support decision-making (Business Intelligence & Analytics Porto – BIA Porto); therefore, the collection of data was one of the challenges faced at the beginning of the analysis procedure.

Data from each city department are scattered, and are not stored in a unique database. However, the city is currently working on building data observatories, particularly in the area of social cohesion (Municipal Department of Social Cohesion) and social housing (Domus Social), which will make data collection and use easier. In April 2021, Porto Municipality launched *'Porto OpenData'*[33], a platform that collects and provides information from various city departments. This data can be used and combined by the various city stakeholders. This repository of open data is the result of a collaborative interface and the active participation of the Municipality, the public, companies, institutions, and other organisations. The platform will also serve as a support for decision-making, as well as for the design of well-informed policies and strategies.

In addition to these initiatives, the creation of a centralised city data observatory would be beneficial, with the goal of sharing information and working methodologies, and providing an overall view of the city's strategy. The various city departments could contribute to this data observatory by providing experimental data, in addition to those from official sources, in order to align them with the SDGs; experimental and official data could then be easily monitored, updated and collected. This would also help to establish a common method for collecting experimental data, as different departments currently calculate the same indicator in different ways. This observatory would prove useful for supporting a more integrated and concerted city vision, strategy and measures that meet sustainability challenges at local level.

With regard to the interpretation of data, it is important to consider the interpretation of the evolution of the indicators in relation to their unit of representation. Data which are presented in absolute values help to 'tell a story', while percentage data (or the calculation of a ratio) may tell a different story. A practical example is the case of the *population attending higher education by gender:* absolute numbers reveal whether entry to this level of education is increasing at the same rate for both genders, individually; when the numbers are given as a percentage, it is not possible to determine whether there are more or fewer women and men in higher education, only the evolution of the gender gap is visible. This type of detailed analysis is important because it allows a number of conclusions to be drawn.

Another difficulty relates to the mapping of the data collected. The geographical scale of reference is the municipal level, however, in most cases data are not disaggregated in such a way to make it possible to understand the spatial distribution within the municipality.

Finally, defining and interpreting trends also poses a challenge, because this requires the interpretation of the objectives of various municipal services, which often go beyond the global targets set out for each SDG.

33 *https://opendata.porto.digital*

## Data gaps and quality of data

The main data gaps are found in the quality of the indicators measuring poverty (SDG 1), *Schooling of the population in non-superior education* (SDG 4), and *Gender equality* (SDG 5).

Indeed, the existing data for poverty indicators are disaggregated at regional or at national level only, while alternative indicators were indicative of poverty in an indirect way. The data on *Education of the population up to secondary level* are available only for census years. Finally, on the *Gender equality* goal, alternatives were chosen to show the differences between men and women, namely in salaries; however, the data quality and the level of disaggregation remain unsatisfactory.

Also for SDG 2 – *No hunger,* it was difficult to find indicators that express the city's performance in 'ensuring safe and sustainable food systems' (referring to targets 2.3 and 2.4). In addition, the city of Porto has been working to create a regenerative and circular food system in order to stimulate local production and consumption in a sustainable way, supporting small producers (local markets) and encouraging self-production and consumption (increasing urban gardens). This is not yet reflected in the indicators for SDG 2, but might be integrated in the near future.

## The new challenge: COVID-19

The pandemic is the most recent challenge that all cities have been facing, and some of the indicators analysed clearly show the effects of the pandemic on the population over a year. While the most evident and immediate impacts have been on the cultural sector[34], it is easy to recognise how it has also affected other areas, such as the economy, where consequences are expected to be long-lasting. Other goals will certainly be affected by the pandemic.

It would be important to monitor indicators that relate to inequalities in access to technology: dependence on technology has taken on new figures and will be an increasing concern in the coming years. In the same way, social challenges will also tend to become more acute, as the economic fragility of families will trigger impacts at various levels. Homelessness may increase, as well as other challenges that already existed. Crime might also increase given more precarious social and economic conditions, together with violence, for example domestic violence.

On the other hand, although pollutant gas emissions have fallen, their progress will have to be monitored even more closely. The pandemic will bring new challenges in channelling efforts towards the environmental commitments already stated.

The city of Porto has been trying to overcome the growing challenges that the pandemic brings by developing various initiatives to promote awareness in the population, and to support the affected sectors though the necessary adaptation process to the new reality.

34 The effects of the pandemic were immediately perceptible in culture because of data already available for 2020, which was not the case for the economy or tourism indicators.

The municipality has created a specific web page[35] to collate all the measures implemented in the city during the course of the pandemic over the past year (Municipality of Porto 2020a); this website contains the confinement measures, and other measures aimed at supporting local companies and the public, as well as information on the dynamics of the new municipal services. The *Data4COVID19* project was also started in 2020, with the aim of building a digital platform to cross-reference data from various sources, to monitor and implement the measures for addressing the pandemic (Porto Digital 2020). Built with an investment of EUR 490 620, with support from the ERDF programme of EUR 392 496, the platform will make data available for use and decision-making by the regional authority for national security, the Porto City Council and the regional tourism authority.

The cultural events organised in the city were adapted to the new circumstances: the activities promoted every year on Environmental Education were maintained and translated in an on-line format, to continue sharing their message on how to live in harmony with the environment. Similarly, the 2020 session of the '*Fórum do Futuro'* (Forum of the Future) festival was transformed and condensed into a book: this Festival fosters debates and reflections on the future from an artistic, scientific, philosophical and technological perspective, with the contribution of numerous professionals from a variety of areas (Fórum do Futuro 2020). Just as the event was free, this book was also a free publication.

Finally, to support local economy the virtual platform *'Shop-in Porto'* was set up, providing visibility to local shops and their products. This was one of the solutions introduced to support the retail sector, one of the most affected sectors over the last year (Shop-in Porto 2020).

The pandemic highlighted the importance of investing in more and better public spaces, such as green spaces or areas dedicated to soft mobility. With this in mind, Porto has been increasing the number of existing cycling paths, turning more streets into exclusive spaces for pedestrians and soft modes of transport. It also intends to double the city's green areas, starting by expanding the native forests on the highways. All these activities will be established as part of the city's future vision, strategies and plans.

## *Future visions for the city*

The city of Porto has been on a very interesting journey. Although it still does not have a strategy directly linked to the fulfilment of the targets proposed for each SDG, in the past few years Porto has visibly engaged in this process and taken action to meet the sustainable development goals. This is illustrated by the city's master plan (*Plano Director Municipal,* PDM), which lays down the seven main strategies of the city and the respective guidelines. In some cases, this engagement is reflected in the evolution of the indicators (in some goals more than in others) but, in general, it can be said that the municipality of Porto has all the elements it needs to start the process of alignment of the city-strategy with the goals.

A stronger cooperation within the municipal structure, with other stakeholders, as well as with neighbouring municipalities could play a strategic role in building a comprehensive pathway to meet the city's goals, adjusting to the real needs of the population. Porto's influence transcends the city's boundaries, and every day thousands of people from neighbouring munici-

35 *www.Covid19.porto.pt*

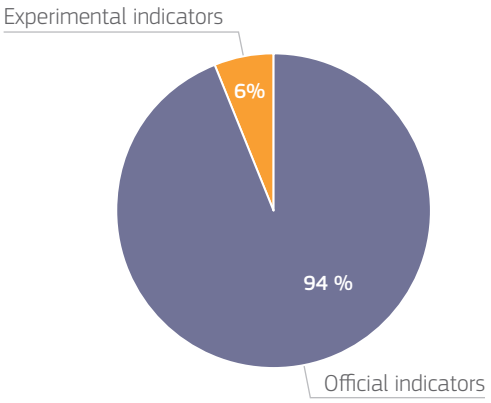
palities use Porto as their home; therefore, it would be important to include this section of the population in any participatory processes.

Finally, it seems relevant to highlight the importance of the engagement of the local population in decision making through innovative participatory models. This could enable more informed, active and constructive participation in order to boost public involvement in processes and projects for which they feel responsible. Such processes will be key for achieving a widely supported transformation towards more sustainable development.

## 4.5 Additional and experimental indicators

Out of the total 158 indicators identified for Porto's analysis, 148 are official indicators (94%), while 10 can be considered experimental indicators (6%). Two of the experimental indicators are illustrated hereafter.

**FIGURE 27:** Porto – Official and experimental indicators




**Source:** Author's own elaboration

### *Number of meals and snacks distributed to children within the framework of the Municipal Initiative School Solidarity*

Ensuring that children attending kindergartens and primary schools have access to free meals and snacks is a major concern for contributing to nutrition, especially for children living in disadvantaged families. The number of meals and snacks served to children in the schools managed by the municipality remained stable between 2016 and 2019; in school year 2019/2020 it registered a slight decrease due to the pandemic: because of the COVID-19 emergency, schools were closed for several months and, even where the initiative continued, demand was lower (Table 5). On the other hand, following an increase in the number of children attending pre-school and primary school in the public network of the city of Porto between 2017 and 2019, the numbers stabilised for the following school year, 2019/2020. It would be interesting to determine the temporal relationship between the meals and snacks served to these children, and the number of students attending the public-school network who benefit from them.

In this respect, another indicator that may help to understand the efforts of the municipality is the Municipal Initiative *School Solidarity.* Since 2015, this campaign has been keeping canteens open during school breaks, to ensure that all children who attend a public primary school or a public kindergarten, and their siblings, have at least one full meal per day[36]. This indicator shows that the number of meals served increased considerably between 2015 and 2020, with an average annual variation of approximately 73%.

36 *https://www.porto.pt/en/news/municipality-of-porto-ensures-more-than-150-meals-a-day-to-students-during-school-break*; *https://www.porto.pt/en/news/enhanced-social-services-support-in-porto-during-the-covid-19-pandemic*

A system for monitoring the nutritional status and physical activity of children (SMENIAF) was created in 2017 (Municipality of Porto, 2020c). The aim was to collect essential information for the development and monitoring of policies that contribute to the improvement of the health of children attending primary education in the public network of schools under municipal management.

**TABLE 5:** Porto – Evolution over time of the number of meals and snacks served to children attending pre-school and primary school, in the public network of the Municipality of Porto (2016-2020)

| | School year | | | | |
|---|---|---|---|---|---|
| | 2015/16 | 2016/17 | 2016/17 | 2018/19 | 2019/20 |
| Number of children in pre-school and primary school * | 9 051 | 8 981 | 8 760 | 8 466 | 8 466 |
| Number of meals and snacks distributed to children in pre-school and primary school ** | 1 505 553 *** | 2 496 106 | 2 459 917 | 2 387 747 | 1 632 487 |

* Only at public schools.
** These numbers refer to the distribution of meals and snacks only in schools under municipal management (public schools).
*** Referred to January 2016 to July 2016, when the initiative started to be monitored by the Municipal Services.
**Source:** Municipality of Porto

## *Biowaste collected as a proportion of total waste produced*

The SDG 12 is one of the recent major undertakings of the city of Porto, addressing the responsible and sustainable management of urban waste of various types (12.2). The indicator for the *proportion of biowaste collected in total waste produced in the municipality* takes into account both food and green waste, which represented 6.5% of the estimated total waste produced in 2020.

The tonnes of municipal food waste collected between 2015 and 2019 increased by 4%, representing an average increase of 120 tonnes per year. These numbers cover the total door-to-door food waste collection, both commercial (since 2015) and residential (since 2018).

With respect to waste management, the Municipality intends to foster a more regenerative circular food system, and has been promoting local and regional production and consumption, as well as projects aimed at enhancing self-consumption and reduction of food waste production (Delgado 2020).

These include the *'Embrulha' (Wrap)*[37] project, an initiative from the municipal company in charge of waste management Porto Ambiente, in partnership with the intermunicipal waste treatment service of Greater Porto Lipor. Since 2016, biodegradable packaging has been distributed to a network of hotels, restaurants and cafes, for take-away food not consumed

37 *https://www.porto.pt/pt/noticia/projeto-embrulha--do-porto-e-exemplo-na-europa-para-empreendedorismo-social*

at the establishments. To date, a total of 28.85 tons of food have been recovered in the 64 participating restaurants (Delgado 2020).

The *'Orgânico' (Organic)* project started in 2020 and aims to make food waste collection available to multi-family dwellings. It intends to reach 60% of the Porto population with the installation of equipment on public roads[38]. This project is supported by the European programme POSEUR, and the first phase involved 30% of the municipal population (Delgado 2020).

Finally, the European project *'Cityloops'*[39] (2019-2023) involves the city of Porto together with six other European cities. Under this project, the cities test around 30 new tools for promoting circularity in waste management processes of various types, including urban biowaste, aimed at its prevention and valorisation (Delgado 2020).

38 *https://www.porto.pt/en/news/porto-extends-organic-waste-collection-to-60-of-the-population*; *https://organico.portoambiente.pt*

39 *https://cityloops.eu/cities/porto*

*We need a new urban planning model that embeds the scenarios, tools and language of the 2030 Agenda in its decisions and management system. This is key to fully insert local urban policies within the European context, as well as to evaluate the potential for innovation and transformation of space and infrastructure.*

**Alex Pratissoli**
**Deputy Mayor, City of Reggio Emilia**

# 5. REGGIO EMILIA, ITALY

Author:

*Serena Foracchia*

*International expert, Italy*

## 5.1 SDGs in the urban planning process in Reggio Emilia

The experience of Reggio Emilia does not stem from the intention to engage solely in a SDG Local Voluntary Review, it rather lies in an urban planning process. The Regional urban planning law[40] of 2017 requires municipalities to renovate city planning regulations, aligning them with the SDGs and a pattern of sustainable development. Therefore, municipal policy makers have decided to adopt an explicit reference to the SDGs in shaping the local planning documents and processes, framing the pre-existing local policy objectives within the definition of the 17 Goals.

The main assumption in this process is that the city representatives have a deep understanding of the value of the SDGs, and intend to bring this perspective to local level in shaping the future of the city. Decision makers understand that sustainability and spatial planning, alongside their regulations, must be assessed not only in terms of environmental impact but also of social, economic and cultural impact, as well as of institutional evolution.

It is important to highlight that the process in Reggio Emilia is not intended to be merely a measure for raising awareness about civil society on the 2030 Agenda; the participation and people's engagement foci adopted in the Reggio Emilia planning process is aimed rather at reaching a common understanding of local challenges and priorities. Following the identification of the local goals, the administration itself has matched the existing local challenges with the SDGs and its targets. This priority mapping process allowed the administration to evaluate which fields – among the 17 – are considered most pressing by the community.

By adopting the SDG framework in a review process, policy makers are able to understand and evaluate the interdependence among the various policies and goals. Indeed, local priorities and policies refer to various SDGs and targets/indicators, to be considered simultaneously when dealing with city challenges.

The identification of the city strategy indicators started with the UN SDG indicators: the result is an assessment of how the city strategy will influence and contribute to the different goals. It became evident that some indicators have less relevance at local level, and imply major measurement difficulties.

The adoption of the 17 interdependent dimensions of sustainable development allows policy makers to gain a more holistic vision of the city's path for growth. Furthermore, the adoption of this pattern allows policymakers to participate to the wider European and international debate on accountability and contribution to sustainable development.

40 Regional law #24 of 2017 (l. regionale 24/2017 – Regione Emilia Romagna)

## 5.2 Methodology

Since 2019, the Municipality of Reggio Emilia has been (and still is) involved in the reformulation of the City Plan and in the preparation of the new PUG (*Piano Urbanistico Generale – General Urban Plan),* introducing the city's visions, establishing priority activities and leading to strategic guidelines, involving a variety of public and private operators.

The ongoing planning process has been centred on the participation and involvement of the public and key stakeholders, a common practice in Reggio Emilia. Institutionalised approaches for technical and cultural discussions have been specifically designed to address various sets of targets (within and outside the municipal administration):

- **Internal municipal staff:** The process required the creation of a specific dedicated planning unit *(Ufficio di Piano),* searching existing policy interdependencies and collecting data to assess existing municipal plans (e.g. energy plan, mobility plan, adaptation plan, strategic neighbourhood plans).
- **Institutional consultations:** the PUG project activates various forms of institutional cooperation, to cope with challenges and exploit the opportunities coming from interactions with other territorial institutions. These include:
  - **the Province of Reggio Emilia and Emilia-Romagna Region;**
  - **Municipalities belonging to the 'Western Emilia'** (Modena, Reggio, Parma and Piacenza);
  - **'Belt municipalities'** (i.e., minor municipalities surrounding the city);
  - **Local political leaders;**
  - **Environmental bodies;**
- **Stakeholder consultations:** trade associations, trade unions, associations from the agricultural sector. The contribution of these sectoral and specialised groups is essential for thematic analysis and scenario development. These stakeholders have been regularly called to working groups to share perspectives, data and concerns in the preparation and subsequent monitoring of the PUG.
- **Public consultations:** In recent years, the City has promoted the project *'QUA - Quartiere bene commune' (The common good neighbourhood).* The project aims to enhance the role of the public, both in the form of associations and as individuals, in planning activities at neighbourhood level. The project establishes a transition from participation, understood in the traditional sense, to responsible leadership to address the social, environmental and economic problems of the territory, in accordance with a more holistic approach and also drawing on local perceptions and knowledge.

The following steps were followed to draw up the strategy of the PUG:

1. **Context definition** or **knowledge framework assessment,** via an initial identification of the city's most **relevant functional systems** (common city, accessibility, environment, agriculture, production, housing, retail and trade, plus the historical centre).
2. **Knowledge systematisation:** inventory and data collection for each functional system.
3. **The development of a diagnostic analysis:** this evolution from the status quo to possible future scenarios allows policy makers to gain a deeper understanding of the most relevant functional systems as well as of the elements, within each system, to be drawn on to support the local resilience and, ultimately, the 'shifting' of the territorial-urban system towards more desirable living conditions.

4. **The vulnerability-resilience analysis:** examines vulnerability and resilience factors, using a SWOT-like analysis[41].
5. The overall assessment and the SWOT analysis help the strategy to identify the **main challenges** to be addressed, the **places** (or local areas) which represent special situations to be considered, and the **constraints** and framework of pre-conditions.
6. Assessing the **specific objectives to be reached, considering the local situation.** It is important at this stage that the connection with the SDGs is not lost, nor simplified by assigning an 'SDG label'.

For each SDG addressed by the strategic challenges, the process closely investigates which SDG target is addressed. A clear correlation at strategy level of challenge/ local goal / SDG and Target has thus been composed, developing a system of indicators which clearly link the local dimension to the SDG framework. The result of this process is the definition of a matrix which logically connects the various local components to the Goals and targets.

Indeed, the General Urban Planning process has clarified the existing links between the challenges addressed by the city development strategy and the SDGs. City challenges are tied to city objectives, which are further described through local targets and sectoral actions. Groups of different actions allow the fulfilment of established local targets, which determine the local contribution that Reggio Emilia is making to shape sustainable development as measured in the SDGs target framework. Actions represent the basic building blocks for the daily implementation of the plan. To implement each action, a set of norms, regulations and procedures is set out, which influences the behaviour of the public, business, institutions, associations etc., and represents the reference in the daily deployment of the plan.

Having established the logical framework of challenges, goals, targets and actions from the macro level to the micro level, the PUG sets out two types of indicators. This allows the plan to be monitored at both 'meta' level as well as at the 'disaggregated' (micro or molecular) level. 'Type A' indicators refer to the overall contribution that the municipality is bringing to achieve the targets set for each SDG. These indicators have been built in accordance with those of the UN, and following the guidelines provided by the *European Handbook*. 'Type B' indicators refer to a more 'micro' level, representing the analytical monitoring of the actions and local specific targets. These are essential in the day-to-day monitoring of the performance of the civil servants, together with the regulations and norms which have been adopted to implement the specific actions.

A logical organisation of the objectives and actions is thus shaped, clearly linking the local assessments to the SDG framework. The result of this process is the definition of a matrix connecting the various components of the local dimension with the SDGs and the Targets.

41 SWOT – Strength, Weakness, Opportunities, Threats analysis.

**FIGURE 28:** Reggio Emilia – Framework connecting the local dimension and the SDG framework


**Source:** Author's own elaboration

## 5.3 Availability of SDG indicators in Reggio Emilia

With regard to the alignment of the final set of indicators, 5 out of the 67 indicators proposed for measuring the SDGs in Reggio Emilia (8 %) match the examples proposed in the *European Handbook,* while 19 (28 %) can be considered indicators with data fairly similar to these. The remaining 43 indicators proposed for Reggio Emilia are city-specific (64 %).

Regarding the indicator type of the final set, 54 of the 67 indicators are official while 13 are experimental.

**FIGURE 29:** Reggio Emilia – Alignment with *European Handbook* indicators

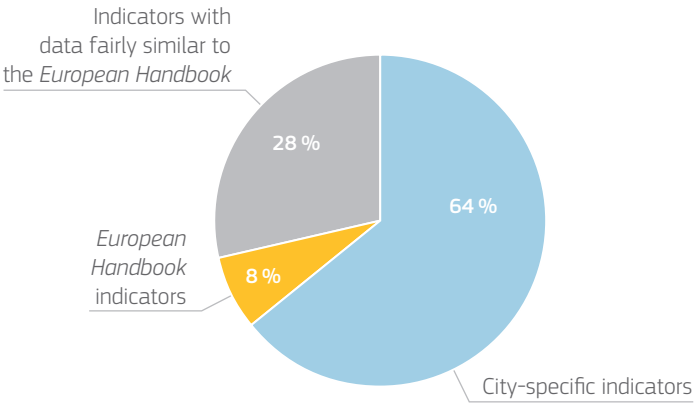
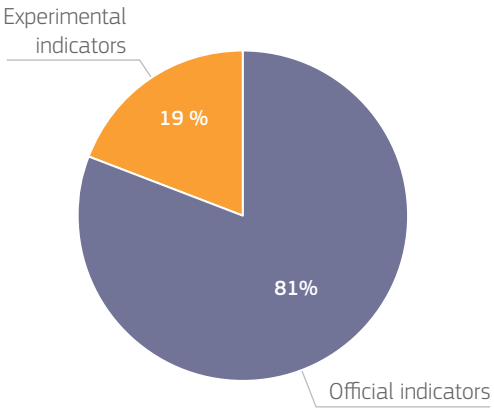



**FIGURE 30:** Reggio Emilia – Indicators by type



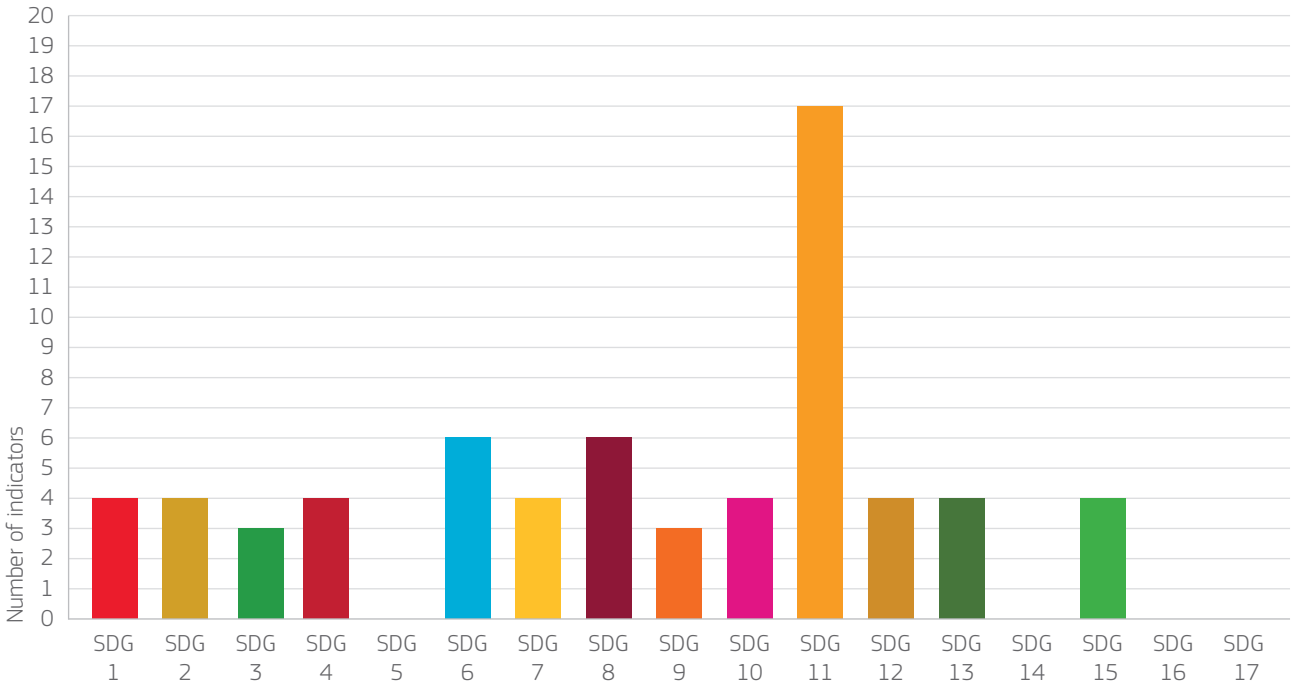

**Source:** Author's own elaboration

The planning process adopted by the city of Reggio Emilia is not to be considered a VLR process, but rather a spatial planning process based on a sustainable city vision, and building on the SDGs. It focuses predominantly on those SDGs that are closely related to the urban dimension and are considered to be drivers of local action, to improve the existing conditions for the environment and the people.

Thus, not all the SDGs are addressed. Beyond Goal 11, which is naturally shaped to measure the accessibility and sustainability of the city infrastructural assets, the strategy focuses mostly on the environmentally related Goals. These include those referring to climate change (Goal 13), preservation of natural resources (Goals 6, 15), circular economy (Goal 12), and energy consumption (Goal 7). By 'shaping' the territory and regulating the use of infrastructures, as well as defining the rules to increase the sustainability of buildings and to preserve the cultural heritage of the city, for example, the urban planning process also influences the public's behaviour by 'shaping' the territory and regulating the use of infrastructures, as well as defining the rules to increase the sustainability of buildings and to preserve the cultural heritage of the city. Vice-versa, the urban planning must also take into consideration the demographic characteristics of its population, its evolution, and the changes in people's perception. The Urban strategic plan might also address the issues of social integration and living conditions (Goals 1, 3, 4, 10), as well as industrial development and the economic sustainability of both families and the territory (Goals 8, 9).

In line with this approach, at the current stage of the work (which is still on-going) some SDGs are not covered by any indicator: these are SDGs 5, 14, 16, and 17. The best covered is SDG11 – sustainable cities and communities, with 17 indicators.

**FIGURE 31:** Reggio Emilia – Availability of indicators by SDG

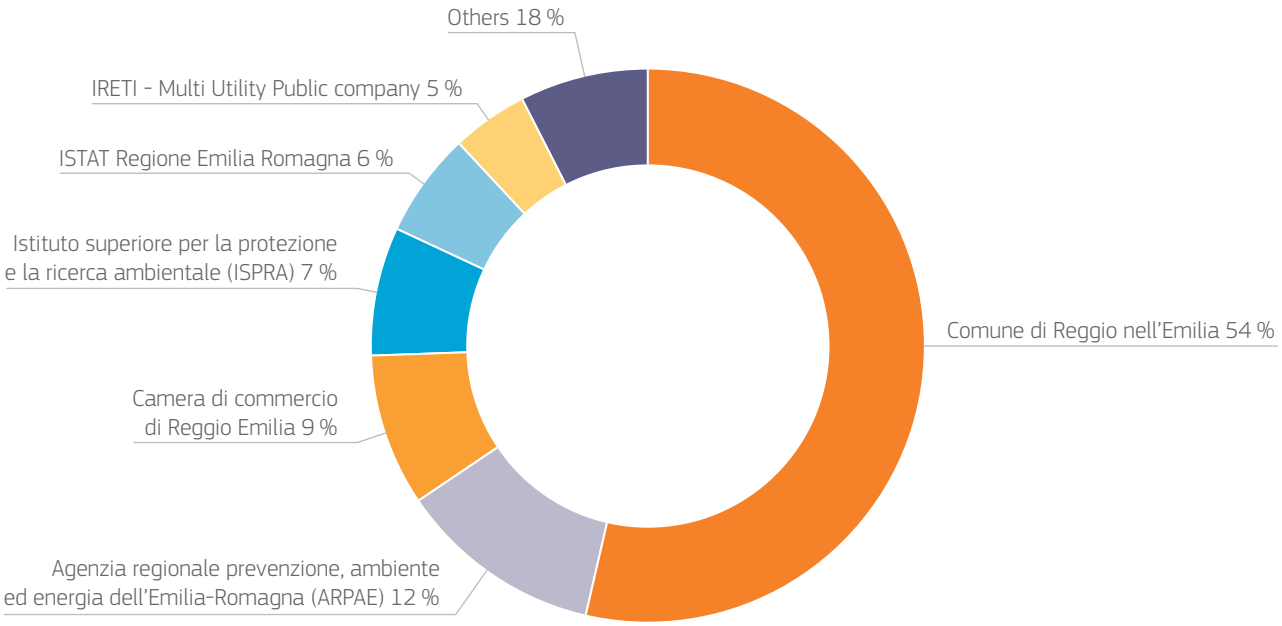



**Source:** Author's own elaboration

36 of the indicators identified in the study are extracted from the database of the municipality, 20 from sources at regional level (such as: multi-utility regional companies, or regional agencies: IRETI, ISTAT RER, ARPAE), six from sources at national level, and five from other sources.

It is interesting to note that at least 26 of the indicators used by Reggio Emilia should be available also for other cities of the same region, enabling comparison, or evaluation compared to the regional averages. Further details on data sources are available in Annex 4.

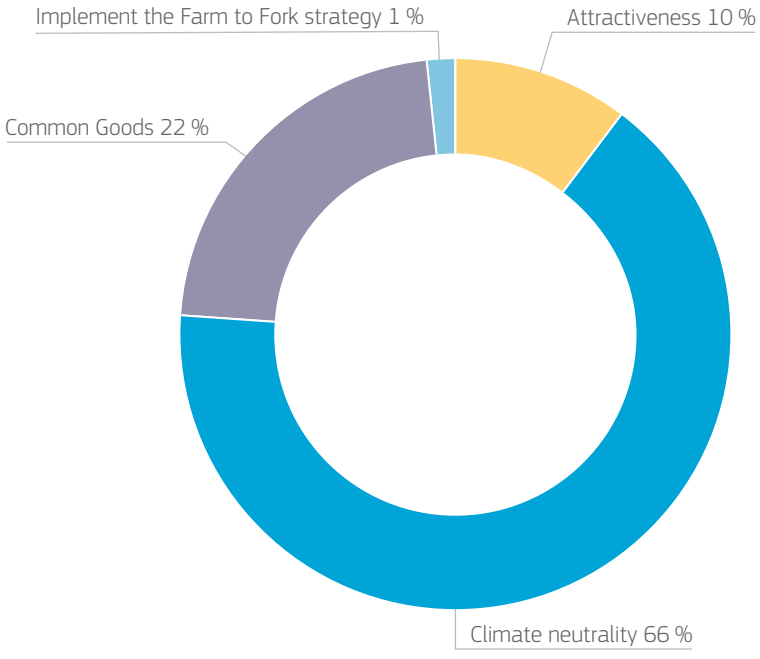
**FIGURE 32:** Reggio Emilia – Data sources




**Source:** Author's own elaboration

Each indicator included in Annex 4 for measuring the achievement of the SDGs in Reggio Emilia is also linked to the specific local challenge identified via the process of the PUG. More specifically, 44 indicators are linked to achieving Climate Neutrality, seven indicators to Attractiveness, 15 to Common Goods, and one to the implementation of the Farm to Fork Strategy.

**FIGURE 33:** Reggio Emilia – Availability of indicators by Local Challenge




**Source:** Author's own elaboration

## 5.4 Key findings

The municipal administration has chosen to specifically link the local strategic planning objectives to the SDGs, using this framework to assess the correspondence of the local priorities, goals, targets and actions with the ongoing European and international debate.

The process for the identification of the indicators took into consideration the indicators developed internally through the initial assessment, the UN Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) set of indicators[42], their adoption at national level[43], as well as the possible adoption of the national set of indicators to regional and municipal level.

Therefore, the strategy is the result of both a top-down approach, participating in the national debate on the sustainable national strategy in line with the ongoing process of regional and provincial adoption of SDG frameworks, and a bottom-up approach through the diagnostic scenarios of the functional systems (developed through a highly participative process).

### *The limits of the top down approach*

Some constraints strongly limit the set of relevant indicators which can be measured at city level when adopting the regional and national indicator sets. Among the major obstacles which limit the applicability of the given set at municipal level are the following:

- **The absence of data at municipal level.** The level of disaggregation of the National databases reaches regional and provincial level. Only in a few cases are indicators available at municipal level. Moreover, when data is available the level of significance of the sample is quite low.
- The lack of availability of data at municipal level, as these are measured only on the occasion of periodical experimental statistical projects, such as the ARCHIMEDE or the URBES projects. Therefore, **data are identified only within the experimental time frame** (i.e.2017-2028), and the measurements do not follow a consistent system, making comparison through time impossible.
- **Not all SDGs and not all targets are relevant at municipal level.** They might have a variety of local meanings – thus the system of indicators conceived at national or regional level might not be aligned with the local meaning associated to the indicators.
- **Municipal offices do not have a true sense of ownership with respect to the given dataset.** The data collection is perceived as an administrative duty, rather than a means for monitoring the implementation of the local strategy and local progress towards the established targets.
- **Data-driven policy-making is far from being a local culture in the administration.** Very little use is made of existing open data platforms, which are implemented and available. These activities are perceived as an administrative duty rather than as a process for shaping a data-driven policy and a tool for shaping the territory with a new sense of community accountability.

The above-mentioned problems, which limit the effectiveness of the adoption of indicators

42 *https://unstats.un.org/sdgs/iaeg-sdgs*

43 *https://www.istat.it/it/benessere-e-sostenibilit%C3%A0/obiettivi-di-sviluppo-sostenibile/gli-indicatori-istat*

used at lower levels of disaggregation on the local municipal scale, were all encountered during the PUG process. Considering the existing limits to the adoption of indicators as measurements for the local contribution to the SDGs, a set of bottom-up indicators has been proposed, based on the available municipal data.

## *The bottom-up integration of the indicator framework*

In shaping the PUG process – especially in the initial assessment and diagnostic phase – a set of indicators was used. Municipal staff and the planning department officers were involved in a joint effort to identify all possible measures and tools, which might contribute to setting out and defining the existing state of the various functional systems. This resulted in the definition of locally-built measurements and indicators. It seems important to fully exploit the administration's work in this area, not only as an initial assessment phase, but also as an asset in owning the data of the city and monitoring the performance of the planning tools in reaching the desired targets and goals set by the local strategy.

In identifying a set of SDG indicators which are locally relevant and linked to the local strategy, it is important that all initial efforts are fully considered and eventually systematised through the creation of a periodic reporting system that feeds on data to monitor, correct and steer the local actions, thus determining the effectiveness of the plan.

The systematisation of the 'bottom-up' draft list of indicators is based upon the concept of rethinking the city and applying a more sustainable development model, preserving and drawing on the resilience capacities of the territory. The objective pursued is the achievement of a compact, complex, resilient and sustainable city model. The set of indicators must thus be well-known and suitable for the capacities of the municipal offices, in order to be used as a diagnostic and verification tool for pursuing a more sustainable and resilient city model (to be adopted in the planning, implementation-design of transformations, construction or use phases).

The indicators constitute the measurement protocol that evaluates the degree of coincidence of the analysed urban fabric (consolidated and regenerated, or newly created) with the urban reference model. Therefore, systematisation of this 'bottom up' set of indicators is based not on the SDGs, but on local assessment. The existing model adopted by the Basque Country in shaping a set of sustainability measurements is considered a reference framework for systematising the indicators - an extensive description of the Basque Country's experience is included in (Hidalgo Simón 2021). The developed indicators combine a number of variables (for example, the 'correct compactness' indicator measures the relationship between the built space and the public and relational space) to simplify a complex urban reality.

To identify relevant local indicators, the regional Open datasets have also been considered[44], with specific attention to data provided by the Regional Environmental Agency[45], as well as health data[46].

Datasets at local administrative level (definition of sub-municipal disaggregated data), available also in a GeoRef system, have been taken into consideration, especially in the initial

44 *https://statistica.regione.emilia-romagna.it*
45 *https://dati.arpae.it/dataset*
46 *https://salute.regione.emilia-romagna.it/siseps/reporter*; *https://emiliaromagnainnodata.art-er.it*

assessment phase, and are eventually reconsidered in shaping indicators to measure the implementation of the strategy.

Open datasets of local stakeholders (the Multi Utility Company IREN / Local Chamber of Commerce etc.) and Community Based Organisations (Caritas, local NGOs and associations) have been integrated in the analysis, especially at the initial stage of the PUG process, when the assessment of each functional system was implemented.

## 5.5 An experimental indicator identified by Reggio Emilia through the URBANPROOF tool

### *URBANPROOF - vulnerability to heat waves indicators*

The URBANPROOF tool for municipalities has been developed in the framework of the LIFE URBANPROOF[47] project 'Climate Proofing Urban Municipalities'. The URBANPROOF project introduces a methodology and experimental indicator which enables better-informed decision-making for climate change adaptation planning. The tool may currently be used for conducting a climate impact and adaptation assessment for every urban municipality in Italy, Greece and Cyprus. This methodology and its indicators have been used in the PUG process as reference in the initial assessment phase, and are also presented in the SDG 13 indicators.

The methodology[48] proposed is considered relevant because it assesses the level of social vulnerability, linking climate change, and subsequent adaptation strategies, to socio/economic measurements. Moreover, it analyses population density combining two datasets: the Copernicus vector polygon Urban Atlas 2012 dataset[49], as well as the ancillary data on population estimates produced by the JRC and DG REGIO. The elaboration of these datasets in a GIS environment enables the assessment of the impact at the building block scale.

The methodology developed for the assessment of heat- and water-related climate change impacts on the urban environment considers the definitions of impact, hazard and exposure as defined by the Intergovernmental Panel on Climate Change in 2014 (IPCC 2014). Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

In line with the methodology developed for the assessment of heat- and water-related climate change, impacts on urban municipalities are conceived as a function of the climate change hazards and the vulnerability of the exposed population. The concept is expressed through Equations 1 and 2 below:

$I = (H*V) /2$ (Eq. 1)
And
$V = aV_s*E$ (Eq. 2)

47 More info on *https://tool.urbanproof.eu*. The project is co-financed by the LIFE programme for the Environment and Climate Action (2014-2020).

48 See project deliverable C.4 Report on the heath related impact and adaptation assessment DELIVERABLE C.4: REPORT ON THE HEAT RELATED IMPACT AND ADAPTATION ASSESSMENT (*http://urbanproof.eu/images/Deliverable_C4.pdf*).

49 *https://land.copernicus.eu/local/urban-atlas*

Where:

- $I$ is the impact examined,
- $H$ is the hazard,
- $V$ is the total vulnerability of the exposed population,
- $E$ is the exposure,
- $V_s$ the social vulnerability and α the weight of social vulnerability.

Each variable in Equations 1 and 2 is an independent indicator, consisting of one or more sub-indicators. The hazard indicators are used to reflect the climate-dependent information for each impact; the exposure indicators are used to reflect the exposure of population and/or infrastructure to an impact; while the social vulnerability indicators are used to reflect population groups sensitive to climate change impacts, and the adaptive capacity of the society and its structures.

The hazard indicators were calculated using climate information for the reference period. Exposure is estimated with the use of spatial data on population (i.e. population density), as well as on the critical infrastructure (where relevant), while social vulnerability is estimated with the use of relevant statistical data on sensitivity and adaptive capacity indicators. The social vulnerability indicators are combined to form the composite social vulnerability index.

Adaptation is considered to reduce the level of impact, and therefore the following equation is applied:

$$I_{withadaptation} = I_{w/oadaptation} - A \quad \text{(Eq. 3)}$$

In general, the methodology includes the stages of normalisation, weighting and aggregation. In the normalisation stage, the values of indicators expressed in various measurement units are adjusted to a common scale, in order to be comparable. The normalisation scale for the impact indicators is set within the numerical range 0-5, where the different values express five different levels.

The social vulnerability indicator values were normalised based on their position with regard to the respective European average value (above/below average values). The weighting stage includes the assignment of weights to the variables in order to express the contribution and the relevant importance of each sub-indicator in a composite index. In particular, a weight of 0.4 is assigned to social vulnerability ($V_s$) in order to reflect its contribution to the overall impact assessment.

*Achieving the SDGs is an end in itself, but the important thing is the path we follow. When we work on each of the seventeen Goals, we are also striving for an inclusive, resilient and environmentally sustainable city.*

**Juan Espadas**
**Mayor, City of Seville**

# 6. SEVILLE, SPAIN

Author:

*Raffaele Sisto*

*Smart&City Solutions, ITD – Universidad Politecnica de Madrid, Spain*

## 6.1 Seville, the SDGs and their targets

In Spain, several cities and regions including Barcelona (Idea 2020), Madrid (Sachs 2015) and the Basque Country (Euskadi Basque Country 2021), have already submitted VLRs and are reference points for SDG progress evaluation in Europe.

In the city of Seville, extensive work on data and indicator collection and evaluation has been conducted. In 2017, the City Council prepared the *'SDG Diagnostics and Evaluation Report'* for the city of Seville ('Informe Diagnóstico y Evaluación ODS Ciudad de Sevilla' 2017). The objective was to establish the state of the art in the city in terms of sustainable development, and also to build a content guide to adapt the various sectoral plans (existing or under development) to the SDG framework. In February 2019, the City Council and the United Nations organised the event 'Localising the SDGs', where the *'Compromiso de Sevilla'* was taken ('Compromiso de Sevilla' 2019). In addition, the *'Seville 2030 Strategic Plan'* (Ayuntamiento de Sevilla 2019) – developed between 2016 and 2019 –, incorporates the SDG vision in both the city model and the local strategic goals.

The next step was to identify reliable and regularly updated indicators for measuring the city's performance in the SDGs, the principal purpose of the present analysis. Following the guidelines for VLRs and the *European Handbook,* the analysis produced for Seville details the data collection and indicator evaluation methodology used to analyse local SDG indicators. It also describes the data sources and the main challenges in data collection; moreover, it includes a series of proposed additional indicators for a more complete SDG progress evaluation at local level in Seville.

## 6.2 Methodology

The methodology integrates a series of steps described below, which led to the selection of indicators for Seville. Annex 6 includes the list of indicators with their characteristics.

### *Identification and localisation of UN targets and global indicators*

The first step focused on revising global and national indicator sets, to place the proposal for local indicators within a contextual framework, and to enable further alignment and comparison of Seville's indicators with those from other local authorities.

First, the official United Nations indicators for SDGs[50] from the UN-Stats indicator list were

50 UN Stats indicators list available at: *https://unstats.un.org/sdgs/indicators/indicators-list*

revised; all UN targets and indicators were considered in this initial step. The same procedure was applied to the national selection of UN indicators: the official indicators of the Spanish Statistics National Institute (INE)[51]. A first screening established which UN and INE targets and related indicators could be excluded or included in the analysis, based on the following criteria:

- Exclusion of targets / indicators not applicable to Spanish and in general European cities:
  1. Target already achieved at national/European level.
  2. Target not applicable at municipal level because it concerned matters of national, European or worldwide governance.
- Inclusion of targets / indicators applicable to European cities:
  3. UN indicator needs to be scaled from national to municipal dimension.
  4. UN indicator applied to the European context.

When more than one indicator was available for one target, only the best fit at municipal level were kept for analysis.

The first criteria for excluding indicators was the achievement of the related targets at national or European level. In this case, the target was considered no longer applicable for Seville. An example is given through *SDG 3: Ensure healthy lives and promote well-being for all at all ages:* out of the 33 UN indicators for SDG 3, 13 were excluded because the targets are already reached in Europe, such as *3.1.1 Maternal mortality ratio,* or at a national level in Spain, *3.b.1: Proportion of the population with access to affordable medicines and vaccines on a sustainable basis.* Although these are targets that are not measured for Seville today, they might be re-considered for inclusion in the local assessment if the supra-municipal values worsen.

The second criteria for exclusion referred to a target not being applicable at a municipal level, either because it could not be scaled down from a global/national/regional indicator or because it was not applicable in the context of Seville, as with target *3.b.2: Total net official development assistance to medical research and basic health sectors,* and *3.d.1: International Health Regulations (IHR) capacity and health emergency preparedness.*

After the application of these two criteria, 101 out of the 169 targets were selected: the SDGs with most excluded targets were SDGs 1, 3, 16 and 17.

## *Definition of indicators*

Secondly, the selected UN and INE indicators were matched and compared using the following sources:

- The *European Handbook* for SDG Voluntary Local Reviews (Siragusa et al. 2020);
- The Report assessing the SDGs in 100 Spanish cities (REDS - Red Española para el Desarrollo Sostenible 2020);
- The Report 'Diagnóstico de la situación actual y evaluación de la ciudad de Seville en el cumplimiento de los 17 Objetivos de Desarrollo Sostenible de la Agenda 2030.' ('Informe Diagnóstico y Evaluación ODS Ciudad de Sevilla' 2017).

51 INE indicators list available at: *https://www.ine.es/dynt3/ODS/es/index.htm*

These reports already considered other indicator systems, thus, they represent the main references when localising SDG targets and defining indicators for the city of Seville. For example, the indicators used in the REDS/SDSN report are the result of an analysis of 84 indicator systems applicable at urban level. Once all indicators and targets were placed in the same target-indicator matrix, the matches were categorised into three different groups:

- Indicators with a perfect match between one or more data sources;
- Indicators that were similar in one or more data sources;
- Indicators without correspondence to official UN indicators or other data sources. This category represents either the official UN indicators not measured in the other reports, or the experimental indicators set out in other reports that monitor cross-cutting aspects of the SDGs.

## *Selection of indicators for the city of Seville*

After the second stage of indicator collection, including those at global, national and municipal level, the most appropriate ones for the city of Seville were selected. For this purpose, a new set of criteria was applied, seeking to cover the broadest possible evaluation.

- Criteria 1: all *European Handbook* indicators were considered until final selection;
- Criteria 2: when *European Handbook* indicators were not available for Seville, REDS/SDSN indicators were given priority, as they repeatedly showed a larger coincidence with indicators from other sources;
- Criteria 3: UN indicators that could be scaled to municipal level were kept;
- Criteria 4: New experimental indicators were proposed, whether they resulted from scaling UN or INE indicators to municipal level, or they were designed taking existing indicators as reference.

## *Availability of data and data sources*

Finally, the data were collected from multiple sources for the selected indicators. In addition to the previously-used data sources, other databases from European to municipal level were consulted. Additional indicator providers/sources included inter alia Eurostat, International Organization for Standardization (ISO), International Telecommunications Union (ITU) / United Nations Economic Commission for Europe (UNECE). The consultation of additional official and public sources, from European to municipal levels, privileged the following databases (in order of preference):

- European / Global
  - (a) Database suggested in the *European Handbook*
  - (b) Eurostat – City statistics database[52]
  - (c) OECD – Metropolitan statistics[53]

52 *https://ec.europa.eu/eurostat/web/cities/data/database*
53 *https://stats.oecd.org/Index.aspx?DataSetCode=CITIES*

- Public nationwide
  - (a) Spanish National Statistics Institute (INE)[54]
  - (b) Spanish Ministries
- Private nationwide (open data of some private bodies)
- Regional
  - (a) Autonomous Regions databases
- Local
  - (a) Seville public databases
  - (b) Seville not open databases

The process of taking data from global to local level ensured the scalability and applicability of the data to other European or Spanish cities. Moreover, it indicated the data disaggregation level (for example: a variable may be available on Eurostat at municipal level, but may also be available at census level in the regional databases).

One of the goals of data collection was to identify existing gaps in data that are key for the city of Seville; the use of local sources is key to integrating data available from European and national sources, however, it can also limit comparability across cities; for this reason, European and national sources were prioritised in this work.

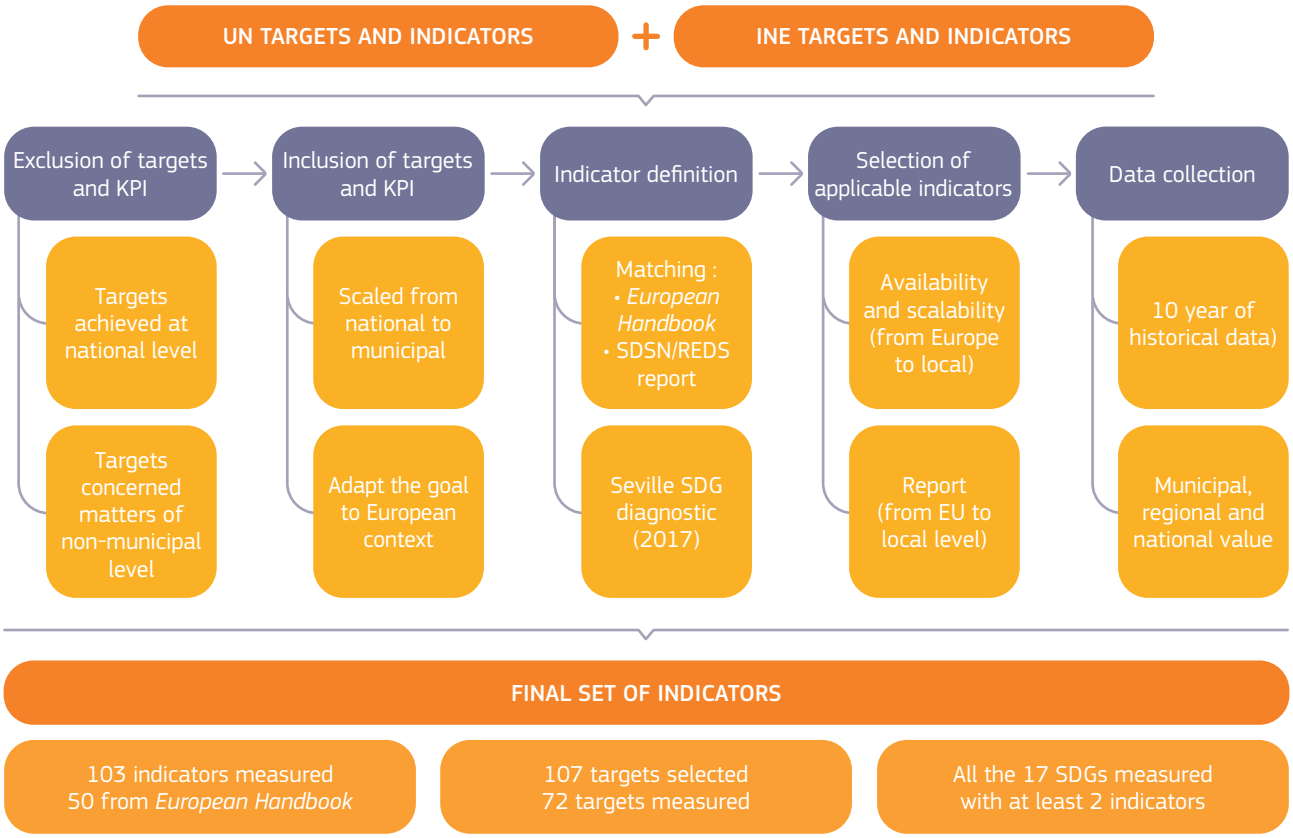
For the sake of future replicability of the assessment, indicators were examined based on criteria such as quality, availability, and reliability. Compliance with the five characteristics of the SMART scheme (Specific, Measurable, Achievable, Relevant, Time-framed) has been used as a criterion (Doran T George 1981).

In addition, the available indicators were classified into two types, according to their approach to measurement: input and output indicators. **Input indicators** are those that measure the degree of implementation of projects and policies – 'control' indicators –, and those that measure the resources devoted to the fulfilment of a given goal, or 'effort' indicators. **Output or 'result' indicators** are those that measure a magnitude directly related to people's quality of life or to the provision of services. They reflect the impact of an organisation's activity; hence this type of indicator was given priority for the selection.

Moreover, the selection of indicators considered their comparability traits. Therefore, open, public, and official databases available beyond the context of Seville were prioritised over others.

54 *https://www.ine.es*

FIGURE 34: Seville – Methodology for the selection of indicators




Source: Author's own elaboration

## 6.3 Availability of SDG indicators in Seville

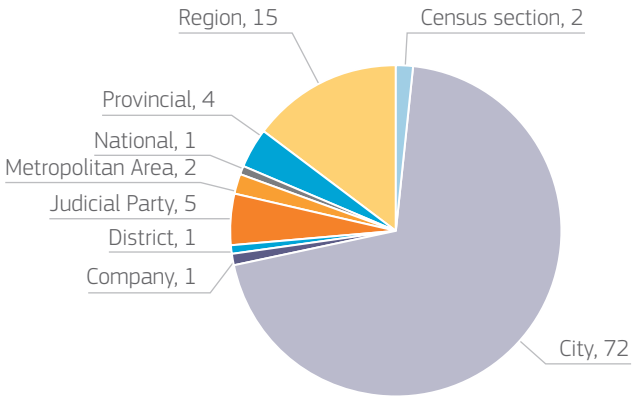
The *European Handbook* is the main reference for starting the selection of indicators for Seville. Following the detailed methodology, it was possible to obtain a set of confirmed, excluded, and newly proposed indicators (detailing whether they are interesting only at a local scale for Seville or for a wider regional or national scale for Spain or Europe), as well as some ideas on indicators to be developed in the future (indicators that are key but that at the moment have no data available for calculation).

For Seville, a total of 103 indicators linked to the SDGs were identified: 75 are available at municipal level, two for the metropolitan area of Seville, four at provincial level, 15 at regional level (Autonomic region of Andalusia), one at national level (Spain) and six for other aggregation levels (e.g. district, census tract etc.). The supra-municipal level indicators have been included in this list when considered relevant for the measurement of progress towards the SDGs and in the absence of municipal (or lower) data.

42 of the 71 indicators identified in the *European Handbook* have available data for Seville. Eight indicators can be calculated with similar methodologies using local official sources. The remaining 21 *European Handbook* indicators, for which no data has been identified, usually belong almost entirely to indicators generated from European surveys (e.g. 'Satisfaction with

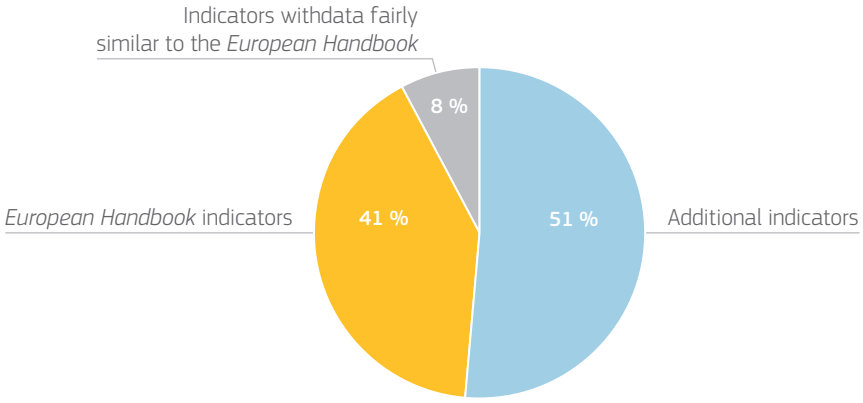
the administrative services of the city'), and to experimental indicators that are difficult to apply due to the lack of data or the complexity of the methodology (e.g. 'Blue City Index').

**FIGURE 35:** Seville – Geographical disaggregation of indicators




**Source:** Author's own elaboration

**FIGURE 36:** Seville – Alignment with *European Handbook* indicators

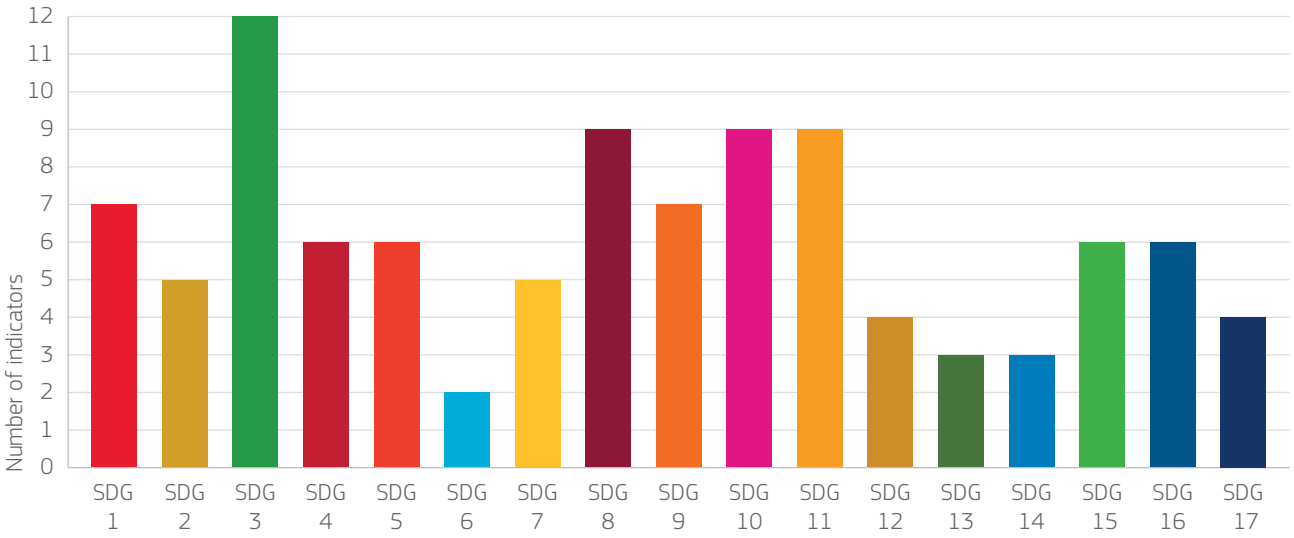



**Source:** Author's own elaboration

The selected indicators cover 72 of the 101 identified SDG targets, and some of them are common to various SDGs. For the SDG targets not covered, forward-looking indicators are suggested. All SDGs are covered by a minimum of two indicators; the following figures show the number of indicators by SDG (Figure 37) and the percentage of coverage of the selected targets (Figure 38).

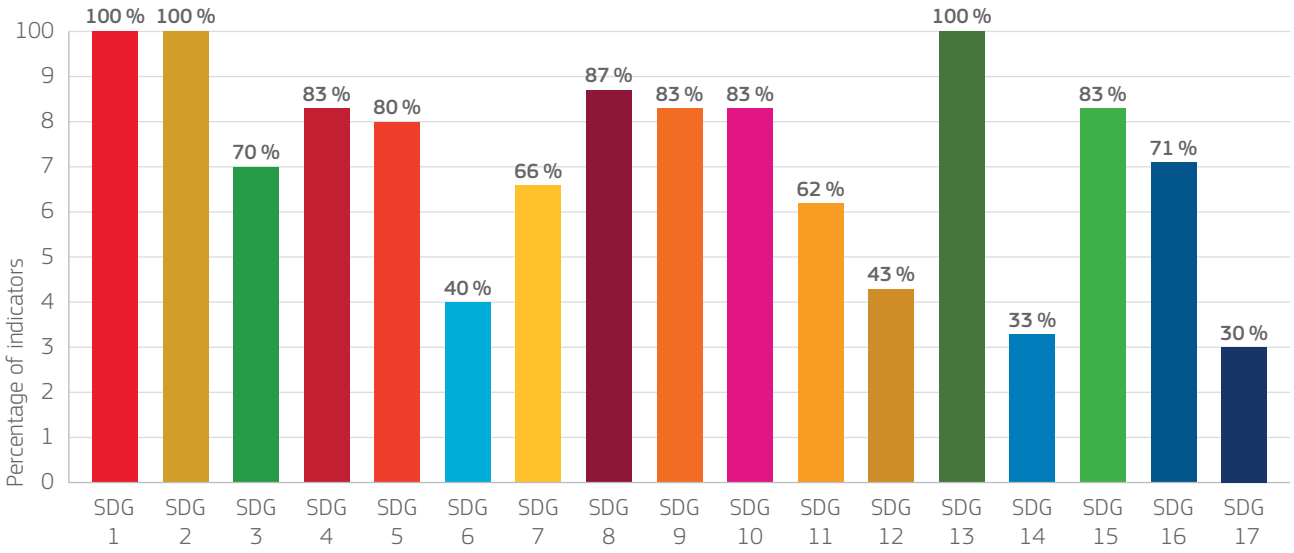
Figure 37 only reflects the quantitative result and not the quality of the indicators. For example, SDGs 1, 2 and 13, seem to be best covered numerically; however, qualitatively, there is some margin for further improvement because some targets are not yet covered. On the other hand, SDGs 6, 14 and 17 have fewer indicators and poor coverage; therefore, an initial conclusion is that the City Council of Seville would need to prioritise data collection in these six SDGs. The measurement of SGD 11 could also be improved, especially with regard to the coverage of the targets relating to mobility and green spaces.

**FIGURE 37:** Seville – Number of indicators available by SDG




**Source:** Author's own elaboration

**FIGURE 38:** Seville – Percentage of target coverage by SDG




**Source:** Author's own elaboration

Detailed results were developed for each SDG target and indicator applied or applicable to the city of Seville. For the 103 indicators, the analysis prepared for the city included a factsheet containing basic information on the method of calculation, the main results and limitations.

The following information was provided for each localised indicator:

- name
- description
- data source
- alignment (UN, JRC, REDS or Seville)

- last available reference values for the indicator. Municipal, regional and national values are shown when available.
- unit of measurement
- last available year at municipal level
- possibility of disaggregating the indicator (e.g. by age, gender, census tract, ...)

Each indicator was described in relation to its target (which may present more than one indicator). At the end of each goal, the common indicators (possibly aligned to more targets), the alignment with the *European Handbook,* and the main limitations and bottlenecks were described. Identifying the missing data led to the pinpointing of gaps between indicators and targets that are key to the urban level but might not be available. The indicators for which it was not possible to collect data, hence not covered, might be considered for further studies.

Finally, each indicator included a brief descriptive summary of the historical trend, with respect to the regional and national value. This helped to identify and assess the main strengths and gaps in Seville. All the historical data collected by each indicator at the various levels of disaggregation used (municipal, regional and national) were also made available to the city.

**FIGURE 39:** Seville – Last year available

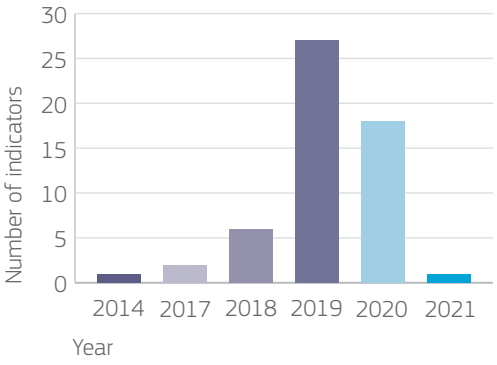
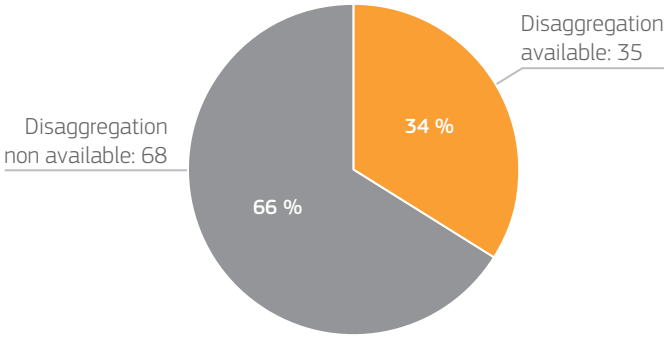



**FIGURE 40:** Seville – Disaggregation available




**Source:** Author's own elaboration

**FIGURE 41:** Seville – Frequency

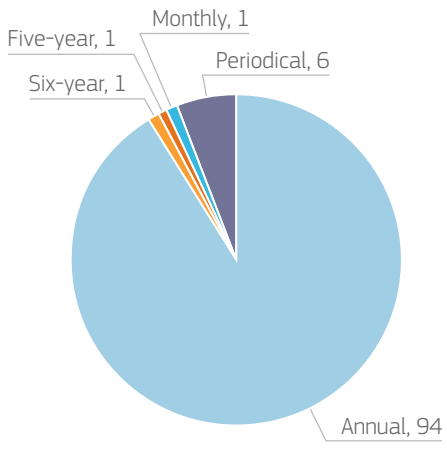
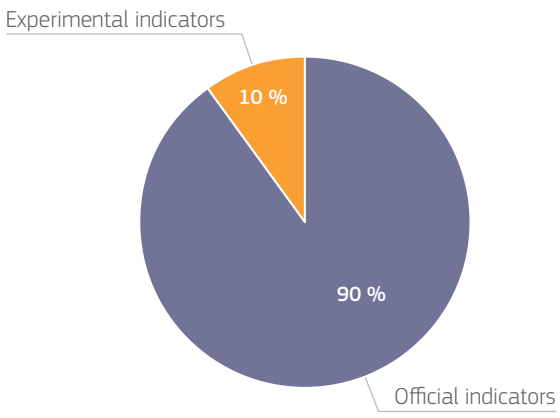



**FIGURE 42:** Seville – Experimental and official indicators




**Source:** Author's own elaboration

## 6.4 Key findings

The SDGs and the 2030 Agenda are a touchstone for a variety of national and European strategies, developed to face challenges in a post-Covid scenario over the next decades. Policies such as *Next Generation EU, European Green Deal, Decarbonisation and Digital Transformation roadmap,* require tracking and benchmarking tools. The SDG monitoring and the work carried out for Seville identify relevant indicators and data that can serve this purpose beyond the scope of the SDGs.

This analysis is a fundamental information tool for demonstrating the SDG performance of Seville: it identifies the indicators that the city could use to monitor the 17 SDGs, and the gaps in data sources that should be addressed in forthcoming years in order to correctly report the impact of the city on sustainable development.

On the one hand, the availability of data for Seville is sufficient to cover many of the priority goals for the city. Most indicators are available from supra-municipal sources and this is an advantage when scaling and comparing them in other contexts and cities. On the other hand, there is a gap in the open availability of certain data sources. Seville has a large amount of data broken down into a variety of topics, but the information is distributed over several statistics or open data web pages. It would be desirable to exploit existing platforms, such as the IECA (*Instituto de Cartografica Y Estatistica de Andalusia*), to centralise the municipal data of Andalusia in a common portal, as occurs in other European regions.[55]

**SOME HIGHLIGHTS**

- The analysis strongly focusses on Targets.
- To ensure indicators' applicability to other contexts, official European and national sources were prioritised.
- Focus on 'Output' or 'Result' indicators reflecting the impact of public policies on the quality of life of the general public or on the provision of services.
- The availability of data for Seville is sufficient; gaps are open availability of some data sources, and lack of centralised municipal data.
- Align the current 2030 Agenda implementation strategy of the city with the relevant targets identified.
- Aligning the local budget with the SDGs is recommended.

From the results extracted for each SDG, it has been possible to identify a battery of new indicators divided into two categories: (i) Available and applicable, and (ii) Not applicable due to lack of data. The efforts of the city of Seville should focus on collecting information to measure the SDG targets not covered. At the same time, the level of disaggregation of identified data became relevant for selecting those indicators that would lead to a more precise evaluation at district level, or a subgroup of the general population.

Seville has made progress in some SDGs, achieving an advanced position in comparison with its region, Andalusia, and with the national average. Seville performs better in **SDGs 1 and 10,** probably influenced by the increase in the social welfare budget. **SDG 2** presents promising results, although it is necessary to introduce a better monitoring system at local level, to improve data on local organic agricultural production and to analyse the food sector and food production situation. In **SDG 3,** even though Seville generally maintains a stable and notable position on health, it is necessary to continue monitoring and improving data on target 3.9 'death produced by air pollution'. **SDG 4** presents controversial data, showing Seville as a polarised territory: on one hand, Seville has a highly educated population or a significant presence of students in higher education while, on the other, it presents a relatively high number of individuals with a low level of education. These extreme values could generate inequalities in society, negatively influencing other SDGs, like SDG 10.

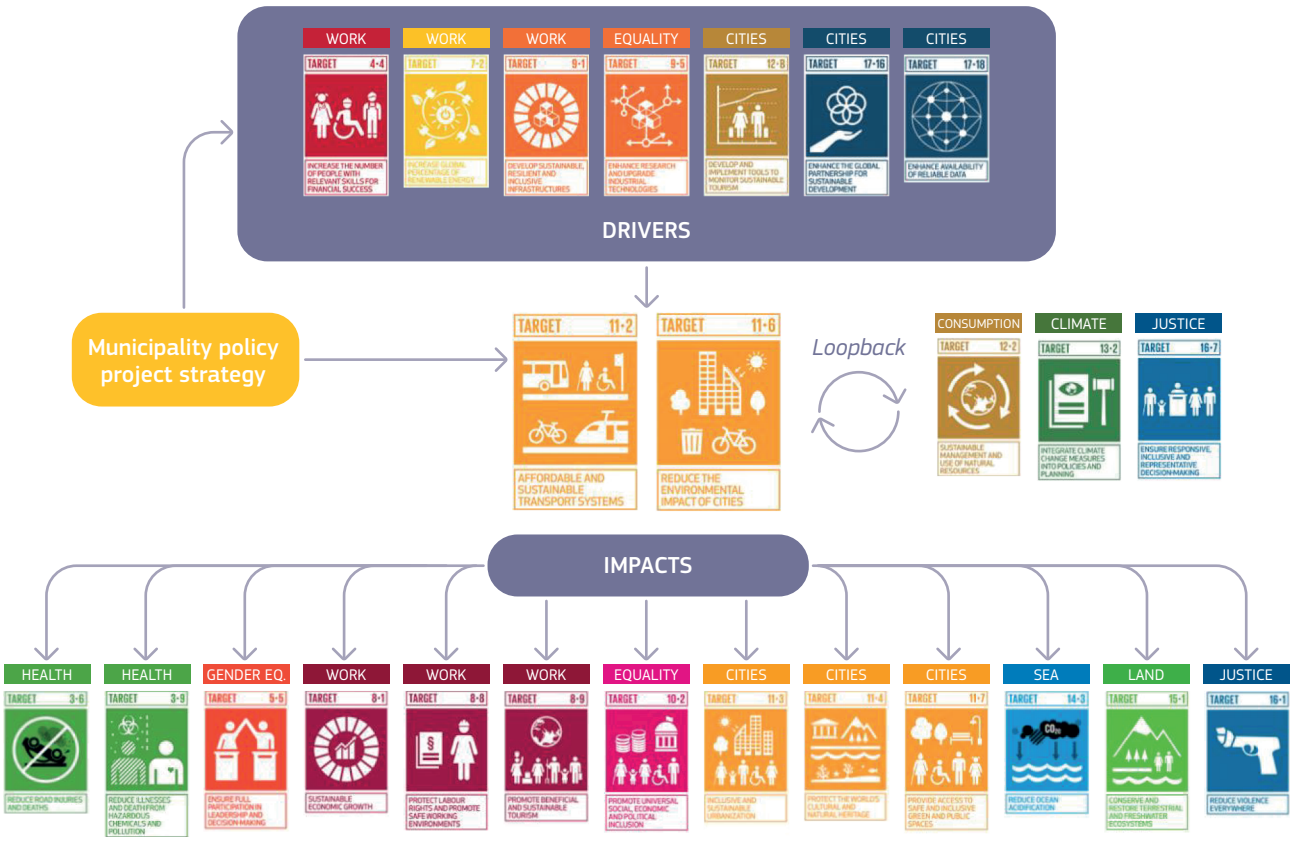
55 Examples of European regions measuring the SDGs are discussed in (Gea Aranoa 2021).

With respect to **SDG 5,** Seville could also improve its performance, not only in terms of employment, where a sustained decrease in the gender employment gap has not been achieved, but also in terms of gender violence, for which the ratios are higher than in Andalusia and Spain. SDG 5 is a cross-cutting goal of 2030 Agenda and should be given high priority in Seville's municipal plans. As for **SDG 6,** the available indicators suggest a favourable situation in the city of Seville. Besides this, it is necessary to visualise other dimensions and targets related to water and sanitation, for example in terms of additional indicators to improve Seville's water efficiency. **SDG 7** depicts a favourable situation in the municipality of Seville; for instance, the renewable energy rate has significant values. However, they are decreasing over time; it would therefore be necessary to know the causes of this trend in order to address this decline.

For **SDG 8,** it is worth highlighting the significant wage gap for women in the municipality (in line with what is presented in SDG 5). The trends of the growth of gross domestic product per capita and GDP per hour worked are not aligned: this phenomenon of the Sevillian labour market requires further analysis. This analysis is closely linked to **SDG 9,** on innovation and the industrial sector: Seville will need to prioritise this SDG and bolster the sustainable infrastructure to advance in industries centred on high technology, and to foster R&D within its territory.

**SDG 11** has several gaps and bottlenecks due to the complexity of measuring some indicators. The indirect impact analysis carried out has enabled the identification of hypotheses of impacts of SDG 11 on other targets, including several that were not covered by any indicator, as illustrated in Figure 43.

**FIGURE 43:** Analysis of the impact of targets 11.2 and 11.6 on other SDG targets




**Source:** Author's own elaboration

The environmental SDGs, including **12, 13, 14 and 15,** present encouraging data for Seville, with particular attention to campaigns that promote recycling and continue to create green areas and reduce greenhouse gas emissions. However, SDG 12 presents data gaps for the circular economy and sustainable tourism, due to the complexity of developing solid indicators in these fields.

**SDG 16** reveals the need to boost public participation (Seville has no participatory budgets) and to collect information on people's level of satisfaction with the public administration and their quality of life. **SDG 17** is the goal with most uncovered targets: Seville needs to make an effort to monitor this goal and report on the achievements and problems related to its targets. Seville, in this aspect, participates in several national and international networks and promotes several initiatives of cooperation and collaboration between the public and private sectors to achieve the SDGs, for example *'El día después'*[56].

## *Further steps*

Once the diagnostics and progress tracking methodology has been established, further steps can be proposed:

- This analysis provides certain suggestions on the specific target values that should be achieved for each indicator to consider their associated SDGs as accomplished. Therefore, Seville should establish its own target values, in accordance with its urban reality and in coherence with those in the 2030 Agenda.
- This analysis should be linked to the current 2030 Agenda implementation strategy of the city. Specific measures and projects integrated in that strategy should be aligned with those SDG targets identified as relevant through this work, and input and output indicators assigned for a better definition of the impact of such public policies. The indicators collected in the analysis could be the key tool for setting priorities and decision-making in the future.
- The question of impact is, however, broader and difficult to conceptualise in quantitative terms. In addition to the direct impact of public policies, an evaluation of their possible side effects is also highly recommended, due to the tight interrelation within the SDGs. This will enable a better prioritisation strategy, favouring those projects that maximise positive impact (both direct and indirect).
- Public budgets are the most powerful instruments for administrations when addressing any agenda. Conclusions from (Lagoarde-Segot 2020) urge mainstreaming SDGs into budgets to meet the SDGs before 2030. Aligning the local budget with the SDGs would be a wise step for Seville, to highlight the effort made and link it to the evolution of the indicators. The Government of Spain has presented, within the General State Budgets for 2021[57], a spending alignment with the SDGs for the first time, and several other administrations have developed their own guidelines.
- This analysis and suggested indicators could be a fundamental tool for the city, policymakers, organisations and the general public, for improving the sustainable development of the City of Seville and updating its sustainability strategy. This analysis offers the opportunity to make municipal data and findings available, and to transfer

56 *https://diadespues.org/?lang=en*

57 *https://www.sepg.pap.hacienda.gob.es/Presup/PGE2021Proyecto/MaestroDocumentos/PGE-ROM/Series.htm*

knowledge between cities for localisations and the implementation of indicators to measure the 17 SDG.

## 6.5 Experimental indicators

New experimental indicators were created either by scaling some of the UN or INE indicators to a municipal level, or by taking some existing indicators as reference. Three of these are presented here as examples.

### *SDG 8: Dependency index by sector of employment*

The main objective of this index is to identify municipalities vulnerable to crises or changes that affect their economy and business network. It measures the distribution of jobs in the city and, consequently, possible problems that may arise in crises affecting certain economic sectors. A city with a distribution of its workers across several sectors will be more resilient to crises with respect to another that is specialised in certain sectors. However, being focused in one or more sectors could also have economic and efficiency advantages. This index was prepared by the author Raffaele Sisto with A. Quintanilla, J. García for the first time for the REDS 2018 report (REDS - Red Española para el Desarrollo Sostenible 2018) to measure aspects of SDG 8 and 9. It has subsequently been used in the REDS 2020 report (REDS - Red Española para el Desarrollo Sostenible 2020) and in several Spanish municipalities to analyse employment and the impact of COVID-19 on the economy.

The index is calculated using the average differences (in absolute values) between the employment percentages for each of the 10 sectors (as defined by Eurostat) in each municipality with respect to the average value of each sector in all the municipalities analysed. A value closer to 0 indicates that the municipality analysed has a distribution of jobs similar to the average of the sample analysed and, therefore, the city adapts better to crises or changes, while a higher value indicates that the municipality has many jobs in few specific sectors and may have problems if its productive network is greatly affected by an unforeseen change.

One advantage of this index is that, using Urban Audit as a data source, it is easily applicable to all European cities included in this database. Another aspect to consider is the decision not to weight the sectors. This is due to the fact that, on the one hand, the average number of jobs per sector already gives sufficient weight to the most predominant sectors in the country, and, on the other hand, the difficulty of assigning objective weights to each sector. In general, cities closer to 0 have a more sustainable development of their productive network. However, it is necessary to partly consider outlying cities that have sectors particularly developed due to their physical, political and environmental conditions (capitals with many workers in public administration, rural and coastal municipalities with many workers in the primary sector, etc.).

The dependency index by employment sector for Seville has a medium-high value, and could therefore be less resilient to a crisis or change affecting its economy; however, when interpreting the data that make up the index, the high value for Seville is found to be mainly due to the 'Employment (jobs) in public administration, defence, education, human health and social work activities (NACE Rev. 2, O to Q)' sector, which is twice the average of the cities analysed (this characteristic usually happens in regional capitals, although not to such an extreme). This

sector is slightly affected by changes. Therefore it can be assumed that, on one hand Seville is more resilient to possible changes due to the strong presence of a static workforce. On the other hand it is less attractive because of the reduced presence of other sector types (industry, small business, R&D).

The index is experimental; it has limits and is subject to improvement, but it may offer significant support to municipalities when defining certain policies aimed at the protection and development of their productive network.

**TABLE 6:** Seville – Sector-dependency job index

| Data Source | Eurostat; City Statistics database; table urb_clma | | | | |
|---|---|---|---|---|---|
| **Disaggregation** | City | | **Alignment** | JRC | |
| **Seville** | 5.42 | **Andalusia** | 3.04 | **Spain** | 3.28 |
| **Reference year** | 2018 | **Unit of measurement** | Index | **Frequency** | Annual |

**Source:** Authors' elaboration

## *SDG 11: Urban Vulnerability*

Urban vulnerability, in a socio-economic sense, concerns the ability of households to have a minimum living standard (both materially and psychologically). This index was defined and calculated by the author Raffaele Sisto with A. Quintanilla, J. García for the first time for the REDS 2018 report (REDS - Red Española para el Desarrollo Sostenible 2018). Urban vulnerability is a multi-dimensional concept, closely related to SDG target 11.1, which measures which urban areas are most vulnerable in terms of income. Vulnerability is measured by the number of people at risk of poverty (family income is below 40% of median income). Hence, vulnerable areas are those where the proportion of the population at risk of poverty is twice the city average or is above the country average (21.5% in the case of Spain). Finally, the indicator is defined as the percentage of the population living in such areas. The data source is the INE's Experimental Statistics Service, where income data is provided for census sections nationwide. Besides urban vulnerability, this indicator provides information about segregation, if represented geographically. It is a relative measure, depending on the city's economic conditions, the country average factor compensates possible bias in extremely rich or poor cities. This indicator is easily applicable to other cities as long as the income statistics are also available in the given country. The value for Seville is lower than the regional and national averages.

TABLE 7: Seville – Urban vulnerability

| Data Source | National Statistics Institute, Experimental Statistics, Household income distribution map, 2019 | | | | |
|---|---|---|---|---|---|
| **Disaggregation** | City | | **Alignment** | REDS | |
| **Seville** | 16.39 | **Andalusia** | 15.05 | **Spain** | 6.77 |
| **Reference year** | 2017 | **Unit of measurement** | % | **Frequency** | - |

Source: Author's own elaboration

## *SDG 17: White Next Generation Access (NGA) areas*

The indicator 'White NGA areas' measures the proportion of dwellings located in white NGA (Next Generation Access) areas as a proportion of the total housing stock. White NGA areas are those where a new generation broadband communication network is not available, and there are no credible and financially-backed plans for its deployment by any operator in the next 3 years. The percentage of dwellings in White Areas in Seville is low, as expected for urban areas (0.51 %); however, it is at the high end for equivalent cities such as Bilbao, Valencia, Málaga, Barcelona or Madrid. Although this is not a direct competence of the local administration, there is room for improvement in the collaboration with digital operators.

This experimental indicator was prepared by Raffaele Sisto with A. Quintanilla, J. García for the first time for the REDS 2020 report (REDS – Red Española para el Desarrollo Sostenible 2020). The information about broadband connectivity, together with the future network deployment plans, is collected annually from the operators by the Secretary of State of Telecommunications and Digital Infrastructure. Based on this, the areas identified as possible White NGA Areas are listed for allegations and data contrast. The information is provided as a list of sub-municipal entities (neighbourhoods, villages...) and the number of people and dwellings affected. This indicator is expressed as the ratio between the number of dwellings not covered by a new generation broadband communication network and with no credible and financially-backed plans for its deployment, and the total number of dwellings within the municipality of Seville. The data for total dwellings in the municipality has been extracted from the Spanish Urban Agenda database. Nowadays, urban cores have almost complete network connectivity in all broadband technologies (both wireless and fixed) and this connectivity is also very high in rural areas. Therefore, a direct measure of network coverage could hide localised digital divide issues. This indicator focuses on those issues by pointing out areas where there is a significant number of people with poor access to communication and data services. The ratios are usually very low (<1 %) for urban areas but make a difference in terms of the socio-economic integration of segregated populations. The applicability of this indicator in other cities depends on the definition of the network coverage standards measured in available statistics. In the case of Spain, the network reach data is collected at a national level and that makes it easier to obtain this indicator for other cities. In other contexts, it might be difficult or even confusing if data quality thresholds are defined differently. For further evolution of the indicator, the broadband technologies considered should evolve as well, following the needs for digital services.

This experimental indicator is applicable to all Spanish cities.

**TABLE 8:** Seville – White NGA areas

| Data Source | Secretaria de Estado de Telecomunicaciones e infraestructura Digital | | | | |
|---|---|---|---|---|---|
| **Disaggregation** | City | | **Alignment** | REDS | |
| **Seville** | 0.51 | **Andalusia** | - | **Spain** | - |
| **Reference year** | 2020 | **Unit of measurement** | % | **Frequency** | |

**Source:** Author's own elaboration

*Valencia has never faced such a vital challenge. Cities need to enable mechanisms to evaluate the extent to which they are really meeting sustainable development objectives to hamper further effects of climate change. Environmental justice and sustainable development are crucial objectives to pursue and the only way to achieve them is implementing actions leading to measure and compare the evolution of public policies. This is the sole path conducting to the successful fulfilment of the global objectives.*

**Elisa Valia**
**Deputy mayor, City of Valencia**

# 7. VALENCIA, SPAIN

Author:

*Eloina Coll Aliaga*

*Universitat Politècnica de València, Spain*

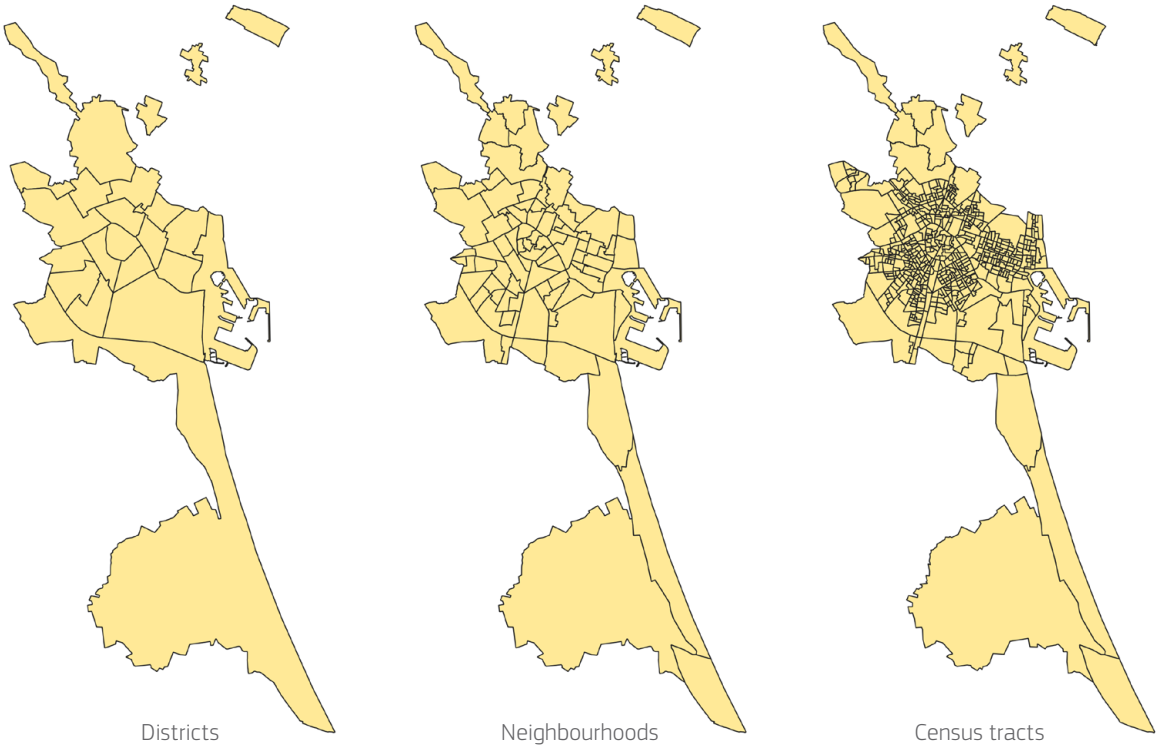
## 7.1 Valencia and the SDGs

The city of Valencia has been publicly committed to sustainable development since 2011, when the city published its *Strategy to fight climate change*[58]. This was a turning point for the city which incorporated sustainable development in its projects. Measures included emphasising the importance of parks and gardens in all the districts of Valencia, promoting sustainable mobility and favouring public transport and cycling.

In 2016, specific teaching activities in relation with the 2030 Agenda and the SDGs were developed through projects such as the *Universitat de tardor*[59].

More recently, in 2020, the City Council allocated more than EUR 350 million of the budget to address 81 of the 169 targets of the UN agenda, reaffirming its commitment towards sustainable development.

**FIGURE 44:** Valencia – Administrative division of Valencia: Districts, Neighbourhoods and census tracts




**Source:** Author's own elaboration using data from the Open Data portal

58 *https://www.valencia.es/documents/20142/44448/Estrategia%2520Valencia%25202020.pdf/246aad9a-3d55-24ff-4a41-8f7a0abb6165*

59 *http://cooperacioValènciana.gva.es/es/universitat-de-tardor-2016*

Valencia is located on the east coast of Spain; the city is the capital of the Valencia province and of the *Comunitat Valenciana.* Divided into 19 districts, 88 neighbourhoods and 606 census tracts, the city has 801 545 inhabitants (according to the 2020 census[60]) and an area of 134.65 km$^2$. Several studies and statistics focus on the metropolitan area of Valencia[61], the area formed by all the municipalities around the city of Valencia (44 municipalities in 628.9 km$^2$). These municipalities belonged to the historic region of la Huerta de Valencia.

## *Missions Valencia 2030*

Missions Valencia 2030 is a process that runs in parallel with and within the Valencia Strategic Plan.[62] It represents the strategic framework for social and urban innovation in Valencia, and aims to direct public effort in this area, as well as facilitating the joint efforts of the research and innovation sectors, willing to contribute to the sustainable development of the city.

Missions Valencia 2030 supports the contribution of the innovation and knowledge management policies of Valencia city council to the 2030 Agenda and the SDGs by improving the public's perception of them. Additionally, the various projects developed within Missions Valencia 2030 (named Innovation Missions, and expressed as Objectives and Key Results), will bring strategic support to the achievement of the SDGs and to local government plans.

With the various Innovation Missions, the city council seeks to achieve the empowerment of the people; therefore, three of the Objectives and Key Results (OKR) to be implemented in Valencia will be chosen by the public, and another three by the city council. The first OKR approved by the city council in February 2021 is *'Valencia Ciudad Neutra',* which aims to have at least three climate-neutral neighbourhoods in the city by 2030.

The approach of the Innovation Missions enabled the development of participatory dynamics with the most relevant networks and operators of the city right from the start, in line with the quadruple helix model. During the identification process and the debate about the relevant areas on which the Innovation Missions for Valencia should focus, three models of city were set out in accordance with social and urban innovation objectives, to ease the dialogue with the four helixes: sustainable city, healthy city and shared city. Therefore, the innovation effort will be directed at improving the health of the inhabitants, the environment and the social and collective well-being of the inhabitants'.

60 *https://www.valencia.es/val/estadistica/ultimes-dades*

61 *https://www.valencia.es/documents/20142/2154295/AM_Poblaciones2018.pdf/8f414064-c791-c819-6709-3406445df991*

62 *https://www.missionsvalencia.eu/wp-content/uploads/2020/06/marco-estrategico-mvlc2030.pdf*

**FIGURE 45:** Valencia – Mission Valencia 2030 in the Valencia Urban Strategy 2030


**Source:** Missions Valencia 2030. Ciudad saludable, sostenible, compartida y emprendedora. Valencia City Council

## 7.2 Methodology

The criteria suggested in the *European Handbook* were prioritised to identify the best indicators for monitoring the SDGs in the City of Valencia. This resulted in the following activities:

- Meetings with the various section heads of the Valencia City Council Departments.
- The creation of an inventory of existing public data in Valencia City Council.
- An assessment of the current legislation and the degree of compliance with regard to open data sets, infrastructures, and geographic information services.
- A study of all the indicators by: name and description, unit of measurement, is publicly available for Valencia, as open data, level of geographical disaggregation (municipal, district, neighbourhood or census units), geographic and time coverage, frequency, data sources, and breakdown (e.g. by age and gender).

This analysis has been carried out in two phases: firstly, an internal study of the indicators was performed with the City Council's statistics office; secondly, an external study was carried out with the support of the *Universitat Politècnica de València* (UPV). The methodology used at the UPV was as follows:

- First the website of the city council's statistical office[63] was searched for indicators. On this website, the indicators are classified by theme and subtopic. If the desired indicator was not found for any theme or subtopic, the City Council's yearbook[64] was searched.
- The documentation for Valencia city council's projects relating to the SDGs and all city websites were reviewed in search of useful data for calculating indicators.
- The various SDG reference systems potentially applicable to Valencia were also studied.

Work on the SDGs took place in parallel with the work on open data in Valencia City Council. Consequently, a large part of the work focused on open data activities in the City. The documents

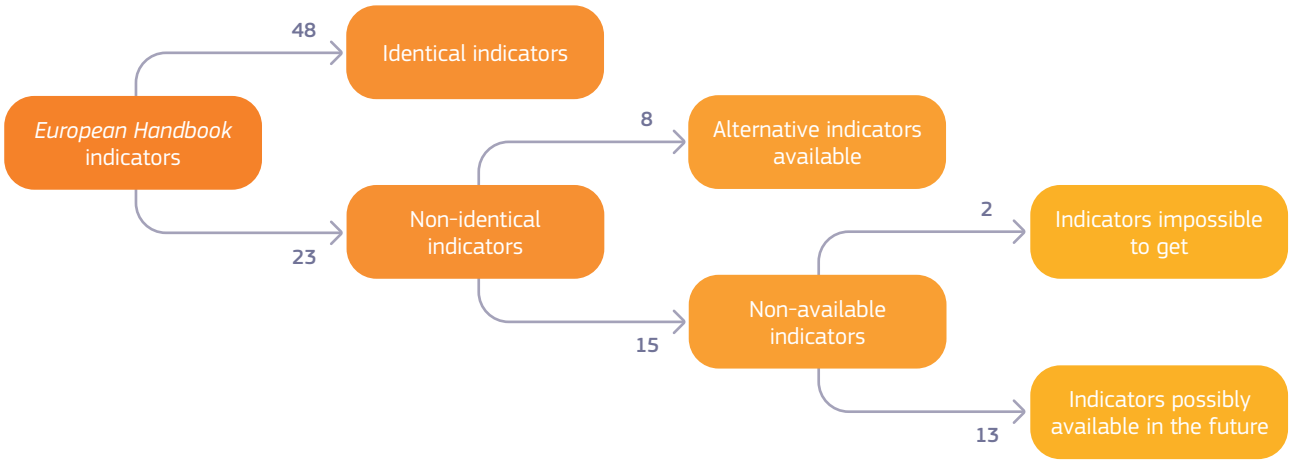
63 *https://www.valencia.es/val/estadistica/indicadors-socials*
64 *https://www.valencia.es/val/estadistica/cataleg-de-publicacions*

reviewed include 40 datasets published either by local entities or by the Spanish Federation of Municipalities and Provinces (FEMP) with the Network of Local Entities for Transparency and Public Participation. Many of these datasets include indicators for the SDGs.

One of the most relevant documents analysed is the *Strategic Plan for Valencia 2030*[65], published by the Valencia City Council in February 2020 to foster the achievement of the SDGs. This has not advanced as planned due to the COVID-19 pandemic.

Finally, new indicators were proposed. These include one specifically related to COVID-19, which has already been used in Valencia during the pandemic. All proposed indicators are the result of various projects developed with the cooperation of the *Universitat Politècnica de València,* and selected in accordance with Valencia's priorities.

**FIGURE 46:** Valencia – Methodology for the selection of indicators




**Source:** Author's own elaboration

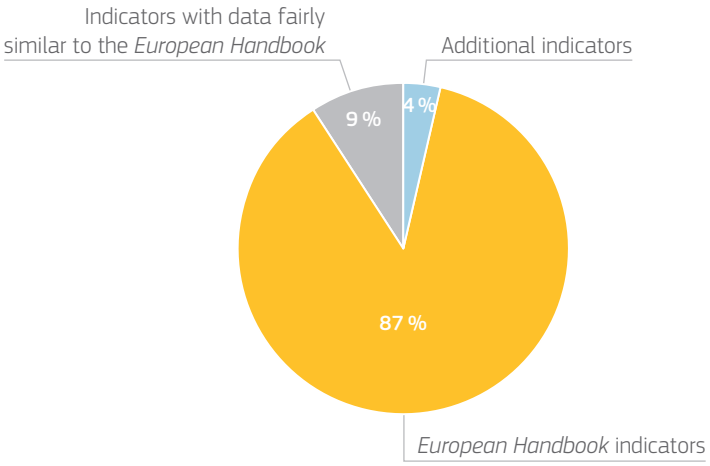
## 7.3 Availability of SDG indicators in Valencia

### *Matches with the European Handbook*

Out of the 71 indicators proposed in the *European Handbook,* 48 are available for Valencia, while for a further seven some alternative or proxy could be proposed, since an identical indicator is not available. Additionally, 20 indicators specifically linked to culture and creativity are available for Valencia. This dimension was covered in the *European Handbook* by the Cultural Creative Cities Index. **Table 9** illustrates the list of alternative indicators proposed for Valencia.

65 Available at *https://www.valencia.es/documents/20142/424002/Estrategia%2520València%25202020.pdf/45a6bf21-6304-7509-c717-ea0e105de538*
The Strategic Plan includes the Missions València 2030 which is the framework for innovation projects with a direct impact on improving people's lives. Missions Valencia 2030 is a guide for the work of Valencia's innovative ecosystem, based on four helixes: the private sector, universities with their research centres and technological institutes, the public sector, and civil society. *https://www.missionsvalencia.eu/cpivalencia/wp-content/uploads/2021/07/marco-estrategico-mvlc2030.pdf*

**FIGURE 47:** Valencia – Alignment with *European Handbook* indicators




**Source:** Author's own elaboration

**TABLE 9:** Valencia – Indicators from the *European Handbook* with their proposed alternatives

| | *European Handbook* indicator | Alternative indicator |
|---|---|---|
| SDG 1 | People living in households with very low work intensity | Number of unemployed people. |
| SDG 1 | Homeless people | People served in Social Attention to Homeless People Program of Municipal Social Services. |
| SDG 5 | Female hospitalization for assault | Complaints of gender violence based on injuries. |
| SDG 6 | Recycled water used for open spaces | Percentage of wastewater receiving tertiary treatment. It does not specify if the water is used for open spaces. |
| SDG 6 | Blue City Index | The Blue City Index is formed by many indicators, some of them are available for the city. |
| SDG 9 | Journeys to work by public transport | Share of employed persons aged 18 and over who travel more frequently to work by public transport. |
| SDG 11 | Housing cost overburden rate | Homes with a mortgage, percentage of economic effort by district for housing, percentage of spending per household on average housing in the city. |
| SDG 11 | Cultural Creative Cities Index | This indicator is originally composed of 29 indicators, of which 20 are available for Valencia.[66] |

**Source:** Author's own elaboration

66 Details are available in Annex 6.

The remaining 15 indicators are not collected and available for Valencia. Two of these are not considered a priority (*Daily smokers in 1st and 2nd year of upper secondary school* and *Average satisfaction with life by sexual identity for 15-year-old children*), considering the sensitivity of handling data about minors and their sexual life and addiction habits. The other 13 indicators could be obtained for the city in the future. The City Council has already proposed methods for monitoring three of these experimentally, more specifically:

1. *Organic food purchased for schools:* could be obtained from the daily publications of the school-menus, or from the statistics office inquiries without detailing whether the food is organic.
2. *Technical Photovoltaic Potential:* could be estimated from the Information System on Land Occupation of Spain (SIOSE), calculating the roof areas.
3. *Pollutants from industrial facilities:* could be calculated from data from the Ministry of Ecological Transition of the Spanish Government.

The 55 available or proxy/alternative indicators have been classified describing the coverage level, the temporary coverage, the frequency and the disaggregation by gender and age.

**TABLE 10:** Valencia – Example of an indicator classification

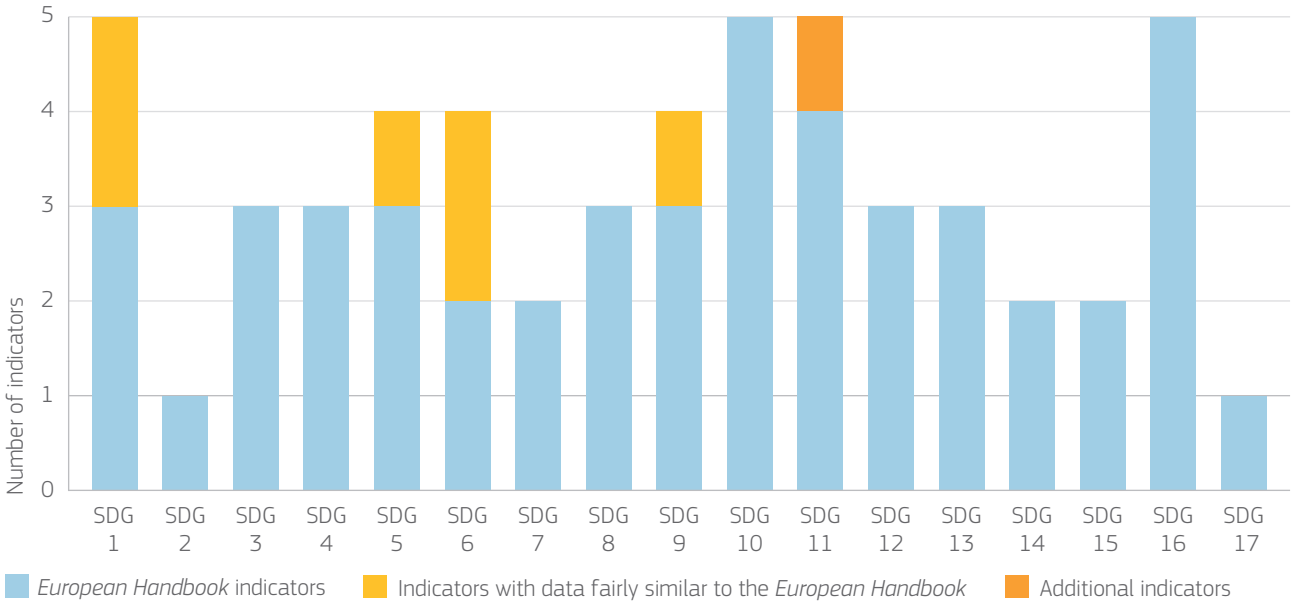
| | |
|---|---|
| **SDG** | Goal 4 |
| **Indicator** | Children from 0 to 4 years in nursery or school |
| **Available in Valencia (YES/NO)** | YES |
| **Alternative indicator** | |
| **Data source type:** official statistics, city's data, experimental, project based | València City Council Statistics Office |
| **Indicator** | Include students in early childhood education in city schools. Early childhood education students are aged 0-5 on January 1 of year t for course t-1 / t. |
| **Data Sources** | Statistics of school equipment of the city of Valencia, Statistical Office |
| **Unit of measurement** | Share |
| **Level of aggregation** (Metropolitan, area, municipal) | Districts and Municipal |
| **Geographic coverage** | València |
| **Last available year** | 2020 |
| **Update periodicity** | Annual |
| **Disaggregation by age (YES/NO)** | NO |
| **Disaggregation by sex (YES/NO)** | YES |
| **Used Estimators** | Share of students in early childhood education over the total in that age group. |
| **URL** | *https://bit.ly/31VSxsd* |

**Source:** Author's own elaboration

## Total number of indicators –Coverage of goals

Figure 48 shows the availability per goal of the indicators in Valencia, giving details of the indicators matching the *European Handbook,* indicators with data fairly similar to those suggested in the *European Handbook*, and additional indicators.

**FIGURE 48:** Valencia – Availability of indicators by SDG




**Source:** Author's own elaboration

## Sources – from local sectoral strategies

The main sources of open data for the SDGs are the data catalogue of the Valencia City Council and the Valencia data yearbook collected by the City Statistical Office. However, other organisations such as NGOs, associations and the universities, might also provide useful data for measuring the SDGs. The main recommendation is therefore to coordinate all data sources in a unique database.

The data collected for this study were mainly provided by Valencia City Council and the Statistical Office, but other organisations or institutions independent to the City Council were also consulted. The potential SDG indicator sources vary, as they are measured by various services and organisations. On the city statistics website, sources are indicated in a specific section together with the calculation of the indicator; this metadata reports the name of the indicator, its code, the topic, the subtopic, the definition and calculation method, the data sources, and the unit of measurement; moreover, they are observed and interpolated.

An example of an experimental indicator not included in the city collection of social indicators is *Overweight adults (including obese).* The information is available from two different sources:

1. **Health survey of the *Comunitat Valenciana:*** The Ministry of Universal Health and Public Health provides microdata from the survey from which tables for the city of

Valencia are extracted. The indicator *Share of people aged 16 and over who are overweight (including obese)* is published, but it could be calculated for people aged 18 and over, to align with the indicator proposed in the *European Handbook*. This indicator is available for the years 2005, 2010 and 2016 (when the percentage was 46.0 %). The health survey is conducted approximately every five years.

2. **Public Opinion Barometer of the city of Valencia:** In the nine editions of the barometer (last edition September 2019) the public were asked about their height and weight, calculating the BMI of the people surveyed. From the microdata file of this barometer, the percentage of the population aged 18 years or over who are overweight (or obese) can be calculated (47.1 % of the population aged 18 years or more).

The last indicator proposed in the *European Handbook* is the *Ratio of official indicators out of all the available indicators:* for the city of Valencia this results in 98 % of the indicators, as almost all come from institutional data sources (city council statistics office, the Valencia smart city office, the European Commission or the Spanish Ministry of the Interior). Only one indicator is not official: *Start-ups over 1 000 inhabitants.*

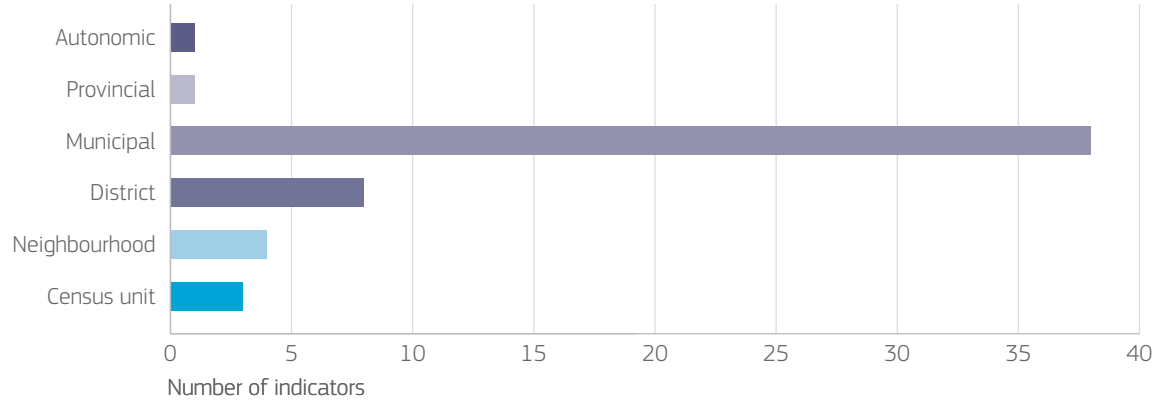
## *Disaggregation and geographical unit*

Six indicators are disaggregated by age for Valencia, while 50 indicators are not. Of the latter, 16 are indicators that cannot be disaggregated by age because of the nature of the indicator, or issues related to privacy or data management.

15 indicators are disaggregated by gender, while 41 indicators are not. Of the latter, 16 are indicators that cannot be disaggregated by gender because of the nature of the indicator, or issues related to privacy or data management.

The geographical disaggregation of the indicators available for Valencia is mainly at municipal level, followed by district level (in this case, an indicator can have more than one level of coverage), as illustrated in Figure 49.[67]

**FIGURE 49:** Valencia – Lower geographical level of disaggregation for the indicators




**Source:** Author's own elaboration

67 Hosted asylum seekers indicator is available at regional level.
Start-ups over 1 000 inhabitants is available at provincial level.
Three indicators (Access to public transport, built-up area per capita and voter turnout in municipal elections) are available per census tractstracks.

### *Time coverage and frequency*

Almost half of the indicators were last measured in 2019, and 19 in 2020. Details on the last year of measurement are given in Annex 6[68].

The indicators are collected with varying frequencies:

- **Monthly:** three indicators (unemployment rate, unemployed people with disabilities and the transparency of the public administration) are updated every month.
- **2** years.
- **Annual:** 48 indicators are updated annually (although in some cases we have observed that data from recent years is missing).
- **Triennial:** *The voter turnout in municipal elections* indicator is updated every 3 years.
- **Quadrennial:** *Overweight adults* indicator is updated every 4 years.
- **Quinquennial:** *City transport performance* indicator is updated every 5 years.

## 7.4 Key findings

The City Council of Valencia has demonstrated strong commitment to both the identification of the indicators for measuring the progress of the city with respect to the SDGs, and to the achievement of the SDGs themselves. For instance, it has already started working on specific measures to improve SDG data collection. Several processes are ongoing and involve inter-departmental working groups; these working groups, as well as the solutions they bring, are the outcome of the Valencia Strategic Plan. Their purpose is to involve the quadruple helix (the general public, public administration, academic sector and private sector) in a long-term strategic plan, to achieve the SDGs.

Missions Valencia 2030 is the framework created by the city to foster innovation projects for the accomplishment of the SDGs. The Valencia City Council has a plan of working with the SDG indicators by using various coordination systems; one of the main measures for creating a framework to foster all projects related to the SDGs is the Valencia Strategic Plan. The following paragraphs summarise the current measures in Valencia for data collection for the SDGs indicators, as well as the measures for the fulfilment of the SDGs.

### *Statistical capacity of Valencia*

In addition to the work on the SDG measurement, the City Council wishes to launch Valencia's public data infrastructure. Various municipal services are in charge of creating and maintaining public data infrastructures, and dedicated services publish data as one of their main functions.

The following services are related to Valencia's data strategy:

- T*he Information and Communication Technologies Service (Servicio Tecnologías Información y Comunicaciones - SERTIC)* is the technical support service for all municipal services. It is also responsible for the Geoportal.

68 *GDP per capita* indicator was last measured in 2014. *Households in social housing* and *Journeys to work by public transport* indicators were last measured in 2017. VLR indicators from official statistics were last measured in 2021.

- *The Transparency and Open Government Service (STiGOV)*[69] is not a service that generates data (except for those of the service, such as requests for the right of access), but is responsible for publishing data on the local government, including contracts, agreements, or the composition of the city council. It also ensures, in the context of open data, that information is published in accordance with the standards for updating, reuse, structured formats and georeferencing.
- *The Smart City Office (Oficina de Ciudad Inteligente – OCI)*[70] carries out activities such as the support and maintenance of the Smart City Platform VLCi-FIRMWARE, 'València al minut', the Economic Management Scorecard, the City Indicators, Transparency and Open Data portal. The OCI also develops the Control Panel for cycling and motorised traffic, conducts the Big Data sociodemographic study on the tourist influx during *Fallas*[71] and prepares data to carry out the Big Data study for cross-analysis of cycling mobility and weather conditions. Moreover, it has a Comprehensive Knowledge Archive Network (CKAN) for which it offers open data and information to the public.
- *The Statistic Office*[72] is responsible for elaborating statistics and facilitating the interpretation of the information to the public. It is also responsible for complying with the applicable legislation, both at state and regional level, that requires statistical information to be public[73].
- *Las NAVES*[74] is a public entity belonging to Valencia City Council, which promotes social and urban innovation with the active involvement of operators from the 'four helix'model: public sector, private sector, academic-research sector and civil society.

In addition to these, there are other services whose primary goal is not data publication, but who still publish the data collected from their functions. These include: Public Road and Infrastructure Maintenance Coordination Service[75] (OCOVAL); *Beach, Acoustic and Air quality Service*[76]*; Mobility Service*[77]*; Gardening Service*[78]*; Climate Emergency and Energy Transition Service*[79]*; Management Service*[80].

## *Analysis of the Open Data in Valencia*

The development of open data is key to monitoring and advancing towards the achievement of the SDGs in a city. Several city documents established priorities and measures in this area.

- The *Open data strategy of the City Council of Valencia*[81] illustrates the approaches followed in recent years: the first open data projects started in 2015, when the

69 *https://www.valencia.es/val/ajuntament/govern-obert*
70 *http://smartcity.valencia.es/es*
71 Valencian traditional festivities
72 *https://www.valencia.es/val/estadistica*
73 Even though at the time of this study there is no formal inventory of all potentially available information, there is a list of sources and a list of statistical operations in 16 categories of data with many datasets to be consulted on the website *https://www.valencia.es/val/estadistica*.
74 *https://www.lasnaves.com/?lang=es*
75 *http://ocoval.es*
76 *https://www.valencia.es/val/platges*
77 *https://www.valencia.es/val/mobilitat/inici*
78 *http://jardins.valencia.es/es*
79 *http://canviclimatic.org/es*
80 *https://www.valencia.es/val/urbanisme/inici*
81 *https://www.valencia.es/documents/20142/631539/20190717-Informe-final-estrategia-ayuntamiento-de-ValènciaV3.pdf/8df048d2-4dc0-983b-7240-b76e0527d331?t=1590648605606*

Transparency regulation was approved, and the interdepartmental working group of Transparency and Open Government of the city council was established. The first initiative of the group was the creation of an Open Data Working Group, to coordinate the projects of the Foundation for Strategic Promotion, Development and Innovation in Valencia InnDEA (Las Naves), the Information and Communication Technologies Service (SERTIC) and the Municipal Statistics Office. The Open data strategy identifies the need for analysis of the data used in the city. Since the collection of data is already systematic, this suggestion is to be applied to the publication of the data instead; this measure has already been organised, but lacks technical development.

- The *People-generated data from the Valencian*[82] explains which data must be measured, how to measure and how to share them. Furthermore, the quality of the data is as important as the quality of the metadata that contain the information about how the data were obtained. In addition to data produced by the administration, the academic and the private sector, the report deals with people-generated data initiatives: five are international initiatives, four are national, and nine are initiatives developed in the Valencian community.
- The *Open Data for Development (OD4D) in the Valencian community*[83] highlights the importance of open data for the progress towards the achievement of SDGs. On this premise, some lines of work are proposed to improve OD4D, based on increasing technical capacities and reinforcing the relationships between various organisations and initiatives related to open data. These relations are promoted through events such as a hackathon or datathon, in which the topic is often one or several of the SDGs. These events often involve young people, who can bring new ideas for the use of open data for the development of the SDGs. This work concludes that the open data portal of the city needs improvement with regard to the coordination of open data responsibilities among municipal services, and that data collection needs to be expanded to sectors that are not yet covered (e.g. socioeconomic indicators such as poverty).
- he Federation of Municipalities and Provinces of Spain[84] (FEMP) created the *'Strategic Open Data Guide - Minimum data sets to be published'*[85] which condenses measures, guidelines and recommendations for municipalities and local entities to publish their data in a useful and effective way for use by public, organisations, companies or other administrations. Based on this publication, Valencia published its Open Data Guide[86].

## 7.5 Additional and experimental indicators

After the evaluation of the city indicators, five complementary indicators were proposed for various SDGs; all of these are experimental in accordance with the *European Handbook* definition. They include one related to health and water (SDGs 3 and 6), which measures traces of SARS-CoV-2 in wastewater: this indicator has already been used during the COVID-19 pandemic. The other indicators are related to the environment and the 'sustainable city' model, and focus on the social-economic characteristics of the neighbourhood to understand how these features affect the environment.

82 *https://www.valencia.es/documents/20142/1863051/CITIZEN-GENERATED.pdf/78bcd5ba-ea46-a32a-ceda-7ade759af760?t=1546505641556*

83 *https://www.valencia.es/documents/20142/631539/Datos-abiertos-para-el-desarrollo-OD4D-en-la-Comunidad-Valenciana.pdf/5a51009b-7a50-49a4-47f4-090030f26d16?t=1590648357486*

84 *http://www.femp.es*

85 *http://femp.femp.es/files/3580-1617-fichero/Gu%C3%ADa%20Datos%20Abiertos.pdf*

86 *https://www.valencia.es/documents/20142/1863051/Gu%C3%ADa+Datos+Abiertos.pdf/ae58fa8d-f6cc-5b6d-239d-fa56aa5574ef?t=1546511062609*

These are the complementary indicators proposed, and the SDG to which they relate:

- Analysis of SARS-CoV-2 in wastewater (SDG 3 and 6)
- Building energy ratings (SDG 7 and 11)
- Economic and Social indicators for companies (SDG 7, 9 and 13)
- Environmental justice (SDG 10)
- Impact index of pollutants on population (IIPP) (SDG 11)

Two examples of the above are illustrated in the following paragraphs.

## *Analysis of SARS-CoV-2 in wastewater (SDG 3 and 6)*

The results of the analysis of a sample of wastewater could be an indicator to identify the presence of traces of SARS-CoV-2 genetic material, thus quantifying the presence of the virus by neighbourhood.

**FIGURE 50:** Valencia – Map of Valencia by district with the results of the analysis

The analysis of the COVID-19 in wastewater in the city shows the areas most impacted.

**Week 15-22 September 2020**

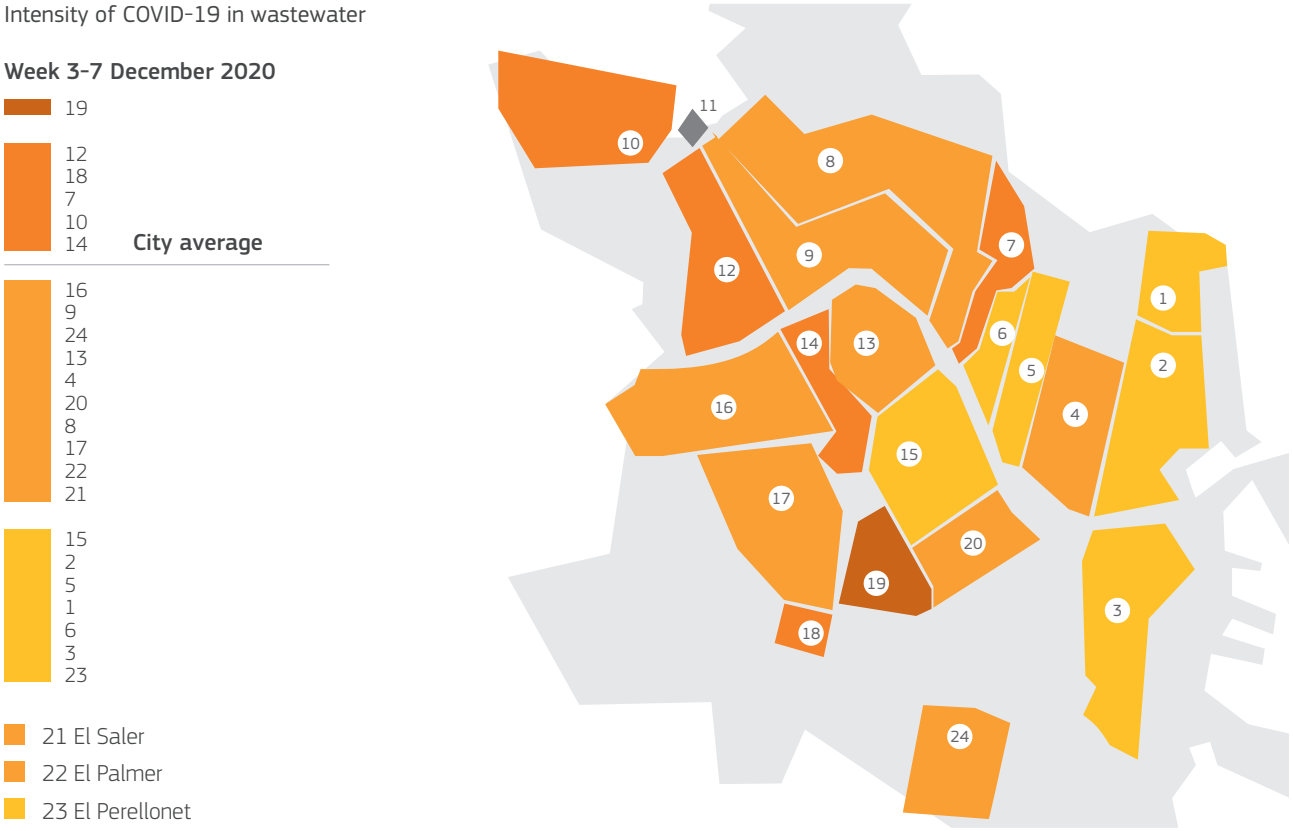
- Without relevant concentrations
- Low concentrations
- High concentrations
- Very high concentrations


**Source:** Author's own elaboration

This SARS-CoV-2 (the coronavirus responsible for the COVID-19 disease) leaves a genetic trace (RNA) that remains in the body of infected people for about 20 days (September 2020) and can be found in excrements. This indicator is key for identifying the areas of the municipality that are most affected by COVID-19; it has also made it possible to follow the evolution, and measure the impact of restrictions imposed to contain the infection. For example, before the Christmas 2020 period, the situation was as shown in Figure 51.

This indicator was extremely useful in 2020 and 2021, since it contributed to creating an overview of the presence of the virus in the city, and to providing detailed information about the most affected districts. Moreover, it could be applied to other diseases and other topics, such as drugs.

**FIGURE 51:** Valencia – Map of Valencia by district with the results of the analysis before Christmas




**Source:** Cicle Integral de l'Aigua

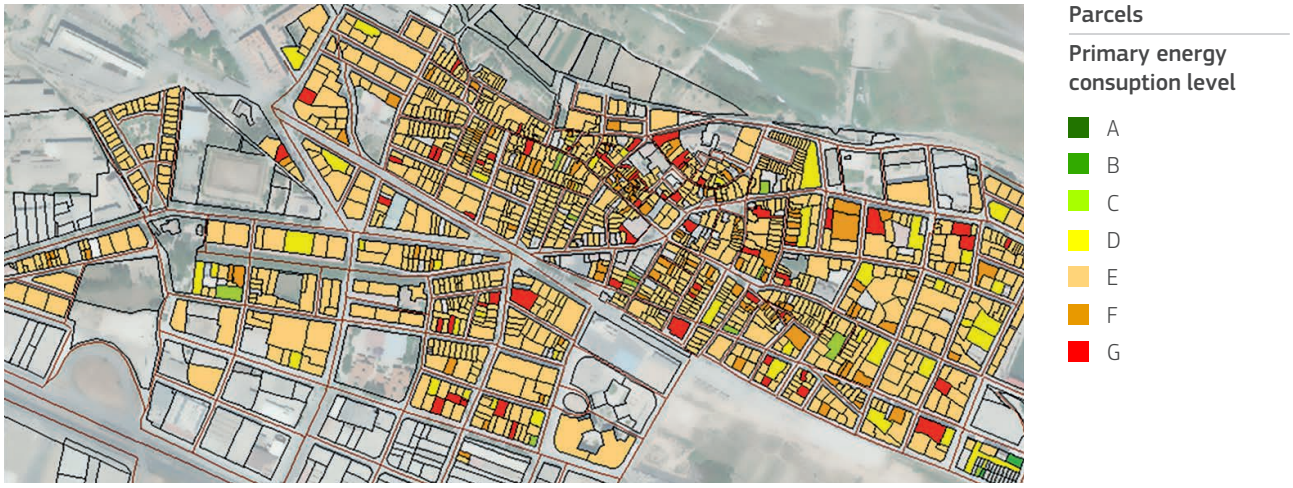
## *Building energy rating (SDG 7 and 11)*

This indicator is based on energy certificates. It can be developed as an indicator of the energy efficiency and consumption of the buildings in the municipality classified by a variety of building types (residential, commercial, others), through geo-localisation.

An example of the potential application of this approach in the city of Quart de Poblet (Valencia) is published in the *Sustainability* journal: it can be used to develop a variety of indicators to monitor specific issues (Lorenzo-Sáez et al. 2020).

The Valencian Institute for Business Competitiveness (IVACE) has energy certificates for 24 557 houses in the municipality of Valencia. It is possible to develop an indicator to monitor SDG 7 using the information from IVACE and the INSPIRE data from the cadastre (Plots, building and building part).

**FIGURE 52:** Valencia – Map of Primary energy consumption level (Quart de Poblet)




**Source:** Author's own elaboration

The energy certificates contain the following information: ID, address, area, primary energy consumption, GHG emissions and year of construction. Cadastre data include orientation, houses by plots and the year of construction. From this information, through geographic information systems and using some variables, it is possible to extrapolate such data for the whole city.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# 8. BUILDING URBAN DATASETS FOR THE SDGS

Authors:

*Alice Siragusa, Paola Proietti, Cecilia Bertozzi*

*European Commission, Joint Research Centre (JRC)*

## 8.1 Challenges and bottlenecks in the application of the *European Handbook* methodology

During the 2020-2021 period, six cities (Bratislava (SK), Reggio Emilia (IT), Oulu (FI), Porto (PT), Seville (ES), and Valencia (ES) have been invited to test the use of the first *European Handbook* (Siragusa et al. 2020).

From this experience, it emerges that the *European Handbook* methodology is generally considered easy to follow, and the indicators proposed in the inspirational framework are appropriate for covering the range of the 17 SDGs and, with some exceptions, are available for calculation across European Cities.

However, JRC experts and local officials pointed out challenges that should be addressed to favour the implementation of an updated framework, which will be presented in the next edition of the *European Handbook* (planned for 2022).

**Among the challenges identified, the following should be taken into account:**

- Several European sources (such as Eurostat City Statistics Database and the Urban Data Platform Plus), were relatively easy to use, but sometimes the data included in these databases were outdated. For some indicators, sourcing directly from national sources might be more efficient and ensure access to more timely data.
- Some of the indicators proposed in the *European Handbook* are collected irregularly or once only. These have been picked to mainstream the measurement of relevant phenomena. However, having indicators available across a longer time span might be preferable for local authorities to track their progress towards the achievement of the SDGs.
- Some of the indicators proposed in the *European Handbook* (such as Tree cover density) require specific technical knowledge to be calculated, such as GIS skills, or handling multiple data sources. Municipalities consider this not very convenient because, even when good statistical capacity is available, it might imply time-consuming processes (as for the analysis of composite indicators).
- Despite the fact that most of the indicators included in the *European Handbook* were publicly available, some required specific organisations to be contacted or researchers to be accessed. Some of the pilot cities suggested avoiding this type of indicator in the next edition of the *European Handbook*.
- Some challenges were also identified when deciding the exact formulation of the indicators, for example: *when to privilege relative indicators rather than indicators measured*

*in absolute terms?* Examples from the city of Oulu include *Children 0-4 in day care or school, Enterprises in industry, construction and services* and *Population with migrant background.* Clearer instructions or recommendations should be provided.

- Finally, the interpretation of indicators and their trends were not always easy. Examples from the city of Porto include the *Number of social housing households and Urban waste selectively collected per capita.*

**The work of JRC experts and cities results in some specific suggestions, in particular:**

- **Ensure that the use of the data sources does not require specific technical capacity,** such as GIS analysis, **or the calculation of composite indicators.** This will facilitate the use of the *European Handbook* by small administrations. Preferably, the indicators included in the next edition of the *European Handbook* should be readily available in tables. This is important noting the limited resources in cities and the fact that experts working with VLR are often not expert in all of the fields covered by SDGs, and might not necessarily have strong technical capacities in all fields for calculating complex indicators on their own.
- **Limit the use of one-time project indicators** to a minimum and suggest timeframes for recurrent analysis and the creation of centralised data storage and dissemination platforms.
- **Underline that the VLRs might serve multiple purposes:** every local authority might have a preponderant scope for engaging in SDG monitoring, which might change over time. These scopes could include: informing about or monitoring city policies and strategies, providing access to open data to the public, supporting collective decision-making, benchmarking with other cities. Consequently, the selection of indicators and data sources for measuring SDGs might depend on these scopes:
  - local data might be prioritised, if the objective is to ensure that the city's departments are well engaged in the process, co-operate and also contribute to local decisions and monitoring efforts. Porto's case is an example of this approach.
  - national data might be prioritised, if the objective is to join forces with other cities in the same country to increase national awareness on the importance and availability of common resources to monitor progress towards the SDGs. Oulu's case is an example of this approach.
  - finally, international data might be prioritised, if the main goal of the assessment relates to international diplomacy, positioning and benchmarking. Sevilla's case is an example of this approach.
- **Make the link between targets and indicators explicit** and not only between SDGs and indicators.
- **Dedicate more space to the interpretation of the indicators and indicator trends**, especially after COVID-19. The pandemic is the most recent challenge that all cities have had to face. Some of the indicators included in the monitoring efforts of the pilots clearly show the effects of the recent health, economic and social crisis. However, these effects are not equally distributed, both in short-medium and long-term impacts, as well as in their incidence across the various population segments and sectors. In addition, the pandemic also brought new challenges, opportunities and initiatives that will require the deployment of new indicators to be monitored.
- **Also favour the integration of bottom-up (locally built) indicators** proposed to 'compensate' the limits of applicability of some national and regional indicators, and foster the development of bottom-up discussions on the SDG indicators to include.

## 8.2 Local approaches to data, data ownership and openness

The main scope of this report was to understand how local authorities select SDG indicators and data based on their local priorities and institutional framework. The outcomes of the work with the six pilot cities reflect various approaches in terms of data-driven decision making and monitoring, statistical capacity, and openness of data but also some common challenges in terms of fragmentation of the information across various stakeholders.

In this regard, two different approaches were observed in Reggio Emilia and Oulu. While the expert for Reggio Emilia found that the potential of data use for informing strategies and policies is still not fully exploited in the city and that data-driven policy-making is still not prevalent, the expert from Oulu mentioned that 'leading with knowledge is an established way of working in the City of Oulu'.

Various approaches were also registered for the link between SDG monitoring and open data platforms. In some cases, very little use is made of existing open data platforms (Bratislava), while in other cities there is a multiplicity of them, which can be also difficult to navigate (Valencia).

Instead, a common trait across the six cities is the fragmentation of data. Data were found to be scattered across city departments across almost all pilot cases. Most of the time data are collected and stored using various methodologies and tools. All the cities, and in particular Porto and Seville, emphasised the importance of building a common database with the support of the different city departments, and establishing common methodologies for data collection.

## 8.3 Topics to investigate further

As a result of the work carried out by JRC researchers together with JRC experts of the six pilot cities, several potential strands of research emerged with promising implications for local policy makers. These topics include:

1. **Synergy between local strategies and projects, and the SDGs,** in particular:
   - Understanding how to further stimulate the mainstreaming of the SDGs and their targets in the cities' strategy. In this sense, the work realised by the city of Reggio Emilia demonstrates how the global framework provided by the SDGs has stimulated the city spatial strategy to incorporate topics that might not have been taken into account until that moment, building an even more organic and coherent strategy which also encompasses socio-economic aspects rather than being focused mostly on environmental sustainability.
   - Develop methods and tools to align the local budgets with local transformative measures aiming at the achievement of the SDGs, as suggested by the JRC expert working on the Seville case study.
   - Set out methods and tools to mainstream the SDGs in strategies and specific projects financed through European Cohesion Funds, and the use of SGD indicators as complementary monitoring instruments for these strategies.
2. **Develop capacities around the SDGs and engage civil society,** and in particular:
   - Investigate how SDGs can stimulate better city strategies, through enhanced cooperation and communication between city departments (within the administration), and with the other city stakeholders.

- Understand how to use SDGs and their monitoring system to train local administration staff and improve their technical capabilities, as well as a more crosscutting and forward-looking vision.
- Promote people's engagement and empowerment; the public can be involved in data collection, but also in co-designing some of the objectives and key results of city schemes.

3. **Improve the measurement of SDG interlinkages at local level**
   Besides observing output and outcome indicators, an evaluation of interlinkages and alternative scenarios or trade-offs of certain initiatives is highly recommended, due to the close interrelation between the SDGs. This will allow a better prioritisation strategy, favouring those projects that maximise positive impact (both direct and indirect). An example would be the standardised installation of air quality monitoring systems across the city instead of in selected neighbourhoods only, based on their socio-economic characteristics.
4. **The automation of data collection**
   While cooperating with the six pilot cities involved in the project, it emerged that most of them were thinking about automating their data collection process to make it easier, cheaper and periodic, also limiting possible manual mistakes in the data collection and elaboration. However, none of them have yet been able to fully automate this process. The expert who most focused on this aspect was the one working on the case of Bratislava; while collecting data necessary for analysis for the city, the expert found that a significant part of the process could be automated, and that the requirements for automation are related to:
   - Datasets which provide API, with the possibility to access more specific data included in the dataset;
   - Datasets with web-published data files (csv, json, xml, etc.);
   - Datasets with coherent structure or granularity over time. Columns, names, data aggregation levels should be maintained as well as inconsistencies in municipal/within municipal units, versions taken into account.

A good starting point in this direction might be the creation of a well-functioning city Open Data Platform. This system can be set up to allow dataset download. However, since the data needs to be transferred and loaded into the ODP, the issues of the data formats described above need to be solved first. Thus, the recommendation is to establish general rules and standards for the EU, national, and municipality data collection that can help this process. A common city data observatory or interdepartmental working group on SDGs would also stimulate collaboration between different city departments, as well as ease the dissemination, update and monitoring of information.

# CONCLUSIONS

In 2015 the United Nations undertook to implement the 2030 Agenda for Sustainable Development and its SDGs (United Nations 2015). Even if adopted by national governments, it is widely recognised that the achievement of the SDGs is only possible with the cooperation of all levels of governments as well as civil society, universities and the private sector.

Local governments, in particular, have been claiming their fundamental role in the achievement of the 2030 Agenda, as institutions close to the public that can influence the adoption of more sustainable habits and choices in every-day life.

In this context, monitoring is one of the most relevant features of the 2030 Agenda and its SDGs. Therefore, it is extremely important to make the SDG framework as operational and effective as possible for local governments too, in order to make it possible for them to measure local challenges and achievements.

To this end, the work developed in the URBAN2030–II project with a number of cities and JRC experts offers an overview of how the methods, criteria, and framework of local indicators for the SDGs proposed in the first *European Handbook* can be operationalised.

Results from this work with the pilot cities suggest that the selection of the local SDG indicators is one of the key steps for the Voluntary Local Reviews, and that the local SDGs indicators should aim at: (i) covering all SDGs; (ii) providing a balance between indicators that enable comparison among various cities/contexts and local indicators, and those tailored to reflect the specific context, projects and objectives; (iii) provide timely information to inform decision-makers; (iv) be policy relevant and cover areas of competence of the local authorities.

This report has shown examples on how effective SDG data-gathering strategies can benefit from a network of operators both at local and national/supra-national level. Local operators can collect data on a smaller scale, but also help to create a shared culture around the SDGs; national and international operators manage databases that enable comparability among cities, as well as bringing skills and resources that can foster mutual learning activities.

The test performed with pilot cities in the URBAN2030–II project shows that the overall approach proposed in the first edition of the *European Handbook* for European cities is sound.

Most of the examples of SDG local indicators included in the first edition are reasonably applicable to European cities. However, further refinement of the framework is still possible, in particular for addressing thematic issues and local statistical capacities. Clearer indications should be given on how to integrate existing monitoring frameworks and reporting systems into the VLRs. Finally, more attention should be devoted to the synergies between transformative measures, to the relation of local budgets with SDGs, as well as to the automation of data collection and dissemination of results.

The second edition of the *European Handbook for SDG Voluntary Local Reviews* is expected to be published in 2022, and will incorporate the suggestions and recommendations included in this report. In addition, the JRC and its partners will further develop some of the research topics identified in this report in partnership with other pilot cities, and through ad-hoc analyses.

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# LIST OF ABBREVIATIONS AND DEFINITIONS

| | |
|---|---|
| **API** | Application Programming Interface |
| **APS** | Adult Population Survey |
| **BOD** | Biological Oxygen Demand |
| **CSV** | Comma-Separated Values |
| **EC** | European Commission |
| **ERDF** | European Regional Development Fund |
| **ESI** | Entrepreneurial Satisfaction Index |
| **GDP** | Gross Domestic Product |
| **GEM** | Global Entrepreneurship Monitor |
| **GHG** | Greenhouse Gas |
| **GIS** | Geographic Information System |
| **GVA** | Gross Value Added |
| **IAEG-SDGs** | UN Inter-Agency and Expert Group on SDG Indicators |
| **IECA** | Instituto de Cartografica Y Estatistica de Andalusia |
| **JRC** | Joint Research Centre |
| **JSON** | JavaScript Object Notation |
| **LAU** | Local Administrative Units |
| **MAP** | Metropolitan Area of Porto |
| **NES** | National Expert Survey |
| **NGA** | Next Generation Access |
| **NGO** | Non-Governmental Organiation |
| **NSOs** | National Statistical Offices |
| **NUTS** | Nomenclature of Territorial Units for Statistics |
| **ODP** | Open Data Platform |
| **OECD** | Organisation for Economic Co-operation and Development |
| **OKR** | Objectives and Key Results |
| **PUG** | Piano Urbanistico Generale - General Urban Plan |

| | |
|---|---|
| **REDS** | Red Española para el Desarrollo Sostenible |
| **SARS-CoV-2** | Severe acute respiratory syndrome coronavirus 2 |
| **SDGs** | Sustainable Development Goals |
| **SIOSE** | Information System on Land Occupation of Spain |
| **SWOT** | Strengths, Weaknesses, Opportunities, Threats |
| **UN** | United Nations |
| **VLR** | Voluntary Local Review |
| **VNR** | Voluntary National Review |
| **XML** | Extensible Markup Language |

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# ANNEX 1. SDG INDICATORS SELECTED FOR BRATISLAVA

| SDG | INDICATOR | ALIGNMENT | TYPE | SOURCE | FREQUENCY | LAST AVAILABLE YEAR | LEVEL OF AGGREGATION |
|---|---|---|---|---|---|---|---|
| 1 | People at risk of income poverty after social transfers | *European Handbook* | Official | Humans of Bratislava report (City private data (not public yet) | Annual | 2017 | LAU 1 |
| | People living in households with very low work intensity | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2020 | LAU 1 |
| | Lone parent private households | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2011 | LAU 1 |
| | Households in social housing | *European Handbook* | Official | *City statistics* | Annual | 2019 | LAU 1 |
| | Homeless people | *European Handbook* | Official | City statistics (City private data, in field counting ) | Annual | 2017 | LAU 1 |
| 2 | Number of overweight people aged 0-26 | Additional indicator | Official | National health information centre, requested data) | Annual | 2019 | NUTS 3 |
| | Soup kitchens for people who cannot afford food | *European Handbook* | Official | City statistics (City private data) | Annual | 2018 | LAU 1 |
| | Amount of patients aged 0-26 with diabetes mellitus | Additional indicator | Official | National health information centre, requested data | Annual | 2019 | NUTS 3 |
| | Infant mortality | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2019 | LAU 1 |
| 3 | Adolescent births | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2019 | LAU 1 |
| | Deaths in road accidents | *European Handbook* | Official | *Ministry of Interior Affairs* | Annual | 2020 | LAU 1 |
| | Number of suicide attempts | Additional indicator | Official | National health information centre, requested data | Annual | 2019 | LAU 1 |
| | Number of suicides | Additional indicator | Official | National health information centre, requested data | Annual | 2019 | LAU 1 |
| | Number of patients with mood disorders | Additional indicator | Experi-mental | National health information centre, requested data | Annual | 2019 | LAU 1 |
| | Respiratory diseases linked to air pollution | Additional indicator | Experi-mental | National health information centre, requested data | Annual | 2019 | LAU 1 |
| 4 | Children 0-4 in day care or school | *European Handbook* | Official | *Slovak Centre of Scientific and Technical Information* | Annual | 2020 | LAU 1 |
| | Adults with less than primary, primary and lower secondary education | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2011 | LAU 1 |
| | Students in higher education by gender | *European Handbook* | Official | *Slovak Centre of Scientific and Technical Information* | Annual | 2020 | LAU 1 |
| | Non-native-speaking students graduating from upper secondary schools | *European Handbook* | Official | *Slovak Centre of Scientific and Technical Information* | Annual | 2020 | LAU 1 |
| 5 | Gender employment gap | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2019 | LAU 1 |
| | Formal complaints for episodes of violence against women | *European Handbook* | Official | Ministry of Interior Affairs (Data must be requested) | Annual | 2020 | LAU 1 |
| | Female hospitalisation for assault | *European Handbook* | Official | National Health Information Centre (Data must be requested) | Annual | 2019 | LAU 1 |

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|---|---|---|---|---|---|---|---|
| | Seats held by women in municipal governments | *European Handbook* | Official | Statistical Office of SR (City private data) | Annual | 2020 | LAU 1 |
| 6 | Wastewater safely treated | *European Handbook* | Official | Bratislava Water Company - Bratislavská vodárenská spoločnosť | Annual | 2019 | LAU 1 |
| | Drinking water consumption | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2019 | LAU 1 |
| 7 | New buildings | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2011 | LAU 1 |
| 8 | Unemployment rate | *European Handbook* | Official | *Ministry of Social Affairs and Family* | Annual | 2020 | LAU 1 |
| | Accidents at work | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2019 | LAU 1 |
| | Perception about the local labour market | *European Handbook* | Official | *Eurostat city database* | Triennial | 2019 | City |
| | Gross domestic product (GDP) per capita | *European Handbook* | Official | *OECD* | Annual | 2018 | Metropolitan areas |
| | Labour productivity | *European Handbook* | Official | *OECD* | Annual | 2018 | Metropolitan areas |
| | Average gross value added per employee | Additional indicator | Official | *OECD* | Annual | 2018 | NUTS 3 |
| | Journeys to work by public transport | *European Handbook* | Official | *Transport company Bratislava* | Annual | 2017 | LAU 1 |
| | Enterprises in industry, construction and services | *European Handbook* | Official | *Slovensko Digital database* | Monthly | 2021 | LAU 1 |
| 9 | Start-ups over 1 000 inhabitants | *European Handbook* | Official | *Slovensko Digital database* | NA | 2018 | LAU 1 |
| | Entrepreneurial Satisfaction Index – ESI | Additional indicator | Experi-mental | Global Entrepreneurship Monitor (GEM) (City private data) | NA | 2019 | LAU 1 |
| | Sustainability of entrepreneurship by gender | Additional indicator | Experi-mental | Global Entrepreneurship Monitor (GEM) (City private data) | NA | 2019 | |
| | Number of passengers transported by public transport | Additional indicator | Official | Transport company Bratislava (City private data) | Annual | 2017 | District |
| | Number and structure of travel ticket subscriptions sold to the passengers | Additional indicator | Official | Transport company Bratislava (City private data) | Annual | 2019 | LAU 1 |
| 10 | Unemployed people with disabilities | *European Handbook* | Official | *Ministry of Social Affairs and Family* | Annual | 2019 | District |
| | Graduates by field and gender | *European Handbook* | Official | *Slovak Centre of Scientific and Technical Information* | Annual | 2020 | LAU 1 |
| | Population with migrant background | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2020 | LAU 1 |
| 11 | Bicycle traffic | *European Handbook* | Official | *OpenData portal of Bratislava* | Annual | 2020 | LAU 1 |
| | Access to public transport | *European Handbook* | Official | City Data (City private data) | Annual | 2019 | LAU 1 |
| | Build-up area per capita | *European Handbook* | Official | City Data (City private data) | Annual | 2019 | LAU 1 |
| | Population without green urban areas in their neighbourhood | *European Handbook* | Official | City Data (City private data) | Annual | 2019 | LAU 1 |
| | Cultural creative cities index – C3 index | *European Handbook* | Experi-mental | *European Commission (Joint Research Centre)* | Annual | 2019 | LAU 1 |
| | Digital literacy | Additional indicator | Experi-mental | City Data (City private data) | Annual | 2020 | LAU 1 |
| | Library related indicators | Additional indicator | Official | City Data (City private data) | Annual | 2019 | LAU 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Total number of library memberships | Additional indicator | Official | City Data (City private data) | Annual | 2019 | LAU 1 |
| | Number of visits of regarding internet usage | Additional indicator | Official | City Data (City private data) | Annual | 2019 | LAU 1 |
| | Number of visits for library services | Additional indicator | Official | City Data (City private data) | Annual | 2019 | LAU 1 |
| | Number of visits for organised events | Additional indicator | Official | City Data (City private data) | Annual | 2019 | LAU 1 |
| | Number of events organised by the libraries | Additional indicator | Official | City Data (City private data) | Annual | 2019 | LAU 1 |
| | Free time centers and events | Additional indicator | Experi-mental | City Data (City private data) | Annual | 2019 | LAU 1 |
| | Number of free time centers | Additional indicator | Experi-mental | City Data (City private data) | Annual | 2019 | LAU 1 |
| | Number of free time events | Additional indicator | Experi-mental | City Data (City private data) | Annual | 2019 | LAU 1 |
| 12 | Local recycling rates | *European Handbook* | Official | *OpenData portal of Bratislava* | Annual | 2019 | LAU 1 |
| | Urban waste per capita | *European Handbook* | Official | *OpenData portal of Bratislava* | Annual | 2019 | LAU 1 |
| | Pollutants released from industrial facilities | *European Handbook* | Official | *Slovak Hydrometeorological Institute* | Annual | 2019 | LAU 1 |
| | Local tourism intensity | *European Handbook* | Official | *Statistical Office of SR* | Annual | 2020 | LAU 1 |
| 13 | People affected by disasters | *European Handbook* | Official | *Emergency Events Database (EM-DAT)* | Annual | 2020 | LAU 1 |
| | Greenhouse gas emissions | *European Handbook* | Official | *Slovak Hydrometeorological Institute* | Annual | 2019 | LAU 1 |
| | Heat vulnerability | *European Handbook* | Experi-mental | *Climate Change atlas of Bratislava* | | 2020 | LAU 2 |
| 14 | Bathing sites with excellent water quality | *European Handbook* | Official | *European Environment Agency* | Annual | 2020 | LAU 1 |
| 15 | Urban greenness | *European Handbook* | Official | *Cadastre bureau* | Annual | 2018 | LAU 1 |
| | Land abandonment | *European Handbook* | Experi-mental | *European Commission (Joint Research Centre)* | Annual | 2020 | NUTS 3 |
| | Tree cover density | *European Handbook* | Official | *European Commission* | Annual | 2019 | LAU 1 |
| 16 | Murders and violent deaths | *European Handbook* | Official | Ministry of Interior Affairs (Data must be requested) | Monthly | 2020 | LAU 1 |
| | Transparency of the public administration | *European Handbook* | Official | *City Data* *City Data (2)* | Annual | 2020 | LAU 1 |
| | Voter turnout in municipal elections | *European Handbook* | Official | *Statistical Office of SR* | Quadrennial | 2018 | LAU 1 |
| | Budget for community foundations and funded projects | Additional indicator | Official | City Data (City private data) | Annual | 2020 | LAU 1 |
| 17 | VLR indicators from official statistics | *European Handbook* | Official | City Data | Annual | 2021 | - |

# ANNEX 2. SDG INDICATORS SELECTED FOR OULU

| SDG | Secondary SDG | INDICATOR | ALIGNMENT | TYPE | SOURCE | FREQUENCY | LAST AVAILABLE YEAR | LEVEL OF AGGREGATION |
|---|---|---|---|---|---|---|---|---|
| 1 | 10 | People at risk of income poverty after social transfers | *European Handbook* | Official | Sotkanet – The Finnish Institute for Health and Welfare (*MayorsIndicators: Relative poverty* ) | Annual | 2018 | |
| | 10 | People living in households with very low work intensity | *European Handbook* | Official | Eurostat, City Statistics Database | Annual | 2016 | |
| | | Lone parent private households (with children aged 0 to under 18) | *European Handbook* | Official | Statistics Finland | Annual | 2019 | Gender |
| | 11 | Households in social housing | Indicator with data fairly similar to that in the *Handbook* | Official | Statistics Finland | Annual | 2019 | |
| | 11 | Share of households receiving housing allowance | City-specific indicator | Official | Sotkanet – The Finnish Institute for Health and Welfare | Annual | 2019 | |
| | 11 | Homeless people | *European Handbook* | Official | ARA, The Housing Finance and Development Centre of Finland (*MayorsIndicators: Homeless people*) | Annual | 2020 | Gender, Age, Immigration |
| 2 | 3 | Adults overweight (obese) | Indicator with data fairly similar to that in the *Handbook* | Official | Sotkanet – The Finnish Institute for Health and Welfare (*MayorsIndicators: Obesity*) | No information whether city-specific data will be collected periodically. Regional data are available for later years. | 2015 | Gender |
| | 12 | Organic food purchased for schools | *European Handbook* | Official | City of Oulu | One-time data collection or not known if data collection will continue | 2020 | |
| | | Soup kitchens for people who cannot afford food (number of meals) | Indicator with data fairly similar to that in the *Handbook* | Experimental | Prikka project | One-time data collection or not known if data collection will continue | 2019 | |
| 3 | | Infant mortality | *European Handbook* | Official | Eurostat, City Statistics database | Annual | 2018 | |
| | | Adolescent births | *European Handbook* | Official | Eurostat, City Statistics database | Annual | 2018 | Not relevant for the indicator |

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|---|---|---|---|---|---|---|---|---|
| | 11 | Deaths in road accidents | *European Handbook* | Official | Statistics Finland (*MayorsIndicators (similar data): Traffic accident mortality rate*) | Annual | 2020 | |
| 4 | | Daily smokers in 1st and 2nd year of upper secondary school (or vocational education) | Indicator with data fairly similar to that in the *Handbook* | Official | Sotkanet -The Finnish Institute for Health and Welfare (*MayorsIndicators: The use of nicotine products among young people*) | Periodic | 2019 | Education |
| | | Children 0-4 in day care or school | *European Handbook* | Official | Eurostat, City Statistics database (*MayorsIndicators (similar data): Publicly paid early childhood education attendance rate*) | Annual | 2018 | |
| | | Adults with less than primary, primary and lower secondary education | *European Handbook* | Official | Eurostat, City Statistics database | Annual | 2019 | |
| | | Students in higher education | *European Handbook* | Official | Eurostat, City Statistics database | Annual | 2018 | Gender |
| | | Non-native students graduating from upper secondary schools | *European Handbookr* | Official | Statistics Finland | Annual | 2019 | Education, Age |
| 5 | | Gender employment gap | *European Handbook* | Official | Statistics Finland (*MayorsIndicators (similar data): Gender balance in labour market*) | Annual | 2019 | Gender, Age |
| | 10 | Satisfaction with life for youth | City-specific indicator | Official | Sotkanet -The Finnish Institute for Health and Welfare (*MayorsIndicators: Life satisfaction of young people*) | Periodic | 2019 | Gender, Age, Education |
| | 16 | Formal complaints for episodes of violence against women | Indicator with data fairly similar to that in the *Handbook* | Official | PolStat, statistical information from Police (*MayorsIndicators: Acts of violence against women*) | Annual | 2020 | Gender, Age |
| | | Seats held by women in municipal governments | *European Handbook* | Official | Statistics Finland *FALSE* | Every four years | 2017 | Gender |
| 6 | | BOD load | City-specific indicator | Official | Oulu waterworks (Oulun vesi) *MayorsIndicators (similar data): Biological oxygen demand in treated wastewater* | Annual | 2020 | Not relevant for the indicator |
| | | Phosphorus load | City-specific indicator | Official | Oulu waterworks (Oulun vesi) (*MayorsIndicators (similar data): Phosphorus in treated wastewater* | Annual | 2020 | Not relevant for the indicator |
| | | Drinking water consumption | *European Handbook* | Official | Oulu waterworks (Oulun vesi) | Annual | 2020 | Not relevant for the indicator |
| 7 | | New buildings | *European Handbook* | Official | Statistics Finland | Annual | 2019 | Not relevant for the indicator |
| | | Energy consumption per capita | City-specific indicator | Official | Finnish Energy: electricity consumption by municipality and district heating statistics (*MayorsIndicators (data for electricity consumption): Residential electricity consumption*) | Annual | 2019 | not relevant for the indicator |
| 8 | | Unemployment rate | *European Handbook* | Official | Statistics Finland | Monthly | 2020 | Gender, Age, Immigration |

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|---|---|---|---|---|---|---|---|---|
| | | Accidents at Work | *European Handbook* | Official | Finnish Workers' Compensation Center | Annual | 2018 | |
| | | Perception about the local labour market | *European Handbook* | Official | Eurobarometer | One-time data collection or not known if data collection will continue | 2019 | |
| | | Gross Domestic Product (GDP) per capita | *European Handbook* | Official | OECD | Annual | 2018 | |
| | | Labour productivity | *European Handbook* | Official | OECD | Annual | 2018 | |
| 9 | 11 | Public transport journeys in regional public transport | City-specific indicator | Official | City of Oulu | Annual | 2019 | |
| | 11 | Public transport satisfactory rate | City-specific indicator | Official | Urban and municipal services study | Periodic | 2020 | |
| | 8 | Enterprises in Industry, construction and services | Indicator with data fairly similar to that in the *Handbook* | Official | Statistics Finland | Quarter | 2019 | Not relevant for the indicator |
| | 8 | New enterprises | City-specific indicator | Official | Statistics Finland (*MayorsIndicators: New businesses*) | Quarter | 2019 | Not relevant for the indicator |
| | | City transport performance | *European Handbook* | Experi-mental | Urban Data Platform Plus | One-time data collection or not known if data collection will continue | 2015 | Not relevant for the indicator |
| 10 | | Gini index | *European Handbook* | Official | Sotkanet – The Finnish Institute for Health and Welfare (*MayorsIndicators: Gini coefficient*) | Annual | 2018 | not relevant for the indicator |
| | 8 | Unemployed people with disabilities | Indicator with data fairly similar to that in the *Handbook* | Official | Statistics Finland | Monthly | 2020 | |
| | | Population by field and gender | City-specific indicator | Official | Statistics Finland | Annual | 2019 | Gender, Age |
| | | Population with migrant background | Indicator with data fairly similar to that in the *Handbook* | Official | Statistics Finland | Annual | 2019 | |
| | | Hosted asylum seekers | *European Handbook* | Experi-mental | Proietti and Veneri | Periodic | 2017 | |
| | | Refugees received | City-specific indicator | Official | Sotkanet – The Finnish Institute for Health and Welfare (*MayorsIndicators: Refugees received*) | Annual | 2019 | |
| 11 | | Bicycle traffic | *European Handbook* | Official | City of Oulu | Annual | 2020 | |
| | | Bicycle roads | City-specific indicator | Official | City of Oulu | Annual | 2020 | not relevant for the indicator |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Access to public transport | *European Handbook* | Experi-mental | European Commission | One-time data collection or not known if data collection will continue | 2015 | |
| | | Population without green urban areas in their neighbourhood | Indicator with data fairly similar to that in the *Handbook* | Official | Finnish environment admin-istration's statistical service LIITERI | Annual | 2018 | |
| | | Air quality in city centre | City-specific indicator | Official | City of Oulu | Annual | 2020 | Not relevant for the indicator |
| | | Museums | City-specific indicator | Experi-mental | Museum and Science Centre Luuppi | Annual | 2020 | Not relevant for the indicator |
| | | Visitors in museums | City-specific indicator | Experi-mental | Museum and Science Centre Luuppi (visitors under 18 years) Museum statistics (number of visitors) | Annual | 2020 | Age |
| | | Creative sector turnover | City-specific indicator | Official | City of Oulu | Annual | 2019 | Not relevant for the indicator |
| | | Creative sector employees | City-specific indicator | Official | Statistics Finland | Annual | 2019 | |
| | | International congresses | City-specific indicator | Official | Business Finland | Annual | 2019 | Not relevant for the indicator |
| 12 | 11 | Biowaste separately collected | City-specific indicator | Official | *Regional data from the regional waste management company Kiertokaari | Annual | 2019 | Not relevant for the indicator |
| | 11 | Incinerated waste | City-specific indicator | Official | Regional data from the regional waste management company Kiertokaari | Annual | 2019 | Not relevant for the indicator |
| | 8 | Local tourism intensity | *European Handbook* | Official | Statistics Finland (*MayorsIndicators (similar data): Accommodation occupancy rate*) | Annual | 2020 | Not relevant for the indicator |
| 13 | | Greenhouse gas emissions | *European Handbook* | Official | CO2-raportti (*MayorsIndicators: GHG emissions per capita*) | Annual | 2019 | Not relevant for the indicator |
| | | Urban Flood Risk | *European Handbook* | Experi-mental | Urban Data Platform Plus | One-time data collection or not known if data collection will continue | 2020 | Not relevant for the indicator |
| | | Number of hot days | City-specific indicator | Official | Finnish Meteorological Institute | Annual | 2020 | Not relevant for the indicator |
| 15 | 11 | Urban greenness | Indicator with data fairly similar to that in the *Handbook* | Official | Finnish Environment Institute (*MayorsIndicators: Green spaces*) | One-time data collection or not known if data collection will continue | 2018 | Not relevant for the indicator |
| | | Share of forests | City-specific indicator | Official | Finnish Environment Institute | One-time data collection or not known if data collection will continue | 2018 | Not relevant for the indicator |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 16 | | Murders and violent deaths | *European Handbook* | Official | Eurostat | Annual | 2018 | |
| | | Level of trust towards other people in the city | *European Handbook* | Official | Eurostat | Annual | 2019 | |
| | | Satisfaction with the administrative services of the city | Indicator with data fairly similar to that in the *Handbook* | Official | Urban and municipal services study | Periodic | 2020 | |
| | | Transparency of the public administration | *European Handbook* | Official | City of Oulu | Annual | 2020 | Not relevant for the indicator |
| | | Voter turnout in municipal elections | *European Handbook* | Official | Statistics Finland (*MayorsIndicators: Municipal election voter turnout*) | Every four years | 2017 | Gender |
| | | Municipal Participatory Budgeting | *European Handbook* | Official | City of Oulu | Annual | 2020 | Not relevant for the indicator |

# ANNEX 3. SDG INDICATORS SELECTED FOR PORTO

| SDG | TAR-GETS | INDICATOR | ALIGNMENT | TYPE | SOURCE | FREQUENCY | LAST AVAILABLE YEAR | LEVEL OF AGGREGATION |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.1 | Homeless people | *European Handbook* | Official | Instituto Nacional de Estatística (INE) *(ENIPSSA)* | - | 2019 | Municipality |
| | 1.2 | Ageing index | Additional indicator | Official | *PORDATA* | Annual | 2019 | Municipality |
| | 1.3 | Beneficiaries of economic support in total active beneficiaries | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 1.4 | Households in social housing | *European Handbook* | Official | Municipality of Porto | Quarterly | 2019 | Municipality |
| | 1.4 | Inequality in the distribu-tion of the declared gross income of households | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2018 | Municipality |
| | 1.4 | Typology of families requesting social housing: Single person | Additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Typology of families requesting social housing: male monoparental | Additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Typology of families requesting social housing: female monoparental | Additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Typology of families requesting social housing: classic with children | Additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Typology of families requesting social housing: classic without children | Additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Typology of families requesting social housing: large families | Additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Typology of families requesting social housing: Grandparents with grandchildren | Additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Typology of families requesting social housing: Others | Additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Average per capita income of families requesting social housing | Additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Level of satisfaction with repair interventions in civil construction | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Level of satisfaction with repair interventions in electromechanics | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.4 | Carried out repairs | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1.4 | Investment in social housing rehabilitation works | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Parish |
| | 1.1 | Households with at least one unemployed member | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Decannual | 2011 | Parish |
| | 1.1 | Lone parent private households | *European Handbook* | Official | *Instituto Nacional de Estatística (INE)* | Decannual | 2011 | Parish |
| | 1.1 | Single-person families with individuals aged 65 years or older | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Decannual | 2011 | Parish |
| | 1.1 | Old people living alone | City additional indicator | Official | Municipality of Porto | - | 2019 | Municipality |
| | 1.4 | Elderly residents in social housing at 'high risk of social isolation' | City additional indicator | Experimental | Municipality of Porto | Annual | 2019 | Parish |
| 2 | 2.1 | Number of meals served by the Solidarity Restaurants | Additional indicator | Official | Municipality of Porto | Annual | 2020 | Municipality |
| | 2.1 | Number of meals and snacks distributed to children | Additional indicator | Official | Municipality of Porto | Annual | 2019 | Municipality |
| | 2.1 | Number of meals and snacks distributed to children within the framework of the Municipal Initiative School Solidarity | City department additional indicator | Official | Municipality of Porto | Annual | 2019 | Municipality |
| | 2.2 | Adults overweight (including obese) | *European Handbook* | Official | Municipality of Porto | - | 2018 | Municipality |
| | 2.2 | Children overweight (including obese) | Additional indicator | Official | Municipality of Porto | - | 2017 | Municipality |
| 3 | 3.2 | Infant mortality | *European Handbook* | Official | Eurostat | Annual | 2019 | Municipality |
| | 3.4 | Deaths by malignant tumor | Additional indicator | Official | *PORDATA* | Annual | 2018 | Municipality |
| | 3.4 | Deaths from circulatory system diseases | Additional indicator | Official | *PORDATA* | Annual | 2018 | Municipality |
| | 3.4 | Deaths from respiratory tract diseases | Additional indicator | Official | *PORDATA* | Annual | 2018 | Municipality |
| | 3.4 | Deaths before 70 (premature death) | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 3.6 | Deaths in Road accidents | *European Handbook* | Official | *PORDATA* | Annual | 2018 | Municipality |
| | 3.7 | Adolescent births | *European Handbook* | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 3.7 | Voluntary abortions performed legally | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2016 | Municipality |
| | 3.8 | Number of in-patient hospital beds per 100 000 population | City department additional indicator | Official | *PORDATA* | Annual | 2019 | Municipality |
| | 3.8 | Number of inhabitants per doctor | Additional indicator | Official | *PORDATA* | Annual | 2019 | Municipality |

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|---|---|---|---|---|---|---|---|---|
| | 3.a | Daily smokers in 1st and 2nd year of upper secondary school | *European Handbook* | Official | Municipality of Porto | - | 2017 | Municipality |
| 4 | 4.1 | Students with e conomic support | Additional indicator | Official | Municipality of Porto | Annual | 2019 | Municipality |
| | 4.1 | Average number of students per computer with internet connection | Additional indicator | Official | *Direção-Geral de Estatísticas da Educação e Ciência* | Annual | 2018 | Municipality |
| | 4.1 | Students per teacher in office at lower and upper secondary school | Additional indicator | Official | *Direção-Geral de Estatísticas da Educação e Ciência* | Annual | 2018 | Municipality |
| | 4.1 | School dropout and retention rate | City department additional indicator | Official | *Direção-Geral de Estatísticas da Educação e Ciência* | Annual | 2018 | Municipality |
| | 4.1 | Children in alternative education | City department additional indicator | Official | *Direção-Geral de Estatísticas da Educação e Ciência* | Annual | 2018 | Municipality |
| | 4.2 | Pre-school children | *European Handbook* | Official | *Direção-Geral de Estatísticas da Educação e Ciência* | Annual | 2019 | Municipality |
| | 4.2 | Real pre-school rate | City department additional indicator | Official | *Direção-Geral de Estatísticas da Educação e Ciência* | Annual | 2018 | Municipality |
| | 4.3; 4.5 | Students in higher education (female) | *European Handbook* | Official | *PORDATA* | Annual | 2020 | Municipality |
| | 4.3; 4.5 | Students in higher education (male) | *European Handbook* | Official | *PORDATA* | Annual | 2020 | Municipality |
| | 4.6 | Adults enrolled in non-tertiary education | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2018 | Municipality |
| | 4.7 | Number of higher education students of foreign nationality | City department additional indicator | Official | *Dados e Estatísticas de Cursos Superiores* | Annual | 2018 | Institution or municipality |
| | 4.1 | Adults with less than primary, primary and lower secondary education | *European Handbook* | Official | *Instituto Nacional de Estatística (INE)* | Decannual | 2011 | Parish |
| 5 | 5.1 | Graduates by gender (female) | *European Handbook* | Official | *PORDATA* | Annual | 2019 | Municipality |
| | 5.1 | Graduates by gender (male) | | | | Annual | 2019 | Municipality |
| | 5.1; 5.5 | Workers of the municipality with the position of director by gender (Female) | Additional indicator | Official | *Municipality of Porto* | Annual | 2019 | Municipality |
| | 5.5 | Disparity in the average monthly earnings of employees by gender | Additional indicator | Official | *PORDATA* | Annual | 2018 | Municipality |
| | 5.1 | Population without any level of education | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Decannual | 2011 | Municipality |
| | 5.5 | Gender employment gap | *European Handbook* | Official | *PORDATA* | Decannual | 2011 | Municipality |
| 6 | 6.1 | Safe water | Additional indicator | Official | *PORDATA* | Annual | 2020 | Municipality |
| | 6.2 | Population served by public water supply systems | Additional indicator | Official | *PORDATA* | Annual | 2017 | Municipality |
| | 6.2 | Population served by wastewater drainage systems | Additional indicator | Official | *PORDATA* | Annual | 2017 | Municipality |

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|---|---|---|---|---|---|---|---|---|
| | 6.2 | Access to drinking water | Blue City Index | Official | Águas do Porto | Annual | 2020 | Municipality |
| | 6.2 | Access to sanitation | Blue City Index | Official | Águas do Porto | Annual | 2020 | Municipality |
| | 6.2 | Operating cost recovery | Blue City Index | Official | Águas do Porto | Annual | 2019 | Municipality |
| | 6.3 | Wastewater safely treated | *European Handbook* | Official | Águas do Porto | Annual | 2019 | Municipality |
| | 6.3 | Stormwater separation | Blue City Index | Official | Águas do Porto | Annual | 2020 | Municipality |
| | 6.3 | Secondary Waste Water Treatment (WWT) | Blue City Index | Official | Águas do Porto | Annual | 2020 | Municipality |
| | 6.3 | Tertiary Waste Water Treatment (WWT) | Blue City Index | Official | Águas do Porto | Annual | 2020 | Municipality |
| | 6.4 | Non-billed water | Additional indicator | Official | *Entidade Reguladora dos Servicos de Aguas e residuos* | Annual | 2018 | Municipality |
| | 6.4 | Drinking water comsumption | *European Handbook* | Official | Águas do Porto | Annual | 2019 | Municipality |
| 7 | 7.1 | Energy consumption per capita | *European Handbook* | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 7.1 | Final Energy Use by sector of activity (%) - Residential buildings | Additional indicator | Official | *Agencia de Energia do Porto* | Annual | 2018 | Municipality |
| | 7.1 | Final Energy Use by sector of activity (%) - Services buildings | Additional indicator | Official | *Agencia de Energia do Porto* | Annual | 2018 | Municipality |
| | 7.1 | Final Energy Use by Industry (%) -Transport | Additional indicator | Official | *Agencia de Energia do Porto* | Annual | 2018 | Municipality |
| | 7.1 | Natural gas consumption per capita | Additional indicator | Official | *Direção-Geral de Energia e Geologia (DGEG)* | Annual | 2018 | Municipality |
| | 7.3 | LED street lighting | Additional indicator | Official | *Municipality of Porto* | Annual | 2020 | Municipality |
| | 7.3 | Greenhouse gas emissions per km² (in public lighting and semaforization) | Additional indicator | Official | *Agencia de Energia do Porto* | Annual | 2018 | Municipal |
| | 7.3 | Fuels consumed by the municipality of Porto and municipal companies – diesel | Additional indicator | Official | Municipality of Porto | Annual | 2019 | Municipality |
| | 7.3 | Fuels consumed by the municipality of Porto and municipal companies – gasoline | Additional indicator | Official | Municipality of Porto | Annual | 2019 | Municipality |
| | 7.3 | Municipal fleet of electric and plug-in hybrid vehicles | Additional indicator | Official | Municipality of Porto | Annual | 2019 | Municipality |
| | 7.1 | New buildings | *European Handbook* | Official | *Instituto Nacional de Estatística (INE)* | Decannual | 2011 | Municipality |
| 8 | 8.1 | GDP per capita | *European Handbook* | Experimental | *OECD* | Annual | 2018 | Municipality |
| | 8.1 | Labour productivity | *European Handbook* | Experimental | *OECD* | Annual | 2018 | Municipality |
| | 8.1 | Purchasing power index per capita | City department additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Biannual | 2017 | Municipality |

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| | 8.2 | Survival rate of companies born 2 years before | City department additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2018 | Municipality |
| | 8.3 | Unemployment rate | *European Handbook* | Official | Municipality of Porto | Annual | 2017 | Municipality |
| | 8.5 | Average monthly income of the municipality compared to the national average | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2018 | Municipality |
| | 8.5; 8.6 | Youth unemployment rate | Additional indicator | Official | *PORDATA* | Annual | 2018 | Municipality |
| | 8.10 | Other monetary intermediation establishments per 10k inhabitants | City department additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2018 | Municipality |
| | 8.10 | ATMs per 10k inhabitants | City department additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2018 | Municipality |
| | 8.5 | Proportion of unpaid workers by gender | City additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Decannual | 2011 | Municipality |
| 9 | 9.1 | Start-ups over 1 000 inhabitants | *European Handbook* | Official | *Porto Digital* | Annual | 2019 | Municipality |
| | 9.1 | Entreprises with information and comunication activities | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 9.1 | Investments in start-ups | City department additional indicator | Official | *Porto Digital* | Annual | 2020 | Municipality |
| | 9.2 | City transport performance | *European Handbook* | Experimental | *Joint Research Centre* | Decannual | 2020 | Municipality |
| | 9.2 | Enterprises in Industry, construction and services | *European Handbook* | Official | *Eurostat* | Annual | 2017 | Municipality |
| | 9.5 | Higher education graduates in S&T areas per 1000 inhabitants | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2018 | Municipality |
| | 9.c | Broadband Internet access at a fixed location per 100 inhabitants | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| 10 | 10.1 | Difference between the national minimum wage and the average monthly basic pay | Additional indicator proposed | Official | *PORDATA* | Annual | 2018 | Municipality |
| | 10.1 | Gini index | *European Handbook* | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2018 | Municipality |
| | 10.2 | Same-sex marriages | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2020 | Municipality |
| | 10.4 | Child allowance beneficiaries | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 10.7 | Migration growth rate | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 10.7 | Resident population with foreign nationality | Additional indicator | Official | *Serviço de Estrangeiros e Fronteiras* | Annual | 2019 | Municipality |
| | 10.2 | Unemployed people with disabilities | *European Handbook* | Official | *Instituto Nacional de Estatística (INE)* | Decannual | 2011 | Municipality |

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| 11 | 11.2 | Bicycle path extension | *European Handbook* | Official | *(1) Carta Educativa do Porto, (2) Ciclovia.PT, (3) PDM Porto - Estratégia para uma rede de circuitos cicláveis para o Grande Porto* | - | 2011 (2 -2012), (3 -2014) | Municipality |
| | 11.3 | Evolution of the efficiency of artificialized territories per capita | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Biannual | 2015 | Municipality |
| | 11.4 | Cultural creative cities index | *European Handbook* | Experimental | *Joint Research Centre* | Biannual | 2019 | Municipality |
| | 11.4 | Number of temporary exhibitions | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Municipality |
| | 11.4 | Total number of tickets sold | Cultural Creative Index | Official | Municipality of Porto | Annual | 2020 | Municipality |
| | 11.4 | Percentage of population that is very satisfied with cultural facilities in the city | Cultural Creative Index | Official | Municipality of Porto | Annual | 2018 | Municipality |
| | 11.4 | Registered visitors to museums, libraries and archives | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Municipality |
| | 11.4 | Participants in activities promoted in museums, libraries and archives and other cultural equipment | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Municipality |
| | 11.4 | New and improved registrations in applications for monitoring cultural heritage | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Municipality |
| | 11.4 | Online access to the municipal libraries catalogue via Horizon | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Municipality |
| | 11.4 | Number of municipal archives documents consulted via GISA Web | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Municipality |
| | 11.4 | Cultural initiatives programmed in the framework of the Porto Book Fair | City department additional indicator | Official | Municipality of Porto | Annual | 2020 | Municipality |
| | 11.6 | Population exposed to NO2 concentration | *European Handbook* | Experimental | *Joint Research Centre* | Decannual | 2020 | Municipality |
| | 11.7 | Beaches accessible to people with reduced mobility | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 11.1 | Built-up area per capita | *European Handbook* | Experimental | *Joint Research Centre* | - | 2015 | Municipality |
| | 11.1 | Resident population living in non-classic housing | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Decannual | 2011 | Municipality |
| | 11.2 | Extension of the public transport network | City additional indicator | Official | *Municipality of Porto* | - | 2020 | Municipality |
| | 11.2 | Transports used for pendular movements (%) | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | - | 2017 | Municipality |
| | 11.2 | Proportion of the population whose average monthly expenditure of their household on public transport exceeds 30 euros | Additional indicator | Official | Instituto Nacional de Estatística (INE) | - | 2017 | Municipality |

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| 12 | 12.2 | Food waste collected | Additional indicator | Official | Porto Ambiente | Annual | 2020 | Municipality |
| | 12.2 | Proportion of biowaste collected in total waste produced | Additional indicator | Official | Porto Ambiente | Annual | 2020 | Municipality |
| | 12.2 | Food waste collected in hotels, restaurants, canteens and cafes that go to combustion | Additional indicator proposed | Official | Porto Ambiente | Annual | 2020 | Municipality |
| | 12.5 | Local recycling rates | *European Handbook* | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 12.5 | Urban waste per capita | *European Handbook* | Official | *PORDATA* | Annual | 2019 | Municipality |
| | 12.5 | Urban waste selectively collected per capita | Additional indicator | Official | *PORDATA* | Annual | 2020 | Municipality |
| | 12.5 | Total waste collected | Additional indicator | Official | Porto Ambiente | Annual | 2020 | Municipality |
| | 12.5 | Urban waste disposed of in landfills | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 12.6 | Pollutants from industrial facilities (total - air) | *European Handbook* | Official | *European Environment Agency* | Annual | 2017 | Industrial facilities withing the area of interest (Porto municipality) |
| | 12.6 | Pollutants from industrial facilities (total - water) | *European Handbook* | Official | *European Environment Agency* | Annual | 2017 | Industrial facilities withing the area of interest (Porto municipality) |
| | 12.6 | Pollutants from industrial facilities (total - soil) | *European Handbook* | Official | *European Environment Agency* | Annual | 2017 | Industrial facilities withing the area of interest (Porto municipality) |
| | 12.b | Local tourism intensity | *European Handbook* | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 12.b | Proportion of non-resident tourists/guests | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 12.b | Accommodation capacity in tourist accommodation establishments per 1000 inhabitants | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| 13 | 13.1 | People affected by disasters | *European Handbook* | Official | *Em-data* | Years with victims | 2019 | Municipality |
| | 13.b | Municipalities' environmental expenses per 1000 inhabitants - Protection of air quality and climate | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | x | Urban Flood Risk | *European Handbook* | Experimental | *Joint Research Centre* | Decannual | 2020 | Municipality |
| | x | Greenhouse gas emissions | *European Handbook* | Official | *Agencia de Energia do Porto* | Annual | 2018 | Municipality |
| | x | Number of days when O3 concentrations exceed 120 ug/m3 | Additional indicator | Official | *Qualar* | Annual | 2019 | Municipality |
| | x | Number of days that NO2 concentrations exceed 200 ug/m3 | Additional indicator | Official | *Qualar* | Annual | 2016 | Municipality |
| | x | Number of days on which PM10 concentrations exceed 50 ug/m3 | Additional indicator | Official | *Qualar* | Annual | 2015 | Municipality |

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| | x | Number of days on which PM2.5 concentrations exceed 25 ug/m3 | Additional indicator | Official | *Qualar* | Annual | 2019 | Municipality |
| | x | Maximum temperature in the hottest month (°C) | Additional indicator | Official | *PORDATA* | Annual | 2019 | Official Meteorological Station (Porto - Serra do Pilar; Porto - Pedras Rubras) |
| | x | Minimum temperature in the coldest month (°C) | Additional indicator | Official | *PORDATA* | Annual | 2019 | Official Meteorological Station (Porto - Serra do Pilar; Porto - Pedras Rubras) |
| 14 | 14.1 | Bathing sites with excellent water quality | *European Handbook* | Official | *European Environment Agency* | Annual | 2018 | Bathing sites (of Porto Municipality) |
| | 14.1 | Proportion of surface of water bodies with good ecological status/potential | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Triennial | 2018 | Municipality |
| 15 | 15.1 | Tree Cover Density | *European Handbook* | Experimental | *Copernicus* | Biannual | 2018 | Municipality |
| | 15.3 | Land Abandoment | *European Handbook* | Experimental | *Joint Research Centre* | Decannual | 2020 | Metropolitan Area of Porto |
| | 15.5 | Investments in the protection of biodiversity and landscape of the municipality | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 15.1 | Native trees planted | Additional indicator | Official | Universidade Católica Portuguesa do Porto | Annual | 2020 | Municipality |
| | 15.1 | Total intervention area | Additional indicator | Official | Universidade Católica Portuguesa do Porto | Annual | 2019 | Municipality |
| | 15.1 | Voluntary participation | Additional indicator | Official | Universidade Católica Portuguesa do Porto | Annual | 2020 | Municipality |
| | 15.1 | Actions with volunteers | Additional indicator | Official | Universidade Católica Portuguesa do Porto | Annual | 2020 | Municipality |
| | 15.1 | Urban greeness | *European Handbook* | Official | Municipality of Porto | - | 2020 | Municipality |
| 16 | 16.1 | Murders and violent deaths | *European Handbook* | Official | *Eurostat* | Annual | 2019 | Municipality |
| | 16.1 | Criminality rate | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 16.1 | Crimes registered by the police | Additional indicator | Official | *PORDATA* | Annual | 2019 | Municipality |
| | 16.1 | Crimes of domestic violence against spouse or similar | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 16.1 | Number of complaints for domestic violence | Additional indicator | Official | *Associação Portuguesa de Apoio à Vítima (APAV)* | Annual | 2019 | Municipality |
| | 16.1 | Victims supported by the Victim Support Office of Porto | Additional indicator | Official | *Associação Portuguesa de Apoio à Vítima (APAV)* | Annual | 2019 | Municipality |
| | 16.6 | Municipal transparency index | Additional indicator | Official | *PORDATA* | Annual | 2017 | Municipality |
| | 16.7 | Voter turnout in municipal elections | *European Handbook* | Official | *PORDATA* | - | 2017 | Municipality |
| | 16.7 | Collaborative Budgeting | *European Handbook* | Official | Municipality of Porto | Annual | 2020 | Municipality |

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| 17 | 17.13 | Extra-EU export of goods | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 17.18 | Municipal council revenues per inhabitant | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 17.18 | City council debt per inhabitant | Additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 17.18 | Proportion of taxes in the total revenue of the city council | City department additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |
| | 17.18 | Relationship between revenues and expenses of the city council | City department additional indicator | Official | *Instituto Nacional de Estatística (INE)* | Annual | 2019 | Municipality |

# ANNEX 4. SDG INDICATORS SELECTED FOR REGGIO EMILIA

| SDG | TARGETS | INDICATOR | ALIGNMENT | TYPE | SOURCE | FREQUENCY | LAST AVAILABLE YEAR | LOCAL CHALLENGE | SPECIFIC OBJECTIVE |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.4 | Proximity index- 15 minutes city index | City-specific indicator | Experimental | Comune di Reggio nell'Emilia (City planning department ) | Yearly | 2020 | Common goods | Community Plan |
| | 1.4 | Vulnerability index | Indicator with data fairly similar to that in the *Handbook* | Experimental | Comune di Reggio nell'Emilia (City planning department ) | Periodic | 2018 | Common goods | Community Plan |
| | 1.4 | Share adult fragility / total people who access by social services (comparable in historical trend) | City-specific indicator | Official | Comune di Reggio nell'Emilia (Internal data Social services ) | Yearly | 2019 | Common goods | Community Plan |
| | 1.4 | Share social services direct contribution assigned to support adult fragility | City-specific indicator | Official | Comune di Reggio nell'Emilia (Internal data Social services ) | Yearly | 2019 | Common goods | Community Plan |
| 2 | 2.3 | Share of farming surface dedicated to organic agriculture | City-specific indicator | Official | *ISTAT Regione Emilia Romagna* (regional offices provided the municipal details – openly published is the regional data) | Yearly | 2020 | Climate neutrality | Support the competitiveness and quality of local agricultural supply chains |
| | 2.4 | Organic farming growth rate | City-specific indicator | Official | *ISTAT Regione Emilia Romagna* (regional offices provided the municipal details – openly published is the regional data) | Yearly | 2019-2020 | Climate neutrality | Protect and enhance the historical, landscape and naturalistic features of the rural territory |
| | 2.4 | Urban horticulture network extension sqm | City-specific indicator | Official | *Comune di Reggio nell'Emilia* | Yearly | 2016-2017 | Climate neutrality | Protect and enhance the historical, landscape and naturalistic features of the rural territory |
| | 2.4 | Share (% organic food in schools over total grocery purchases for schools by municipality) | Indicator with data fairly similar to that in the *Handbook* | Experimental | Comune di Reggio nell'Emilia (School department ( officina Educativa) – Internal data) | 3 year basin | 2020 | Implement the Farm to Fork strategy | To be associated to different strategic obj |
| 3 | 3.6 | Road accident death rate | *European Handbook* | Official | *Comune di Reggio Emilia Bilancio Ambientale* | Yearly | 2018 | Climate neutrality | Ensure the improvement and safety of the urban infrastructure |
| | 3.8 | Accessibility 15 minutes city – accessibility of the population to a drug store or a doctors/ health point intensity of the 15 minutes city | City-specific indicator | Experimental | Comune di Reggio nell'Emilia (City planning department) | Yearly | 2020 | Common goods | Extending the care of the community |
| | 3.9 | asbestos plan – % asbestos on buildings | City-specific indicator | Experimental | Comune di Reggio nell'Emilia (City planning department Project implemented with University of Modena and Reggio Emilia) | Yearly | 2020 | Climate neutrality | Reclaim the soils, air and water |

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| 4 | 4.2 | Share of schools not accessible through local public tranport | City-specific indicator | Experi-mental | Comune di Reggio nell'Emilia (City planning department based on internal data) | Yearly | 2020 | Common goods | Requalify and re-functionalize school equipment |
| | 4.2 | School services intensity | City-specific indicator | Experi-mental | Comune di Reggio nell'Emilia (City planning department based on data provided of the school department (number of schools) and demographic data) | Yearly | 2020 | Common goods | Requalify and re-functionalize school equip-ment |
| | 4.2 | Number of children attending pre schools | Indicator with data fairly similar to that in the *Handbook* | Official | Comune di Reggio nell'Emilia (*Municipal Open data*) (data available in open format until 2016; data for following years provided internally by the school department) | Yearly | 2011-12 / 2018-19 | Common goods | Requalify and re-functionalize school equipment |
| | 4.a | Number of accessible schools | City-specific indicator | Experi-mental | Comune di Reggio nell'Emilia (Municipal internal data Educational department) | Yearly | 2020 | Common goods | No barriers Plan |
| 6 | 6.3 | Waste water treatment * Percentage share of polluting loads that flow into secondary or advanced plants, in equivalent inhabitants, compared to the total urban loads generated | Indicator with data fairly similar to that in the *Handbook* | Official | *ATERSIR - Regional agency for water and waste management* | Periodic | 2011 | Climate neutrality | Improve water quality and hydraulic efficiency |
| | 6.3 | Efficiency of drinking water distribution networks | City-specific indicator | Official | IRETI - Multi Utility Public company (Multi Utility Public company owned data) | Yearly | 2020 | Climate neutrality | Improve water quality and hydraulic efficiency |
| | 6.3 | Mancasale plant-purification water used for industrial, irrigation or other uses ( % of purified water used for different purposes) | Indicator with data fairly similar to that in the *Handbook* | Official | *Comune di Reggio nell'Emilia* | Yearly | 2017 | Climate neutrality | Improve water quality and hydraulic efficiency |
| | 6.4 | resident population served by purification plants | City-specific indicator | Official | IRETI - Multi Utility Public company (Multi Utility Public company owned data – periodically reported nationally and locally) | Yearly | 2020 | Climate neutrality | Improve water quality and hydraulic efficiency |
| | 6.4 | Withdrawals of drinking water ( Water introduced in the system per year) | City-specific indicator | Official | IRETI - Multi Utility Public company (Multi Utility Public company owned data – periodically reported nationally and locally) | Yearly | 2020 | Climate neutrality | Improve water quality and hydraulic efficiency |
| | 6.6 | Ecological quality of surface water bodies (LIMECO index) | City-specific indicator | Official | *Agenzia regionale prevenzione, ambiente ed energia dell'Emilia-Romagna (ARPAE)* | Yearly | 2019 | Climate neutrality | Improve water quality and hydraulic efficiency |
| 7 | 7.1 | New Buildings: Share of buildings build after 1980 over total buildings % buildings in critical energy class (before Law 10/91) | *European Handbook* | Experi-mental | Comune di Reggio nell'Emilia (City planning department – internal elaboration) | Yearly | 2020 | Climate neutrality | Requalifying the building stock: seismic safety, energy efficiency, living comfort |
| | 7.2 | Final energy consumption of the residential sector per capita | Indicator with data fairly similar to that in the *Handbook* | Official | *Agenzia regionale prevenzione, ambiente ed energia dell'Emilia-Romagna (ARPAE)* | Yearly | 2017 | Climate neutrality | Requalifying the building stock: seismic safety, energy efficiency, living comfort |

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| | 7.2 | Number of renewable energy plants in the Municipality of Reggio Emilia | City-specific indicator | Official | *Comune di Reggio nell'Emilia* | Yearly | 2020 | Climate neutrality | Requalifying the building stock: seismic safety, energy efficiency, living comfort |
| | 7.3 | Number of open building interventions / CARBONO | City-specific indicator | Official | Comune di Reggio nell'Emilia (Internal Budget and activity report planning PEG) | Yearly | 2020 | Climate neutrality | Requalifying the building stock: seismic safety, energy efficiency, living comfort |
| 8 | 8.1 | Average gross income per contributor | City-specific indicator | Official | *Camera di commercio di Reggio Emilia* | Yearly | 2013 | Attractive-ness | |
| | 8.2 | Number of Firms registred in tech upgraded domains / overall number of existing firms | City-specific indicator | Official | *Camera di commercio di Reggio Emilia* | Yearly | 2018 | Attractive-ness | Requalify productive areas – Attracting new investments with high added value and employability |
| | 8.2 | Variation rate in the number of registered firms | City-specific indicator | Official | *Camera di commercio di Reggio Emilia* | Yearly | 2017-2018 | Attractive-ness | Requalify productive areas – Attracting new investments with high added value and employability |
| | 8.3 | Number of ERDF financed projects | City-specific indicator | Official | *Open Coesione* | Yearly | 2014-2020 | Attractive-ness | Requalify productive areas |
| | 8.9 | Hospitality offer (number of available hotel rooms or other forms of touristic accomodation ) | City-specific indicator | Official | *Camera di commercio di Reggio Emilia* | Periodic | 2014 | Attractive-ness | Qualifying touristic and commercial strategy |
| | 8.9 | % of agritourism and B&B over total hospitality ( total B&B + agritourism offer / alla available rooms for hospitality) | City-specific indicator | Official | *Camera di commercio di Reggio Emilia* | Periodic | 2014 | Attractive-ness | Qualifying touristic and commercial strategy |
| 9 | 9.1 | Families with fixed and / or mobile broadband connection | City-specific indicator | Official | Comune di Reggio nell'Emilia (City planning department – internal elaboration) | Yearly | 2019 | Climate neutrality | Shifting from mobility to accessibility |
| | 9.1 | Number of production sites localised in the municipality / number of firms registered | City-specific indicator | Official | *Camera di commercio di Reggio Emilia* | Periodic | 2018 | Climate neutrality | Shifting from mobility to accessibility |
| | 9.1 | Balance between activity and residence % production on residential | City-specific indicator | Official | Comune di Reggio nell'Emilia (Based on the internal municipal data Urban department) | Yearly | 2019 | Climate neutrality | Shifting from mobility to accessibility |
| 10 | 10.2 | Composition of the needs fragile fringes of the population | City-specific indicator | Official | Comune di Reggio nell'Emilia (Municipal open data – Social services department) | Yearly | 2019 | Common goods | |
| | 10.2 | Number of families hosted through emergency housing / housing assinstance | City-specific indicator | Experi-mental | Comune di Reggio nell'Emilia (Municipal open data City planning department + social servces over internal data set) | Yearly | 2021 | Common goods | Solidarity housing settelements |
| | 10.2 | Number of families in a social public housing reserve list / number of families in economic frailty (over a set portion of city area) | City-specific indicator | Experi-mental | Comune di Reggio nell'Emilia (local city planning department + social servces over internal data set) | Yearly | 2019 | Common goods | Solidarity housing settelements |

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|---|---|---|---|---|---|---|---|---|---|
| | 10.2 | Share of families asking economic contribution for housing / overall amount of family units requests | City-specific indicator | Official | Comune di Reggio nell'Emilia (Municipal open data) | Yearly | 2019 | Common goods | Solidarity housing settelements |
| 11 | 11.2 | Citizens' mobility habits | Indicator with data fairly similar to that in the *Handbook* | Official | Comune di Reggio nell'Emilia (Environmental municipal open data) | Periodic | 2015 | Climate neutrality | Sustainable mobility |
| | 11.2 | Home to school mobility patterns (% on foot, bicycle, collective transport, private car) | Indicator with data fairly similar to that in the *Handbook* | Official | Comune di Reggio nell'Emilia (Environmental municipal open data) | Periodic | 2017 | Climate neutrality | Sustainable mobility |
| | 11.2 | Availability of cycling lanes for inhabitants | Indicator with data fairly similar to that in the *Handbook* | Official | Comune di Reggio nell'Emilia (Environmental municipal open data) | Yearly | 2018 | Climate neutrality | Sustainable mobility |
| | 10.2 | Protected paths home to school | Indicator with data fairly similar to that in the *Handbook* | Official | Comune di Reggio nell'Emilia (Environmental municipal open data) | yearly | 2018 | Climate neutrality | Sustainable mobility |
| | 11.3 | Waterproofing and land use per capita | Indicator with data fairly similar to that in the *Handbook* | Official | *Istituto superiore per la protezione e la ricerca ambientale (ISPRA)* | yearly | 2020 | Climate neutrality | Reducing soil consumption |
| | 11.3 | Built-up area per capita | *European Handbook* | Official | *Istituto superiore per la protezione e la ricerca ambientale (ISPRA)* | yearly | 2020 | Climate neutrality | Reducing soil consumption |
| | 11.3 | Number of building permits adopting the regulation allowing use changes due to elderly or disability | City-specific indicator | Official | Comune di Reggio nell'Emilia (To be calculated) | yearly | | Common goods | Solidarity housing settelements |
| | 11.4 | Public expenditure on biodiversity and landscape | City-specific indicator | Official | *Comune di Reggio nell'Emilia* | yearly | 2019 | Climate neutrality | Preserving and restoring ecosystems and biodiversity |
| | 11.4 | 'SIC areas (Site of Community Interest) and ZPS (Special Protection Areas) PRG / PSC restricted naturalistic value areas PRG / PSC restricted areas of landscape value sqm' | City-specific indicator | Official | Comune di Reggio nell'Emilia (Municipal Open data environmental balance data set) | yearly | 2018 | Climate neutrality | Preserving and restoring ecosystems and biodiversity |
| | 11.4 | Number of building interventions carried out in the historic centre (trend) | City-specific indicator | Official | Comune di Reggio nell'Emilia (Municipal Open data – edilizia) | yearly | 2020 | Attractive-ness | Value the historical city centre |
| | 11.6 | Separate collection of urban waste | Indicator with data fairly similar to that in the *Handbook* | Official | *Agenzia regionale prevenzione, ambiente ed energia dell'Emilia-Romagna (ARPAE)* | yearly | 2020 | Climate neutrality | Mitigation & adaptation to climate change |
| | 11.6 | Incidence of urban green areas on the urbanised surface | Indicator with data fairly similar to that in the *Handbook* | Official | *ISTAT Regione Emilia Romagna* | yearly o multiannual | 2018 | Climate neutrality | Mitigation & adaptation to climate change |

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|---|---|---|---|---|---|---|---|---|---|
| | 11.6 | Municipal waste sent to landfill out of the total municipal waste collected | City-specific indicator | Official | IREN - Multiservice company | yearly | 2020 | Climate neutrality | Mitigation & adaptation to climate change |
| | 11.6 | Average annual concentration PM 2.5 | Indicator with data fairly similar to that in the *Handbook* | Official | *Agenzia regionale prevenzione, ambiente ed energia dell'Emilia-Romagna (ARPAE)* | yearly | 2020 | Climate neutrality | Mitigation & adaptation to climate change |
| | 11.6 | Average annual particulate concentration <10 µm | Indicator with data fairly similar to that in the *Handbook* | Official | *Agenzia regionale prevenzione, ambiente ed energia dell'Emilia-Romagna (ARPAE)* | yearly | 2020 | Climate neutrality | Mitigation & adaptation to climate change |
| | 11.6 | 'Urban air quality Sulfur dioxide Percentage of control units in provincial capitals / metropolitan cities with valid measurements that have exceeded the annual limit value for $NO_2$ (40 µg / $m^3$).' | Indicator with data fairly similar to that in the *Handbook* | Official | *Agenzia regionale prevenzione, ambiente ed energia dell'Emilia-Romagna (ARPAE)* | yearly | 2020 | Climate neutrality | Mitigation & adaptation to climate change |
| | 11.7 | Recreational and green area asset per inhabitant | Indicator with data fairly similar to that in the *Handbook* | Official | Comune di Reggio nell'Emilia (City environmental department Open data environmental budget) | yearly | 2018 | Common goods | Solidarity housing settlements |
| 12 | 12.2 | energy efficiency and zero carbon interventions (RIE building response) | City-specific indicator | Experimental | Comune di Reggio nell'Emilia (Experimental approaches to be introduced) | yearly | 2018 | Climate neutrality | mitigation & adaptation to climate change |
| | 12.3 | Number of Children – Teachers involved in environmental education projects | City-specific indicator | Official | Comune di Reggio nell'Emilia (Environmental balance Local Utility company +Municipal school department) | yearly | 2018 | Climate neutrality | Rural territory: sustainable agriculture and landscape heritage |
| | 12.3 | Number of public fountains on the territory – for drinkable water (carbonated and still) | City-specific indicator | Official | Comune di Reggio nell'Emilia (Environmental balance) | yearly | 2018 | Climate neutrality | Rural territory: sustainable agriculture and landscape heritage |
| | 12.5 | Separate collection of urban waste which is recovered | Indicator with data fairly similar to that in the *Handbook* | Official | *Agenzia regionale prevenzione, ambiente ed energia dell'Emilia-Romagna (ARPAE)* | yearly | 2019 | Climate neutrality | Mitigation & adaptation to climate change |
| 13 | 13.1 | Emissions of $CO_2$ and other climate-altering gases | Indicator with data fairly similar to that in the *Handbook* | Official | *Agenzia regionale prevenzione, ambiente ed energia dell'Emilia-Romagna (ARPAE)* | periodic | 2017 | Climate neutrality | Mitigation & adaptation to climate change |
| | 13.1 | Extimation of $CO_2$ emissions per building in the municipal territory | City-specific indicator | Official | *Comune di Reggio nell'Emilia* | yearly | | Climate neutrality | Mitigation & adaptation to climate change |
| | 13.1 | Population exposed to flood risk | *European Handbook* | Official | *Istituto superiore per la protezione e la ricerca ambientale (ISPRA)* | periodic | 2020 | Climate neutrality | Mitigation & adaptation to climate change |
| | 13.2 | Heat vulnerability share of urbanised area | *European Handbook* | Experimental | Life UrbanProof (EU – Life UrbanProof based indicator) | periodic | 2020 | Climate neutrality | Mitigation & adaptation to climate change |

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|---|---|---|---|---|---|---|---|---|---|
| 15 | 15.2 | Coefficient of woodiness | City-specific indicator | Official | Regione Emilia-Romagna (indicator elaborated based on Land Use Regione-Emilia Romagna 2017) | periodic | 2017 | Climate neutrality | Mitigation & adaptation to climate change |
| | 15.3 | Soil waterproofing by artificial cover | City-specific indicator | Official | *Istituto superiore per la protezione e la ricerca ambientale (ISPRA)* | yearly | 2020 | Climate neutrality | Mitigation & adaptation to climate change |
| | 15.5 | Protected land areas | City-specific indicator | Official | Comune di Reggio nell'Emilia (Municipal Open data environmental balance data set) | yearly | 2018 | Climate neutrality | Mitigation & adaptation to climate change |
| | 15.9 | Fragmentation of the natural and agricultural territory | City-specific indicator | Official | *Istituto superiore per la protezione e la ricerca ambientale (ISPRA)* | yearly | 2019 | Climate neutrality | Rural territory: sustainable agriculture and landscape heritage |

# ANNEX 5. SDG INDICATORS SELECTED FOR SEVILLE

| SDG | TARGETS | INDICATOR | ALIGNMENT | TYPE | SOURCE | FREQUENCY | LAST AVAILABLE YEAR | LEVEL OF AGGREGATION | DISAGGREGATION |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.2 | Population with income per consumption unit below 40 % of the median | Indicator with data fairly similar to that in the *Handbook* | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2017 | City | Sex/age |
| | 1.2 | Risk of poverty rate | *European Handbook* | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2017 | Census section | Sex/age |
| | 1.2 | Child poverty rate | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2018 | Census section | Sex/age |
| | 1.2 | People living in households with very low work intensity | *European Handbook* | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2019 | Region | Sex/age |
| | 1.3 | Households in social housing | *European Handbook* | Official | *Ministerio de Transportes, Movilidad y Agenda Urbana* | Annual | 2019 | Provincial | Type |
| | 1.a | Social Welfare spending per capita | Additional indicator | Official | *Spanish Tax Agency* | Annual | 2020 | City | |
| | 1.3 | Lone parent private households | *European Handbook* | Official | *Eurostat, City Statistics database* | Annual | 2019 | City | |
| 2 | 2.2 | Adults overweight | *European Handbook* | Official | *Instituto Nacional de Estadística (INE)* | Six-year | 2017 | Region | Sex |
| | 2.3 | Employment rate in agriculture and fishery | Additional indicator | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | Sector |
| | 2.4 | Organic agriculture rate | Additional indicator | Official | *Ministerio de Agricultura, Pesca y Alimentación* | Annual | 2019 | Region | |
| | 2.a | Share of land of agricultural areas | Additional indicator | Official | *Eurostat, City Statistics database* | Annual | 2014 | City | |
| | 2.c | Food consumption prices index | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2020 | Provincial | Type |
| 3 | 3.2 | Infant mortality | *European Handbook* | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | |
| | 3.3 | HIV and AIDS death rate | Additional indicator | Official | Instituto Nacional de Estadística (INE) (microdata available upon request) | Annual | 2018 | City | Sex/age |
| | 3.3 | Tuberculosis death rate | Additional indicator | Official | Instituto Nacional de Estadística (INE) (microdata available upon request) | Annual | 2019 | City | Sex/age |
| | 3.4 | Non-communicable diseases death rate | Additional indicator | Official | Instituto Nacional de Estadística (INE) (microdata available upon request) | Annual | 2020 | City | Sex/age |
| | 3.4 | Circulatory or respiratory systems diseases death rate | Additional indicator | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | |

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|---|---|---|---|---|---|---|---|---|---|
| | 3.4 | Respiratory system tumours death rate | Additional indicator | Official | Instituto Nacional de Estadística (INE) (microdata available upon request) | Annual | 2018 | City | Sex/age |
| | 3.4 | Suicide death rate | Additional indicator | Official | Instituto Nacional de Estadística (INE) (microdata available upon request) | Annual | 2019 | City | Sex/age |
| | 3.5 | Alcohol and drugs death rate | Additional indicator | Official | Instituto Nacional de Estadística (INE) (microdata available upon request) | Annual | 2018 | City | Sex/age |
| | 3.6 | Traffic accident death rate | *European Handbook* | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | |
| | 3.7 | Adolescent births | *European Handbook* | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | |
| | 3.8 | Proportion of population with large health expenditures per household (> 10 %) as a percentage of total household expenditure | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2016 | National | sSex, nationality, income |
| | 3.c | Density and distribution of health workers | Additional indicator | Official | *Ministerio de Sanidad, Consumo y Bienestar Social* | Annual | 2018 | Region | Sex |
| 4 | 4.1 | Adults with less then primary, primary and lower secondary education | *European Handbook* | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | |
| | 4.2 | Children 0-4 in day care or school | *European Handbook* | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | |
| | 4.3 | Students in higher education | *European Handbook* | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | Sex |
| | 4.4 | Adults with higher education (ISCED level 5-8 from 2014 onwards) | Additional indicator | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | |
| | 4.b | Education spending per capita | Additional indicator | Official | *Spanish Tax Agency* | Annual | 2020 | City | |
| | 4.b | Graduates ISCED 5-7 | Additional indicator | Official | *European tertiary education register (ETER)* | Annual | 2015 | City | University |
| 5 | 5.1 | Gender employment gap | *European Handbook* | Official | *Eurostat, City Statistics database* | Annual | 2019 | City | Sex |
| | 5.2 | Gender Violence rate | Indicator with data fairly similar to that in the *Handbook* | Official | *Portal Estadístico de Criminalidad* | Annual | 2020 | Judicial Party | Sex |
| | 5.2 | Violence and sexual exploitation | Additional indicator | Official | *Portal Estadístico de Criminalidad* | Annual | 2020 | Judicial Party | Sex |
| | 5.4 | Time dedicated to home and family on an average day | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2010 | Region | Sex |
| | 5.5 | Seats held by women in municipal governments | *European Handbook* | Official | 'Instituto de la Mujer y Para la Igualdad de Oportunidades ()' | Annual | 2019 | City | |
| | 5.5 | Proportion of women in managerial positions | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2019 | Region | |

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|---|---|---|---|---|---|---|---|---|---|
| 6 | 6.1 | Drinking water consumption | *European Handbook* | Official | Empresa Metropolitana de Abastecimiento y Saneamiento de Aguas de Sevilla (data is not open or public) | Annual | 2020 | City | |
| | 6.3 | Wastewater safely treated | *European Handbook* | Official | *Consejeria de Agricultura, Ganadería Pesca y Desarrollo* | Annual | 2019 | Provincial | |
| 7 | 7.2 | Renewable energy rate | Additional indicator | Official | *Ministerio para la Transición Ecológica y el Reto Demográfico* | Annual | 2018 | Provincial | Technology |
| | 7.3 | Energy intensity | Additional indicator | Official | *Instituto de Estadística y Cartografía de Andalucía* | Annual | 2018 | City | Sector |
| | 7.3 | Impact of electricity costs on average household income | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2018 | City | |
| | | New buildings | *European Handbook* | Official | *Dirección General del Catastro* | Annual | 2020 | City | |
| | | Energy consumption per capita | *European Handbook* | Official | *Instituto de Estadística y Cartografía de Andalucía* | Annual | 2019 | City | Sector |
| 8 | 8.1 | Annual growth rate of real GDP per capita | Additional indicator | Official | *Organisation for Economic Co-Operation and Development (OECD)* | Annual | 2018 | City | |
| | 8.2 | Annual growth rate of real GDP per person employed | Additional indicator | Official | *Organisation for Economic Co-Operation and Development (OECD)* | Annual | 2018 | City | |
| | 8.5 | Gender wage gap | Additional indicator | Official | *Spanish Tax Agency* | Annual | 2019 | City | Sex |
| | 8.5 | Unemployment rate | *European Handbook* | Official | *Eurostat, City Statistics database* | Annual | 2019 | City | Sex |
| | 8.6 | Young unemployed rate | Additional indicator | Official | *Instituto de Estadística y Cartografía de Andalucía* | Annual | 2020 | City | Sex/age |
| | 8.8 | Accidents at Work | *European Handbook* | Official | *Ministerio de Trabajo, Migraciones y Seguridad Social* | Annual | 2020 | City | Sex/age |
| | 8.9 | Proportion of jobs in the tourism sector | Additional indicator | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | Sector |
| | 8.b | Public funds in promoting employment spending per capita | Additional indicator | Official | *Spanish Tax Agency* | Annual | 2020 | City | |
| | | Dependency index by sector of employment | Additional indicator | Official | "Eurostat, City Statistics database ()" | Annual | 2018 | City | |
| 9 | 9.2 | Employees in Industry rate | Additional indicator | Official | *Eurostat, City Statistics database* | Annual | 2018 | City | |
| | 9.3 | Net business population growth, industry | Indicator with data fairly similar to that in the *Handbook* | Official | *Eurostat; Metropolitan Areas Statistics database* | Annual | 2017 | Metropolitan Area | |
| | 9.4 | $CO_2$ emission per unit of value added | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2016 | Region | |
| | 9.5 | Patent applications local rate | Additional indicator | Official | *Spanish Patent and Trademark Office Statistics* | Annual | 2019 | City | |

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|---|---|---|---|---|---|---|---|---|---|
| | 9.5 | Researchers (in full-time equivalent) per million inhabitants | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2019 | Region | |
| | 9.a | Proportion of medium and high-tech industry value added in total value added | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2017 | Region | |
| | | City transport performance | *European Handbook* | Experi-mental | *Joint Researche Centre (JRC)* | Annual | 2020 | City | |
| 10 | 10.1 | Per capita growth rates of household income of the poorest 40% of the population | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2019 | Region | |
| | 10.2 | Proportion of people living below 50 per cent of median income, by age, sex and persons with disabilities | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2017 | City | |
| | 10.4 | Labour share of GDP, comprising wages and social protection transfers | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2019 | Region | |
| | 10.5 | Municipal public debt | Additional indicator | Official | *Spanish Tax Agency* | Annual | 2019 | City | |
| | 10.7 | Foreign unemployment rate | Additional indicator | Official | *Instituto de Estadística y Cartografía de Andalucía* | Annual | 2020 | City | Sex |
| | 10.4 | Gini Index | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2017 | City | |
| | 10.4 | ratio 80/20 | Additional indicator | Official | *Instituto Nacional de Estadística (INE)* | Annual | 2017 | City | |
| | 10.7 | Population with migrant background | *European Handbook* | Official | *Instituto de Estadística y Cartografía de Andalucía* | Annual | 2020 | City | |
| | 10.7 | Hosted asylum seekers | *European Handbook* | Official | *Ministerio del Interior* | Annual | 2019 | Region | |
| 11 | 11.1 | Urban vulnerability | *European Handbook* | Official | Elaborated by data of: *Instituto Nacional de Estadística (INE)* | Annual | 2017 | City | |
| | 11.1 | Housing access Index | Indicator with data fairly similar to that in the *Handbook* | Official | Elaborated by data of: *Instituto Nacional de Estadística (INE)* / Ministerio de movilidad, transporte y Agenda Urbana Data available in: REDS | Annual | 2017 | City | |
| | 11.2 | Access to public transport | *European Handbook* | Experi-mental | *DG Regional and Urban Policy* | Periodical | 2020 | City | |
| | 11.4 | Protection and management of the Historic-Artistic Heritage spending per capita | Additional indicator | Official | *Spanish Tax Agency* | Annual | 2020 | City | |
| | 11.6 | Annual average PM10 | Additional indicator | Official | *Ministerio para la Transición Ecológica y el Reto Demográfico* | Annual | 2020 | Metropol-itan Area | |
| | 11.7 | Built-up area per capita | *European Handbook* | Experi-mental | *Joint Research Centre (JRC)* | Periodical | 2015 | City | |
| | 11.6 | Population exposed to NO2 concentration | *European Handbook* | Official | *Consejería de Agricultura, Ganadería, Pesca y Desarrollo Sostenible de Andalucía* | Monthly | 2020 | City | |

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|---|---|---|---|---|---|---|---|---|---|
| | 11.7 | Population without green urban areas in their neighbourhood | *European Handbook* | Experimental | DG Regional and Urban Policy | Periodical | 2014 | City | |
| | 11.4 | Cultural Creative Cities Index | *European Handbook* | Experimental | *Joint Research Centre (JRC)* | Annual | 2020 | City | |
| 12 | 12.5 | Local recycling rate | *European Handbook* | Official | *LIPASAM (public utility company)* | Annual | 2017 | City | |
| | 12.5 | Urban waste per capita | *European Handbook* | Official | *LIPASAM (public utility company)* | Annual | 2017 | City | |
| | 12.6 | Number of organisations with Eco-Management and Audit Scheme (EMAS) | Additional indicator | Official | *EMAS Register* | Annual | 2020 | Company | |
| | 12.b | Local tourism intensity | *European Handbook* | Official | *Eurostat, City Statistics database* | Annual | 2019 | City | |
| 13 | 13.1 | People affected by disasters | *European Handbook* | Official | *Emergency Events Database (EM-DAT)* | Annual | 2018 | City | |
| | 13.2 | Greenhouse gas emissions | *European Handbook* | Official | *Junta de Andalucía* | Annual | 2018 | City | Sector |
| | | Urban Flood Risk | *European Handbook* | Experimental | *Joint Research Centre (JRC)* | Periodical | 2020 | City | |
| 14 | 14.1 | Authorised pollutant load | Indicator with data fairly similar to that in the *Handbook* | Official | *Consejeria de Agricultura, Ganadería Pesca y Desarrollo Sostenible* | Annual | 2018 | City | Pollutant parameter |
| | 14.1 | Non-authorised pollutant load | Indicator with data fairly similar to that in the *Handbook* | Official | *Consejeria de Agricultura, Ganadería Pesca y Desarrollo Sostenible* | Annual | 2018 | City | |
| | 14.3 | Bathing sites with excellent water quality | *European Handbook* | Official | *Consejería de Salud y Familias* | Annual | 2018 | City | |
| 15 | 15.1 | Forest areas | Indicator with data fairly similar to that in the *Handbook* | Official | Eurostat, City Statistics database | Annual | 2014 | City | |
| | 15.3 | Land Abandoment | *European Handbook* | Experimental | *Joint Research Centre (JRC)* | Five-year | 2020 | region | |
| | 15.4 | Protection of Natural Areas | Additional indicator | Official | *Consejería de Agricultura, Ganadería, Pesca y Desarrollo Sostenible de Andalucía* | Annual | 2019 | region | |
| | 15.a | Environment spending per capita | Additional indicator | Official | *Spanish Tax Agency* | Annual | 2020 | City | |
| | 15.b | Tree Cover Density | *European Handbook* | Experimental | *European Environment Agency (EEA)* | Annual | 2018 | City | |
| | | Urban greenness | *European Handbook* | Experimental | City of Seville (based on *GHSL*) | Annual | 2019 | District | Type |
| 16 | 16.1 | Murders and violent deaths | *European Handbook* | Official | *Portal Estadístico de Criminalidad* | Annual | 2019 | Judicial Party | |
| | 16.1 | Crime rate | Additional indicator | Official | *Portal Estadístico de Criminalidad* | Annual | 2019 | Judicial Party | |

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|---|---|---|---|---|---|---|---|---|---|
| | 16.4 | Drug traffic | Additional indicator | Official | *Portal Estadístico de Criminalidad* | Annual | 2019 | Judicial Party | |
| | 16.6 | Strength and autonomy of the municipal institution | Additional indicator | Official | *Spanish Tax Agency* | Annual | 2018 | City | |
| | 16.7 | Transparency of the public administration | Indicator with data fairly similar to that in the *Handbook* | Experi-mental | *Dyntra* | Annual | 2019 | City | |
| | 16.8 | Voter turnout in municipal elections | *European Handbook* | Official | *Instituto de Estadística y Cartografía de Andalucía* | Annual | 2019 | City | |
| 17 | 17.1 | Total government revenue as proportion of GDP | *European Handbook* | Official | *Spanish Tax Agency* | Annual | 2019 | Region | |
| | 17.2 | Cooperation and development projects | Additional indicator | Official | *Federación Española de Municipios y Provincias (FEMP)* | Annual | 2019 | City | Project/sector |
| | 17.8 | White NGA areas | Additional indicator | Official | *Secretaria de Estado de Telecomunicaciones e infraestructura Digital* | Periodical | 2020 | City | |
| | 17.18 | VLR indicators from official statistics | *European Handbook* | Official | City of Seville | Periodical | | City | |

# ANNEX 6. SDG INDICATORS SELECTED FOR VALENCIA

| SDG | INDICATOR | ALIGNMENT | TYPE | SOURCE | DATASET | LAST AVAILABLE YEAR | LEVEL OF AGGREGATION | FREQUENCY | DISAGGREGATION |
|---|---|---|---|---|---|---|---|---|---|
| 1 | People at risk of income poverty after social transfers | *European Handbook* | Official | Valencia City Council Statistics Office | *Indicators of poverty and living conditions at the subregional level. Valencian Institute of Statistics* | 2019 | Municipal | Annual | |
| | Lone parent private households | *European Handbook* | Official | Valencia City Council Statistics Office | *Population Statistics, Statistical Office, Valencia City Council* | 2020 | Municipal | Annual | Age, Gender |
| | Households with all economically active population unemployed | Indicator with data fairly similar to that in the *Handbook* | Official | Valencia City Council Statistics Office | *Labor Force Survey (EPA). INE* | 2020 | Municipal | Annual | |
| | Households in social housing | *European Handbook* | Official | Valencia City Council Statistics Office | *Valencian Housing Observatory* | 2017 | Municipal | Annual | |
| | People served in Social Attention to Homeless People Program of Municipal Social Services | Indicator with data fairly similar to that in the *Handbook* | Official | Valencia City Council Statistics Office | *Social Welfare and Integration Service. Valencia City Council* | 2019 | Municipal | Annual | Gender |
| 2 | Adults overweight | *European Handbook* | Official | Valencia City Council Statistics Office | *Public Opinion Survey of the city of Valencia. Statistical Office* | 2019 | Districts and municipal | Triennial | Age, Gender |
| | Infant mortality | *European Handbook* | Official | Valencia City Council Statistics Office | *Vital Statistics. INE* | 2019 | Districts and municipal | Annual | Gender |
| 3 | Adolescent births (aged 10-19) | *European Handbook* | Official | Valencia City Council Statistics Office | *Vital Statistics. INE* | 2019 | Municipal | Annual | Age, Gender |
| | Deaths in Road Accidents | *European Handbook* | Official | Valencia City Council Statistics Office | *Mortality statistics by cause, Statistical Office. Mortality Registry of Valencian Region* | 2018 | Neighborhood, districts and municipal | Annual | |
| | Children 0-4 in day care or school | *European Handbook* | Official | Valencia City Council Statistics Office | *Statistics of school equipment of the city of Valencia, Statistical Office* | 2020 | Districts and municipal | Annual | Gender |
| 4 | Adults with less then primary, primary and lower secondary education(25-64) | *European Handbook* | Official | Valencia City Council Statistics Office | *Population Statistics, Statistical Office, Valencia City Council* | 2020 | Neighborhood, districts and municipal | Annual | Gender |
| | Students in higher education by gender | *European Handbook* | Official | Valencia City Council Statistics Office | *Regional Ministry of Education, Research, Culture and Sports. Universities with campus in the city* | 2020 | Municipal | Annual | Gender |
| 5 | Gender employment gap | *European Handbook* | Official | Valencia City Council Statistics Office | *Labor Force Survey (EPA). INE* | 2020 | Districts and municipal | Annual | Gender |
| | Formal complaints for episodes of violence against women | *European Handbook* | Official | Valencia City Council Statistics Office | *General Council of the Judiciary. Municipal Population Census* | 2020 | Municipal | Annual | Gender |

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|---|---|---|---|---|---|---|---|---|---|
| | Complaints of gender violence based on injuries | Additional indicator | Official | Valencia City Council Statistics Office | *Observatory against Domestic and Gender Violence of the General Council of the Judiciary* | 2020 | Municipal | Annual | |
| | Seats held by women in municipal governments | *European Handbook* | Official | Valencia City Council Statistics Office | *General Secretariat of the Plenary of the Valencia City Council* | 2020 | Municipal | Annual | Gender |
| 6 | Wastewater safely treated | *European Handbook* | Official | Valencia City Council Statistics Office | *EPSAR (Public Entity for Wastewater Sanitation of the Valencian Community)* | 2018 | Municipal | Annual | Not necessary |
| | Drinking water consumption | *European Handbook* | Official | Valencia City Council Statistics Office | *Water Section. Comprehensive Water Cycle Service. Valencia City Council* | 2019 | Municipal | Annual | Not necessary |
| | Percentage of wastewater receiving tertiary treatment | Indicator with data fairly similar to that in the *Handbook* | Official | Valencia City Council Statistics Office | *Comprehensive Water Cycle Service. Ajuntament de Valencia* | 2019 | Municipal | Annual | Not necessary |
| | Water Consumption by sector (domestic, industrial, public) and by inhabitants. | Indicator with data fairly similar to that in the *Handbook* | Official | Valencia City Council Statistics Office | *Comprehensive Water Cycle Service. Valencia City Council* | 2019 | Districts and municipal | Annual | Not necessary |
| 7 | New buildings | *European Handbook* | Official | Valencia City Council Statistics Office | *Construction and Occupation Licenses* | 2020 | Municipal | Annual | Not necessary |
| | Energy consumption per capita | *European Handbook* | Official | Valencia City Council Statistics Office | *Iberdrola. Municipal Population Census* | 2019 | Municipal | Annual | |
| 8 | Unemployment rate | *European Handbook* | Official | Valencia City Council Statistics Office | *Labor Force Survey (EPA)* | 2020 | Neighbor-hoods | Monthly | Age, Gender |
| | Accidents at Work | *European Handbook* | Official | Valencia City Council Statistics Office | *Subdirectorate General for Statistics. Ministry of Labor and Social Security* | 2019 | Municipal | Annual | |
| | GDP per capita | *European Handbook* | Official | Valencia City Council Statistics Office | *INE. Experimental Statistics* | 2014 | Neighbor-hoods | Annual | Not necessary |
| 9 | Share of employed persons aged 18 and over who travel more frequently to work by public transport | Indicator with data fairly similar to that in the *Handbook* | Official | Valencia City Council Statistics Office | *Public Opinion Survey of the city of Valencia* | 2017 | District | Annual | Age, Gender |
| | Enterprises in Industry, construction and services | *European Handbook* | Official | Valencia City Council Statistics Office | *Statistics National Institute* | 2020 | Municipal | Annual | |
| | Start-ups over 1 000 inhabitants | *European Handbook* | Experi-mental | Start-Ups Valencia: Not-official data source | *Start-Ups Valencia* | 2020 | Provincial | Annual | |
| | City trasport performance | *European Handbook* | Experi-mental | European Commis-sion | *European Commis-sion* | 2020 | Municipal | Quin-quen-nial | |
| 10 | Unemployed people with disabilities | *European Handbook* | Official | Valencia City Council Statistics Office | *General Directorate of Economy, Entrepreneurship and Cooperativism. Valencian generalitat* | 2019 | Municipal | Monthly | Age, Gender |
| | Gini index | *European Handbook* | Official | Valencia City Council Statistics Office | *Ministry of Sustainable Economy, Productive Sectors, Commerce and Labor. Living Conditions Survey* | 2018 | Municipal | Annual | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Graduates by field and gender | *European Handbook* | Official | Valencia City Council Statistics Office | *Municipal Register of Inhabitants as of 01/01/2019. Statistical Office. Valencia City Council* | 2019 | District | Annual | Gender |
| | Population with migrant background | *European Handbook* | Official | Valencia City Council Statistics Office | *Modifications registered in the Municipal Register of Inhabitants. Valencia City Council* | 2019 | Municipal | Annual | |
| | Hosted asylum seekers | *European Handbook* | Official | Interior Ministry | *Ministry of the Interior of Spain* | 2019 | Autonomic | Annual | |
| 11 | Homes with a mortgage, percentage of economic effort by district for housing, percentage of spending per household on average housing in the city | Additional indicator | Official | *Valencia City Council Statistics Office* | | 2019 | Municipal | Annual | Not necessary |
| | Bicycle traffic | *European Handbook* | Official | Valencia City Council Statistics Office | *Sustainable Mobility Service. Valencia City Council* | 2018 | Municipal | Annual | |
| | Access to public transport | *European Handbook* | Official | Valencia City Council Statistics Office | *Valencia City Council* | 2019 | Census unit | Annual | |
| | Built-up area per capita | *European Handbook* | Official | Valencia cIty Council Statistics Office | *Population and Housing Census 2011. INE web server: www.ine.es* | 2019 | Census unit, neigh-borhood, district and municipal | Annual | |
| | Population without green urban areas in their neighbourhood | *European Handbook* | Experi-mental | OCI EN: EN: PSN:2A | | 2019 | Municipal | Annual | |
| 12 | Local recycling rates | *European Handbook* | Official | Valencia City Council Statistics Office | *Own Elaboration. Valencia City Council Statistics Office* | 2019 | Municipal | Annual | Not necessary |
| | Urban waste per capita (kg/hab in one year) | *European Handbook* | Official | Valencia City Council Statistics Office | *Solid Waste Management and Cleaning Service. Valencia City Council. Municipal Register of Inhabit-ants on January 1 of each year* | 2019 | Municipal | Annual | |
| | Local tourism intensity | *European Handbook* | Official | Valencia City Council Statistics Office | *Hotel Occupancy Survey. INE Municipal Register of Inhabitants. Valencia City Council* | 2019 | Municipal | Annual | |
| 13 | People affected by disasters | *European Handbook* | Official | *OCI SC:SH:SA:4A* | | 2019 | Municipal | Annual | |
| | Greenhouse gas emissions | *European Handbook* | Official | *OCI EN:EN:AQ:2C/ ISO37120 -EV8.3* | | 2019 | Municipal | Annual | Not necessary |
| | Urban Flood Risk | *European Handbook* | Official | Generalitat Valenciana | *Generalitat Valenciana* | 2019 | Municipal | Annual | Not necessary |
| 14 | Bathing sites with excellent water quality | *European Handbook* | Official | Valencia City Council Statistics Office | *Ministry of the Environment, Water, Town Planning and Housing* | 2018 | Municipal | Annual | |
| | Participation of local governments in Communi-ty-Led Local Development (CLLD) projects | *European Handbook* | Official | *El Palmar participates in the FLAG* | | 2020 | Municipal | Annual | Not necessary |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 15 | Urban greenness | *European Handbook* | Official | Valencia City Council Statistics Office | *Gardening Service. Municipal Autonomous Body of Singular Parks and Gardens. Valencia City Council. Polytechnic University of Valencia. University of Valencia. Municipal Register of Inhabitants. Valencia City Council* | 2018 | Municipal | Annual | Not necessary |
| | Tree Cover Density | *European Handbook* | Official | Valencia City Council Statistics Office | *Sustainable Gardening Service. Valencia City Council* | 2019 | Municipal | Annual | Not necessary |
| 16 | Murders and violent deaths | *European Handbook* | Official | Valencia City Council Statistics Office | *Crime Balance of the Ministry of the Interior. Municipal Register of Inhabitants of Valencia City Council* | 2019 | Municipal | Annual | |
| | Satisfaction with the administrative services of the city | *European Handbook* | Official | Valencia City Council Statistics Office | *Municipal Barometer of Citizen Opinion* | 2020 | Districts and municipal | Bian-nual | |
| | Transparency of the public administration | *European Handbook* | Official | *Valencia City Council Statistics Office* | | 2020 | Municipal | Monthly | Not necessary |
| | Voter turnout in municipal elections | *European Handbook* | Official | Valencia City Council Statistics Office | *Ministry of the Interior* | 2019 | Census unit, neigh-borhood, district and municipal | Quad-rennial | |
| | Municipal Participatory Budgeting | *European Handbook* | Official | Valencia City Council Statistics Office | *Economic and Budgetary Service. Valencia City Council.* | 2020 | Municipal | Annual | Not necessary |
| 17 | VLR indicators from official statistics | *European Handbook* | Official | Case study of local data used for SDG Voluntary Local Rewiews in Valencia | | 2021 | Municipal | | Not necessary |

# ANNEX 7. THE SDGS AND RELATED TARGETS

## GOAL 1. END POVERTY IN ALL ITS FORMS EVERYWHERE

**1.1** By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day

**1.2** By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions

**1.3** Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable

**1.4** By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance

**1.5** By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters

**1.a** Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions

**1.b** Create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions

## GOAL 2. END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE

**2.1** By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round

**2.2** By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, prgnant and lactating women and older persons

2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment

2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality

2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed

2.a Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries

2.b Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round

2.c Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility

## GOAL 3. ENSURE HEALTHY LIVES AND PROMOTE WELL-BEING FOR ALL AT ALL AGES

3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100 000 live births

3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1 000 live births and under-5 mortality to at least as low as 25 per 1 000 live births

3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being

3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol

3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents

3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes

**3.8** Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all

**3.9** By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

**3.a** Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate

**3.b** Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all

**3.c** Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States

**3.d** Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

## GOAL 4. ENSURE INCLUSIVE AND EQUITABLE QUALITY EDUCATION AND PROMOTE LIFELONG LEARNING OPPORTUNITIES FOR ALL

**4.1** By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes

**4.2** By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education

**4.3** By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

**4.4** By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship

**4.5** By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations

**4.6** By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy

**4.7** By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development

**4.7** By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development

**4.a** Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

**4.b** By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries

**4.c** By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States

## GOAL 5. ACHIEVE GENDER EQUALITY AND EMPOWER ALL WOMEN AND GIRLS

**5.1** End all forms of discrimination against all women and girls everywhere

**5.2** Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation

**5.3** Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation

**5.4** Recognise and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate

**5.5** Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life

**5.6** Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences

**5.a** Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws

**5.b** Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women

**5.c** Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels

## GOAL 6. ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL

**6.1** By 2030, achieve universal and equitable access to safe and affordable drinking water for all

**6.2** By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

**6.3** By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

**6.4** By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

**6.5** By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

**6.6** By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

**6.a** By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

**6.b** Support and strengthen the participation of local communities in improving water and sanitation management

## GOAL 7. ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL

**7.1** By 2030, ensure universal access to affordable, reliable and modern energy services

**7.2** By 2030, increase substantially the share of renewable energy in the global energy mix

**7.3** By 2030, double the global rate of improvement in energy efficiency

**7.a** By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

**7.b** By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support

# GOAL 8. PROMOTE SUSTAINED, INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, FULL AND PRODUCTIVE EMPLOYMENT AND DECENT WORK FOR ALL

**8.1** Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries

**8.2** Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors

**8.3** Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

**8.4** Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead

**8.5** By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

**8.6** By 2020, substantially reduce the proportion of youth not in employment, education or training

**8.7** Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms

**8.8** Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment

**8.9** By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products

**8.10** Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all

**8.a** Increase Aid for Trade support for developing countries, in particular least developed countries, including through the Enhanced Integrated Framework for Trade-related Technical Assistance to Least Developed Countries

**8.b** By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization

## GOAL 9. BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALISATION AND FOSTER INNOVATION

**9.1** Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

**9.2** Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries

**9.3** Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets

**9.4** By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

**9.5** Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

**9.a** Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States

**9.b** Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities

**9.c** Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

## GOAL 10. REDUCE INEQUALITY WITHIN AND AMONG COUNTRIES

**10.1** By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average

**10.2** By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status

**10.3** Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard

**10.4** Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality

**10.5** Improve the regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations

**10.6** Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions

**10.7** Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies

**10.a** Implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with World Trade Organization agreements

**10.b** Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes

**10.c** By 2030, reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent

## GOAL 11. MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE

**11.1** By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

**11.2** By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

**11.3** By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

**11.4** Strengthen efforts to protect and safeguard the world's cultural and natural heritage

**11.5** By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations

**11.6** By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

**11.7** By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities

**11.a** Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

**11.b** By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in

line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels

11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilising local materials

## GOAL 12. ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS

12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries

12.2 By 2030, achieve the sustainable management and efficient use of natural resources

12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses

12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment

12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle

12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities

12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production

12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products

12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities

## GOAL 13. TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS

**13.1** Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

**13.2** Integrate climate change measures into national policies, strategies and planning

**13.3** Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

**13.a** Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible

**13.b** Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

## GOAL 14. CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT

**14.1** By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

**14.2** By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

**14.3** Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

**14.4** By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics

**14.5** By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

**14.6** By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation

**14.7** By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

**14.a** Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries

**14.b** Provide access for small-scale artisanal fishers to marine resources and markets

**14.c** Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of 'The future we want'

## GOAL 15. PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS

**15.1** By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

**15.2** By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

**15.3** By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world

**15.4** By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development

**15.5** Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

**15.6** Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed

**15.7** Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products

**15.8** By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species

**15.9** By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts

**15.a** Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems

**15.b** Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation

**15.c** Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

## GOAL 16. PROMOTE PEACEFUL AND INCLUSIVE SOCIETIES FOR SUSTAINABLE DEVELOPMENT, PROVIDE ACCESS TO JUSTICE FOR ALL AND BUILD EFFECTIVE, ACCOUNTABLE AND INCLUSIVE INSTITUTIONS AT ALL LEVELS

**16.1** Significantly reduce all forms of violence and related death rates everywhere

**16.2** End abuse, exploitation, trafficking and all forms of violence against and torture of children

**16.3** Promote the rule of law at the national and international levels and ensure equal access to justice for all

**16.4** By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime

**16.5** Substantially reduce corruption and bribery in all their forms

**16.6** Develop effective, accountable and transparent institutions at all levels

**16.7** Ensure responsive, inclusive, participatory and representative decision-making at all levels

**16.8** Broaden and strengthen the participation of developing countries in the institutions of global governance

**16.9** By 2030, provide legal identity for all, including birth registration

**16.10** Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements

**16.a** Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime

**16.b** Promote and enforce non-discriminatory laws and policies for sustainable development

## GOAL 17. STRENGTHEN THE MEANS OF IMPLEMENTATION AND REVITALISE THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT

**17.1** Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection

**17.2** Developed countries to implement fully their official development assistance commitments, including the commitment by many developed countries to achieve the target of 0.7 per cent of gross national income for official development assistance (ODA/GNI) to developing countries and 0.15 to 0.20 per cent of ODA/GNI to least developed countries; ODA providers are encouraged to consider setting a target to provide at least 0.20 per cent of ODA/GNI to least developed countries

**17.3** Mobilize additional financial resources for developing countries from multiple sources

**17.4** Assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring, as appropriate, and address the external debt of highly indebted poor countries to reduce debt distress

**17.5** Adopt and implement investment promotion regimes for least developed countries

### TECHNOLOGY

**17.6** Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism

**17.7** Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed

**17.8** Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology

### CAPACITY-BUILDING

**17.9** Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation

### TRADE

**17.10** Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda

**17.11** Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020

**17.12** Realize timely implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, consistent with World Trade Organization decisions, including by ensuring that preferential rules of origin applicable to imports from least developed countries are transparent and simple, and contribute to facilitating market access

### SYSTEMIC ISSUES

#### Policy and institutional coherence

**17.13** Enhance global macroeconomic stability, including through policy coordination and policy coherence

**17.14** Enhance policy coherence for sustainable development

**17.15** Respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development

### Multi-stakeholder partnerships

**17.16** Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries

**17.17** Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

### Data, monitoring and accountability

**17.18** By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts

**17.19** By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries

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