Report on SOIs for SECAPs

D5.1

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LOCALISED

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List of Abbreviations

SECAPs	Sustainable Energy and Climate Action Plan
CoM	Covenant of Mayors
SDGs	Sustainable Development Goals
BEI	Baseline Emission Inventory
RVA	Risks and Vulnerability Assessment
SOIs	SDG Oriented Indicators
EUCALC	European Calculator
NUTS	Nomenclature of Territorial Units for Statistics
KPI	Key Performance Indicators

Executive Summary

The overriding objective of LOCALISED project is to downscale national Decarbonization trajectories consistent with Europe's net-zero target to the local levels in a way that would speed up the uptake of mitigation and adaptation actions. Consequently, and specifically through the implementation of the Decarbonization Profiler, the project will inform local administrations and consultants on viable combinations of (sectoral) mitigation and adaptation measures.

The main innovation of the Decarbonization Profiler will be its capability to create an initial data-driven assessment adapted for each municipality or region on risks, vulnerabilities, emissions, and sectoral reduction quota, accompanied by a set of customized combinations of measures and processes to reach the goals. In that context and considering that the Sustainable Development Goals (SDGs) and the Sustainable Energy and Climate Actions Plans (SECAPs), which are the two main instruments contemplated at regional and local levels, are not currently aligned, the aim of this deliverable is to establish appropriate indicators connected to both instruments. The establishment of adequate indicators facilitates not only the optimization of resources but also the smart implementation of actions and the benchmarking between regions and cities. Since indicators are needed for several parts of the process, they need to be defined in an early project stage in order to clearly understand the input data needed, the calculations required, as well as the output data provided.

Defining and selecting appropriate indicators can be a challenge, due to many factors such as data availability, comparability or the complexity implied in establishing a proper methodology for calculation. To take into consideration all these aspects, several steps were conducted to gather, filter and evaluate the list of indicators proposed. This deliverable includes an extensive bibliographic review of local SDGs implementation, and two complementary processes conducted to gather relevant feedback from other work packages and partners, and relevant external advisers. It connects the information needed for improving the implementation of local plans with the necessities of the targeted audiences in LOCALISED.

Initially, 93 indicators were introduced to outline the diversity of goals and targets that can be influenced by local action plans and the numerous connections between SDGs targets and SECAPs pillars.

As this is an ongoing process, (with both the reference instruments and the final development of the profiler and its capabilities continuously evolving), further work has been conducted after the first submission to fully review the feasibility of the listed

indicators and adapt and improve them as needed. Currently, the list of indicators has been expanded to 234, which aims to be the final list agreed among all the LOCALISED partners to be used for different purposes.

1. Introduction

The overriding objective of LOCALISED project is to downscale national decarbonization trajectories consistent with Europe's net-zero target to the local levels and provide the results to local administrations, citizens and businesses, in a way that would speed up the uptake of mitigation and adaptation actions. Consequently, and through the implementation of (1) Decarbonization Profiler and (2) the Net-Zero Business Consultant tool, the project will inform key stakeholders on viable combinations of (sectoral) mitigation and adaptation measures.

The main innovation of the Decarbonization Profiler will be its capability to create an initial data-driven assessment adapted for each municipality or region on risks, vulnerabilities, emissions, and sectoral reduction quota accompanied by a set of customized combinations of measures and processes to reach the goals. Given that at the local and regional levels the Sustainable Development Goals (SDGs)[1] (supported by the United Nations (UN)) and the Sustainable Energy and Climate Actions Plans (SECAPs) (created under the umbrella of the Covenant of Mayors (CoM)[2]) are two of the mains instruments contemplated to establish long-term strategies, this deliverable makes use of both initiatives to establish appropriate indicators for assessing the current situation and to monitor the implementation of measures.

Both instruments have a generic and predefined set of indicators, which are used to verify the achievement of specific goals and are frequently used to, among others, oversee the implementation of mitigation and adaptation actions at local and other levels. Nevertheless, even though there is a wide range of indicators available, there is a lack of alignment between the initiatives, and indicators are sometimes conceptualized considering a different scale, such a national implementation. In addition, some of them are not clearly established, such as the ones related to adaptation strategies, therefore relying on the hands of public administrations resulting in a wide dispersion. Consequently, the lack of harmonization entails an extra effort to align the objectives established in both instruments and hinders the implementation and benchmarking. Even as more than 9,000 towns and cities have joined the Covenant of Mayors initiative, the analysis of achievement of SDG is only considered by some advanced local administration, highlighting the lack of

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[1] https://unstats.un.org/sdgs/
[2] https://www.eumayors.eu/

resources and the difficulty of obtaining the necessary data as barrier to assess the current situation, establish appropriate measures and monitor them.

Based on the analysis of the targets and available indicators, the platform will gather a set of oriented specific indicators to help local and regional authorities defining the steps and measures to successfully implement both SECAPs and the 2030 Agenda, and therefore define and monitor mid to long-term scenarios at local level, based on introduced and reliable indicators. The alignment between SECAPs and SDGs targets and indicators will provide a framework to define and monitor the necessary measures and effectively allocate resources, leading to comprehensible, feasible, and effective long-term strategies.

To this end, the project aims to provide a full set of relevant data for each region that allows the establishment of the Baseline Emission Inventory (BEI) and the Risks and Vulnerabilities Assessment (RVA) on the territory. Since not all relevant indicators are available at a local level, the data will be a combination of official statistics and disaggregated indicators that use a proxy metric to map the indicator to the local level. The data is then used to provide feasible adaptation and mitigation options to achieve the intended goals at Municipality and NUTS3 levels. This assessment will enable local administrations, especially those facing limited resources or lacking information, to ask the right questions and involve the appropriate local partners to support planning and implementation.

The Baseline Emission Inventory and the Risks and Vulnerabilities Assessment will be defined using consistent geo-located public information to identify the crucial aspects to be assessed in long-term plans to achieve Decarbonization and implement adaptation measures. Special emphasis will be given to large-scale building retrofit actions, and local energy communities, as these seems to be key pillars for decarbonization. As regards to adaptation, the project will define relevant and feasible remaining adaptation measures on the regional level. Consequently, local authorities will gain knowledge on their remaining risk profiles and be provided with knowledge on feasible solutions. Moreover, since currently SECAPs are often based on static administrative documents, which difficult the monitoring of the objectives over the years, the project will introduce a dynamic model that will allow an active control of the Covenant of Mayors initiative targets for assessment and dynamic adaptation.

In summary, the majority of the information provided in this document is directly associated with D5.2, which pertains to "BEI and RVA dynamic templates for dynamic implementation." This information is organized based on the sections of BEI/RVA/EP CoM that need to be reported in the official template by participating municipalities. The SECAP semi-automatic filling tool will be publicly introduced through the Profiler platform (T8.2/D8.2). End-users, such as municipalities and related stakeholders, will have the ability to view and download the SOIs in an organized manner, simplifying the process of completing the data fields required for the CoM SECAP template.

Furthermore, the information presented in the Profiler will also be categorized according to the structure of SDG targets. This way, users will be able to identify the connections between the indicators aligned with SDG targets and objectives. They will also have the option to download these indicators for official reporting of the SDGs at the local level.

As a starting point, the aim of the report is to present a set of SDG Oriented Indicators (SOIs) to establish in detail where municipalities are, where do they need to go and how do they get there in a feasible and reliable way adapted to territory conditions. Several knowledge fields have been considered, from socio-demographic conditions to financial aspects, including the characterization of the main involved sectors, namely building and transport and from public to private views. This report complements the work done under WP2, and the list of indicators identified as a part of **D2.6 Mitigation and Adaptation Indicators** (Warmuth, Ibañez Iralde, Shayegh, & Horvath, 2022), in this case specifically through the lens of the SDGs and SECAPs. Even the main work has been specifically produced and introduced for each of both deliverables, the list of indicators of both deliverables was not introduced independently, but is the result of a collaborative work among all the involved partners, in such a way robustness and coherence is ensured.

The sections of this deliverable are organized as follow: after the Introduction, **Section 1** presents the SDGs and SECAPs plans and the relevant link between the initiatives; **Section 3** analyses the concept of indicator as well and describes the methodology followed to review indicators and establish the list; **Section 4** introduces the bibliographic analysis, the case studies selected and the set of potential indicators identified in existing framework; **Section 5** introduces the alignment with other Work Packages and the complementary list of indicators added, **Section 6** describes the feedback received from relevant stakeholders, **Section 7** exposes the study's results, and **Section 8** summarizes the conclusions.

2. Covenant of Mayors and United Nations instruments

2.1. Covenant of Mayors initiative

In alignment with the "2020 Climate & Energy Package" (European Commission, 2007), which aimed to reduce 20% of emissions, improve 20% energy efficiency and increase 20% renewable sources by 2020, the European Commission launched the "Covenant of Mayors for Climate & Energy" initiative in 2008 with the intention of gathering local governments committed to achieving the targets. The initiative extended all over the world, and currently counts with more than 9.000 local and regional signatory authorities across 57 countries. The CoM framework is structured in three main pillars: (i) reducing greenhouse gas emissions, (ii) increasing resilience and adapting to climate change, and (iii) tackling energy poverty as a key action to ensure a just transition as illustrated in

Figure 1. It should be noted that even though nowadays the three pillars are integrated in a single plan, mayors adapt was introduced in 2014 and it wasn't fully integrated in the plans until 2015, and the submission of some aspects of the poverty pillar will not be mandatory until 2025. Furthermore, the framework has been recently updated to consider the objectives of the New Green Deal (European Commission, 2019), including the update of energy targets such as the more ambitious greenhouse gas emissions reduction of 55% by 2030.
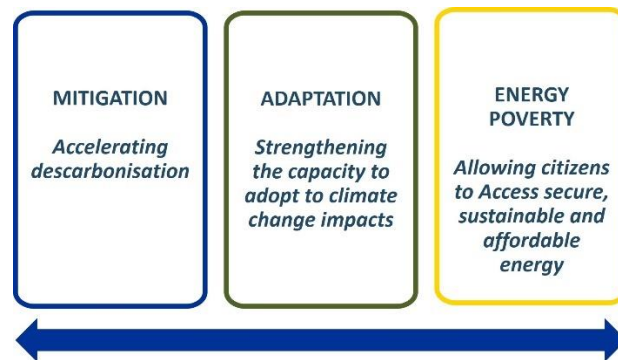
Figure 1. SECAPs pillars. Source: own elaboration

2.1.1. Sustainable Energy and Climate Actions Plans

As a first step to achieve the targets, within two years after the signature each municipality or region must present a *Sustainable Energy and Climate Action Plan* (SECAPs), previously called *Sustainable Energy Action Plans* (SEAP), and present monitoring reports in subsequent years. As mentioned above SECAPs are structured into three pillars, each pillar is composed by several parts to firstly assess the current state, and secondly to establish appropriate actions to be implemented. For the mitigation pillar calculations are made by establishing a *Baseline Emission Inventory (BEI),* which is calculated considering the energy consumption of the relevant sectors, the energy generation and the emissions coefficients introduced. In addition, a *Risk and Vulnerability Assessment (RVA)* must be conducted to evaluate the current and future impacts of climate change; the assessment includes the evaluation of climate hazards, the analysis of the vulnerable sectors and groups and the study of the adaptive capacity of the municipality. Lastly, the energy poverty pillar, which was recently incorporated, is structured in six macro areas that facilitate the analysis of the current situation in the locality.

As for the indicators used in each of the pillars, the *Baseline Emission Inventory (BEI)* has a preestablished set of indicators, mainly *Final Energy consumption (MWh), Energy produced (MWh) and Emission factors (t/MWh produced)*, while the adaptation section only introduces some recommended indicators for assessing vulnerable sectors and the adaptive capacity of the municipality. Similarly, the energy poverty pillar presents some recommended indicators for assessing each of the six macro areas included, even though

starting on 2025 one specific socioeconomic indicator, *the Percentage of population or households spending up to XX % of their income on energy services (%)* will become mandatory.

In relation to the monitoring of the plans, as represented in *Figure 2* the frequency of the reports varies, the RVA, BEI and the key mitigation actions must be presented within two years of joining the CoM initiative while the RVA must be updated within four years of joining, while the adaptation and the energy poverty actions to be implemented can be presented within four years of joining. In addition, the update of the BEI, the Monitoring Emission Inventory (MEI), must be presented within six years of the initial signature.

	Registration	Action plan	Monitoring	
	Year 0	Within 2 years	Within 4 years	Within 6 years
My strategy	o	✓	✓	✓
Action plan documents upload	o	✓	o	o
Emission inventory	o	✓ (BEI*)	o	✓ (MEI*)
Risk & vulnerabilities assessment	o	✓	✓	✓
Mitigation actions	o	✓ (min. 3 key actions)	✓	✓
Adaptation actions	o	o	✓ (min. 3 key actions)	✓
Energy poverty actions	o	o	✓ (min. 1 key action)	✓

Table 1 Frequency of reporting

Legend: ✓ Mandatory | o Optional

BEI = Baseline Emission Inventory; MEI = Monitoring Emission Inventory

Figure 2. SECAPs frequency of reporting. Source: Covenant of Mayors

However, despite the considerable number of entities committed to the CoM, municipalities face a multitude of challenges, including limited access to data for measuring progress and lack of resources, resulting in the fact that, until now only 23% of the signatories have presented monitoring reports as shown in *Figure 3*. Moreover, since many municipalities joined the program before the adaptation pillar were fully integrated in 2015, many reports primarily address mitigation aspects only.

Status of the signatories

Number of signatories — 11,077

Action Plans Submitted — 7,785 70.28%

Results Monitored — 2,544 22.97%
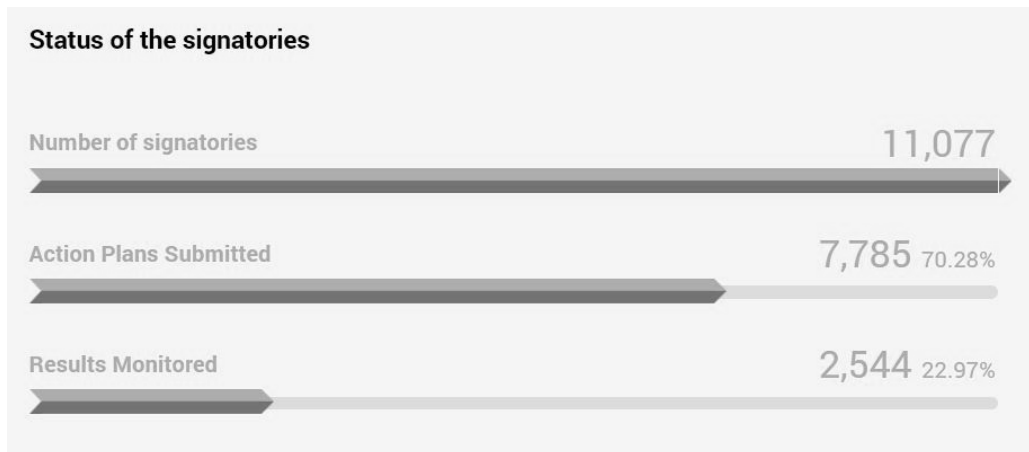
Figure 3. SECAPs Monitoring status. Source: Covenant of Mayors

In that regard, a large number of documents can be found explicitly addressing SECAPs and SEAPs challenges and barriers over the years, such as the complexity of assessing the adaptation pillar and the long-term benefits of actions at a local level (Jekabsone, Marín, Martins, Rosa, & Kamenders, 2021); the lack of knowledge and resources whether is human, technical or financial (Basso & Tonin, 2022; Jekabsone et al., 2021); the lack of the requirement of a final monitoring report when the target year arrives, the heterogeneity of both baseline and monitoring years, and the low number of intermediate monitoring reports submitted (Rivas, Urraca, Palermo, & Bertoldi, 2022) or no political interest in implementing and monitoring the plans after the initial commitment (Basso & Tonin, 2022).

2.2. Sustainable Development Goals

The instruction to develop the SDGs was included in the Rio de Janeiro Conference 'The Future We Want' (United Nations, 2012), which incorporated the request to create an Open Working Group (OWG) to develop this set of goals. The SDGs "zero draft" was adopted by the OWG in July 2014 (International Institute for Sustainable Development (IISD), 2014), and was endorsed in the autumn of 2014. The SDGs were built based on The Millennium Development Goals (MDG), which included a total of 60 indicators (United Nations, 2015a), the Sustainable Development Indicators of the European Statisticians Conference (CES SDI) which included a set of 90 indicators (United Nations Economic Commission for Europe, 2014), and the SD Solutions Network which contained 100 indicators (SDG Knowledge Hub, 2014).

In September 2015, United Nations member states adopted the post-2015 Agenda which contained 17 Sustainable Development Goals (SDGs), as illustrated in *Figure 4*, and 169 targets. The goal was to achieve sustainable development by 2030, considering five

different topics: (i) People, (ii) Planet, (iii) Prosperity, (iv) Peace, and (v) Partnership and integrating the three dimensions of Sustainable Development (environment, economy, and social). To this end, the 169 targets were disaggregated into 248 indicators, which in fact are based in 231 unique indicators, since 13 of those are introduced in two or three different targets. The signatory countries should try to accomplish with all the targets and indicators, even this is an on-going process for most of these due to both, the complexity of the evaluation and the political wills. By 2030, all signatory countries should have complied with their assessment and implemented monitoring.

Figure 4. SDGs goals. Source: United Nations

As part of its follow-up and review mechanisms, the 2030 Agenda for Sustainable Development encourages member states to "conduct regular and inclusive reviews of progress at the national and sub-national levels, which are country-led and country-driven" (United Nations, 2015b), therefore being countries the main actor involved in the process. Up to now, 177 countries have presented at least one Voluntary National Report (VNR) (United Nations, 2021). Nevertheless, although Agenda 2030 encouraged countries to conduct regular and inclusive reviews also at sub-national levels and called for cross-sector collaboration, the monitoring of SDGs has been mainly done at the national level.

In addition, beyond the specific introduction of Goal 11 addressed to cities and human settlements, the UN-Habitat established in 2016 the New Urban Agenda (NUA) (United Nations, 2016) and has subsequently promoted actions to localise and complement the global indicator framework. But, despite this initial effort, there is a significantly smaller number of Voluntary Local Reviews (VLRS); Until now, 106 reports were presented by 87 local and regional governments concentrated in 27 countries (UN-Habitat, 2021). However, even though the UN-Habitat and also regional and local associations have progressively developed guidelines to facilitate the implementation of SDGs at sub-

national and local levels (Álvarez, Varela, & Corté, 2021; Andrea Ciambra & Martinez, 2022; Fox & Macleod, 2019; Idea Group & Association of Flemish Cities and Municipalities (VVSG), 2019; Ihobe Sociedad Pública de Gestión Ambiental & ENEA Estrategias para la Sostenibilidad S.L, 2019; Siragusa, Vizcaino, Proietti, & Lavalle, 2020; UCLG & UN-Habitat, 2020) the downscaling of SDGs targets and indicators continues to be a challenge that each administration faces individually.

2.3. Synergies between the programs

As mentioned above and showed in *Figure 5*, both mechanisms SDGs and SECAPs share some relevant contents, specifically regarding mitigation and adaptation to climate change but also energy poverty aspects. Nevertheless, as in many cases, mitigation and adaptation actions are interrelated, and several other SDGs targets are linked to these actions, a holistic approach is necessary to achieve sustainable development objectives effectively. Despite the close linkage between both initiatives at the local level, up to now there has been little effort to clearly analyse the interconnection of the actions, the potential synergies, and the alignment of the objectives of both programs to save efforts while maintaining coherence at regional and local levels. It is noteworthy that up until the moment of the writing of this report no bibliography results were found involving SDG and SECAP.
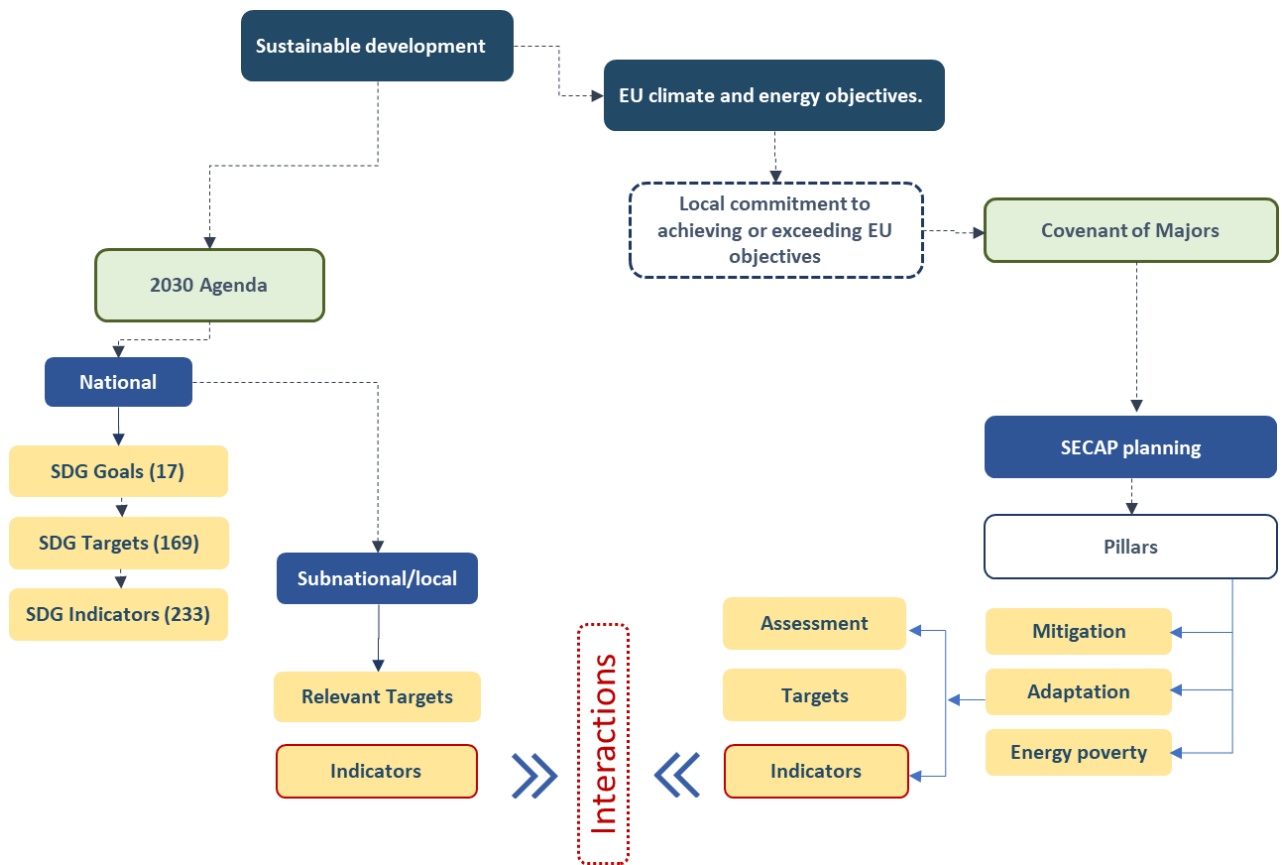
Figure 5. SECAPs and SDGs frameworks. Source: own elaboration

3. Definitions and methodology

3.1.   Assessing indicators

This report analyses indicators proposed to measure the achievement of SDGs and SECAPs plans. However, before beginning the analysis of the studies found, we present some fundamental aspects and definitions related to the notion of indicators in the context of the study, both in terms of subject and scope.

An indicator can be defined as an observable variable that provides evidence of a particular condition, either that exists, there is a trend in a particular direction, or that a specific goal has been accomplished. (Bunge, 1975; Horsch, 1997). Sustainable development indicators were introduced in Chapter 40.4 of Agenda 21 as the means to ''provide solid bases for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems.'' (United Nations, 1992).

Indicators can either be science-driven, and therefore based on non-subjective theoretical models, or value-driven, where the indicators reflect current social debates and priorities (Zinkernagel, Evans, & Neij, 2018). Indicators can also be conceived as technical instruments based on available and reliable data that assist decision-making processes, or as message carriers allowing the definition of the different arguments or ideas not only from the technical perspective but also involving political and normative aspects (Merino-Saum, Halla, Superti, Boesch, & Binder, 2020). In addition, the process of developing an indicator set for sustainability faces several tensions such as parsimony vs. comprehensiveness which can be evidenced in the variation in the choice and number of indicators to assess a key aspect properly. Also, context-specificity vs. general comparability expressed as the dichotomy between adopting indicators that consider local specificities or using internationally standardized indicators. And finally complexity vs. simplicity embodied by the necessity to balance scientific credibility with a suitable level of understandability for all involved stakeholders (Merino-Saum et al., 2020).

The attributes to select the indicators also varies among the different studies, one particularly widespread approach with the acronym S.M.A.R.T goals (Doran, 1981). identifies five characteristics that an indicator must have:

- Specific: the indicator must be clear
- Measurable: specific criteria to measure the progress
- Achievable and Relevant: it must be possible to comply with the objective and to collect the data
- Time-related: there is a specific timeline to meet the goal

However, other approaches include further attributes such as credibility, universality, data requirements and availability, comprehensibility, linked with management, and spatial and temporal applicability (Tanguay, Rajaonson, Lefebvre, & Lanoie, 2010).

Concerning the indicators selected for SDGs, as stated in the section 2, the framework is structured around 231 global indicators which can be found in the UN official website[3]. However, this set of official indicators was developed considering the main actor involved in the reporting system, hence national scope. At local level, however, no official indicators were established and therefore there is no specific consensus. Many regional and local frameworks can be found both from local and regional governments and from international organisations as well (Diputació Barcelona, n.d.; Idea Group & Association of Flemish Cities and Municipalities (VVSG), 2019; ISO International Organization for Standardization, 2018; Perry, Diprose, Taylor Buck, & Simon, 2021; Sánchez de Madariaga et al., 2020; Varma, 2019).

At the other side, and regarding the CoM initiative, as indicated in section 2.1.1 three mitigation indicators are defined in the templates and guidelines of the program to provide

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[3] https://unstats.un.org/sdgs/metadata/

clear accountability of greenhouse emissions in what is called the BEI. Regarding the adaptation pillar, there are a set of 35 recommended indicators but nowadays the definition of the metrics to be used relies on the hands of the authorities developing the plans, introducing complexity in any potential cross analysis due to the different frameworks introduced by each administration. In addition, the reporting template has been updated recently and a set of 56 monitoring and related indicators has been added for the energy poverty pillar. The current list of official indicators proposed or recommended can be found in the official CoM website. As CoM programme will sign a new agreement from 2024, it is expected that the most recent sections (related to the adaptation and energy poverty sections) can evolve to a more detailed framework.

Given the above-described background, Derivable D5.1 provide a review and a comparative analysis of existing and measurement city initiatives linked to SDGs and CoM initiatives, to provide an overview of the diversity of proposed indicators and draw lessons to establish a more explicit link between these two complementary frameworks. Thus, the main aim of D5.1 is to establish a clear set of unique indicators to build the fundamentals to link both initiatives, as far as possible, and ease their implementation and monitoring. Given that these initiatives are increasingly being used, both at the local and supra-municipal level, having common indicators and metrics should allow for: i) generate coherent plans within the framework of the two initiatives, ii) save resources in its definition and implementation, iii) ensure periodic monitoring of compliance with the planning and established objectives, and iv) allow for benchmarking, both own and with equivalent third parties.

3.2. Methodology of analysis and data collection

To identify the potential indicators to be used in the Decarbonisation profiler a four steps methodology has been conducted including a bibliographic analysis, specific methodology for analysing and filtering indicators, and two consecutive processes to complement and set the final list of metrics. This could be summarized as introduced in *Figure 6*.

STEP 1	STEP 2	STEP 3	STEP 4
Bibliographic review of scientific papers and reports of existing regional and local SDGs frameworks	Systematic exchange with other work packages to establish the interconnections and adding more indicators to cover their needs	Complementary exchanges with city partners and external advisers to gather their feedback	Fine-tuning based on the availability of data, the feasibility to downscale the information and the feedbacks coming from previous step

Figure 6. Methodology steps. Source: own elaboration

Deeper in detail, the main steps taken are as follows:

1. A bibliographic review of scientific papers and reports of existing regional and local SDGs frameworks. (*Section 4*) This first step included:
   1.1. Review and filtering of bibliography found based on the level of detail found in the reports.
   1.2. Selection of case studies to conduct a deeper analysis of the metrics proposed.
   1.3. A methodological approach to filter and selected potential indicator.
   1.4. The establishment of correlations between SDGs vs SECAPs indicators.
2. A systematic exchange with other work packages, mainly WP4 dedicated to adaptation, WP6 assessing citizens and WP7 dedicated to business, to establish the interconnections and adding more indicators to cover their needs if needed. (*Section 5*).
3. Complementary exchanges with city partners (as a part of T5.5 included in WP5) among the consortium and external advisers to gather their feedback, verify main areas of interest and specific needs. (*Section 6*).
4. As a final step, the list was refined based on the availability of data, the feasibility to downscale the information and the feedback received in the previous steps (*Section 7*).

4. Bibliographic analysis of local and regional indicators frameworks

4.1. Data collection

As regional to local implementation of SDGs is more diffuse (compared to SECAPs established definitions), as a first step of the process, we identified how regional and local frameworks are addressing these SDGs. Thus, an initial search was conducted in order to identify scientific papers and grey literature, such as local reports on the topic. Scientific literature was identified through a methodical literature review using the search engine "*web of science*", due to its broad coverage of sustainability journals. The search was conducted using "Sustainable Development Goals indicators," "SDGs Indicators" as keywords in the title, complemented by "cities" and "indicators" in all fields, which generated 80 results; two additional searches were conducted using "Sustainable Development Goals," "SDGs" as keywords in the title and refined with the terms "localising" and "localizing", to obtain studies which presented conclusions of local SDGs implementation. The search yielded 6 and 16 results respectively.

Regarding the grey literature, the approach to identify local indicator frameworks was conducted using the Google engine; the search engine facilitated the identification of a significant number of reports related to VLR and initiatives that gathered information around the subject, such as Local2030[4] and The Thematic Research Network on Data and Statistics of the Sustainable Development Solution Network (SDSN TRENDS)[5]. In addition, other initiatives were found through references in scientific articles or institutional reports and the authors' professional networks. As a result, 83 additional reports and relevant platforms were included in the analysis.

All identified documents and platforms (102 + 83 = 185) were then filtered considering the following criteria:

- Analysis and development of indicators to be implemented at a regional or local scale
- Studies focused on the analysis of the overall SDGs framework, therefore in more than one specific goal.

The application of the filters generated a final sample of 120 documents and 24 platforms.

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[4] https://local2030.org/
[5] https://www.sdsntrends.org/

4.2.   Case studies selected and filters applied.

The filtered studies were then examined considering the following conditions:

- Documents addressing local SDGs implementation with detailed information of the indicators chosen for all SDGs targets
- Documents which represented two different conditions:
  a. International, national, and regional frameworks which were developed and tested in more than one city or region
  b. Exemplary frameworks elaborated by a given city or region to visualize local specific contextualization.

Bearing in mind the above conditions, the filtered reveal that even though 86% of the initially considered documents were somehow related to SDGs implementation, the thematic addressed by the studies varied considerably, tackling from financial implications, monitoring, geospatial representation, and other complementary aspects. Only 21% of the documents included the detailed description of the indicators chosen. This initial categorization yielded a total of 24 documents from which the eight cases were selected considering their relevance and the geographical scope desired. The aim of the task was to identifying similarities and differences between the global SDGs framework and the indicators chosen to downscale the framework by regions and cities.

At the international level, three relevant reports were selected:

- ***The European Handbook for SDGs Voluntary Local Reviews*** (Siragusa et al., 2020), as it was developed at the European level and contained a detailed guideline to implement SDGs at the local level, with 71 selected indicators.
- ***The OECD localized indicator framework for SDGs*** (OECD, 2020), developed as a framework to measure the distance towards the SDGs for more than 600 regions and 600 cities.
- **The report *Indicators for European cities to assess and monitor the UN Sustainable Development Goals*** (de Maio, Kuhn, Fons Esteve, & Prokop, 2020), since it is an extensive analysis of the link between SDGs targets and goals listing more than 2000 possible indicators present in 30 existing urban indicators sets[6].

At the regional and national scale, three representative cases were selected for the analysis:

- **The report *Local Indicators for The 2030 Agenda*** (Sustainable Development Goals), developed as a manual for Flemish Cities and Municipalities (Idea Group & Association of Flemish Cities and Municipalities (VVSG), 2019), due to the detailed

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[6] The list of the 30 indicators sets included in the report can be found in
Annex I

methodology described including the analysis of relevant local indicators, their correlation with the global SDGs indicators and their sources and modes of calculation.

- **The second edition of the *REDS report Los ODS en 100 ciudades españolas*** (Sánchez de Madariaga et al., 2020), as it was developed and tested in 100 cities with more than 80.000 inhabitants each.
- **The framework proposed by the Province of Barcelona** to monitor the progress of SDGs goals in the region (Diputació Barcelona, n.d.), which gives an overview of the indicators and targets selected for monitoring and comparing the progress in 311 different municipalities of the province therefore in a regional scale.

Finally, two case studies at the local level were included in the analysis:

- **The indicator framework developed by the city of Barcelona** (Barcelona City Council, 2022; Barcelona City Council & REDS, 2021), which has an extensive analysis of indicators and publicly available open database (Barcelona City Council, 2022).
- **The indicator set proposed by the city of Los Angeles** (Bromaghim, 2019). The latter, albeit it was outside the original scope of the study, which was focused on the European territory, was included due to their long experience on developing and implementing VLR.

Indicators present in the eight selected cases were listed and compared among each other to find common metrics and also to distinguish the different indicators used to report the same target. Particularly for the international report containing 30 existing indexes and more than 2,000 possible metrics, due to the large extension of possible indicators only metrics with more than one reference source were included in the study. Indicators with a single source were considered only when no indicators were found with more than one source for a particular SDG target. A total of 745 possible indicators were identified during the first step, with up to 35 different proposals to monitor a specific target.

From there, each case study was contrasted with the global SDGs framework to verify the alignment between the official indicators and the local adaptation, and the targets covered at local level. The initial analysis revealed that 48 targets corresponding to 73 SDGs global indicators were present in local frameworks, which were either related to mitigation and adaptation actions or social and business aspects relevant for the project. Nevertheless, 10 out of 73 indicators were used in more than one target, therefore addressing more than one aspect with the same metric.

In addition, and after the initial sifting, the official indicators listed in the CoM initiative were added and then compared with the ones defined in the different frameworks with the aim of identifying synergies between both instruments.

Finally, in order to reduce the list of potential local indicators, the indicators were moved to a second list if they complied with at least one of the following criteria:

- **A1**: indicators proposed by more than one source to monitor the same target
- **A2:** indicators that were linked more than one target, therefore could serve to reduce the total amount of indicators needed to address SDGs.
- **A3:** indicators that were either constructed or based in metrics reported in SECAPs
- **A4**: indicators that could be constructed using open data sources such as Eurostat.

The first filter, **A1**, aims to highlight the indicators that are repeated in the different studied cases, demonstrating their replicability and coherence among different localities. If an indicator is used in various regions, it suggests that the data required for calculation is commonly available and/or could be compared, and the calculation itself is not overly complex at the local level.

Filter **A2** is designed to emphasize versatility, with the goal of achieving maximum reporting efficiency using a minimal number of indicators. This approach could be crucial for a regional administration in terms of lowering time consumption and resource needs.

Filter **A3** focuses on selecting indicators directly related to the information required for reporting the SECAP. This alignment with local-level tools is crucial for the project's platform usability and is closely linked to Task 5.3.

Lastly, filter **A4** addresses data availability barriers. Indicators relying on open-source data are considered more accessible and feasible compared to those dependent on less commonly available analytics or data that must be provided by local administrations. Although a detailed analysis of data accessibility is subsequently carried out, applying this criterion initially without going into details allows us to rule out those cases in which references are clearly not available.

Furthermore, since the task aimed to identify indicators for all NUTS-3 regions in Europe, all indicators based on locally developed surveys were discarded. After applying the four filters, a total of 314 potential indicators were listed, which contained 191 unique indicators since several were associated to multiple targets.
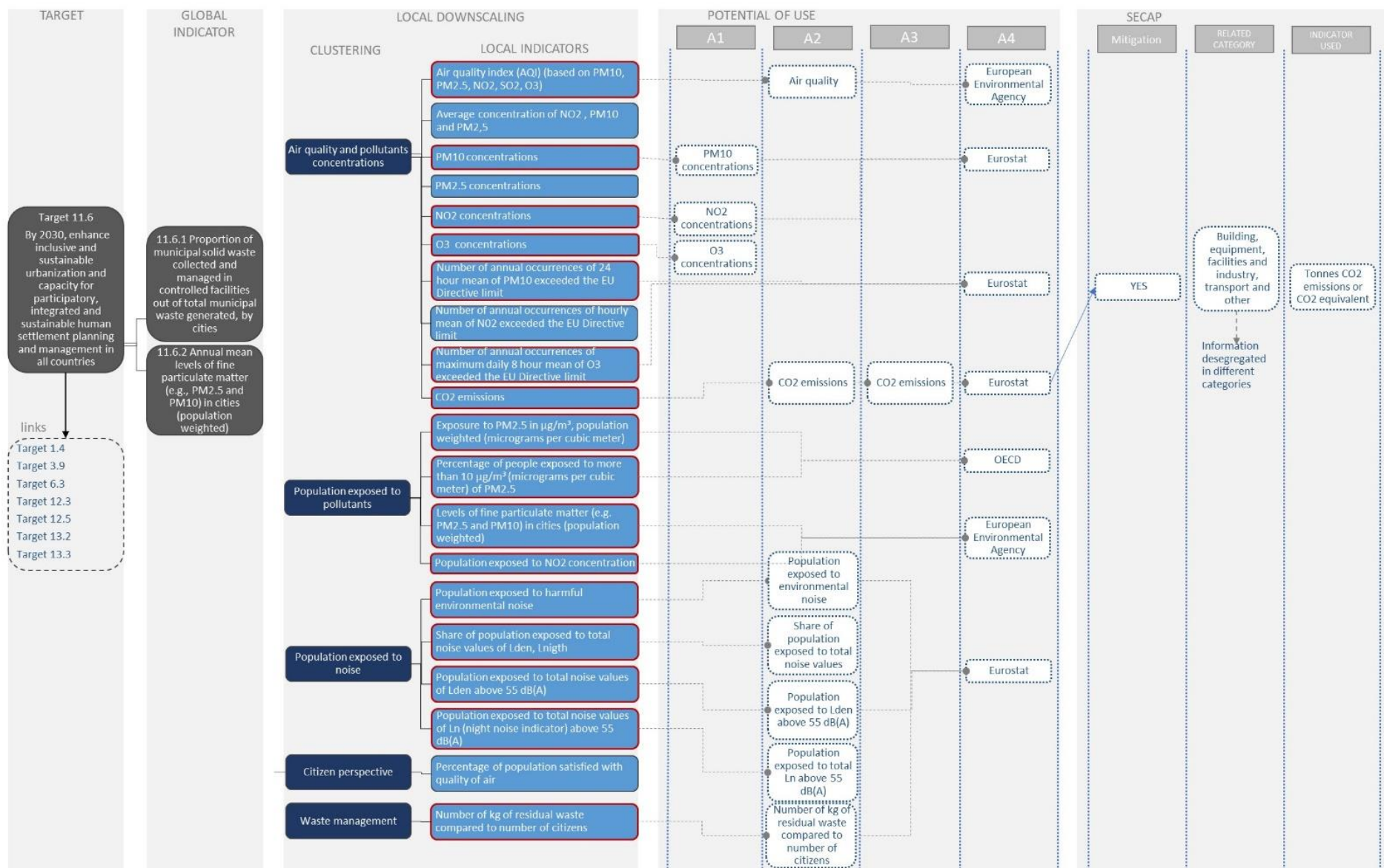
Figure 7. Process to filter potential indicators, showing the SDG 11.6 as example. Source: own elaboration

As exemplified in *Figure 7. Process to filter potential indicators, showing the SDG 11.6 as example. Source: own elaboration Figure 7* for target 11.6, indicators were analyzed by systematically reviewing their compliance with each of the four filters applied (A1 to A4), and by revising their relationship with the three SECAPs pillars. If at least one of the conditions was met, the metrics were moved to the potential list of indicators.

4.3.   Analysis of proposed indicators

4.3.1.   Targets addressed and indicators selected

As a first step the eight selected cases were contrasted with the SDGs official framework to verify which of the 48 targets included in the analysis were addressed in the documents or platforms. Between 18 to 42 targets were addressed in the case studies, therefore, between 25% and 58% of the proposed ones in the global framework. Only two targets were listed in all documents, target 1.2 related to poverty and target 3.6 related to traffic deaths and injuries. Target 8.3 assessing unemployment, on the other hand, was either already incorporated in the framework or being analysed for future implementation. Oppositely, Target 13.b, related to climate change planning in the least developed countries and small islands, was not included in any of the case studies, and three targets, 7.b installed renewable energy in developing countries, 12.1 of sustainable consumption and production patterns and 13.a aiming at mobilizing sources to address the needs of developing countries were included in only one source. Targets related to goal 17, addressing global partnership for sustainable development, were, in general not addressed by the sources since many of the indicators refer to countries, thus beyond city limits.

Regarding the second question of the research, each set was analysed to verify the alignment between the global SDGs framework and the indicators proposed at the local level. As it can be seen in *Table 1*, indicators were listed and compared with the official SDGs indicator list, first to establish if all indicators were reported at the local level or if there were some areas either not reported or pending to analyse, and secondly to establish which indicators were equivalent to the global framework and how many were local adaptations.

Table 1. Alignment between global and local SDGs indicators and reporting state

Number of Indicators. Equivalence and reporting state	City scope		National - Regional analysis			International analysis		
	Barcelona	*Los Angeles*	*Flanders*	*Province of Barcelona*	*100 Spanish Cities*	*OECD*	*European Handbook*	*Indicators for European cities*
Reported and equivalent to the global UN indicator	4	25	1	2	1	2	2	7
Reported but different from the global framework	38	25	48	22	32	22	20	50

Number of Indicators. Equivalence and reporting state	City scope		National - Regional analysis			International analysis		
	Barcelona	Los Angeles	Flanders	Province of Barcelona	100 Spanish Cities	OECD	European Handbook	Indicators for European cities
Total reported	42	50	49	24	33	24	22	57
Pending to report. Currently analysing how to report it	13	15	-	-	-	-	-	-
Not reported	18	8	24	49	40	49	51	16

The analysis showed that there is little alignment between local frameworks and the proposed UN indicators. Official SDGs indicators represented up to 34% of the total sets. Oppositely, alternative indicators, introducing a wider range of monitoring possibilities, varied up to 68% of the total frameworks proposed in the studies. As for the total number of indicators established in the sets and setting aside the extensive document comparing the 30 international indexes, which can be clearly differentiated in the sample since its main objective was to identify alignment between SDGs targets and other global frameworks, the European Handbook and the OECD framework were composed by a small number of indicators. The same approach can be identified in some of the regional studies, which intended to reduce the complexity of the exercise and select a few comparable indicators to monitor the progress among cities; this is the case of the assessment done in Spain. The median of indicators proposed in regional and international sources was 24 being the Flanders and the Spanish report the only documents that proposed a larger sample of indicators. Oppositely, city frameworks included a more extensive set of indicators, 42 in the case of Barcelona and 50 for Los Angeles city. Nevertheless, the approach chosen differs significantly; the Los Angeles assessment is closely aligned with the global framework, with a total of 25 indicators that were equivalent to the SDGs global framework, whereas Barcelona's city used only 4 global indicators, and 52% were local adaptations to consider the specific reality of the city. The same approach can be identified in several other VLR Ultimately, as analysed by Ciambra, A., about 52% of all used indicators in European VLRs are local or originally designed by the institutions in charge of the assessment (A. Ciambra, Siragusa, & Proietti, 2021).

As for the total amount of indicators integrated in local frameworks, as shown in *Figure 8* four indicators were assessed by all studies or being analysed to verify their implementation, indicators 1.2.1 and 1.2.2 associated with poverty, 3.6.1 linked to death and traffic injuries, and indicator 8.3.1 related to employment, while 38 indicators were listed in at least 4 of the sources and the rest in three or fewer documents. In addition, the approach chosen by the cities differs significantly; the Los Angeles assessment is closely aligned with the global framework, whereas almost 58% of the indicators proposed by Barcelona were adapted to consider the specific reality of the city.

On average, indicators belonging to SDGs 2, 12 and 17 were the least assessed in the frameworks, while all the other goals were present in more than half of the samples.

Nevertheless, not all aspects of the goals were addressed in the sets, as an example, even though, in general, indicators related to SDG 13 were present in 50% of the documents, they also had some indicators which were not addressed in almost any of the documents. Furthermore, considering only the four smallest sets, 30 indicators of the total sample analysed were not included in any frameworks. The least assessed indicators in these sets are linked to SDGs11 and SDGs17. Surprisingly, even though SDGs11 specifically addresses cities, fewer indicators were assessed, 64% of the indicators comprehended in the goal were absent in all the smaller sets.
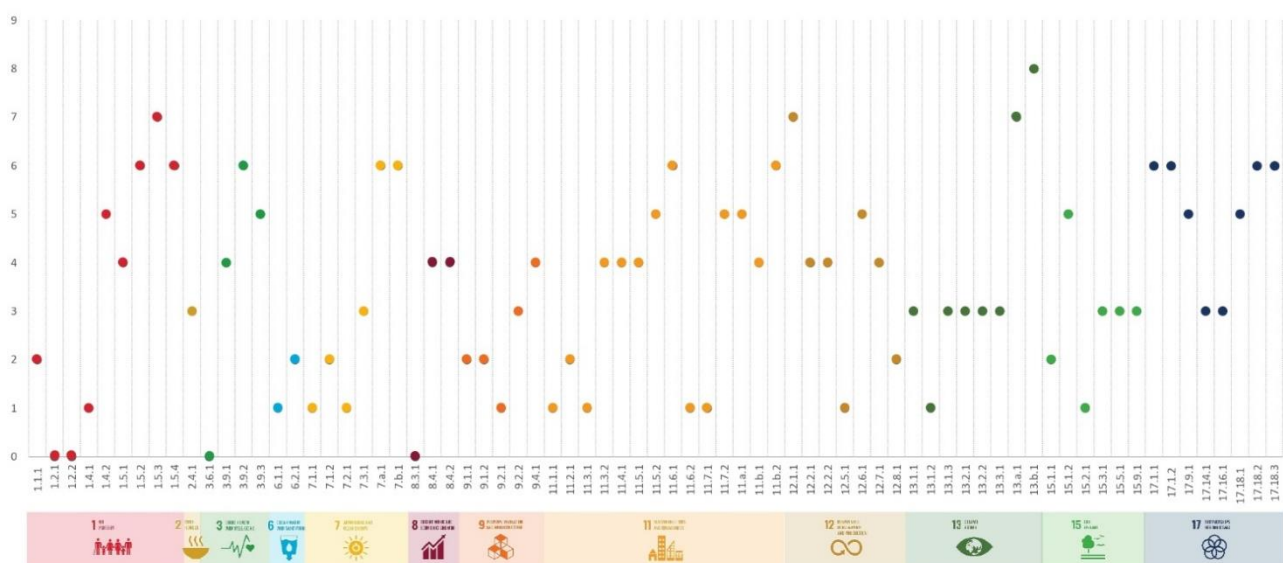
Figure 8. Number of documents in which the indicators are absent. Source: own elaboration

As mentioned before, up to 68% of the indicators proposed by the studies constitute adaptations of the global framework or new metrics proposed at the local level. As illustrated in *Figure 9*, the analysis of the indicators listed shows that between 1 and 32 different proposals can be identified to monitor each target. Consequently, it can be concluded that due to the diversity of indicators proposed, there are several approaches to monitoring each target. Nonetheless, some common metrics can be identified, such as measuring energy production and consumption for target 7.2. In addition, even though several variables were detected, after applying the filters introduced in *section 5*, several metrics were discarded, leaving a maximum of 22 alternatives to monitor the same target, as represented by the grey bars. Finally, up to nine targets in the other hand, did not comply with any of the filters proposed hence no potential indicator was identified in the filter list.

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Figure 9. Indicators proposed for each target. Source: own elaboration

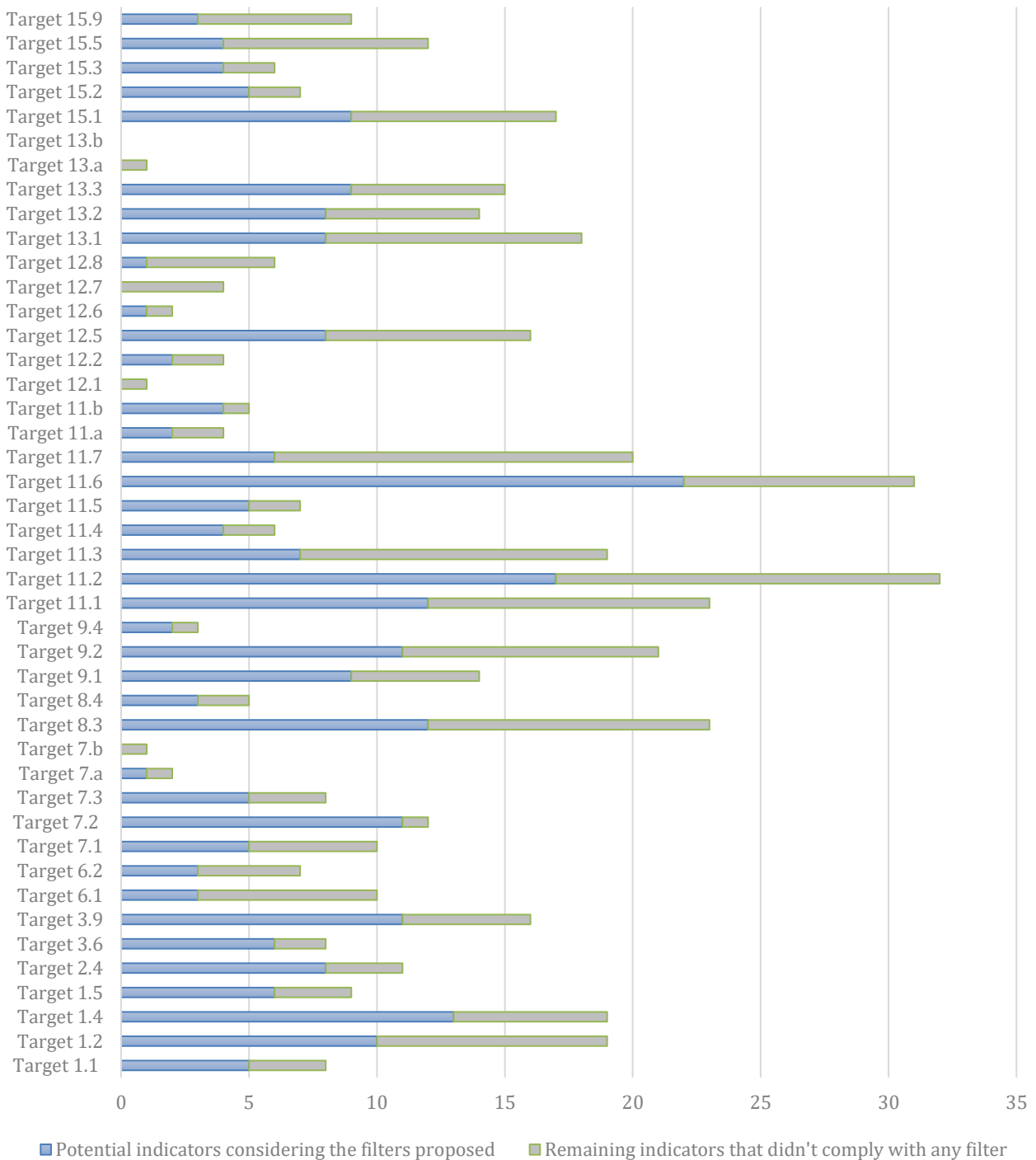Despite the diversity of proposed indicators, the analysis yielded a total of 98 potentially indicators that were either proposed by several sources or linked to more than one SDGs target. A total of 34 of those ones were proposed by more than one source and therefore complied with the first filter; 60 could be linked to more than one target hence the second

filter as shown in *Table 2*. The connexions with the targets and goals listed in the table are based on the associations previously established in the documents.

Table 2. Indicators linked to more than one SDG targets (LOT) and proposed by more than one source (PSS).

Indicator	*Filter*	*SDG goal*	*SDG target addressed*
Population at risk of poverty	*LOT, PSS*	*SDG01*	*T 1.1 T 1.2*
High poverty rate	*LOT*	*SDG01*	*T 1.1 T 1.2*
Child poverty rate	*LOT*	*SDG01*	*T 1.1 T 1.2*
People living in households with very low work intensity	*LOT*	*SDG01*	*T 1.2 T 1.4*
Share of connections compared to number of electricity or gas access points	*LOT*	*SDG01* *SDG07*	*T 1.4* *T 7.1*
Citizens' satisfaction in regard to housing standards and its availability and affordability	*LOT*	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Social housing availability	*LOT*	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Social/affordable homes delivered	*LOT*	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Social/affordable housing rate	*LOT*	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Creation of new subsidized affordable housing	*LOT*	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Ratio of the median free-market price of a dwelling unit and the median annual household income	*LOT*	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Housing cost overburden where the total housing costs represent more than 40% of the total disposable household income	*LOT*	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Average annual price of renting a home compared to gross disposable family income	*LOT*	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Number of deaths, missing, directly affected persons attributed to disasters	*LOT, PSS*	*SDG01* *SDG11* *SDG13*	*T 1.5* *T 11.5* *T 13.1*
Population exposed to flood risk, flood prone population	*LOT*	*SDG01* *SDG11*	*T 1.5* *T 11.5*
Disaster Office of Emergency Services	*LOT*	*SDG01*	*T 1.5*

Indicator	Filter	SDG goal	SDG target addressed
Administered Costs		SDG11	T 11.5
Adoption and implementation of local disaster risk reduction strategies in line with national disaster risk reduction strategies	LOT	SDG01 SDG11 SDG13	T 1.5 T 11.b T 13.1
Implementation of risk and vulnerability assessments addressing natural and human induced disasters and hazards	LOT	SDG01 SDG11 SDG13	T 1.5 T 11.b T 13.1
Adoption and implementation of a disaster risk reduction strategy in line with the Sendai Framework for Disaster Risk Reduction 2015–2030.	LOT	SDG01 SDG11 SDG13	T 1.5 T 11.b T 13.1
Proportion of agricultural area under productive and sustainable or organic agriculture	PSS	SDG02	T 2.4
Crop area by municipality	PSS	SDG02	T 2.4
Presence of regulations supporting biodiversity, soil and ecosystem health and/or regulating use of chemical inputs/sustainable farming practices	LOT	SDG02 SDG15	T 2.4 T 15.5
Traffic accidents with deaths	PSS	SDG03 SDG11	T 3.6 T 11.2
Death rate due to road traffic	PSS	SDG03	T 3.6
Traffic accidents with victims (injuries and deaths)	LOT	SDG03 SDG11	T 3.6 T 11.2
Deaths from infectious diseases of the respiratory system	PSS	SDG03	T 3.9
Air quality	LOT	SDG03 SDG11	T 3.9 T 11.6
CO2 emissions from households, tertiary and industry	LOT	SDG03 SDG09 SDG13	T 3.9 T 9.4 T13.3
Population exposed to harmful environmental noise	LOT	SDG03 SDG11	T 3.9 T 11.6
Share of population exposed to total daily (Lden) and night (Lnight) noise values	LOT	SDG03 SDG11	T 3.9 T 11.6
Population exposed to total noise values of Lden above 55 dB(A)	LOT	SDG03 SDG11	T 3.9 T 11.6
Population exposed to total noise values of Ln (night noise indicator) above 55 dB(A)	LOT	SDG03 SDG11	T 3.9 T 11.6
Effort rate of domestic users for the payment of water	LOT, PSS	SDG06	T 6.1 T 6.2

[D5.1] - [SOIs for SECAPs definition and assessment]

Indicator	Filter	SDG goal	SDG target addressed
Proportion of population connected or using safely managed drinking water services	PSS	SDG06	T 6.1
Proportion of population with access to electricity	PSS	SDG07	T 7.1
Number of charging outlets available for cars owned privately in the public space	LOT	SDG07 SDG09 SDG11	T 7.1 T 9.1 T 11.2
Proportion of the electricity consumed in the city that comes from renewable sources	LOT, PSS	SDG07 SDG12	T 7.2 T 12.2
Energy consumed locally generated using renewable resources	LOT, PSS	SDG07	T 7.2
Percentage of renewable energy production	LOT, PSS	SDG07	T 7.2
The energy consumption of households for heating	LOT	SDG07 SDG13	T 7.3 T 13.3
Energy recovery from solid municipal waste	LOT	SDG07 SDG09 SDG12	T 7.3 T 9.4 T 12.5
Signatory of Covenant of Mayors	LOT	SDG07 SDG11 SDG13	T 7.a T 11.b T 13.1 T 13.2
New business registration	LOT, PSS	SDG08 SDG09	T 8. T 9.2
Increase the total number of new businesses in targeted industry sectors over time	LOT	SDG08 SDG09	T 8.3 T 9.2
Firm creation rate (%)	PSS	SDG08	T 8.3
3-year survival rate of firms (%)	PSS	SDG08	T 8.3
Unemployment rate	PSS	SDG08	T 8.3
Households with internet access	PSS	SDG09	T 9.1
Satisfaction with level of public transport services	LOT	SDG09 SDG11	T 9.1 T 11.2
Public transport network	LOT	SDG09 SDG11	T 9.1 T 11.2
Performance of public transport network, ratio between accessibility and proximity to people or hospitals	LOT	SDG09 SDG11	T 9.1 T 11.2
Performance of car transport network, ratio between accessibility and proximity to people or hospitals	LOT	SDG09 SDG11	T 9.1 T 11.2

[D5.1] - [SOIs for SECAPs definition and assessment]

Indicator	Filter	SDG goal	SDG target addressed
Gross Value Added (GVA) in Manufacture (ISIC rev4) as a percentage of GDP	PSS	SDG09	T 9.2
Manufacturing employment as a percentage of total employment	PSS	SDG09	T 9.2
City inhabitants living in slums, informal settlements or inadequate housing	PSS	SDG11	T 11.1
Public Transport Use for Work Commute (or go to school)	PSS	SDG11	T 11.1
Ratio of land consumption to population growth rate	PSS	SDG11	T 11.3
Built-up Areas per Inhabitant	PSS	SDG11	T 11.3
Soil sealing or artificial coverage of land	LOT	SDG11 SDG15	T 11.3 T 15.1 T 15.3
Natural or Green Areas in the city / municipality	LOT	SDG11 SDG15	T 11.4 T 11.7 T 15.1 T 15.2
Expenditure of local authority dedicated to the preservation, protection and conservation of cultural heritage per inhabitant	PSS	SDG11	11.4
Percentage of city area protected as natural sites	LOT	SDG11 SDG15	T 11.4 T 15.5
Areas exposed to flooding or urban flood risk	LOT	SDG11 SDG13	T 11.5 T 13.1
Placement of artificial materials that cause the loss of essential soil ecosystem functions	LOT	SDG11 SDG13	T 11.5 T 13.1
CO2 emissions	LOT	SDG11 SDG13	T 11.6 T 13.2 T 13.3
PM10 concentrations	PSS	SDG11	T 11.6
NO2 concentrations	PSS	SDG11	T 11.6
O3 concentrations	PSS	SDG11	T 11.6
Number of kg of residual waste compared to number of citizens (also Number of kg selectively collected waste)	LOT	SDG11	T 11.6 T 12.5
Share (%) of the total green area of the city/municipality	LOT, PSS	SDG11 SDG15	T 11.7 T 15.2
Green area / infrastructure (inside and outside the city)	LOT	SDG11 SDG15	SDG 11.7 SDG 15.9
The concept of 'corridors' or connected	LOT	SDG11	T 11.a

Indicator	Filter	SDG goal	SDG target addressed
spaces for wildlife across the city is included in the action plans		SDG15	T 15.9
Connectivity measures in place	LOT	SDG11 SDG15	T 11.a T 15.9
Municipal waste rate (kilos per capita)	PSS	SDG12	T 12.5
Municipal waste processed according to differentiated reuse collection schemes (separated / recycled)	PSS	SDG12	T 12.5
Percentage of the city's solid waste that is recycled	PSS	SDG12	T 12.5
Number of kg selectively collected waste	LOT	SDG12	T 12.5
CO2 emissions per electricity production (in tons of CO2 equivalent per gigawatt hours) or (CO2 emissions (tons) per MWh electricity consumed, Carbon content in electricity)	LOT	SDG13	T 13.1 T 13.3
CO2 emissions per capita	LOT	SDG13	T 13.2 T 13.3
CO2 emissions per capita buildings and industry	LOT	SDG13	T 13.2 T 13.3
CO2 emissions per capita transport	LOT	SDG13	T 13.2 T 13.3
Territory and diversity of habitats. Forest area	LOT	SDG15	T 15.1 T 15.2
Urban greenness, amount of green area in square meters as approximated by the Normalized Difference Vegetation Index (NDVI) based on satellite imagery.	LOT	SDG15	T 15.1 T 15.2
Tree Cover Density	LOT	SDG15	T 15.1 T 15.2
Total area of the municipality occupied by public urban vegetation	PSS	SDG15	T 15.2
Total tree-covered surface area in the municipality	PSS	SDG15	15.2

4.3.2.   Synergies between SDGs indicators and SECAPs

Regarding to the link between SDGs and SECAPs frameworks though specific indicators, the indicators directly related to both initiatives are listed. The following lists includes the

resulting 98 final indicators, sorted by any one of the three main pillars of SECAPs: Mitigation, Adaptation and Energy Poverty.

Table 3. List of potential SDGs indicators related to SECAPs Mitigation pillar

Indicators related to Mitigation pillar	SDG	SDG target addressed
CO2 emissions or CO2 equivalent emissions	SDG11 SDG13	T 11.6 T 13.2 T 13.3
CO2 emissions generated by the industrial sector	SDG09	9.2
CO2 emissions generated by the commerce sector	SDG08	8.4
CO2 from households, tertiary and industry	SDG03 SDG09 SDG13	T 3.9 T 9.4 T 13.3
CO2 emissions per capita	SDG13	T 13.2 T 13.3
CO2 emissions per capita buildings and industry	SDG13	T 13.2 T 13.3
CO2 emissions per capita transport	SDG13	T 13.2 T 13.3
CO2 emissions per electricity production (in tons of CO2 equivalent per gigawatt hours) or (CO2 emissions (tons) per MWh electricity consumed	SDG13	T 13.1 T 13.3
Final energy consumption by sector and fuel	SDG07	T 7.2
Transport energy consumption	SDG11	T 11.2
Final energy consumption of public buildings per year	SDG07	T 7.3
Final energy consumption in homes including all types of energy	SDG07	T 7.3
Electricity consumption per capita	SDG07	T 7.3
Proportion of the electricity consumed in the city that comes from renewable sources	SDG07 SDG12	T 7.2 T 12.2
Energy consumed locally generated using renewable resources	SDG07	T 7.2
Renewable energy on the total energy consumed in households and the tertiary sector	SDG07	T 7.2
Percentage of renewable energy production	SDG07	T 7.2
Installed power (kW) per technology eligible for green certificates	SDG07	T 7.2
Energy generated locally from renewable resources	SDG07	T 7.2
Percentage of total electricity production that comes from coal	SDG07	T 7.2

Indicators related to Mitigation pillar	SDG	SDG target addressed
Percentage of total electricity production that comes from fossil fuels (natural gas and oil, excluding coal)	SDG07	T 7.2
Signatory of Covenant of Mayors	SDG07 SDG11 ASG13	T 7.a T 11.b T 13.1 T13.2
Municipal waste rate (kilos per capita)	SDG12	T 12.5
Energy recovery from solid municipal waste	SDG07 SDG09 SDG12	T 7.3 T 9.4 T 12.5
Total municipal (solid) waste generated (domestic and commercial)	SDG12	T 12.5

At the other side, and even though adaptation indicators are not clearly defined, as previously mentioned, the list of 98 was reviewed to establish potential correlations with adaptation aspects. Indicators that might be associated to energy poverty indicators were also identified among the list, *Table 4* and *Table 5* show the list of potential connections based in this preliminary assessment.

Table 4. List of potential SDGs indicators related to SECAPs Adaptation pillar

Indicators related to Adaptation pillar	SDG	SDG target addressed
Number of deaths, missing, directly affected persons attributed to disasters	SDG01 SDG11 SDG13	T 1.5 T 11.5 T 13.1
Population exposed to flood risk, flood prone population	SDG01 SDG11	T 1.5 T 11.5
Disaster Office of Emergency Services Administered Costs	SDG01 SDG11	T 1.5 T 11.5
Adoption and implementation of local disaster risk reduction strategies in line with national strategies	SDG01 SDG11 SDG13	T 1.5 T 11.b T 13.1
Implementation of risk and vulnerability assessments, financial (capital and operating) plans and technical systems for disaster mitigation addressing natural and human induced disasters and hazards	SDG01 SDG11 SDG13	T 1.5 T 11.b T 13.1
Adoption and implementation of a disaster risk reduction strategy in line with the Sendai Framework for Disaster Risk Reduction 2015–2030.	SDG01 SDG11 SDG13	T 1.5 T 11.b T 13.1
Soil sealing or artificial coverage of land	SDG11 SDG15	T 11.3 T 15.1 T 15.3
Natural or Green Areas in the city / municipality	SDG11 SDG15	T 11.4 T 11.7 T 15.1 T 15.2

Indicators related to Adaptation pillar	SDG	SDG target addressed
Percentage of city area protected as natural sites	SDG11 SDG15	T 11.4 T 15.5
Expenditure of local authority dedicated to the preservation, protection, and conservation of cultural heritage per inhabitant	SDG11	T 11.4
Areas exposed to flooding or urban flood risk	SDG11 SDG13	T 11.5 T 13.1
Placement of artificial materials that cause the loss of essential soil ecosystem functions	SDG11 SDG13	T 11.5 T 13.1
Share (%) of the total green area of the city/municipality	SDG11 SDG15	T 11.7 T 15.2
Green area / infrastructure (inside and outside the city)	SDG11 SDG15	T 11.7 T 15.9
The concept of 'corridors' or connected spaces for wildlife across the city is included in the action plans	SDG11 SDG15	T 11.a T 15.9
Connectivity measures in place	SDG11 SDG15	T 11.a T 15.9
Forest area	SDG15	T 15.1 T 15.2
Urban greenness, amount of green area in square meters as approximated by the Normalized Difference Vegetation Index (NDVI) based on satellite imagery	SDG15	T 15.1 T 15.2
Tree Cover Density	SDG15	T 15.1 T 15.2
Total area of the municipality occupied by public urban vegetation	SDG15	T 15.2
Total tree-covered surface area in the municipality	SDG15	T 15.2

Table 5. List of potential SDGs indicators related to SECAPs Energy poverty pillar

Indicators related to Energy poverty pillar	SDG	SDG target addressed
Population at risk of poverty (some slight variations such us social exclusion or after social transfers)	SDG01	T 1.1 T 1.2
High poverty rate	SDG01	T 1.1 T 1.2
Child poverty rate	SDG01	T 1.1 T 1.2
People living in households with very low work intensity	SDG01	T 1.2 T 1.4
Social housing availability or share of social rental housing in the municipality	SDG01 SDG11	T 1.4 T 11.1
Social/affordable homes delivered	SDG01 SDG11	T 1.4 T 11.1

Social/affordable housing rate	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Creation of new subsidized affordable housing	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Ratio of the median free-market price of a dwelling unit and the median annual household income	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Housing cost overburden where the total housing costs (net of housing allowances) represent more than 40% of the total disposable household in-come (net of housing allowances) (other authors refer it as rent Burdened Residents)	*SDG01* *SDG11*	*T 1.4* *T 11.1*
Effort rate of domestic users for the payment of water	*SDG06*	*T 6.1 T 6.2*
Proportion of population connected or using safely managed drinking water services	*SDG06*	*T 6.1*
Proportion of population with access to electricity	*SDG07*	*T 7.1*
City inhabitants living in slums, informal settlements, or inadequate housing	*SDG11*	*T 11.1*

5. Alignment with other work packages

After the preliminary analysis of case studies, the initial list of indicators was complemented with relevant metrics identified in SECAPs, complementary metrics coming from other work packages, mainly, indicators identified so far in WP4 (adaptation and mitigation measures), WP6 (citizen perspective and engagement) and WP7 (business and investors), as well as metrics highlighted by city partners. In some cases, additional metrics were added for the same target to have second options in case the main indicator chosen was not available at the desired level (not feasible to be downscaled). The 82 new added indicators can be seen in *Table 6*.

Table 6. Indicators added to the original list in Table 2

Indicators added	*WP source*	*SDG*	*SDG target addressed*
Share of imports for essential material	*WP6*	*SDG01*	*T 1.2 T 1.3 T 1.4*
Cost of final residential energy consumption compared to Gross Family Income	*WP6*	*SDG01* *SDG07* *SDG11*	*T 1.4* *T 7.1* *T 11.1*
Households with access to basic services	*WP6*	*SDG01*	*T 1.4*

Indicators added	WP source	SDG	SDG target addressed
Number of deaths, missing persons and persons affected by disaster per 100,000 people	WP6	SDG01 SDG11 SDG13	T 1.5 T 11.5 T 13.1
Proportion of people who have to migrate to another region due to climate/natural hazards	WP6	SDG01 SDG11	T 1.5 T 11.5
Exposure of people to heat waves	WP6	SDG01 SDG11	T 1.5 T 11.5
Exposure of people to other climate hazards (cold waves, mass movement, heavy precipitation, droughts, storms, forest fires, heat island effect)	WP5	SDG01 SDG11	T 1.5 T 11.5
Production in Agriculture (total number of animals)	WP7	SDG02	T 2.3
Production in Agriculture (crop-aggregate)	WP7	SDG02	T 2.3
Share of imports of staple food	WP6	SDG02	T 2.4
Agricultural and forestry holdings (also manufacturing and transportation)	WP7	SDG02	T 2.4
Health situation	WP6	SDG03	T 3.8
Mortality rate attributed to unintentional poisoning	WP5	SDG03	T 3.9
Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene	WP5	SDG03	T 3.9
Mortality rate attributed to household and ambient air pollution	WP5	SDG03	T 3.9
Education Index	WP6	SDG04 SDG13	T 4.3 T 4.5 T 13.3
Education and Training (female)	WP7	SDG04	T 4.3
Extent to which (i) global citizenship education and (ii) education for sustainable development and climate change are mainstreamed at all levels in: (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment	WP6	SDG04 SDG13	T 4.7 T 13.3
Gender pay gap	WP6	SDG05	T 5.1
Gender Pension Gap	WP6	SDG05	T 5.1
Percentage of women participating in citizens assemblies	WP6	SDG05	T 5.5
Gini-Index	WP6	SDG05	T 5.a
Population with access to improved sanitation	WP6	SDG06	T 6.1 T 6.2

Indicators added	WP source	SDG	SDG target addressed
Citizens connected to the mains water network (or potable drinking water system)	WP6	SDG06	T 6.1 T 6.2
Energy production with fossil fuels: Hard coal, Brown coal (Lignite), Oil, Natural Gas, Liquid Gas, Heating Oil	WP4	SDG07	T 7.2
Renewable sources installed capacity	WP4	SDG07	T 7.2
Vehicle energy consumption of the different transport modes	WP4	SDG07	T 7.3
Energy demand of buildings	WP4	SDG07	T 7.3
Energy demand of residencies	WP4	SDG07	T 7.3
Energy demand of households for the different uses: appliances, lighting, air conditioning/ heating demand.	WP4	SDG07	T 7.3
Energy demand of transport	WP7	SDG07 SDG11	T 7.3 T 11.2
Energy demand of manufacturing	WP7	SDG07	T 7.3
Energy demand of agriculture	WP7	SDG07	T 7.3
Index value of GDP growth per employed person	WP5	SDG08	T 8.2
Share of jobs in environmental industries	WP7	SDG08	T 8.3
Production of residual waste, PMC, paper, organic waste	WP4	SDG08 SDG11	T 8.4 T 11.6
Total male employment	WP7	SDG08 SDG09	T 8.5 T 9.2
Total female employment	WP7	SDG08 SDG09	T 8.5 T 9.2
Young people neither in employment nor in education and training by sex	WP6	SDG08	T 8.6
Number of tourist accommodation places with respect to the residential population	WP5	SDG08	T 8.9
Volume of freight transport relative to GDP	WP7	SDG09	T 9.1
Access to public transport	WP5	SDG09 SDG11	T 9.1 T 11.2
Production in Manufacturing (aggregate)	WP7	SDG09	T 9.2
Gross value added (GVA) growth	WP7	SDG09	T 9.2
GVA in Agriculture	WP7	SDG09	T 9.2
GVA in Manufacturing	WP7	SDG09	T 9.2

Indicators added	WP source	SDG	SDG target addressed
GVA in Transportation	WP7	SDG09	T 9.2
Real Labor productivity	WP7	SDG09	T 9.2
Production growth	WP7	SDG09	T 9.2
Emissions from manufacturing	WP7	SDG09	T 9.4
Emissions from agriculture	WP7	SDG09	T 9.4
Income	WP6	SDG10	T 10.1
Migration index	WP6	SDG10	T 10.2 T 10.3
Attitudes towards (sexual) minorities	WP6	SDG10	T 10.2
Tolerance towards minorities, homosexuals, immigrants, disabilities	WP6	SDG10	T 10.2
Share of people who have/had to migrate to another region due to natural hazards	WP6	SDG11	T 11.1 T 11.b
Tenancy	WP6	SDG11	T 11.1
Traffic modal split	WP4	SDG11	T 11.2
Occupancy rate by mode	WP4	SDG11	T 11.2
Transportation (passenger distance - aggregate)	WP7	SDG11	T 11.2
Percentage of population satisfied with quality of air	WP6	SDG11	T 11.6
Percentage of people exposed to more than 10 µg/m³ of PM2.5	WP6	SDG11	T 11.6
Population exposed to NO2 concentration	WP6	SDG11	T 11.6
Percentage of population with access to at least 1 hectare of green urban areas (parks) and forests within 15 minutes of walking	WP6	SDG11	T 11.7
Population without green urban areas in their neighborhood	WP6	SDG11	T 11.7
Hazardous waste generated per capita	WP6	SDG12	T 12.4
Proportion of hazardous waste treated, by type of treatment	WP6	SDG12	T 12.4
Number of motor road vehicles per 100 people	WP4	SDG12	T 12.8
Hazard Current probability (Low, moderate, high, not known) - heat/cold waves, floods, precipitation, droughts, storms, mass movement, wildfires, chemical change, biological	WP5	SDG13	T 13.1
Hazards Impact (Low, moderate, high, not	WP5	SDG13	T 13.1

Indicators added	WP source	SDG	SDG target addressed
known) - heat/cold waves, floods, precipitation, droughts, storms, mass movement, wildfires, chemical change, biological			
Hazards Expected change in intensity (increase, decrease, no change, not known) - heat/cold waves, floods, precipitation, droughts, storms, mass movement, wildfires, chemical change, biological	WP5	SDG13	T 13.1
Hazards Expected change in frequency (increase, decrease, no change, not known) - heat/cold waves, floods, precipitation, droughts, storms, mass movement, wildfires, chemical change, biological	WP5	SDG13	T 13.1
Hazards Timeframe (current, short-term, medium-term, long-term, not known) - heat/cold waves, floods, precipitation, droughts, storms, mass movement, wildfires, chemical change, biological	WP2-WP5	SDG13	T 13.1
Heating degree-days needed to maintain an average building indoor temperature of 15.5 degree Celsius	WP4	SDG13	T 13.2
Cooling degree-days needed to maintain an average building indoor temperature of 22 degree Celsius	WP4	SDG13	T 13.2
Public attitudes to Climate Change and Energy. How likely the impact of climate change will be very bad	WP6	SDG13	T 13.3
Red List Index	WP6	SDG15	T 15.5
Biodiversity index for native birds	WP6	SDG15	T 15.5
Crime level	WP6	SDG16	T 16.1 T 16.2 T 16.3
Trust in the government	WP6	SDG16	T 16.6
Political left-right self-placement	WP6	SDG16	T 16.6
Political trust: confidence in government / parties / parliament	WP6	SDG16	T 16.6

The above indicators where then added to the metrics identified during the bibliographic analysis and listed in *Table 2*, constituting a list of 181 total indicators. As a final part of the exercise the complete list of indicators was synthesized considering the availability of data, the downscaling process and the feedback received by relevant actors as explained in *section 7*.

6. Feedback from relevant stakeholders

6.1. Feedback from Barcelona and Metropolitan Area Gdansk-Gdynia-Sopot

As a part of the first exercise and after filtering the initial list of indicators, city partners were asked to review the list of metrics with the aim of:

1. Identify indicators which were currently used by cities and obtaining feedback over the calculation process to verify if local surveys or calculations were executed, or national data was used to populate the metrics.
2. Detect which aspects were not included in their frameworks and why (data availability, difficulty to calculate, etc.)
3. Identify if all relevant aspects or priorities identified by the regions were currently reflected by the list of final indicators and there was at least one indicator addressing these issues.
4. Obtaining feedback regarding the usefulness of the indicators to compare the results with other cities/regions and if other criteria or disaggregation was needed

As for Barcelona, the current SDG framework was included in the initial analysis and therefore the indicators and aspects included in their assessment was already incorporated in the preliminary list of indicators. Nevertheless, some other relevant aspects were highlighted by the members. In relation to the criteria used to select indicators there were four main aspects considered to include a specific metric in the assessment. They prioritized metrics which were:

1. Already included in some approved municipal plan, therefore metrics aligned with the current planning
2. Quantifiable indicators that can have a specific goal to be achieved
3. Indicators that can be populated with local data
4. When possible, indicators that were also present in other relevant studies or frameworks such as the SDG global framework or other important institutions.

Even though some common metrics were identified during the analysis, some potential issues were underlined such as the difficulty of balancing the need of several of sub-indicators with the availability of resources and money. The total amount of indicators can be a key aspect for municipalities, since the inclusion of more tailored metrics can provide relevant data but at the same time increase the economic resources needed to handle the calculations and further analytical effort to provide a clear conclusion. Therefore, Barcelona strongly suggested to simplify the number of indicators, by using the ones that are linked

to more than one target and then incorporating more detailed variables that specifically address important aspects of the regions.

At the same time, five other remarks were made after looking over the list of potential indicators, such as the availability of data, the scope of the indicators which can imply the implementation of regulations that are outside the city or region scope (mainly to land management, biodiversity and so on), the difficulty in case the indicator is based in surveys since most of them are conducted by national authorities and updated every four years, and the difficulty in estimating the impacts of climate change.

In relation to their priorities, social housing and how housing cost related to income, and the gathering of data around emissions with a sufficient level of disaggregation, are part of the primary aspects where the local government is focusing the efforts. In that sense Barcelona has implemented some local consultant offices, the offer both educational programs and technical support to citizens, with the aim of helping them learn how to decrease the energy consumption of the house, and also get advice related to the energy bill and the current aspects that influence it.

They also underlined their interest in having indicators to track productivity in the economic sectors and tourism impact.

As for the Metropolitan Area Gdansk-Gdynia-Sopot (MAGGS) region, several additional comments were made. In their case, Energy and Climate change has not been a priority for regions in Poland until now, consequently, there is little data available and therefore the lack of detail information to establish the baseline is a critical issue to overcome. Consequently, any contribution associated to the establishment of CO_2 emissions can potentially improve the planning and execution of actions.

Related to this matter, the region is developing several Sustainable mobility plans and a Supra local climate action plan. The plans are meant to be presented during September of 2023 and they would include a set of KPIs to monitor the progress. Nevertheless, even though this list of indicators has not been released yet, specifically for mobility there are four main indicators that are currently mandatory to obtain funding:

- CO_2 emissions
- Modal split
- Fatalities due to traffic accidents
- Accessibility to transport.

In addition, for future programs a set of specific indicators will be developed to monitor the progress in the transport sector, also considering spatial planning.

In regard to their priorities, three relevant aspects were pointed out, the shift on the electricity production, since up to now they were mainly dependent on the gas coming from the Russian Federation, the prohibition of some fossil fuels therefore which fuels can be used and where, and the Decarbonization of households specially for low-income families which can be particularly affected by the regulations put in place.

In the same line than Barcelona, MAGGS is working on creating a group of local advisers that could help citizens establish the best options for them to reduce the energy consumption considering the energy efficiency and the available funds to cover the cost. In addition to households, Poland has implemented annual campaigns to promote the use of the bicycle to go to school through a contest between students, albeit they have observed that after the contest is finalized some students stop using the bicycles.

In addition, the relevance of relating the actions with climatic conditions was emphasized by the region, as an example the weather in Poland is very volatile and its condition affects the PV production over the course of the year.

Finally, some common points were stressed by both partners:

- Is necessary to take into consideration the interactions between the different governance levels when proposing actions since regulation over specific aspects and competences can vary among territories. A clear example is transport, trains can be administered or owned by national authorities, metropolitan entities, or local governments.
- Both cities considered that it would be relevant to have a set of potential indicators and a clearer link with mitigation and adaptation aspects. Even though there are actions only linked to adaptation in many cases measures have impact over both.
- As households and citizens are in the center of their priorities, it would be relevant to have KPIs that could serve to construct the storytelling to engage the different groups (schools, kids, vulnerable groups).

6.2. Feedback from WISE stakeholders

Additional feedback from key third-parties was gathered through interviews with relevant stakeholders, identified and mapped as a part of the *Stakeholder interaction methodology and schedule (LOCALISED Deliverable 8.1)* (Hezel, Broschkowski, Lamberty, Firus, & Shayegh, 2022)*. The following actors involved in the development of SDGs and CoM initiatives were contacted for oriented interviews:

1. Ivan Capdevila and Carla García from *Estudi Ramon Folch (ERF)*, a consultancy office involved in the development of SECAPs and local SDG agendas working with several authorities in Spain.
2. Vasileios Latinos, from *Local Governments for Sustainability* (*ICLEI)* involved in the CoM initiative.
3. Giulia Melica and Aldo Treville of the *Join Research Center* (*JRC)*, the institution behind the monitoring of SECAPs.

The interviews focused not so much on the review, one by one, of the proposed KPIs, but on the proposed objective of establishing synergies between SECAPs and SDGs, the

established methodology, and its potential uses at the platform level. Thus, some of the ideas that emerged more oriented to these issues are summarized below.

Some common problematics around indicators and assessing SDGs and SECAPs were highlighted by the wise stakeholders:

- Developing and monitoring several actions and impacts can be specially challenging in small and medium municipalities since they have a small number of resources they can allocated to this task. The development of plans is in most cases done through subsidies and with the support of regional authorities, but the following up of the plans relies on the hands of local technicians. For that reason, even though many of them develop long-term action plans, the follow up of the actions and the impact over the indicators is almost never conducted.
- The current official lists of SECAPs and SDG indicators do not actually contribute to foster the implementation of actions. The large number of indicators and aspects addressed, especially for SDGs which are much broader than SECAPs, seems unreachable or out of scope for small localities.
- In general, data sharing is an issue, how to make sure that the data is available and who has it. In addition, scale and property are also relevant, in other words how to establish what are the limits, what can be included, and who owns it.
- Monitoring air quality is also a common issue, many municipalities struggle to monitor and analyze the data since the information is coming from different sources.

Based on the problematics detected so far, some recommendations were also made, mainly:

- Reducing the list of indicators as much as possible, implementing metrics with clear objectives instead of many metrics addressing several aspects.
- As for the monitoring process, it would be ideal to have indicators that can be updated each year, but is not possible, at least each four years. In particular some highlighted the need to have updated data during the election years to allow a proper assessment of the current situation at the beginning of each political mandate. For the actions every two years would be ideal to properly track the process of the measures implemented
- In regards of the type of indicators the consultancy office remarked that outcome indicators, which can track the overall objective achievement, are crucial, even though indicators specifically monitoring actions are also important. In the same line the highlighted the need to have absolute numbers at national level and weighted metrics at NUTS-3 regions or cities. At a lower scale is necessary to verify if the oscillations in the values are due to for example the increase of consumption or to changes in population.
- Another relevant aspect underline is the necessity to consider the follow up on the metrics proposed. If the intention is to construct a platform that would allow a dynamic interaction, then the indicators need to feasible and updatable, data have to be available so local authorities can update metrics after the initial assessment.

[D5.1] - [SOIs for SECAPs definition and assessment]

These recommendations have been considered as: 1) the number of final SOIs are the less able to feedback all the requested information by SDG and SECAPs initiatives, 2) for the final list of SOIs (see section 8), all data sources have been validated, so that they are public and/or accessible and that they are renewed with a periodicity that allows credible updating, and 3) the SOIs final list ensures the access to local/regional data, or proposes downscaling reliable proxies, or offer to the end-user to fine-tune the values with local data.

As far as the interviews included complementary questions related to the overall process of WP5 and other aspects of the project, other relevant feedback was also pointed. The complete list of questions and the related answers, which includes also other aspects beyond the main topics of D5.1, can be found in

Annex II

7. Prioritizing SOIs for the LOCALISED project

To prioritize the indicators, all 181 metrics (99 coming from the analysis of the sources plus 82 coming from other WPs) were associated with the target stakeholders identified for the project, mainly public administrators, citizens, and business. Subsequently, the list of indicators was prioritised considering 1) the availability of data at the desired spatial level; 2) the necessity to reduce and simplify the list as advised by the external experts; 3) the main relevant aspects that could be important to address and, 4) to have at least one or two indicators representing each SDG target and, when possible, linked to SECAPS.

Thus, from the 181 original ones, the exercise yielded a total of **93 possible final indicators** (89 related to SDG and 2 additional metrics), the so-called **SDG Oriented Indicators (SOIs)**.

A scale was assigned to each of the indicators based on a preliminary assessment of the feasibility to have the data at NUTS-2 or NUTS-3 level. Indicators were ranked as already available , probably available , probably not available , or impossible due to availability of open data-sources or scope. Indicators already disaggregated and available in the database were marked as available. If the disaggregation process is still pending, they were rated as probably available. Those marked as impossible were moved to a backup list in case they are needed for other relevant purpose, even if they might be only available at a higher geographical scope. Some other indicators were also moved to the backup list since they were similar to other metrics, or another relevant aspect was chosen for one specific target. Nevertheless, a more detail analysis in WP3 needs to be conducted to verify the feasibility of implementing the selected indicators. Additional issues can arise during the disaggregation process.

Table 7 summarizes the data of the indicators ordered by SDG number. The columns included in the table include the description of the indicator, the potential methodology necessary to downscale the data, the unit and the relation with SDGs and SECAPs. Some complementary columns were added with TIER level and the main stakeholders as introduced in **D2.6 Mitigation and Adaptation Indicators** (Warmuth et al., 2022), and a first feasibility assessment.

Table 7. List of D5.1 final proposed SOIs.

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
People at risk of income poverty after social transfers	People at risk-of-poverty are persons with an equivalized disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalized disposable income (after social transfers). The indicator is part of the multidimensional poverty index	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	%	SDG01 SDG10	T 1.1, 1.2 T 10.2	Can be linked to SECAPs Energy Poverty or Adaptation pillars to establish vulnerability	Citizens and public administrations	Tier 1	
Families or households that allocate more than 40% of their resources to housing expenditures or services or housing cost burden	Share of persons / households spending more than a specific percentage of their incomes on energy services putting them in a situation of energy poverty	Data available at OECD and EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	%	SDG01 SDG11	T 1.4 T 11.1	Linked to SECAPs Energy Poverty pillar	Citizens and public administrations	Tier 1	
Cost of final residential energy Consumption compared to Gross Family Income	This indicator measures the share of gross family income used for housing expenses such as water, electricity, gas or heating	Electricity data and income are available at EUROSTAT, even though at higher level and in separate tables, further analysis needs to be done. In addition, the methodology to downscale the information needs to be established	%	SDG01 SDG07 SDG11	T 1.4 T 7.1 T 11.1	Linked to SECAPs Energy Poverty pillar	Citizens and public administrations	Tier 1	
Number of deaths, missing persons and persons affected by disaster per 100,000 people	This indicator measures the number of people who died, went missing or were directly affected by disasters per 100,000 population. Focus on poor and vulnerable groups needed	Data available at UNECE, even though at higher level, the methodology to downscale the information needs to be established	Rate, Nº deaths/ 100.000 inhabitants	SDG01 SDG11 SDG13	T 1.5 T 11.5 T 13.1	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations	Tier 2	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
Population exposed to flood risk or flood prone population	The indicator shows the number of people who are directly exposed to floods in a 1-in-100-year flood event, thus posing significant risk to lives and livelihoods	Not clear established methodology. One reference study was found: The RESIN project that addresses the percentage of the total population living in settlements that would be exposed to flooding. Further analysis needs to be done	Number of people or %	SDG01 SDG06 SDG11	T 1.5 T 6.4 T 11.5	Could be linked to SECAP Adaptation pillar and vulnerability	Public administrations	Tier 3	
Exposure of vulnerable people to Heat waves	This indicator tracks the change in the number of heatwave exposure events (with one exposure event being one heatwave experienced by one person aged over 65 or child from birth to 1 year old) and days of heatwave exposure in these populations compared with the average number of events in the reference period (1986–2005)	Data available at ESPON, not further calculations are needed	INDEX	SDG01 SDG11	T 1.5 T 11.5	Could be linked to SECAP Adaptation pillar and vulnerability	Public administrations	Tier 2	
Exposure of people to mass movement	This indicator shows the percentage of population located in areas that are susceptible to landslide hazard. The key factor that influences landslide susceptibility is the presence of steep slopes. Others include bedrock and soil characteristics, deforestation, and the presence of roads. Heavy rainfall can often trigger landslides	Not clear established methodology. One approach found in RESIN and ESPON projects that analyses population living in settlements exposed to landslide	INDEX	SDG01 SDG11	T 1.5 T 11.5	Could be linked to SECAP Adaptation pillar and vulnerability	Public administrations	Tier 3	
Production in Agriculture (total number of animals)	This indicator informs on the number of livestock units produced by the agricultural sector.	The values can be disaggregated using the data from EUCALC	#	SDG02	T 2.3		Business	Tier 1	
Production in Agriculture (crop-aggregate)	This indicator informs on the total amount of total calories produced by the agricultural sector	The values can be disaggregated using the data from EUCALC	kcal	SDG02	T 2.3		Business	Tier 1	
Share of imports of staple food	The indicator measures the dependency on other economies. Scarcity (and price)	Data available at World Bank, even though at higher level, a deeper analysis needs to	%	SDG02	T 2.4		Citizens	Tier 3	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	of staple food poses risk.	be done							
Presence of regulations supporting biodiversity, soil and ecosystem health or regulating use of chemicals	The indicator provides information of whether the region has implemented regulations to protect areas or regulated the use of chemicals in agricultural practices	Protected areas available at EEA, use of pesticides available at EUROSTAT, no further calculations needed	m^2 for areas kg for pesticides	SDG02 SDG15	T 2.4 T 15.5	Could be linked to SECAP Adaptation pillar	Public administrations	Tier 1	
Proportion of agricultural area under productive and sustainable/organic agriculture	This indicator measures progress in achieving more productive and sustainable agriculture. The indicator measures the share of total utilized agricultural area (UAA) occupied by organic farming. Farming is recognized to be organic if it complies with Council Regulation (EC) No 834/2007, which has set up a comprehensive framework for the organic production of crops and livestock and for the labelling, processing and marketing of organic products, as well as for governing imports of organic products into the EU	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	%	SDG02	T 2.4	Could be linked to SECAP Adaptation pillar	Public administrations	Tier 2	
Traffic accidents with victims (injuries and deaths) per 100 000 passengers	The indicator measures the number of fatalities and injuries caused by traffic accidents, including drivers and passengers of motorized vehicles and pedal cycles as well as pedestrian. This metric shows how safe roads and traffic systems are.	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	Nr. per 100000	SDG03	T 3.6		Citizens and public administrations	Tier 2	
Health situation	Indicator to be defined, there are two possible approaches. Could be measure by the number of sick leaves or absences due to health problems or expenditure	Data available at EUROSTAT, even though at higher level, a deeper analysis needs to be done	% For absences PPS per	SDG03	T 3.9		Citizens and public administrations	Tier 2	

50

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	on health benefits.		inhabitant						
CO₂ emissions from households, tertiary and industry (non-ETS industry)	This indicator estimates the emissions yearly emitted by households, tertiary and industry buildings	The values can be disaggregated using the data from EUCALC	Tons CO2eq/ year	SDG03 SDG07 SDG09 SDG13	T 3.9 T7.2 T 9.2, 9.4 T 13.3	Linked to SECAP Mitigation pillar. Building section	Public administrations	Tier 1	
Mortality rate attributed to unintentional poisoning	The indicator provides information on mortality patterns due to unintentional poisoning. It describes mortality in relation to the total population. Expressed in deaths per 100 000 inhabitants.	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	Rate: Nº of death/1 00.000 inhabitants	SDG03	T 3.9	Could be linked to SECAP Adaptation pillar and impact	Public administrations	Tier 1	
Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene	The indicator provides information on mortality patterns attributed to unsafe water, unsafe sanitation, and lack of hygiene. It describes mortality in relation to the total population. Expressed in deaths per 100 000 inhabitants.	Data available at WHO or World Bank, even though at higher level, the methodology to downscale the information needs to be established	Rate: Nº of death/1 00.000 inhabitants	SDG03	T 3.9	Could be linked to SECAP Adaptation pillar and impact	Public administrations	Tier 2	
Mortality rate attributed to household and ambient air pollution	The indicator estimates the number of deaths that can be attributed to ambient pollution (outdoor) and household (indoor). It is calculated by first combining information on the increased (or relative) risk of a disease resulting from exposure, with information on how widespread the exposure is in the population (the annual mean concentration of particulate matter to which the population is exposed).	Data available at EEA, not further calculations are needed	Years of life lost of number of premature deaths	SDG03	T 3.9	Could be linked to SECAP Adaptation pillar and impact	Public administrations	Tier 2	
Deaths from infectious diseases of the respiratory system	The indicator estimates the number of deaths due to respiratory system. It describes mortality in relation to the total population in a given period.	Data available at EUROSTAT or WHO, even though at higher level and with different approaches, more deep analysis needs to be done to establish which deceases to include	Rate: Nº of death/1 00.000	SDG03	T 3.9	Could be linked to SECAP Adaptation	Public administrations	Tier 2	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	The great majority of deaths from respiratory infections are caused by lower respiratory infections -- predominantly pneumonia. When they occur, upper respiratory infection and otitis media deaths are included in this category as well	and how to downscale the information	inhabitants			pillar and impact			
Education and Training (female)	This indicator shows the participation rate of female, 25-64 years, in education and training (last 4 weeks)	Data available on EUROSTAT, no further calculations are needed	%	SDG04	T 4.3		Business	Tier 1	
As Education Index: Population with tertiary education	The indicator shows the share of population with tertiary education. Tertiary education is defined as those having completed the highest level of education, by age group. This includes both theoretical programs leading to advanced research or high skill professions such as medicine and more vocational programs leading to the labor market.	Data available at EUROSTAT, not further calculations are needed	%	SDG04 SDG13	T 4.3, 4.5 T 13.3		Citizens	Tier 1	
Gender pay gap	This indicator is defined as the difference between the average gross hourly earnings of men and women expressed as a percentage of the average gross hourly earnings of men. Disaggregation needed by age, highest education and income (class).	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	% (share of male gross earning)	SDG05	T 5.1		Citizens	Tier 2	
Share of women in regional assemblies	This indicator is a measure for the political power women are holding on a regional level. Lower rates of women participation in policy making would indicate that mechanisms of exclusion come into play and policies would tend to be not gender sensitive	Data available on EIGE, no further calculations are needed	%	SDG05	T 5.5		Citizens	Tier 2	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
Gini-Index	This indicator measures the (in)equality of income in society therefore the extent to which the distribution of income within a country deviates from a perfectly equal distribution. A coefficient of 0 expresses perfect equality where everyone has the same income, while a coefficient of 100 expresses full inequality where only one person has all the income.	Data available at World Bank, even though at higher level, the methodology to downscale the information needs to be established	%	SDG05	T 5.a	Linked to SECAPs Energy Poverty pillar	Citizens	Tier 1	
Proportion of population with access to electricity	The indicator measures the share of population that has access to electricity as a basic good necessary to satisfy basic needs. Electricity access entails a household having initial access to sufficient electricity to power a basic bundle of energy services – at a minimum, several lightbulbs, phone charging, a radio and potentially a fan or television – with the level of service capable of growing over time	Data available at World Bank, even though at higher level, the methodology to downscale the information needs to be established	%	SDG07	T 7.1	Linked to SECAPs Energy Poverty pillar	Citizens	Tier 2	
Final energy consumption by sector and fuel	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors	The values can be disaggregated using the data from EUCALC, but some additional analysis is needed to match the SECAPS categories	TWh/year	SDG07	T 7.2, 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations	Tier 1	
Proportion of the electricity consumed that comes from renewable sources	The indicator provides information about the proportion of energy consumed in the city that comes from renewable sources. Renewable generation is an indicator reported in SECAP mitigation pillar and is used to calculate the final	The values can be disaggregated using the data from EUCALC, but some assumptions need to be established	%	SDG07	T 7.2	Linked to SECAP Mitigation pillar. Energy consumption coming from	Public administrations	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	emissions					renewable sources			
Energy production with fossil fuels	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	The values can be disaggregated using the data from EUCALC	TWh/year	SDG07	T 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations	Tier 1	
Percentage of total electricity production that comes from fossil fuels (excluding coal)	The indicator provides information about the percentage of gross electricity production coming from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	The values can be disaggregated using the data from EUCALC, but some assumptions are needed	%	SDG07	T 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations	Tier 1	
Percentage of renewable energy production	The indicator provides information about the percentage of gross electricity production coming from renewable sources. Renewables can include hydro, geothermal, solar, wind, tide and wave sources, biofuels, and energy recovered from municipal waste present in the site. The production of renewable electricity is part of the SECAP mitigation template and is used to calculate the final emissions	The values can be disaggregated using the data from EUCALC, but some assumptions are needed	%	SDG07	T 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations	Tier 1	
Renewable sources installed capacity	The indicator estimates the maximum net amount of energy that a certain region can produce. Including: solar PV, onshore wind, offshore wind, nuclear, hydroelectric, geothermal, marine, CSP, biomass & biogas and district heating. The indicator is relevant to monitor Tech development, increase the renewable share and reduce CO_2 emission	Data available at EUROSTAT or IRENA, even though at higher level, the methodology to downscale the information needs to be established	GW or MW	SDG07	T 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
Electricity consumption per capita	This indicator covers the final electricity consumption excluding transmission, distribution, and transformation losses and own use power plants weighted by the average population of the reference year	The values can be disaggregated using the data from EUCALC, but some assumptions are needed	kWh/ year / citizen	SDG07	T 7.3	Linked to SECAP Mitigation pillar. Energy consumption	Public administrations	Tier 1	
Final energy consumption of public buildings per year	This indicator covers the final energy consumption of public buildings. Public buildings are one of the key sectors included in the SECAP mitigation pillar and one of the main areas of intervention for municipalities	The values can be disaggregated using the data from EUCALC, but some assumptions are needed to establish which categories fall under public ownership	MWh/year	SDG07	T 7.3	Linked to SECAP Mitigation pillar. Energy consumption buildings	Public administrations	Tier 1	
Final energy consumption in homes including all types of energy	This indicator covers the final energy consumption of households by citizen	The values can be disaggregated using the data from EUCALC	MWh/inhabitant	SDG07	T 7.3	Linked to SECAP Mitigation pillar. Energy consumption buildings	Public administrations	Tier 1	
Energy consumption of households for heating	This indicator covers the final energy consumption in households dedicated to heating	The values can be disaggregated using the data from EUCALC	MWh/inhabitant	SDG07	T 7.3	Linked to SECAP Mitigation pillar. Energy consumption buildings	Public administrations	Tier 1	
Vehicle energy consumption of the different transport modes	The indicators measure the fuel required to travel a unit of distance (L/100km). This metric is calculated for each vehicle model through standardized testing procedures and drive cycles. Including passengers automotive, passengers 2-wheel, passengers aviation, passengers' marine, regional public transport, commercial, freight automotive, commercial freight aviation, commercial freight marine, commercial freight rail.	The values can be disaggregated using the data from EUCALC	TWh/pkm	SDG07	T 7.3	Linked to SECAP Mitigation pillar. Energy consumption transport	Public administrations	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	Technologies that improve vehicle fuel efficiency are important for CO_2 emission reductions								
Transport energy consumption	This indicator covers the final energy consumption of the transport sector. Transport is one of the key sectors included in the SECAP mitigation pillar and one of the main areas of intervention for municipalities	The values can be disaggregated using the data from EUCALC and a metric to differentiate the different regions such as vehicle stock	TWh/year	SDG07 SDG11	T 7.3 T 11.2	Linked to SECAP Mitigation pillar. Energy consumption transport	Public administrations	Tier 1	
Energy demand of buildings	The indictor provides information about building energy demand. The indicator is relevant to monitor Tech development and efficiency of the systems and retrofitting actions to reduce CO_2 emission	The values can be disaggregated using the data from EUCALC and a metric to differentiate the regions such as building stock	TWh/year	SDG07	T 7.3		Public administrations	Tier 1	
Energy demand of residencies	The indictor provides information about energy demand by dwelling. The total demand is weighted by the total number of dwellings	The values can be disaggregated using the data from EUCALC and a metric to differentiate the regions such as building stock	TWh/year	SDG07	T 7.3		Public administrations	Tier 1	
Energy demand of households for the different uses: appliances, lighting, air conditioning/ heating demand	The indictor provides information about the energy demand for the main household uses	The values can be disaggregated using the data from EUCALC and a metric to differentiate the regions such as building stock	TWh/year	SDG07	T 7.3		Public administrations	Tier 1	
Energy demand of agriculture	The indictor provides information about the energy demand of the agricultural sector. Agricultural energy demand can be divided into direct and indirect energy needs. The direct energy needs include energy required for land preparation, cultivation, irrigation, harvesting, post-harvest processing, food production,	The values can be disaggregated using the data from EUCALC	TWh/year	SDG07	T 7.3		Business	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	storage and the transport of agricultural inputs and outputs. Agricultural energy demand can be divided into direct and indirect energy needs. The direct energy needs include energy required for land preparation, cultivation, irrigation, harvesting, post-harvest processing, food production, storage and the transport of agricultural inputs and outputs. The indicator is relevant to monitor Tech development and efficiency to reduce CO_2 emission								
Energy demand of transport	The indictor provides information about the energy demand of the transport sector including passenger automotive, passenger 2-wheel, passenger aviation, passenger marine, commercial freight automotive, commercial freight aviation, commercial freight marine and commercial freight rail. The indicator is relevant to monitor Tech development and efficiency and to reduce CO2 emission	The values can be disaggregated using the data from EUCALC	TWh/year	SDG07 SDG11	T 7.3 T 11.2		Business	Tier 1	
Energy demand of manufacturing	The indictor provides information about the energy demand of manufacturing sectors	The values can be disaggregated using the data from EUCALC	TWh/year	SDG07	T 7.3		Business	Tier 1	
Index value of GDP growth per employed person	The indicator measures the changes in productivity over time in relation to employment	The value can be calculated by using GDP and employment numbers, both metrics are available at EUROSTAT	Index	SDG08	T 8.2		Public administrations	Tier 2	
Unemployment rate	Measures the share of people without formal income as a percentage of the labor force. An unemployed person is defined by Eurostat, according to the guidelines of the International Labor Organization, as someone aged 15 to 64	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	%	SDG08	T 8.3, 8.6		Citizens	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	not employed during the reference week according to the definition of employment, currently available for work and actively seeking work								
CO₂ emissions generated by the commerce sector	This indicator estimates CO₂ yearly emitted by commercial buildings	The values can be disaggregated using the data from EUCALC and a metric to differentiate the different regions such as building stock. The commerce sector can be represented by: Hotels & gastronomy and Wholesale & trade	MWh/year	SDG08	T 8.4	Linked to SECAP Mitigation pillar. Buidling section	Business	Tier 1	
Generation of residual waste, PMC, paper, organic waste in the municipality by capita	The indicator estimates the amount of municipal waste generated including residual waste, PMC, paper, and organic waste, weighted by the average population of the reference year. Municipal waste from industry and agriculture are not included. The amount of municipal waste generated consists of waste collected by or on behalf of municipal authorities and disposed of through the waste management system. According to the OECD/Eurostat Joint Questionnaire municipal waste includes the following types of materials: paper, paperboard and paper products, plastics, glass, metals, food and garden waste and textiles. The definition also includes bulky waste (e.g., white goods, old furniture, mattresses); and garden waste, leaves, grass clippings, street sweepings, the content of litter containers, and market cleansing waste, if managed as waste.	Data available at EUROSTAT or EEA, even though at higher level, it can be disaggregated considering the total population of each region	Kg per capita	SDG08	T 8.4		Business	Tier 1	
Total male employment	This indicator shows the total employment of males, 15-64 years, in all sectors in year 2021	Data available at EUROSTAT, not further calculations are needed	Nº people	SDG08 SDG09	T 8.5 T 9.2		Business	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
Total female employment	This indicator shows the total employment of females, 15-64 years, in all sectors in year 2021	Data available at EUROSTAT, not further calculations are needed	Nº people	SDG08 SDG09	T 8.5 T 9.2		Business	Tier 1	
Number of tourist accommodation places with respect to the residential population	The indicators provide information of the number of tourist accommodations in relation to the total population of the region. It is relevant to control uses in the urban area, and balance tourism and housing needs.	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	%	SDG08	T 8.9		Public administrations	Tier 2	
Household access to internet	Internet access is defined as the percentage of households who have access to the Internet. It might be via smartphones or personal computer, using a dial-up or cable broadband access.	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	% Of households	SDG09	T 9.1, 9.c		Citizens	Tier 2	
Access to public transport	Indicator measures the access to basic goods and the chance to satisfy basic needs.	Not clear methodology established, some data about trains and buses, a deeper analysis needs to be done	TBD	SDG09 SDG11	T 9.1, 9.c T 11.2		Citizens and public administrations	Tier 3	
Performance of public transport network, ratio between accessibility and proximity to people	This indicator provides information on the quality of the public transport network.	Not clear methodology established, some data about trains and buses, a deeper analysis needs to be done	TBD	SDG09 SDG11	T 9.1, 9.c T 11.2		Citizens and public administrations	Tier 3	
Volume of freight transport relative to GDP	This indicator shows the volume of freight in each year as an Index compared to 2010 levels set to 100 for all countries	Data available at EUROSTAT, not further calculations are needed	Index	SDG09	T 9.1		Business	Tier 2	
Gross value added (GVA) growth	This indicator shows the real growth rate of regional gross value added (GVA) at basic prices by NUTS 2 regions - percentage change on previous year.	Data available at EUROSTAT, not further calculations are needed	%	SDG09	T 9.2		Business	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	GVA (gross value added) is an indicator of the economic activity of a country or a region. It reflects the total value of all goods and services produced less the value of goods and services used for intermediate consumption in their production								
GVA in Agriculture	This indicator shows the gross value added at basic prices in [A] Agriculture, forestry and fishing sector in each year	Data available at EUROSTAT, not further calculations are needed	million EUR	SDG09	T 9.2		Business	Tier 1	
GVA in Manufacturing	This indicator shows the gross value added at basic prices in [C] Manufacturing sector in each year	Data available at EUROSTAT, not further calculations are needed	million EUR	SDG09	T 9.2		Business	Tier 1	
GVA in Transportation	This indicator shows the gross value added at basic prices in [G-I] Wholesale and retail trade, transport, accommodation, and food service activities sector in each year	Data available at EUROSTAT, not further calculations are needed	million EUR	SDG09	T 9.2		Business	Tier 1	
Real Labor productivity	This indicator shows the real labor productivity per person in all sectors in each year as an Index compared to 2015 levels set to100 for all regions	Data available at EUROSTAT, not further calculations are needed	Index	SDG09	T 9.2		Business	Tier 1	
Production growth	This indicator shows the relative production in Manufacturing sector in each year as an Index compared to 2015 levels set to100 for all countries	Data available at EUROSTAT, not further calculations are needed	Index	SDG09	T 9.2		Business	Tier 1	
Production in Manufacturing (aggregate)	This indicator informs on the total amount of production in the manufacturing sector.	The values can be disaggregated using the data from EUCALC	Mt	SDG09	T 9.2		Business	Tier 1	
Emissions from manufacturing	The indictor provides information about the total CO2 emissions from manufacturing	The values can be disaggregated using the data from EUCALC	Tons CO2eq/ year	SDG09	T 9.4	Linked to SECAP Mitigation	Business	Tier 2	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
						pillar			
Emissions from agriculture	The indictor provides information about the total CO2 emissions from agriculture	The values can be disaggregated using the data from EUCALC	Tons CO2eq/year	SDG09	T 9.4	Linked to SECAP Mitigation pillar	Business	Tier 2	
Income of households	This indicator provides information regarding the total income by household, it measures the wealth and is a proxy measure for well-being.	Data available at EUROSTAT, not further calculations are needed	Euro	SDG10	T 10.2, 10.3	Linked to SECAP Energy Poverty pillar	Citizens and public administrations	Tier 1	
Migration: foreign born population	The indicator provides information about the share of people born in foreign countries	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	%	SDG10	T 10.2, 10.3		Citizens and public administrations	Tier 2	
Tenancy	The indicator provides information about the distribution of population by tenure status; therefore, the percentage of owners and tenants disaggregated by income group and type of household	Data available at EUROSTAT or OECD, even though at higher level, the methodology to downscale the information needs to be established	%	SDG11	T 11.1		Citizens and public administrations	Tier 2	
Transportation (passenger distance - aggregate)	This indicator informs on the amount of distance travelled by passengers across all modes.	The values can be disaggregated using the data from EUCALC	pkm	SDG11	T 11.2		Business	Tier 1	
Traffic modal split	Modal split of passenger transport is defined as the percentage share of each mode of transport in total inland transport, expressed in passenger-kilometers (pkm). It is based on transport by passenger cars, buses and coaches, and trains.	The values can be disaggregated using the data from EUCALC dividing the transport demand of each mode divided by the total (passenger) transport demand. the methodology to downscale the information needs to be established	%	SDG11	T 11.2		Public administrations	Tier 1	
Occupancy rate by mode	The indicator provides information about the average number of passengers in a	The values can be disaggregated using the model input from EUCALC and output	Passengers	SDG11	T 11.2		Public administration	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	vehicle (cars, buses, trains, and aircraft). Including: automotive, passenger 2-wheel, passenger aviation, passenger marine, commercial freight, commercial freight aviation, commercial freight marine, commercial freight rail. For commercial uses load factor is another relevant metric. Utilization efficiency is one of the main parameters that determine energy and emission efficiency. High occupancy rates are usually assumed to reduce emissions.	values: Occupancy Rate = Transport demand [pkm] / (Vehicle Stock [number] * Mileage [km])	per vehicle, % of passenger seats occupied				s		
Soil sealing or artificial coverage	The indicator estimates the increase in sealed soil surfaces with impervious materials due to urban development and construction (e.g., buildings, constructions and laying of completely or partially impermeable artificial material, such as asphalt, metal, glass, plastic or concrete). This provides an indication of the rate of soil sealing when areas change land use towards artificial and urban land use. The indicator builds on data from the imperviousness High Resolution Layer (a product of the Copernicus Land Monitoring Service)	Data available at ESPON, not further calculations are needed	ha	SDG11 SDG15	T 11.3 T 15.3, 15.4	Could be linked to SECAP Adaptation pillar and vulnerability	Public administrations	Tier 1	
Percentage of total area protected as natural sites	The indicator measures the surface of terrestrial protected areas. The indicator comprises nationally designated protected areas and Natura 2000 sites. A nationally designated area is an area protected by national legislation. The Natura 2000 network comprises both marine and terrestrial protected areas designated under the EU Habitats and Birds Directives with the goal to maintain or restore a favorable conservation status for habitat types and species of	Data found at several sources, even though at higher level or with different methodologies, a more detail analysis needs to be conducted	km^2 or %	SDG11 SDG15	T 11.4 T 15.4, 15.5	Could be linked to SECAP Adaptation pillar and vulnerability	Public administrations	Tier 2	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	EU interest.								
Percentage of green urban areas	The indicator provides information about the percentage of natural areas in the city. Green urban areas: Public green areas for predominantly recreational use such as gardens, suburban natural areas that have become and are managed as urban parks, forests or green areas extending from the surroundings into urban areas are mapped as green urban areas when at least two sides are bordered by urban areas, and traces of recreational uses are visible. Not included are: private gardens, buildings within parks, patches of natural vegetation or agricultural areas enclosed by built-up areas without being managed as green urban areas, natural areas (forests, herbaceous vegetation with a minimum coverage, beaches, dunes and sand, bare rocks, sparsely vegetated areas such as steppes or tundra, burnt areas such as forest or shrubs and snow and ice such as glaciers)	Data available at Corine Land Cover, not further calculations are needed	%	SDG11 SDG15	T 11.4, 11.7 T 15.1	Could be linked to SECAP Adaptation pillar vulnerability and actions	Public administrations	Tier 1	
Urban Flood Risk or areas exposed to flooding	The indicator shows the areas potentially exposed to flooding or in floodplains.	No clear established methodology. Some references found in EEA and JRC that developed composite indicators considering exposure and sensitivity, in other cases only population exposed in those areas or infrastructure present. Further analysis needs to be done	Area	SDG11 SDG13	T 11.5 T 13.1	Could be linked to SECAP Adaptation pillar vulnerability	Public administrations	Tier 2	
Percentage of people exposed to	The indicator refers to health risk due to exposure to three main pollutants	Data available at EEA, not further calculations are needed	Ug/m^3	SDG11	T 11.6	Could be linked to	Public administration	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
PM2.5, NO2 and O3	(PM2.5, NO2 and O3-SOMO35) at NUTS3 and Country levels. In addition, average and population weighted average concentration values are available in the data set for PM10, PM2.5, NO2 and O3 (SOMO35)					SECAP Adaptation pillar vulnerability	s		
CO₂ emissions per capita	This indicator estimates the tons of CO2 equivalents yearly emitted by a city weighted by the average population of the reference year (per capita).	The values can be disaggregated using the data from EUCALC and weighted by population	Tons CO₂eq/ year / citizen	SDG11 SDG13	T 11.6 T 13.2, T 13.3	Linked to SECAPs mitigation pillar	Public administrations	Tier 1	
Percentage of population with access to at least 1 hectare of green urban areas (parks) and forests within 15 minutes of walking	Indicator measures the access to basic goods and the chance to satisfy basic needs.	Not clear database found, a deeper analysis needs to be done	%	SDG11	T 11.7		Citizens	Tier 2	
Number of motor road vehicles per 100 people	The indicator provides information about the vehicle stock. The indicator is derived by dividing the vehicle stock by the number of inhabitants	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	Vehicles / 1,000 inhabitants	SDG12	T 12.8		Public administrations	Tier 1	
Hazard Current probability (Low, moderate, high, not known) - heat/cold waves, floods, precipitation, droughts, storms, mass movement, wildfires, chemical change, biological-	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Current hazard probability will be assessed via the estimation of the frequency of past extreme climatic events that toke place in the 30 years preceding 2005. Depending on the nature of the hazard the resulting metric will take the general form of "event/year". For the purposes of SECAP compliance, "events/year" needs to be reclassified to qualitative scale ranging from low to high. In order to do so a percentile threshold will be applied taking into account the European distribution of past events.	Qualitative: low to high	SDG13	T 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
Hazards Impact (Low, moderate, high, not known) - heat/cold waves, floods, precipitation, droughts, storms, mass movement, wildfires, chemical change, biological-	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by society. This implies to establish a relationship (either empirically or process-based) between the occurrence of a hazard and the estimation of a second-order impact of value for society.	To estimate this indicator previous studies that have established a hazard-impact relationship will be used from peer-reviewed literature. The intermediate quantification of the indicator will be in % of infrastructure, production, population, or ecosystems services values by society affected by climate hazard. To comply with the SECAP requirements the %-values will be reclassified into a qualitative statement ranging from low to high. To do so a percentile approach will be used that compares the extent of hazard impact on a given NUTS3 with the European distribution.	Qualitative: low to high	SDG13	T 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations	Tier 1	
Hazards Expected change in intensity (increase, decrease, no change, not known) - heat/cold waves, floods, precipitation, droughts, storms, mass movement, wildfires, chemical change, biological-	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed, the methodology to establish the values must be defined.	Not clear methodology established. Further analysis needs to be done	Qualitative: increasing, decreasing or no-change	SDG13	T 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations	Tier 1	
Hazards Expected change in frequency (increase, decrease, no change, not known) - heat/cold waves, floods, precipitation,	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Change in hazard frequency will be assessed via the %-difference in probability of current hazard and the hazard probability from future climate projections during a 30-year period centered around the year 2050. Climate projections used will be based on a multi-model ensemble mean. In order to comply with the SECAP requirements the %-difference will be reclassified into a	Qualitative: increasing, decreasing or no-change	SDG13	T 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
droughts, storms, mass movement, wildfires, chemical change, biological-		qualitative statement of "increasing", "decreasing" or "no-change"							
Hazards Timeframe (current, short-term, medium-term, long-term, not known) - heat/cold waves, floods, precipitation, droughts, storms, mass movement, wildfires, chemical change, biological-	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	The hazards timeframe indicator will be set up as a function of the current and future change in hazard frequency. As an example, if the current hazard frequency is "high" or "moderate" and expected frequency "increasing" or "not-known", then the hazard time frame indicator will be classified as "short-term"	Qualitative: short-, medium-, and long-term	SDG13	T 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations	Tier 1	
Heating degree-days needed to maintain an average building indoor temperature of 15.5 degree Celsius	This indicator measures the total effort needed to keep a decent indoor temperature / exposure to cold temperatures.	Data available at EURO-CORDEX, no further calculations needed	Degree days	SDG13	T 13.2	Linked to SECAPs Energy Poverty pillar	Citizens and public administrations	Tier 1	
Cooling degree-days needed to maintain an average building indoor temperature of 22 degree Celsius	This indicator measures the total effort needed to keep and decent indoor temperature / the exposure to hot temperatures	Data available at EURO-CORDEX, no further calculations needed	Degree days	SDG13	T 13.2	Linked to SECAPs Energy Poverty pillar	Citizens and public administrations	Tier 1	
CO_2 Emissions from transport	This indicator estimates the CO_2 emission generated by the transport sector. It is a relevant sector addressed in Sustainable Energy and Climate Action Plans at local level	The values can be disaggregated using the data from EUCALC	Tons CO2eq/ year	SDG13	T 13.2, T 13.3	Linked to SECAPs mitigation pillar. Transport	Business and public administrations	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
						section			
CO_2 emissions (per MWh or gigawatt) electricity consumed or Carbon content in electricity	This indicator estimates the CO_2 emission per MWh of electricity generated to cover energy consumption. The CO_2 emission intensity is calculated as the ratio of CO_2 emissions from electricity generation and gross electricity generation. The GHG intensity of total electricity generation is taken as the ratio of CO_2 equivalent emissions from all electricity production (both from main activity producers and auto-producers) to total electricity generation, including electricity from nuclear plants and renewable sources	The values can be disaggregated using the data from EUCALC	g CO_2eq/MWh	SDG13	T 13.2, T 13.3	Linked to SECAPs, coefficients of the different fuels	Public administrations	Tier 1	
CO_2 emissions for buildings	This indicator estimates CO_2 yearly emitted by buildings	The values can be disaggregated using the data from EUCALC	Tons CO_2eq/year	SDG13	T 13.2, T 13.3	Linked to SECAPs mitigation pillar. Building section	Public administrations	Tier 1	
Public attitudes to Climate Change and Energy. How likely the impact of climate change will be very bad	The indicator provides information on how climate change is considered	Data available at European Social Surveys, even though at higher level, the methodology to downscale the information needs to be established	Index (o-100)	SDG13	T 13.3		Citizens	Tier 2	
Forest area	The indicator measures the proportion of forest ecosystems in comparison to the total land area. Data used for this indicator is derived from the Land Use and Cover Area frame Survey (LUCAS). According to the FAO definitions, Forest	Data available on several sources not further calculations are needed	%	SDG15	T 15.1, 15.2	Could be linked to SECAP Adaptation pillar and actions	Public administrations	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
	is defined as: "land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use" Total land area is the total surface area of a country less the area covered by inland waters, like major rivers and lakes.								
Red List Index	The Red List Index measures change in aggregate extinction risk across groups of species. It is based on genuine changes in the number of species in each category of extinction risk on The IUCN Red List of Threatened Species (IUCN 2015) is expressed as changes in an index ranging from 0 to 1. Threatened species are those listed on The IUCN Red List of Threatened Species in the categories Vulnerable, Endangered, or Critically Endangered (i.e., species that are facing a high, very high, or extremely high risk of extinction in the wild in the medium-term future)	Data available at several sources even though at higher level. Further analysis needs to be done	Index ranging from 0 to 1.	SDG15	T 15.5		Public administrations	Tier 1	
Political left-right self-placement	This indicator provides information on the political positions and ideological orientations held in the public.	Data available at European Social Surveys or World Value Survey, even though at higher level, the methodology to downscale the information needs to be established	Index (0-10)	SDG16	T16.6		Citizens	Tier 2	
Age groups	Distribution of age groups, Demographic change in Europe	Data available on EUROSTAT several sources not further calculations are needed	% Of each group	-	-	Relevant for the Adaptation pillar and establishing vulnerability	Citizens and public administrations	Tier 1	

Indicator	Description	Methodology	Unit	SDG Goal	SDG Targets	SECAP link	Stakeholder	Tier level	Feasibility
Political action	Provides information on whether respondents have participated in political actions other than voting, for instances: signing a petition, joining in boycotts, attending lawful/ peaceful demonstrations, or joining unofficial strikes	Data available at EUROSTAT, even though at higher level, the methodology to downscale the information needs to be established	Qualitative (have done/ might do/ would never do)	-	-		Citizens	Tier 2	

Finally, ands shown in *Figure 10* a Sankey graphic was constructed to illustrate the interconnections detected between the different goals and targets and the SECAPs pillars listed in *Table 7*. The thickness of the lines represents the number of indicators found in each target and the distribution considering the other targets where the same indicator is used. Since indicators were sometimes linked to only one target and to several in others the inputs and outputs received by each targets vary.
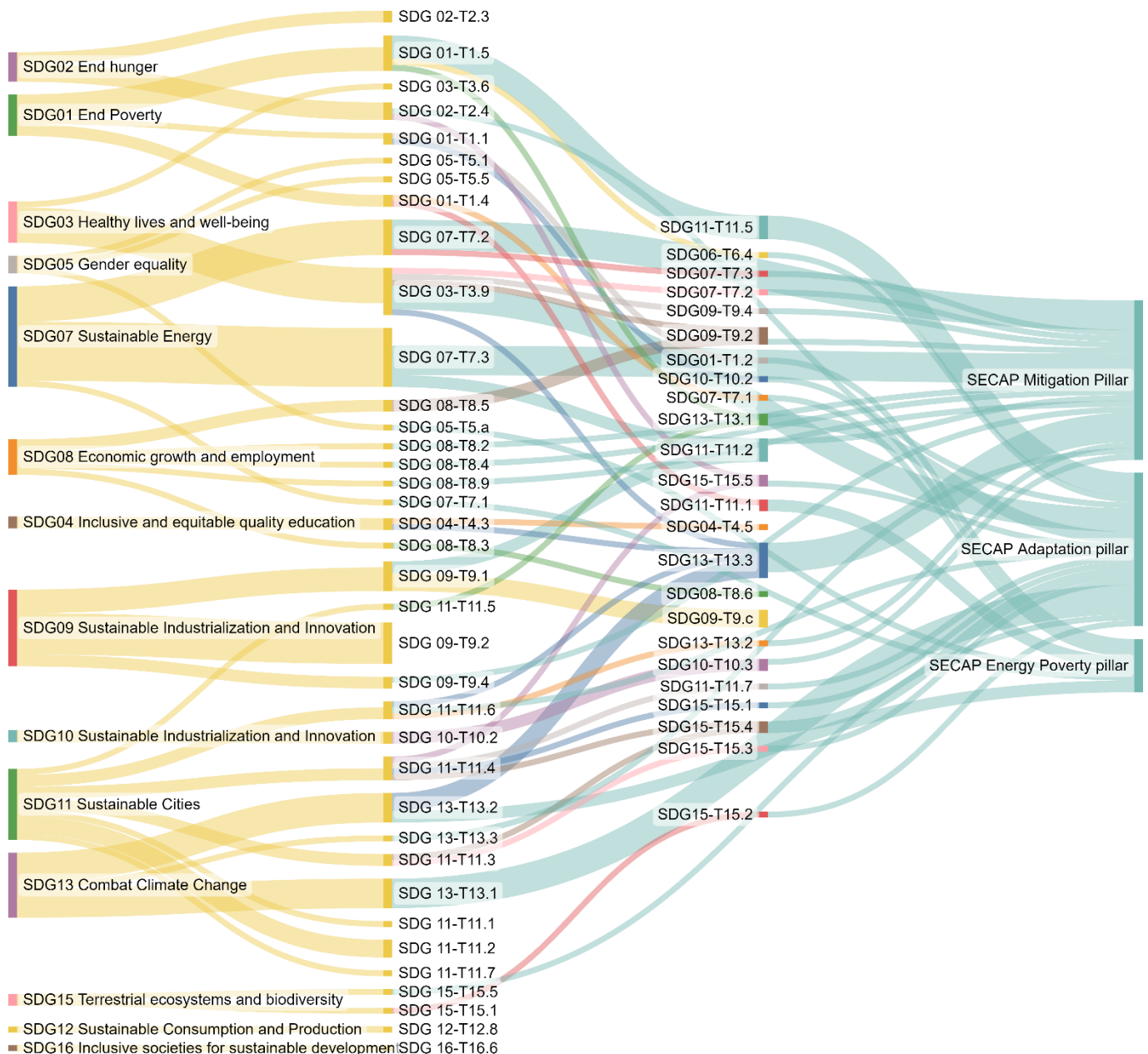
Figure 10. Relation between SDGs targets and SECAPs pillars. Source: own elaboration

A total of 44 different targets and almost every SDGs, except for SDG17, can be tackled by the 93 indicators proposed. 20 of them related to SECAPs mitigation pillar, 22 to the

Adaptation pillar and 7 to the Energy Poverty pillar. Between 1 and 4 associations between targets were identified mainly between SDGs 01, 03, 07, 09, 11, and 13, which have clear links to energy, citizens, and climate change.

Regarding the link with relevant stakeholders as shown in *Figure 11,* 22 targets can be linked to business, 24 to citizens and 59 with public administrations, nevertheless some overlaps and common topics can be found among all three relevant actors. Eight goals were addressed by business indicators, mainly SDG 09 sustainable industrialization and innovation but also SDGs 02, 04, 07, 08, 10, 11 and 13 while social and public administrations covered a broader range of SDGs, with 12 and 11 goals covered respectively.
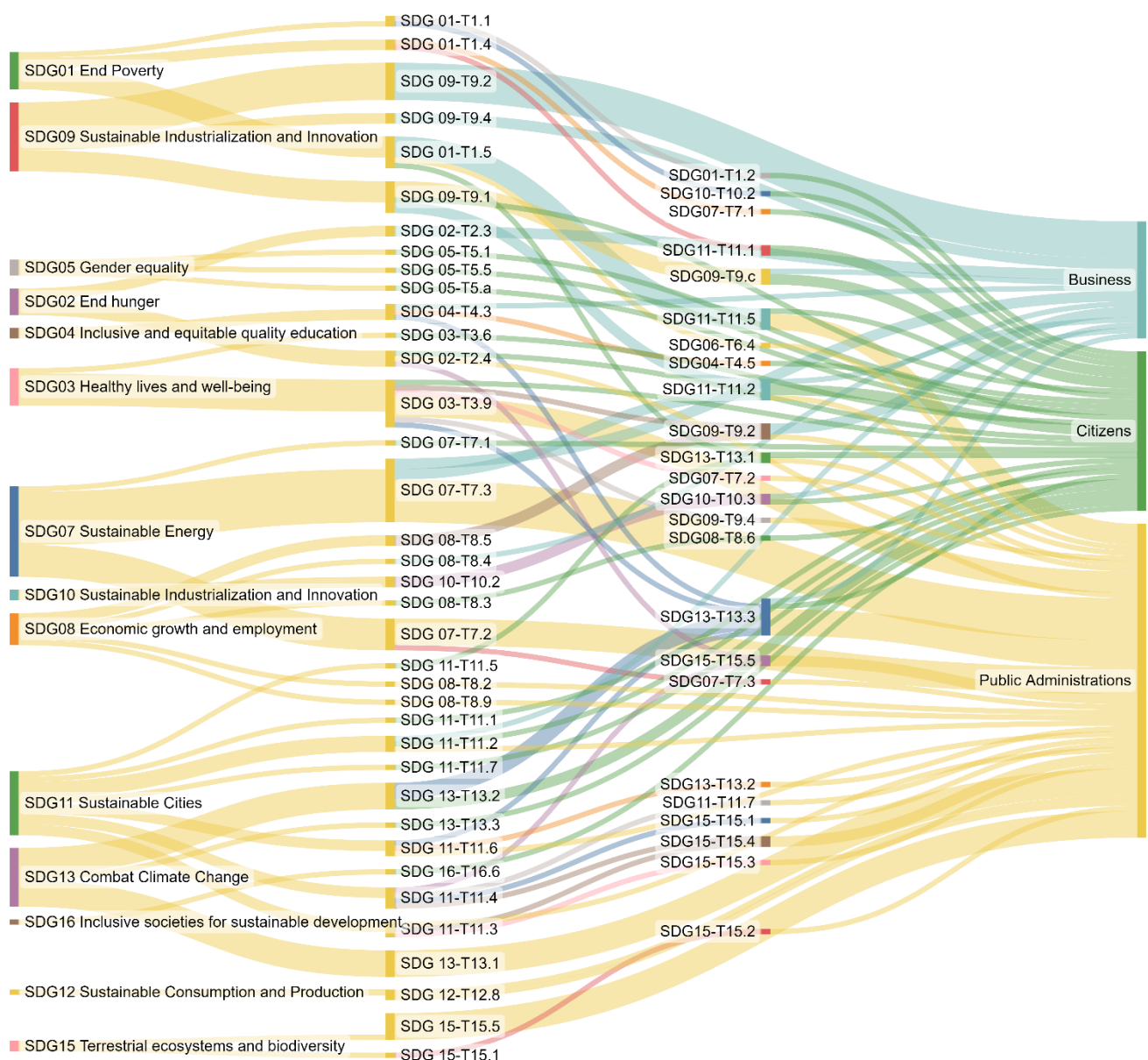
Figure 11. Relation between SDGs targets and relevant stakeholders. Source: own elaboration

8. 2023 updated SOIs list

As explained in chapter 7 of the current document, the final list of SOIs introduced in *Table 7* was published considering the feasibility of obtaining data for anyone of those 93 indicators.

Nowadays, in September 2023, the final list has been fine-tuned considering the following factors:

1. A rigorous verification was conducted by other project partners to ensure the timely and robust availability of the data that populates the different indicators. Following these verifications, feasibility and Tier classifications became useless since the whole set of data is now fully reliable. Consequently, "feasibility" and "Tier" columns were removed from the table in this new version of the document.

2. Deepening in the SECAP and SOI interaction in task 5.2 has resulted in the inclusion of a set of extra indicators, which allow complementing the previously selected ones and complete, as much as possible, the BEI/RVA/EP CoM templates.

3. Building on the previous point, certain initially considered KPIs contained aggregated information that has since been disaggregated. This expansion has permitted a wider interaction with the SECAP template, covering information that was not covered at the beginning. For example it is the case of the indicator related to *Climate Hazards frequency*, this SOI has been multiplied to cover the number of reportable hazards within the SECAP framework, increasing from the original 5 to 30 SOIs now.

4. In some cases no data sources where found to report a specific SOI in a enough precise manner, but since these indicators where relevant enough, it was decided to leave them blank for the municipality to complete. Subsequently, thanks to the planned data bi-directionality within the platform, we could populate the blind spots using the user data and return a better picture of the current local reality, resulting in an enriched mitigation and adaptation planning capacity while maintaining the alignment with the SDGs.
It is important to note that the SOIs are automatically calculated. Then, the user has the election to utilize all of them or just specific ones. Additionally, the user could choose to report only to the SDGs, or only to the SECAPS, since this dual functionality will be implemented in the Decarbonisation Profiler (WP8).

As a result of this refining exercise, the list of SOIs has expanded from **93** to **234** indicators. The new revised list is available in the following *Table 8*.

Table 8. Final D5.1 list of SOIs (resubmission)

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
1	*People at risk of income poverty after social transfers*	People at risk-of-poverty are persons with an equivalized disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalized disposable income (after social transfers). The indicator is part of the multidimensional poverty index.	Data available at EUROSTAT at NUTS2 region level. Disaggregated to NUTS3 using the data from EUROSTAT for Gross domestic product (GDP) at current market prices.	percentage	SDG 1.1 SDG 1.2 SDG 10.2	Can be linked to SECAPs Energy Poverty or Adaptation pillars to establish vulnerability	Citizens and public administrations
2	*Families or households that allocate more than 40% of their resources to housing expenditures or services or housing cost burden*	Share of persons / households spending more than a specific percentage of their incomes on energy services putting them in a situation of energy poverty.	Data available at OECD and EUROSTAT, even though at higher level. Disaggregated to NUTS3 using the data from EUROSTAT for Gross domestic product (GDP) at current market prices.	percentage	SDG 1.1 SDG 1.4 SDG 10.2	Linked to SECAPs Energy Poverty pillar	Citizens and public administrations
3	*Cost of final residential energy Consumption compared to Gross Family Income*	This indicator measures the share of gross family income used for housing expenses such as water, electricity, gas or heating.	Data available at EUROSTAT at NUTS0 level. Same value for lower levels.	percentage	SDG 1.4 SDG 7.1 SDG 11.1	Linked to SECAPs Energy Poverty pillar	Citizens and public administrations
4	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Drought*	This indicator measures the number of people who died, went missing or were directly affected by Drought per 100,000 population.	Data available at EM-DAT at NUTS0 level. Climate data disaggregation defined in WP3.	Rate, Nº deaths/ 100.000 inhabitants	SDG 1.5 SDG 11.5 SDG 13.1	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations
5	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Earthquakes*	This indicator measures the number of people who died, went missing or were directly affected by Earthquakes per 100,000 population.	Data available at EM-DAT at NUTS0 level. Climate data disaggregation defined in WP3.	Rate, Nº deaths/ 100.000 inhabitants	SDG 1.5 SDG 11.5 SDG 13.1	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
6	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Volcanic activity*	This indicator measures the number of people who died, went missing or were directly affected by Volcanic activity per 100,000 population.	Data available at EM-DAT at NUTS0 level. Climate data disaggregation defined in WP3.	Rate, Nº deaths/ 100.000 inhabitants	SDG 1.5 SDG 11.5 SDG 13.1	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations
7	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Floods*	This indicator measures the number of people who died, went missing or were directly affected by Floods per 100,000 population.	Data available at EM-DAT at NUTS0 level. Climate data disaggregation defined in WP3.	Rate, Nº deaths/ 100.000 inhabitants	SDG 1.5 SDG 11.5 SDG 13.1	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations
8	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Mass movement*	This indicator measures the number of people who died, went missing or were directly affected by Mass movement per 100,000 population.	Data available at EM-DAT at NUTS0 level. Climate data disaggregation defined in WP3.	Rate, Nº deaths/ 100.000 inhabitants	SDG 1.5 SDG 11.5 SDG 13.1	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations
9	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Storm*	This indicator measures the number of people who died, went missing or were directly affected by Storm per 100,000 population.	Data available at EM-DAT at NUTS0 level. Climate data disaggregation defined in WP3.	Rate, Nº deaths/ 100.000 inhabitants	SDG 1.5 SDG 11.5 SDG 13.1	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations
10	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Landslides*	This indicator measures the number of people who died, went missing or were directly affected by Landslides per 100,000 population.	Data available at EM-DAT at NUTS0 level. Climate data disaggregation defined in WP3.	Rate, Nº deaths/ 100.000 inhabitants	SDG 1.5 SDG 11.5 SDG 13.1	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations
11	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Wildfires*	This indicator measures the number of people who died, went missing or were directly affected by Wildfires per 100,000 population.	Data available at EM-DAT at NUTS0 level. Climate data disaggregation defined in WP3.	Rate, Nº deaths/ 100.000 inhabitants	SDG 1.5 SDG 11.5 SDG 13.1	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations
12	*Number of deaths, missing persons and persons affected by disaster per 100,000 people -*	This indicator measures the number of people who died, went missing or were directly affected by Extreme temperature per 100,000 population.	Data available at EM-DAT at NUTS0 level. Climate data disaggregation defined in WP3.	Rate, Nº deaths/ 100.000 inhabitants	SDG 1.5 SDG 11.5 SDG 13.1	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
	Extreme temperature						
13	*Population exposed to flood risk or flood prone population*	The indicator shows the number of people who are directly exposed to floods in a 1-in-100-year flood event, thus posing significant risk to lives and livelihoods	Data calculated by LOCALISED in WP2.	Number of people or %	SDG 1.5 SDG 6.4 SDG 11.5	Could be linked to SECAP Adaptation pillar and vulnerability	Public administrations
14	*Exposure of vulnerable people to Heat waves*	This indicator tracks the change in the number of heatwave exposure events (with one exposure event being one heatwave experienced by one person aged over 65 or child from birth to 1 year old) and days of heatwave exposure in these populations compared with the average number of events in the reference period (1986–2005)	Data available at ESPON, not further calculations are needed.	index	SDG 1.5 SDG 11.5	Could be linked to SECAP Adaptation pillar and vulnerability	Public administrations
15	*number of bovines*	This indicator informs on the number of livestock units produced by the agricultural sector.	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	nº of animals	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
16	*number of other animals*	This indicator informs on the number of livestock units produced by the agricultural sector.	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	nº of animals	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
17	*number of pigs*	This indicator informs on the number of livestock units produced by the agricultural sector.	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	nº of animals	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
18	*number of poultry*	This indicator informs on the number of livestock units produced by the agricultural sector.	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	nº of animals	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
19	*number of sheeps*	This indicator informs on the number of livestock units produced by the agricultural sector.	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	nº of animals	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
20	*Agricultural production - algae*	This indicator informs on the total amount of total calories produced by the agricultural sector	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	kcal	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
21	*Agricultural production - cereal*	This indicator informs on the total amount of total calories produced by the agricultural sector	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	kcal	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
22	*Agricultural production - fruit*	This indicator informs on the total amount of total calories produced by the agricultural sector	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	kcal	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
23	*Agricultural production - energy crop*	This indicator informs on the total amount of total calories produced by the agricultural sector	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	kcal	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
24	*Agricultural production - oilcrop*	This indicator informs on the total amount of total calories produced by the agricultural sector	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	kcal	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
25	*Agricultural production - pulse*	This indicator informs on the total amount of total calories produced by the agricultural sector	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	kcal	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
26	*Agricultural production - rice*	This indicator informs on the total amount of total calories produced by the agricultural sector	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	kcal	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
27	*Agricultural production - starch*	This indicator informs on the total amount of total calories produced by the agricultural sector	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	kcal	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
28	*Agricultural production - sugarcrop*	This indicator informs on the total amount of total calories produced by the agricultural sector	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	kcal	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
29	*Agricultural production - vegetables*	This indicator informs on the total amount of total calories produced by the agricultural sector	The values are disaggregated using the data from EUCALC. Disaggregation method based on Copernicus Land Monitoring Service Areas.	kcal	SDG 2.3	Could be linked to SECAP Adaptation pillar and vulnerability	Business
30	*Terrestrial protected areas*	The indicator provides information of whether the region has implemented regulations to protect areas or regulated the use of chemicals in agricultural practices.	Protected areas available at EEA, use of pesticides available at EUROSTAT, not further calculations needed.	square kilometer	SDG 2.4 SDG 15.5	Could be linked to SECAP Adaptation pillar	Public administrations
31	*Organic crop area as a percentage of total agricultural area*	This indicator measures progress in achieving more productive and sustainable agriculture. The indicator measures the share of total utilized agricultural area (UAA) occupied by organic farming. Farming is recognized to be organic if it complies with Council Regulation (EC) No 834/2007, which has set up a comprehensive framework for the organic production of crops and livestock and for the labelling, processing and marketing of organic products, as well as for governing imports of organic products into the EU. This indicator was called "Proportion of agricultural area under productive and sustainable/organic agriculture" before.	Data available at EUROSTAT at NUTS0 level, the methodology to downscale uses Copernicus Land Monitoring Service surface.	percentage	SDG 2.4	Could be linked to SECAP Adaptation pillar	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
32	**Traffic accidents with victims (injuries and deaths) per 100 000 inhabitants**	The indicator measures the number of fatalities and injuries caused by traffic accidents, including drivers and passengers of motorized vehicles and pedal cycles as well as pedestrian. This metric shows how safe roads and traffic systems are.	Data available at Our World in Data at NUTS0 level, the methodology to downscale the information uses deaths at NUTS3 level from EUROSTAT.	number	SDG 3.6	-	Citizens and public administrations
33	**Health situation**	This indicator informs on the share of the population aged 16 or over perceiving itself to be in "good" or "very good" health. The data stem from the EU Statistics on Income and Living Conditions (EU SILC). Indicators of perceived general health have been found to be a good predictor of people's future health care use and mortality	Data available at EUROSTAT at NUTS0 level, disaggregation based on life expectancy from EUROSTAT.	Share of population	SDG 3.9	Could be linked to SECAP Adaptation pillar and vulnerability	Citizens and public administrations
34	**CO₂ emissions from households**	This indicator estimates the emissions yearly emitted by households	The values can be disaggregated using the data from EUCALC	Mt CO2 eq/year	SDG 3.9 SDG 7.2 SDG 9.2 SDG 9.4 SDG 13.3	Linked to SECAP Mitigation pillar. Building section	Public administrations
35	**CO₂ emissions from tertiary sector**	This indicator estimates the emissions yearly emitted by tertiary buildings	The values can be disaggregated using the data from EUCALC	Mt CO2 eq/year	SDG 3.9 SDG 7.2 SDG 9.2 SDG 9.4 SDG 13.4	Linked to SECAP Mitigation pillar. Building section	Public administrations
36	**CO₂ emissions from non-ETS industries**	This indicator estimates the emissions yearly emitted by industry buildings	The values can be disaggregated using the data from EUCALC	Mt CO2 eq/year	SDG 3.9 SDG 7.2 SDG 9.2 SDG 9.4 SDG 13.5	Linked to SECAP Mitigation pillar. Building section	Public administrations
37	**Number of deaths due to accidental poisoning by and exposure to noxious substances per 100000 people**	The indicator provides information on mortality patterns due to unintentional poisoning. It describes mortality in relation to the total population. Expressed in deaths per 100 000 inhabitants. Originally the KPI was "Mortality rate attributed to unintentional poisoning".	Data available at EUROSTAT at NUTS2 level, the methodology to downscale the information uses deaths at NUTS3 level from EUROSTAT.	number	SDG 3.9	Could be linked to SECAP Adaptation pillar and impact	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
38	*Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene*	The indicator provides information on mortality patterns attributed to unsafe water, unsafe sanitation, and lack of hygiene. It describes mortality in relation to the total population. Expressed in deaths per 100 000 inhabitants.	Data available at WHO or World Bank at NUTS0 level, the methodology to downscale the information uses deaths at NUTS3 level from EUROSTAT.	number	SDG 3.9	Could be linked to SECAP Adaptation pillar and impact	Public administrations
39	*years of life lost due to air pollution*	The indicator estimates the number of deaths that can be attributed to ambient pollution (outdoor) and household (indoor). It is calculated by first combining information on the increased (or relative) risk of a disease resulting from exposure, with information on how widespread the exposure is in the population (the annual mean concentration of particulate matter to which the population is exposed).	Data available at EEA, not further calculations are needed.	number	SDG 3.9	Could be linked to SECAP Adaptation pillar and impact	Public administrations
40	*Education and Training (female)*	This indicator shows the participation rate of female, 25-64 years, in education and training (last 4 weeks)	Data available on EUROSTAT, not further calculations are needed	percentage	SDG 4.3	-	Business
41	*As Education Index: Population with tertiary education*	The indicator shows the share of population with tertiary education. Tertiary education is defined as those having completed the highest level of education, by age group. This includes both theoretical programs leading to advanced research or high skill professions such as medicine and more vocational programs leading to the labour market. Calculated value: (number of people with tertiary education/population)*100	Data available at EUROSTAT, not further calculations are needed	percentage	SDG 4.3 SDG 4.5 SDG 13.3	Linked to SECAPs Energy Poverty pillar	Citizens
42	*Gender pay gap*	This indicator is defined as the difference between the average gross hourly earnings of men and	Data available at EUROSTAT, not further calculations are needed	percentage	SDG 5.1		Citizens

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		women expressed as a percentage of the average gross hourly earnings of men.					
43	*Share of women in regional assemblies*	This indicator is a measure for the political power women are holding on a regional level. Lower rates of women participation in policy making would indicate that mechanisms of exclusion come into play and policies would tend to be not gender sensitive	Data available on EIGE, not further calculations are needed	index	SDG 5.5	-	Citizens
44	*Gini-Index*	This indicator measures the (in)equality of income in society therefore the extent to which the distribution of income within a country deviates from a perfectly equal distribution. A coefficient of 0 expresses perfect equality where everyone has the same income, while a coefficient of 100 expresses full inequality where only one person has all the income.	Data available at World Bank, not further calculations needed	index	SDG 5.a	Linked to SECAPs Energy Poverty pillar	Citizens
45	*Proportion of population with access to electricity*	The indicator measures the share of population that has access to electricity as a basic good necessary to satisfy basic needs. Electricity access entails a household having initial access to sufficient electricity to power a basic bundle of energy services – at a minimum, several lightbulbs, phone charging, a radio and potentially a fan or television – with the level of service capable of growing over time.	Data available at World Bank at NUTS0 level, the methodology to downscale the information uses population at NUTS3 from EUROSTAT.	percentage	SDG 7.1	Linked to SECAPs Energy Poverty pillar	Citizens
46	*Residential final energy consumption from electricity*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.					
47	*Residential final energy consumption from natural gas*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
48	*Residential final energy consumption from liquid gas*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
49	*Residential final energy consumption from heating oil*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		to calculate the emissions of the different sectors.					
50	*Residential final energy consumption from diesel*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
51	*Residential final energy consumption from gasoline*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
52	*Residential final energy consumption from lignite*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
53	*Residential final energy consumption from coal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
54	*Residential final energy consumption from other fossil fuels*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
55	*Residential final energy consumption from biogas*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
56	*Residential final energy consumption from plant oil*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.					
57	*Residential final energy consumption from biofuel*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
58	*Residential final energy consumption from other biomass*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
59	*Residential final energy consumption from solar thermal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		to calculate the emissions of the different sectors.					
60	*Residential final energy consumption from geothermal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
61	*Total residential final energy consumption*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data obtained by adding all residential final energy consumption per energy carriers. (SOI 46 - 60)	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
62	*final energy consumption in agriculture, forestry and fisheries from electricity*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
63	*final energy consumption in agriculture, forestry and fisheries from natural gas*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
64	*final energy consumption in agriculture, forestry and fisheries from liquid gas*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
65	*final energy consumption in agriculture, forestry and fisheries from heating oil*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
66	*final energy consumption in agriculture, forestry and fisheries from diesel*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.					
67	*final energy consumption in agriculture, forestry and fisheries from gasoline*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
68	*final energy consumption in agriculture, forestry and fisheries from lignite*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
69	*final energy consumption in agriculture, forestry and fisheries from coal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		to calculate the emissions of the different sectors.					
70	*final energy consumption in agriculture, forestry and fisheries from other fossil fuels*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
71	*final energy consumption in agriculture, forestry and fisheries from biogas*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
72	*final energy consumption in agriculture, forestry and fisheries from plant oil*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
73	*final energy consumption in agriculture, forestry and fisheries from biofuel*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
74	*final energy consumption in agriculture, forestry and fisheries from other biomass*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
75	*final energy consumption in agriculture, forestry and fisheries from solar thermal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
76	*final energy consumption in agriculture, forestry and fisheries from geothermal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy	Data available at EUROSTAT, downscaling based on gross value added by NACE sector at NUTS3 level from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.					
77	*Total final energy consumption in agriculture, forestry and fisheries*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data obtained by adding all agriculture, forestry and fisheries final energy consumption per energy carriers. (SOI 62 - 76)	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
78	*final energy consumption in ETS industries from electricity*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
79	*final energy consumption in ETS industries from natural gas*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		to calculate the emissions of the different sectors.					
80	*final energy consumption in ETS industries from liquid gas*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
81	*final energy consumption in ETS industries from heating oil*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
82	*final energy consumption in ETS industries from diesel*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
83	*final energy consumption in ETS industries from gasoline*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
84	*final energy consumption in ETS industries from lignite*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
85	*final energy consumption in ETS industries from coal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
86	*final energy consumption in ETS industries from other fossil fuels*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.					
87	*final energy consumption in ETS industries from biogas*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
88	*final energy consumption in ETS industries from plant oil*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
89	*final energy consumption in ETS industries from biofuel*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		to calculate the emissions of the different sectors.					
90	*final energy consumption in ETS industries from other biomass*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
91	*final energy consumption in ETS industries from solar thermal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
92	*final energy consumption in ETS industries from geothermal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on energy demands from SEEnergies Open Data.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
93	**Total final energy consumption in ETS industries**	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data obtained by adding all ETS industries energy consumption per energy carriers. (SOI 78 - 92)	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
94	**final energy consumption in non-ETS industries from electricity**	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
95	**final energy consumption in non-ETS industries from natural gas**	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
96	**final energy consumption in non-ETS industries from liquid gas**	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.					
97	*final energy consumption in non-ETS industries from heating oil*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
98	*final energy consumption in non-ETS industries from diesel*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
99	*final energy consumption in non-ETS industries from gasoline*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		to calculate the emissions of the different sectors.					
100	*final energy consumption in non-ETS industries from lignite*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
101	*final energy consumption in non-ETS industries from coal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
102	*final energy consumption in non-ETS industries from other fossil fuels*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
103	*final energy consumption in non-ETS industries from biogas*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
104	*final energy consumption in non-ETS industries from plant oil*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
105	*final energy consumption in non-ETS industries from biofuel*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
106	*final energy consumption in non-ETS industries from other biomass*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.					
107	*final energy consumption in non-ETS industries from solar thermal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
108	*final energy consumption in non-ETS industries from geothermal*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar to calculate the emissions of the different sectors.	Data available at EUROSTAT, downscaling based on employment by NACE sector from EUROSTAT.	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations
109	*Total final energy consumption in non-ETS industries*	This indicator covers the final energy consumed by end users, such as industry, transport, households, services, and agriculture; it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy. It is the main information requested in SECAP mitigation pillar	Data obtained by adding all non - ETS industries energy consumption per energy carriers. (SOI 94 - 108)	MWh	SDG 7.2 SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption all sectors	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		to calculate the emissions of the different sectors.					
110	*Share of renewable energy in gross final energy consumption*	The indicator provides information about the proportion of energy consumed in the city that comes from renewable sources. Renewable generation is an indicator reported in SECAP mitigation pillar and is used to calculate the final emissions.	Data available at EUROSTAT, not further calculations are needed.	percentage	SDG 7.2	Linked to SECAP Mitigation pillar. Energy consumption coming from renewable sources	Public administrations
111	*Electricity production with natural gas*	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	Data available at EUROSTAT, downscaling methodology based on number of fossil fuel plants at NUTS3 from JRC Open Power Plants Database (JRC-PPDB-OPEN).	MWh	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
112	*Electricity production with liquid gas*	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	Data available at EUROSTAT, downscaling methodology based on number of fossil fuel plants at NUTS3 from JRC Open Power Plants Database (JRC-PPDB-OPEN).	MWh	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
113	*Electricity production with heating oil*	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	Data available at EUROSTAT, downscaling methodology based on generation capacity at NUTS3 from JRC Open Power Plants Database (JRC-PPDB-OPEN).	MWh	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
114	*Electricity production with lignite*	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	Data available at EUROSTAT, downscaling methodology based on generation capacity at NUTS3 from JRC Open Power Plants Database (JRC-PPDB-OPEN).	MWh	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
115	*Electricity production with coal*	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	Data available at EUROSTAT, downscaling methodology based on generation capacity at NUTS3 from JRC Open Power Plants Database (JRC-PPDB-OPEN).	MWh	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
116	*Heat production with natural gas*	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	Data available at EUROSTAT, downscaling methodology based on generation capacity at NUTS3 from JRC Open Power Plants Database (JRC-PPDB-OPEN).	MWh	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
117	*Heat production with gas liquids*	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	Data available at EUROSTAT, downscaling methodology based on generation capacity at NUTS3 from JRC Open Power Plants Database (JRC-PPDB-OPEN).	MWh	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
118	*Heat production with heating oil*	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	Data available at EUROSTAT, downscaling methodology based on heat demand at NUTS3 from Hotmaps database.	MWh	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
119	*Heat production with lignite*	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	Data available at EUROSTAT, downscaling methodology based on heat demand at NUTS3 from Hotmaps database.	MWh	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
120	*Heat production with coal*	The indicator provides information about the gross electricity production from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports	Data available at EUROSTAT, downscaling methodology based on heat demand at NUTS3 from Hotmaps database.	MWh	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
121	*Percentage of total electricity production that comes from fossil fuels (excluding coal)*	The indicator provides information about the percentage of gross electricity production coming from fossil fuels. Primary energy supply is defined as energy production plus energy imports, minus energy exports.	Data available at EUROSTAT, not further calculations are needed.	percentage	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
122	*Percentage of renewable electricity production*	The indicator provides information about the percentage of gross electricity production coming from renewable sources. Renewables can	Data available at EUROSTAT, not further calculations are needed.	percentage	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		include hydro, geothermal, solar, wind, tide and wave sources, biofuels, and energy recovered from municipal waste present in the site. The production of renewable electricity is part of the SECAP mitigation template and is used to calculate the final emissions.					
123	*Renewable sources installed capacity*	The indicator estimates the maximum net amount of energy that a certain region can produce. Including: solar PV, onshore wind, offshore wind, nuclear, hydroelectric, geothermal, marine, CSP, biomass & biogas and district heating. The indicator is relevant to monitor Tech development, increase the renewable share and reduce CO_2 emission.	Data obtained by adding all renewable sources installed capacities available at JRC Open Power Plants Database (JRC-PPDB-OPEN).	MW	SDG 7.2	Linked to SECAP Mitigation pillar. Energy generation	Public administrations
124	*Electricity consumption per capita*	This indicator covers the final electricity consumption excluding transmission, distribution, and transformation losses and own use power plants weighted by the average population of the reference year	Data available at EUROSTAT, downscaling methodology based on population and GVA at NUTS3 from EUROSTAT.	MWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption	Public administrations
125	*Final energy consumption of public buildings per year*	This indicator covers the final energy consumption of public buildings. Public buildings are one of the key sectors included in the SECAP mitigation pillar and one of the main areas of intervention for municipalities	To be filled by the user in the Decarbonisation Profiler. Depends on data bi-directionality.	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption buildings	Public administrations
126	*Final energy consumption in homes including all types of energy*	This indicator covers the final energy consumption of households by citizen.	Data available at EUCALC, downscaling methodology based on number of dwellings at NUTS3 level from EUROSTAT.	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption buildings	Public administrations
127	*Energy consumption of households for heating*	This indicator covers the final energy consumption in households dedicated to heating.	Data available at EUCALC, downscaling methodology based	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
			on heating demand at NUTS3 level from Hotmaps.			consumption buildings	
128	*Vehicle energy consumption of the different transport modes*	The indicators measure the fuel required to travel a unit of distance (L/100km). This metric is calculated for each vehicle model through standardized testing procedures and drive cycles. Including passengers automotive, passengers 2-wheel, passengers aviation, passengers' marine, regional public transport, commercial, freight automotive, commercial freight aviation, commercial freight marine, commercial freight rail. Technologies that improve vehicle fuel efficiency are important for CO_2 emission reductions.	The values can be disaggregated using the data from EUCALC, not further calculations needed.	TWh/pkm	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption transport	Public administrations
129	*Transport energy consumption*	This indicator covers the final energy consumption of the transport sector. Transport is one of the key sectors included in the SECAP mitigation pillar and one of the main areas of intervention for municipalities	The values can be disaggregated using the data from EUCALC. The downscaling method is based on transport freight and passengers from EUROSTAT.	TWh	SDG 7.3 SDG 11.2	Linked to SECAP Mitigation pillar. Energy consumption transport	Public administrations
130	*Energy demand of buildings*	The indictor provides information about building energy demand. The indicator is relevant to monitor Tech development and efficiency of the systems and retrofitting actions to reduce CO_2 emission	Data available at EUCALC, downscaling methodology based on number of dwellings at NUTS3 level from EUROSTAT.	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption	Public administrations
131	*Energy demand of residencies*	The indictor provides information about energy demand by dwelling. The total demand is weighted by the total number of dwellings.	Data available at EUCALC, downscaling methodology based on number of dwellings at NUTS3 level from EUROSTAT.	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption	Public administrations
132	*Energy demand of agriculture*	The indictor provides information about the energy demand of the agricultural sector. Agricultural energy demand can be divided into direct and indirect energy needs.	Data available at EUCALC, downscaling methodology based on number of dwellings at NUTS3 level from EUROSTAT.	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption	Business

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		The direct energy needs include energy required for land preparation, cultivation, irrigation, harvesting, post-harvest processing, food production, storage and the transport of agricultural inputs and outputs. Agricultural energy demand can be divided into direct and indirect energy needs. The direct energy needs include energy required for land preparation, cultivation, irrigation, harvesting, post-harvest processing, food production, storage and the transport of agricultural inputs and outputs. The indicator is relevant to monitor Tech development and efficiency to reduce CO_2 emission					
133	*Energy demand of manufacturing*	The indictor provides information about the energy demand of manufacturing sectors.	The values can be disaggregated using the data from EUCALC.	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption	Business
134	*Index value of GDP growth per employed person*	The indicator measures the changes in productivity over time in relation to employment	The value can be calculated by using GDP and employment numbers, both metrics are available at EUROSTAT.	Index	SDG 8.2	-	Public administrations
135	*Unemployment rate*	Measures the share of people without formal income as a percentage of the labour force. An unemployed person is defined by Eurostat, according to the guidelines of the International Labour Organization, as someone aged 15 to 64 not employed during the reference week according to the definition of employment, currently available for work and actively seeking work.	Data available at EUROSTAT, downscaling based on population at NUTS3 level from EUROSTAT.	percentage	SDG 8.3 SDG 8.6	Linked to SECAP Energy Poverty pillar	Citizens

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
136	*CO₂ emissions generated by the commerce sector*	This indicator estimates CO$_2$ yearly emitted by commercial buildings.	The values can be disaggregated using the data from EUCALC and the GVA from EUROSTAT.	Mt	SDG 8.4	Linked to SECAP Mitigation pillar. Building section	Business
137	*Residential energy demand - space heating*	The indictor provides information about the energy demand for the residential space heating.	Data available at JRC-IDEES source, not further calculations needed.	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption	Public administrations
138	*Residential energy demand - space cooling*	The indictor provides information about the energy demand for the residential space cooling.	Data available at JRC-IDEES source, not further calculations needed.	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption	Public administrations
139	*Non-residential energy demand - space heating*	The indictor provides information about the energy demand for the non-residential space heating.	Data available at JRC-IDEES source, not further calculations needed.	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption	Public administrations
140	*Non-residential energy demand - space cooling*	The indictor provides information about the energy demand for the non-residential space cooling.	Data available at JRC-IDEES source, not further calculations needed.	TWh	SDG 7.3	Linked to SECAP Mitigation pillar. Energy consumption	Public administrations
141	*Generation of residual waste in the municipality by capita*	The indicator estimates the amount of municipal waste generated including residual waste, PMC, paper, and organic waste, weighted by the average population of the reference year. Municipal waste from industry and agriculture are not included. The amount of municipal waste generated consists of waste collected by or on behalf of municipal authorities and disposed of through the waste management system. According to the OECD/Eurostat Joint Questionnaire municipal waste includes the following types of materials: paper, paperboard and paper products, plastics, glass, metals, food and garden waste and textiles. The definition also includes bulky waste (e.g., white goods, old	Data available at EUROSTAT, it can be disaggregated considering the total population of each region from EUROSTAT.	kilogram	SDG 8.4	-	Business

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		furniture, mattresses); and garden waste, leaves, grass clippings, street sweepings, the content of litter containers, and market cleansing waste, if managed as waste.					
142	*Generation of plastic waste in the municipality by capita*	The indicator estimates the amount of municipal waste generated including residual waste, PMC, paper, and organic waste, weighted by the average population of the reference year. Municipal waste from industry and agriculture are not included. The amount of municipal waste generated consists of waste collected by or on behalf of municipal authorities and disposed of through the waste management system. According to the OECD/Eurostat Joint Questionnaire municipal waste includes the following types of materials: paper, paperboard and paper products, plastics, glass, metals, food and garden waste and textiles. The definition also includes bulky waste (e.g., white goods, old furniture, mattresses); and garden waste, leaves, grass clippings, street sweepings, the content of litter containers, and market cleansing waste, if managed as waste.	Data available at EUROSTAT, it can be disaggregated considering the total population of each region from EUROSTAT.	kilogram	SDG 8.4	-	Business
143	*Generation of metal waste in the municipality by capita*	The indicator estimates the amount of municipal waste generated including residual waste, PMC, paper, and organic waste, weighted by the average population of the reference year. Municipal waste from industry and agriculture are	Data available at EUROSTAT, it can be disaggregated considering the total population of each region from EUROSTAT.	kilogram	SDG 8.4	-	Business

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		not included. The amount of municipal waste generated consists of waste collected by or on behalf of municipal authorities and disposed of through the waste management system. According to the OECD/Eurostat Joint Questionnaire municipal waste includes the following types of materials: paper, paperboard and paper products, plastics, glass, metals, food and garden waste and textiles. The definition also includes bulky waste (e.g., white goods, old furniture, mattresses); and garden waste, leaves, grass clippings, street sweepings, the content of litter containers, and market cleansing waste, if managed as waste.					
144	*Generation of paper waste in the municipality by capita*	The indicator estimates the amount of municipal waste generated including residual waste, PMC, paper, and organic waste, weighted by the average population of the reference year. Municipal waste from industry and agriculture are not included. The amount of municipal waste generated consists of waste collected by or on behalf of municipal authorities and disposed of through the waste management system. According to the OECD/Eurostat Joint Questionnaire municipal waste includes the following types of materials: paper, paperboard and paper products, plastics, glass, metals, food and garden waste and	Data available at EUROSTAT, it can be disaggregated considering the total population of each region from EUROSTAT.	kilogram	SDG 8.4	-	Business

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		textiles. The definition also includes bulky waste (e.g., white goods, old furniture, mattresses); and garden waste, leaves, grass clippings, street sweepings, the content of litter containers, and market cleansing waste, if managed as waste.					
145	*Generation of organic waste in the municipality by capita*	The indicator estimates the amount of municipal waste generated including residual waste, PMC, paper, and organic waste, weighted by the average population of the reference year. Municipal waste from industry and agriculture are not included. The amount of municipal waste generated consists of waste collected by or on behalf of municipal authorities and disposed of through the waste management system. According to the OECD/Eurostat Joint Questionnaire municipal waste includes the following types of materials: paper, paperboard and paper products, plastics, glass, metals, food and garden waste and textiles. The definition also includes bulky waste (e.g., white goods, old furniture, mattresses); and garden waste, leaves, grass clippings, street sweepings, the content of litter containers, and market cleansing waste, if managed as waste.	Data available at EUROSTAT, it can be disaggregated considering the total population of each region from EUROSTAT.	kilogram	SDG 8.4	-	Business
146	*Total male employment*	This indicator shows the total employment of males, 15-64 years, in all sectors in year 2021	Data available at EUROSTAT, not further calculations are needed	number	SDG 8.5 SDG 9.2	Linked to SECAP Energy Poverty pillar.	Business

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
147	*Total female employment*	This indicator shows the total employment of females, 15-64 years, in all sectors in year 2021	Data available at EUROSTAT, not further calculations are needed	number	SDG 8.5 SDG 9.2	Linked to SECAP Energy Poverty pillar.	Business
148	*Number of tourist accommodation places with respect to the residential population*	The indicator provides information of the number of tourist accommodations in relation to the total population of the region. It is relevant to control uses in the urban area, and balance tourism and housing needs.	Data available at EUROSTAT, the methodology to downscale the information is based on GVA per NACE group from EUROSTAT.	percentage	SDG 8.9	Could be linked to SECAP Adaptation pillar	Public administrations
149	*Household access to internet*	Internet access is defined as the percentage of households who have access to the Internet. It might be via smartphones or personal computer, using a dial-up or cable broadband access.	Data available at EUROSTAT, the methodology to downscale the information is based on population at NUTS3 from EUROSTAT.	percentage	SDG 9.1 SDG 9.c	-	Citizens
150	*Access to public transport*	Indicator measures the access to basic goods and the chance to satisfy basic needs based on road and rail coverage.	Data available at Copernicus Land Monitoring Service - Corine Land Cover, not further calculations needed.	index	SDG 9.1 SDG 9.c SDG 11.2	Linked to SECAP Energy Poverty pillar.	Citizens and public administrations
151	*percentage of people very satisfied with public transport*	This indicator provides information on the quality of the public transport network.	Data available at EUROSTAT, not further calculations are needed	percentage	SDG 9.2 SDG 9.c SDG 11.2	Linked to SECAP Energy Poverty pillar.	Citizens and public administrations
152	*percentage of people rather satisfied with public transport*	This indicator provides information on the quality of the public transport network.	Data available at EUROSTAT, not further calculations are needed	percentage	SDG 9.2 SDG 9.c SDG 11.2	Linked to SECAP Energy Poverty pillar.	Citizens and public administrations
153	*percentage of people rather unsatisfied with public transport*	This indicator provides information on the quality of the public transport network.	Data available at EUROSTAT, not further calculations are needed	percentage	SDG 9.2 SDG 9.c SDG 11.2	Linked to SECAP Energy Poverty pillar.	Citizens and public administrations
154	*percentage of people not at all satisfied with public transport*	This indicator provides information on the quality of the public transport network.	Data available at EUROSTAT, not further calculations are needed	percentage	SDG 9.2 SDG 9.c SDG 11.2	Linked to SECAP Energy Poverty pillar.	Citizens and public administrations
155	*percentage of people with unknown satifactory level with public transport*	This indicator provides information on the quality of the public transport network.	Data available at EUROSTAT, not further calculations are needed	percentage	SDG 9.2 SDG 9.c SDG 11.2	Linked to SECAP Energy Poverty pillar.	Citizens and public administrations

[D5.1] - [SOIs for SECAPs definition and assessment]

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
156	*Volume of freight transport relative to GDP*	This indicator shows the volume of freight in each year as an Index compared to 2010 levels set to 100 for all countries	Data available at EUROSTAT, not further calculations are needed	index	SDG 9.1	-	Business
157	*Gross value added (GVA) growth*	This indicator shows the real growth rate of regional gross value added (GVA) at basic prices by NUTS 2 regions - percentage change on previous year. GVA (gross value added) is an indicator of the economic activity of a country or a region. It reflects the total value of all goods and services produced less the value of goods and services used for intermediate consumption in their production	Data available at EUROSTAT, not further calculations are needed	percentage	SDG 9.2	-	Business
158	*GVA in Agriculture*	This indicator shows the gross value added at basic prices in [A] Agriculture, forestry and fishing sector in each year	Data available at EUROSTAT, not further calculations are needed	Euros	SDG 9.2	-	Business
159	*GVA in Manufacturing*	This indicator shows the gross value added at basic prices in [C] Manufacturing sector in each year	Data available at EUROSTAT, not further calculations are needed	Euros	SDG 9.2	-	Business
160	*GVA in Transportation*	This indicator shows the gross value added at basic prices in [G-I] Wholesale and retail trade, transport, accommodation, and food service activities sector in each year	Data available at EUROSTAT, not further calculations are needed	Euros	SDG 9.2	-	Business
161	*Real Labour productivity*	This indicator shows the real labour productivity per person in all sectors in each year as an Index compared to 2015 levels set to 100 for all regions	Data available at EUROSTAT, not further calculations are needed	index	SDG 9.2	-	Business
162	*Production growth*	This indicator shows the relative production in Manufacturing sector in each year as an Index compared to 2015 levels set to 100 for all countries	Data available at EUROSTAT, not further calculations are needed	index	SDG 9.2	-	Business

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
163	*Production in Manufacturing (aggregate)*	This indicator informs on the total amount of production in the manufacturing sector.	The values can be disaggregated using the data from EUCALC.	Mt	SDG 9.2	-	Business
164	*Emissions from manufacturing*	The indictor provides information about the total CO2 emissions from manufacturing	The values can be disaggregated using the data from EUCALC.	Mt	SDG 9.4	Linked to SECAP Mitigation pillar	Business
165	*Emissions from agriculture*	The indictor provides information about the total CO2 emissions from agriculture	The values can be disaggregated using the data from EUCALC.	Mt	SDG 9.4	Linked to SECAP Mitigation pillar	Business
166	*Income of households*	This indicator provides information regarding the total income by household, it measures the wealth and is a proxy measure for well-being.	Data available at EUROSTAT, not further calculations are needed	Euros	SDG 10.2 SDG 10.3	Linked to SECAP Energy Poverty pillar	Citizens and public administrations
167	*Migration: foreign born population*	The indicator provides information about the share of people born in foreign countries	Data available at EUROSTAT, the methodology to downscale the information is based on population at NUTS3 from EUROSTAT.	percentage	SDG 10.2 SDG 10.3	-	Citizens and public administrations
168	*Tenancy*	The indicator provides information about the distribution of population by tenure status; therefore, the percentage of owners and tenants disaggregated by income group and type of household	Data available at EUROSTAT, the methodology to downscale the information is based on number of residential buildings at NUTS3 from EUROSTAT,	percentage	SDG 11.1	-	Citizens and public administrations
169	*Transportation passenger (distance aggregate) - 2-wheeler*	This indicator informs on the amount of distance travelled by passengers across all modes.	The values can be disaggregated using the data from EUCALC.	pkm	SDG 11.2	-	Business
170	*Transportation passenger (distance aggregate) - LDV*	This indicator informs on the amount of distance travelled by passengers by light-duty vehicles.	The values can be disaggregated using the data from EUCALC.	pkm	SDG 11.2	-	Business
171	*Transportation passenger (distance aggregate) - aviation*	This indicator informs on the amount of distance travelled by passengers by plane.	The values can be disaggregated using the data from EUCALC.	pkm	SDG 11.2	-	Business
172	*Transportation passenger (distance aggregate) - bike*	This indicator informs on the amount of distance travelled by passengers by bike.	The values can be disaggregated using the data from EUCALC.	pkm	SDG 11.2	-	Business

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
173	*Transportation passenger (distance aggregate) - bus*	This indicator informs on the amount of distance travelled by passengers by bus.	The values can be disaggregated using the data from EUCALC.	pkm	SDG 11.2	-	Business
174	*Transportation passenger (distance aggregate) - metro-tram*	This indicator informs on the amount of distance travelled by passengers by metro-tram.	The values can be disaggregated using the data from EUCALC.	pkm	SDG 11.2	-	Business
175	*Transportation passenger (distance aggregate) - rail*	This indicator informs on the amount of distance travelled by passengers by train.	The values can be disaggregated using the data from EUCALC.	pkm	SDG 11.2	-	Business
176	*Transportation passenger (distance aggregate) - walk*	This indicator informs on the amount of distance travelled by passengers walking.	The values can be disaggregated using the data from EUCALC.	pkm	SDG 11.2	-	Business
177	*share of demand for passenger two-wheelers*	Modal split of passenger transport is defined as the percentage share of each mode of transport in total inland transport, expressed in passenger-kilometers (pkm). It is based on transport by passenger cars, buses and coaches, and trains. This indicator informs on the share of passengers using two-wheelers.	The values can be disaggregated using the data from EUCALC.	percentage	SDG 11.2	-	Public administrations
178	*share of demand for passenger buses*	Modal split of passenger transport is defined as the percentage share of each mode of transport in total inland transport, expressed in passenger-kilometers (pkm). It is based on transport by passenger cars, buses and coaches, and trains. This indicator informs on the share of passengers using two-wheelers.	The values can be disaggregated using the data from EUCALC.	percentage	SDG 11.2	-	Public administrations
179	*share of demand for passenger trains*	Modal split of passenger transport is defined as the percentage share of each mode of transport in total inland transport, expressed in passenger-kilometers (pkm). It is based on transport by passenger cars, buses and coaches, and trains. This indicator informs on the	The values can be disaggregated using the data from EUCALC.	percentage	SDG 11.2	-	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		share of passengers using two-wheelers.					
180	*occupancy - two wheelers*	The indicator provides information about the average number of passengers in a vehicle (cars, buses and trains).Utilization efficiency is one of the main parameters that determine energy and emission efficiency. High occupancy rates are usually assumed to reduce emissions.	Data obtained from EU Calculator - Transport module documentation, not further calculations needed.	Passengers per vehicle, % of passenger seats occupied	SDG 11.2	-	Public administrations
181	*occupancy - busses*	The indicator provides information about the average number of passengers in a vehicle (cars, buses and trains).Utilization efficiency is one of the main parameters that determine energy and emission efficiency. High occupancy rates are usually assumed to reduce emissions.	Data obtained from EU Calculator - Transport module documentation, not further calculations needed.	Passengers per vehicle, % of passenger seats occupied	SDG 11.2	-	Public administrations
182	*occupancy - rail*	The indicator provides information about the average number of passengers in a vehicle (cars, buses and trains).Utilization efficiency is one of the main parameters that determine energy and emission efficiency. High occupancy rates are usually assumed to reduce emissions.	Data obtained from EU Calculator - Transport module documentation, not further calculations needed.	Passengers per vehicle, % of passenger seats occupied	SDG 11.2	-	Public administrations
183	*Soil sealing or artificial coverage*	The indicator estimates the increase in sealed soil surfaces with impervious materials due to urban development and construction (e.g., buildings, constructions and laying of completely or partially impermeable artificial material, such as asphalt, metal, glass, plastic or concrete). This provides an indication of the rate of soil sealing when areas change land use towards artificial and urban land	Data available at ESPON, not further calculations are needed	square kilometer	SDG 11.3 SDG 15.3 SDG 15.4	Could be linked to SECAP Adaptation pillar and vulnerability	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		use. The indicator builds on data from the imperviousness High Resolution Layer (a product of the Copernicus Land Monitoring Service)					
184	*Percentage of total area protected as natural sites*	The indicator measures the surface of terrestrial protected areas. The indicator comprises nationally designated protected areas and Natura 2000 sites. A nationally designated area is an area protected by national legislation. The Natura 2000 network comprises both marine and terrestrial protected areas designated under the EU Habitats and Birds Directives with the goal to maintain or restore a favorable conservation status for habitat types and species of EU interest.	Data available at EUROSTAT, disaggregation method based on land areas from Copernicus Land Monitoring Service - Corine Land Cover.	square kilometer	SDG 11.4 SDG 15.4 SDG 15.5	Could be linked to SECAP Adaptation pillar and vulnerability	Public administrations
185	*Percentage of green urban areas*	The indicator provides information about the percentage of natural areas in the city. Green urban areas: Public green areas for predominantly recreational use such as gardens, suburban natural areas that have become and are managed as urban parks, forests or green areas extending from the surroundings into urban areas are mapped as green urban areas when at least two sides are bordered by urban areas, and traces of recreational uses are visible. Not included are: private gardens, buildings within parks, patches of natural vegetation or agricultural areas enclosed by built-up areas without being managed as green urban areas, natural areas (:	Data available at Corine Land Cover, not further calculations are needed	percentage	SDG 11.4 SDG 11.7 SDG 15.1	Could be linked to SECAP Adaptation pillar vulnerability and actions	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		forests, herbaceous vegetation with a minimum coverage, beaches, dunes and sand, bare rocks, sparsely vegetated areas such as steppes or tundra, burnt areas such as forest or shrubs and snow and ice such as glaciers).					
186	**Urban Flood Risk or areas exposed to flooding**	The indicator shows the areas potentially exposed to flooding or in floodplains.	Data available at River flood hazard maps for Europe and the Mediterranean Basin region database, not further calculations needed.	meter	SDG 11.5	Could be linked to SECAP Adaptation pillar vulnerability	Public administrations
187	**CO_2 emissions per capita**	This indicator estimates the tons of CO2 equivalents yearly emitted by a city weighted by the average population of the reference year (per capita).	The values can be disaggregated using the data from EUCALC and weighted by population from EUROSTAT.	Mt	SDG 11.6 SDG 13.2 SDG 13.3	Linked to SECAPs mitigation pillar	Public administrations
188	**Percentage of green urban areas and forests per population**	Indicator measures the access to basic goods and the chance to satisfy basic needs. This indicator was called "Percentage of population with access to at least 1 hectare of green urban areas (parks) and forests within 15 minutes of walking" previously.	Data available at Copernicus Land Monitoring Service - Corine Land Cover, not further calculations needed.	percentage	SDG 11.7	Could be linked to SECAP Adaptation pillar adaptive capacity.	Citizens
189	**Number of motor road vehicles per 100 people**	The indicator provides information about the vehicle stock. The indicator is derived by dividing the vehicle stock by the number of inhabitants	Data available at EUROSTAT, the methodology to downscale the information is based on population at NUTS3 from EUROSTAT.	number	SDG 12.8	-	Public administrations
190	**Average air pollution due to PM2.5**	This indicator provides information on reported fine particle concentrations annual average. This indicator was called "Percentage of people exposed to PM2.5, NO2 and O3" previously.	Data available at European Environmental Agency, not further calculations needed.	Ug/m^3	SDG 11.6	Could be linked to SECAP Adaptation pillar vulnerability	Public administrations
191	**Average air pollution due to NO2**	This indicator provides information on reported NO2 concentrations annual average. This indicator was called "Percentage of people	Data available at European Environmental Agency, not further calculations needed.	Ug/m^3	SDG 11.6	Could be linked to SECAP Adaptation pillar vulnerability	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		exposed to PM2.5, NO2 and O3" previously.					
192	*Average air pollution due to O3*	This indicator provides information on reported O3 concentrations annual average. This indicator was called "Percentage of people exposed to PM2.5, NO2 and O3" previously.	Data available at European Environmental Agency, not further calculations needed.	Ug/m^3	SDG 11.6	Could be linked to SECAP Adaptation pillar vulnerability	Public administrations
193	*Hazard Current probability (Low, moderate, high, not known) - heatwaves*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Current hazard probability will be assessed via the estimation of the frequency of past extreme climatic events that toke place in the 30 years preceding 2005. Depending on the nature of the hazard the resulting metric will take the general form of "event/year". For the purposes of SECAP compliance, "events/year" needs to be reclassified to qualitative scale ranging from low to high. In order to do so a percentile threshold will be applied taking into account the European distribution of past events.	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
194	*Hazards Impact (Low, moderate, high, not known) - heatwaves*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by society. This implies to establish a relationship (either empirically or process-based) between the	To estimate this indicator previous studies that have established a hazard-impact relationship will be used from peer-reviewed literature. The intermediate quantification of the indicator will be in % of infrastructure, production, population, or ecosystems services values by society affected by climate hazard. To comply with the SECAP requirements the %-values will be reclassified into a qualitative statement ranging from low to high. To do so a percentile	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

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SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		occurrence of a hazard and the estimation of a second-order impact of value for society.	approach will be used that compares the extent of hazard impact on a given NUTS3 with the European distribution.				
195	**Hazards Expected change in intensity (increase, decrease,** no **change, not known) - heatwaves**	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Data calculated by LOCALISED in WP2.	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
196	**Hazards Expected change in frequency (increase, decrease, no change, not known) - heatwaves**	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Change in hazard frequency will be assessed via the %-difference in probability of current hazard and the hazard probability from future climate projections during a 30-year period centered around the year 2050. Climate projections used will be based on a multi-model ensemble mean. In order to comply with the SECAP requirements the %-difference will be reclassified into a qualitative statement of "increasing", "decreasing" or "no-change"	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
197	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - heatwaves*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	The hazards timeframe indicator will be set up as a function of the current and future change in hazard frequency. As an example, if the current hazard frequency is "high" or "moderate" and expected frequency "increasing" or "not-known", then the hazard time frame indicator will be classified as "short-term"	Qualitative: short-, medium-, and long-term	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
198	*Hazard Current probability (Low, moderate, high, not known) - coldwaves*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Current hazard probability will be assessed via the estimation of the frequency of past extreme climatic events that toke place in the 30 years preceding 2005. Depending on the nature of the hazard the resulting metric will take the general form of "event/year". For the purposes of SECAP compliance, "events/year" needs to be reclassified to qualitative scale ranging from low to high. In order to do so a percentile threshold will be applied taking into account the European distribution of past events.	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
199	*Hazards Impact (Low, moderate, high, not known) - coldwaves*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by	To estimate this indicator previous studies that have established a hazard-impact relationship will be used from peer-reviewed literature. The intermediate quantification of the indicator will be in % of infrastructure, production, population, or ecosystems services values by society affected by climate hazard. To comply with the SECAP requirements the %-values will	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		society. This implies to establish a relationship (either empirically or process-based) between the occurrence of a hazard and the estimation of a second-order impact of value for society.	be reclassified into a qualitative statement ranging from low to high. To do so a percentile approach will be used that compares the extent of hazard impact on a given NUTS3 with the European distribution.				
200	*Hazards Expected change in intensity (increase, decrease, no change, not known) - coldwaves*	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Data calculated by LOCALISED in WP2.	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
201	*Hazards Expected change in frequency (increase, decrease, no change, not known) - coldwaves*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Change in hazard frequency will be assessed via the %-difference in probability of current hazard and the hazard probability from future climate projections during a 30-year period centered around the year 2050. Climate projections used will be based on a multi-model ensemble mean. In order to comply with the SECAP requirements the %-difference will be reclassified into a qualitative statement of "increasing", "decreasing" or "no-change"	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
202	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - coldwaves*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	The hazards timeframe indicator will be set up as a function of the current and future change in hazard frequency. As an example, if the current hazard frequency is "high" or "moderate" and expected frequency "increasing" or "not-known", then the hazard time frame indicator will be classified as "short-term"	Qualitative: short-, medium-, and long-term	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
203	*Hazard Current probability (Low, moderate, high, not known) - Heavy precipitation*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Current hazard probability will be assessed via the estimation of the frequency of past extreme climatic events that toke place in the 30 years preceding 2005. Depending on the nature of the hazard the resulting metric will take the general form of "event/year". For the purposes of SECAP compliance, "events/year" needs to be reclassified to qualitative scale ranging from low to high. In order to do so a percentile threshold will be applied taking into account the European distribution of past events.	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
204	*Hazards Impact (Low, moderate, high, not known) - Heavy precipitation*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by	To estimate this indicator previous studies that have established a hazard-impact relationship will be used from peer-reviewed literature. The intermediate quantification of the indicator will be in % of infrastructure, production, population, or ecosystems services values by society affected by climate hazard. To comply with the SECAP requirements the %-values will	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		society. This implies to establish a relationship (either empirically or process-based) between the occurrence of a hazard and the estimation of a second-order impact of value for society.	be reclassified into a qualitative statement ranging from low to high. To do so a percentile approach will be used that compares the extent of hazard impact on a given NUTS3 with the European distribution.				
205	*Hazards Expected change in intensity (increase, decrease, no change, not known) - Heavy precipitation*	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Data calculated by LOCALISED in WP2.	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
206	*Hazards Expected change in frequency (increase, decrease, no change, not known) - Heavy precipitation*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Change in hazard frequency will be assessed via the %-difference in probability of current hazard and the hazard probability from future climate projections during a 30-year period centered around the year 2050. Climate projections used will be based on a multi-model ensemble mean. In order to comply with the SECAP requirements the %-difference will be reclassified into a qualitative statement of "increasing", "decreasing" or "no-change"	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
207	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - Heavy precipitation*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	The hazards timeframe indicator will be set up as a function of the current and future change in hazard frequency. As an example, if the current hazard frequency is "high" or "moderate" and expected frequency "increasing" or "not-known", then the hazard time frame indicator will be classified as "short-term"	Qualitative: short-, medium-, and long-term	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
208	*Hazard Current probability (Low, moderate, high, not known) - Fire risk*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Current hazard probability will be assessed via the estimation of the frequency of past extreme climatic events that toke place in the 30 years preceding 2005. Depending on the nature of the hazard the resulting metric will take the general form of "event/year". For the purposes of SECAP compliance, "events/year" needs to be reclassified to qualitative scale ranging from low to high. In order to do so a percentile threshold will be applied taking into account the European distribution of past events.	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
209	*Hazards Impact (Low, moderate, high, not known) - Fire risk*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by	To estimate this indicator previous studies that have established a hazard-impact relationship will be used from peer-reviewed literature. The intermediate quantification of the indicator will be in % of infrastructure, production, population, or ecosystems services values by society affected by climate hazard. To comply with the SECAP requirements the %-values will	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

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SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		society. This implies to establish a relationship (either empirically or process-based) between the occurrence of a hazard and the estimation of a second-order impact of value for society.	be reclassified into a qualitative statement ranging from low to high. To do so a percentile approach will be used that compares the extent of hazard impact on a given NUTS3 with the European distribution.				
210	*Hazards Expected change in intensity (increase, decrease, no change, not known) - Fire risk*	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Data calculated by LOCALISED in WP2.	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
211	*Hazards Expected change in frequency (increase, decrease, no change, not known) - Fire risk*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Change in hazard frequency will be assessed via the %-difference in probability of current hazard and the hazard probability from future climate projections during a 30-year period centered around the year 2050. Climate projections used will be based on a multi-model ensemble mean. In order to comply with the SECAP requirements the %-difference will be reclassified into a qualitative statement of "increasing", "decreasing" or "no-change"	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
212	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - Fire risk*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	The hazards timeframe indicator will be set up as a function of the current and future change in hazard frequency. As an example, if the current hazard frequency is "high" or "moderate" and expected frequency "increasing" or "not-known", then the hazard time frame indicator will be classified as "short-term"	Qualitative: short-, medium-, and long-term	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
213	*Hazard Current probability (Low, moderate, high, not known) - droughts*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Current hazard probability will be assessed via the estimation of the frequency of past extreme climatic events that toke place in the 30 years preceding 2005. Depending on the nature of the hazard the resulting metric will take the general form of "event/year". For the purposes of SECAP compliance, "events/year" needs to be reclassified to qualitative scale ranging from low to high. In order to do so a percentile threshold will be applied taking into account the European distribution of past events.	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
214	*Hazards Impact (Low, moderate, high, not known) - droughts*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by	To estimate this indicator previous studies that have established a hazard-impact relationship will be used from peer-reviewed literature. The intermediate quantification of the indicator will be in % of infrastructure, production, population, or ecosystems services values by society affected by climate hazard. To comply with the SECAP requirements the %-values will	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		society. This implies to establish a relationship (either empirically or process-based) between the occurrence of a hazard and the estimation of a second-order impact of value for society.	be reclassified into a qualitative statement ranging from low to high. To do so a percentile approach will be used that compares the extent of hazard impact on a given NUTS3 with the European distribution.				
215	*Hazards Expected change in intensity (increase, decrease, no change, not known) - droughts*	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Data calculated by LOCALISED in WP2.	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
216	*Hazards Expected change in frequency (increase, decrease, no change, not known) - droughts*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Change in hazard frequency will be assessed via the %-difference in probability of current hazard and the hazard probability from future climate projections during a 30-year period centered around the year 2050. Climate projections used will be based on a multi-model ensemble mean. In order to comply with the SECAP requirements the %-difference will be reclassified into a qualitative statement of "increasing", "decreasing" or "no-change"	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
217	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - droughts*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	The hazards timeframe indicator will be set up as a function of the current and future change in hazard frequency. As an example, if the current hazard frequency is "high" or "moderate" and expected frequency "increasing" or "not-known", then the hazard time frame indicator will be classified as "short-term"	Qualitative: short-, medium-, and long-term	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
218	*Hazard Current probability (Low, moderate, high, not known) - floods*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Current hazard probability will be assessed via the estimation of the frequency of past extreme climatic events that toke place in the 30 years preceding 2005. Depending on the nature of the hazard the resulting metric will take the general form of "event/year". For the purposes of SECAP compliance, "events/year" needs to be reclassified to qualitative scale ranging from low to high. In order to do so a percentile threshold will be applied taking into account the European distribution of past events.	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
219	*Hazards Impact (Low, moderate, high, not known) - floods*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed. Hazard impact is defined the hazard effect on human and natural systems following the SECAP guidelines. Accordingly, this indicator is concerned with evaluating what is called second-order impacts, that is, impacts of climate change on infrastructure, production, population, or ecosystems services values by	To estimate this indicator previous studies that have established a hazard-impact relationship will be used from peer-reviewed literature. The intermediate quantification of the indicator will be in % of infrastructure, production, population, or ecosystems services values by society affected by climate hazard. To comply with the SECAP requirements the %-values will	Qualitative: low to high	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		society. This implies to establish a relationship (either empirically or process-based) between the occurrence of a hazard and the estimation of a second-order impact of value for society.	be reclassified into a qualitative statement ranging from low to high. To do so a percentile approach will be used that compares the extent of hazard impact on a given NUTS3 with the European distribution.				
220	*Hazards Expected change in intensity (increase, decrease, no change, not known) - floods*	New indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures.	Data calculated by LOCALISED in WP2.	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
221	*Hazards Expected change in frequency (increase, decrease, no change, not known) - floods*	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	Change in hazard frequency will be assessed via the %-difference in probability of current hazard and the hazard probability from future climate projections during a 30-year period centered around the year 2050. Climate projections used will be based on a multi-model ensemble mean. In order to comply with the SECAP requirements the %-difference will be reclassified into a qualitative statement of "increasing", "decreasing" or "no-change"	Qualitative: increasing, decreasing or no-change	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations

| SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
222	**Hazards Timeframe (current, short-term, medium-term, long-term, not known) - floods**	Indicator with the aim of assessing and evaluating climatic hazards in the regions and adaptation measures needed.	The hazards timeframe indicator will be set up as a function of the current and future change in hazard frequency. As an example, if the current hazard frequency is "high" or "moderate" and expected frequency "increasing" or "not-known", then the hazard time frame indicator will be classified as "short-term"	Qualitative: short-, medium-, and long-term	SDG 13.1	Linked to SECAP Adaptation pillar. RVA component	Public administrations
223	**Heating degree-days needed to maintain an average building indoor temperature of 15.5 degree Celsius**	This indicator measures the total effort needed to keep a decent indoor temperature / exposure to cold temperatures.	Data available at EURO-CORDEX, not further calculations needed	heating degree days	SDG 13.2	Linked to SECAPs Energy Poverty pillar	Citizens and public administrations
224	**Cooling degree-days needed to maintain an average building indoor temperature of 22 degree Celsius**	This indicator measures the total effort needed to keep and decent indoor temperature / the exposure to hot temperatures	Data available at EURO-CORDEX, not further calculations needed	cooling degree days	SDG 13.2	Linked to SECAPs Energy Poverty pillar	Citizens and public administrations
225	**CO₂ Emissions from transport**	This indicator estimates the CO$_2$ emission generated by the transport sector. It is a relevant sector addressed in Sustainable Energy and Climate Action Plans at local level	The values can be disaggregated using the data from EUCALC	Mt	SDG 13.2 SDG 13.3	Linked to SECAPs mitigation pillar. Transport section	Business and public administrations
226	**CO₂ emissions (per MWh or gigawatt) electricity consumed or Carbon content in electricity**	This indicator estimates the CO$_2$ emission per MWh of electricity generated to cover energy consumption. The CO$_2$ emission intensity is calculated as the ratio of CO$_2$ emissions from electricity generation and gross electricity generation. The GHG intensity of total electricity generation is taken as the ratio of CO2 equivalent emissions from all electricity production (both from main activity producers and auto-	The values can be disaggregated using the data from EUCALC	tCO2/MWh	SDG 13.2 SDG 13.3	Linked to SECAPs, coefficients of the different fuels	Public administrations

SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		producers) to total electricity generation, including electricity from nuclear plants and renewable sources					
227	**CO₂ emissions for buildings**	This indicator estimates CO_2 yearly emitted by buildings	The values can be disaggregated using the data from EUCALC	Mt	SDG 13.2 SDG 13.3	Linked to SECAPs mitigation pillar. Building section	Public administrations
228	**Public attitudes to Climate Change and Energy. How likely the impact of climate change will be very bad**	The indicator provides information on how climate change is considered	To be filled by the user in the Decarbonisation Profiler. Depends on data bi-directionality.	Index (0-100)	SDG 13.3		Citizens
229	**Forest area**	The indicator measures the proportion of forest ecosystems in comparison to the total land area. Data used for this indicator is derived from the Land Use and Cover Area frame Survey (LUCAS). According to the FAO definitions, Forest is defined as: "land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use" Total land area is the total surface area of a country less the area covered by inland waters, like major rivers and lakes.	Data available at Copernicus Land Monitoring Service - Corine Land Cover, not further calculations needed.	percentage	SDG 15.1 SDG 15.2	Could be linked to SECAP Adaptation pillar and actions	Public administrations
230	**Red List Index**	The Red List Index measures change in aggregate extinction risk across groups of species. It is based on genuine changes in the number of species in each category of extinction risk on The IUCN Red List of Threatened Species (IUCN 2015) is expressed as changes in an index	To be filled by the user in the Decarbonisation Profiler. Depends on data bi-directionality.	Index ranging from 0 to 1.	SDG 15.5	Could be linked to SECAP Adaptation pillar and actions	Public administrations

| SOI nº	Indicator	Description	Methodology	Unit	SDG Goals & Targets	SECAP link	Stakeholder
		ranging from 0 to 1. Threatened species are those listed on The IUCN Red List of Threatened Species in the categories Vulnerable, Endangered, or Critically Endangered (i.e., species that are facing a high, very high, or extremely high risk of extinction in the wild in the medium-term future)					
231	*number of children*	Distribution of age groups, Demographic change in Europe	Data available at EUROSTAT, not further calculations are needed	number	-	-	Citizens and public administrations
232	*number of youth*	Distribution of age groups, Demographic change in Europe	Data available at EUROSTAT, not further calculations are needed	number	-	-	Citizens and public administrations
233	*number of elderly*	Distribution of age groups, Demographic change in Europe	Data available at EUROSTAT, not further calculations are needed	number	-	-	Citizens and public administrations
234	*Political action*	Provides information on whether respondents have participated in political actions other than voting, for instances: signing a petition, joining in boycotts, attending lawful/ peaceful demonstrations, or joining unofficial strikes	Data available at EU Social Progress Index - 2020, not further calculations are needed.	Qualitative (have done/ might do/ would never do)	-	-	Citizens
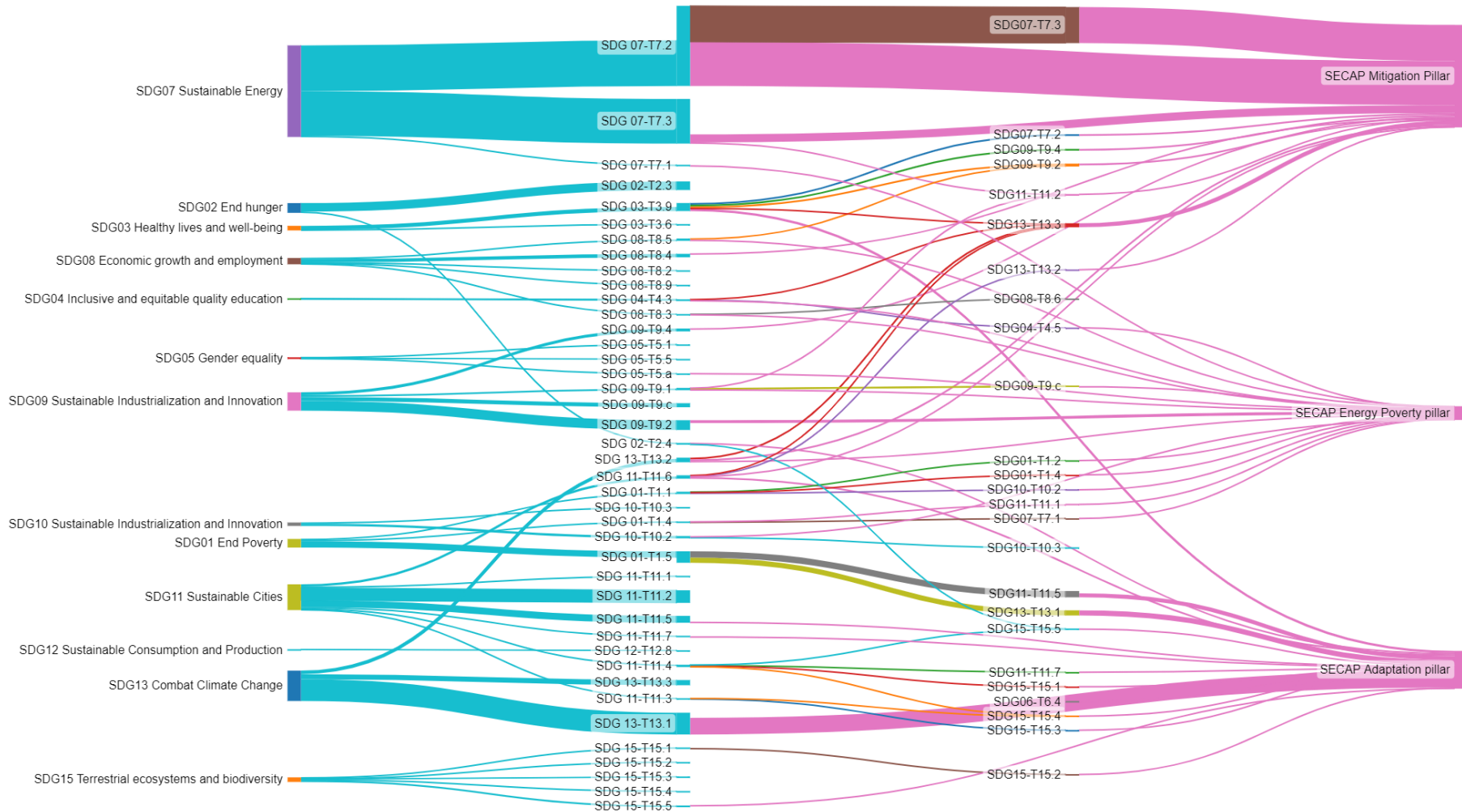
Figure 12 Relation between SDGs targets and SECAPs pillars (resubmission). Source: own elaboration
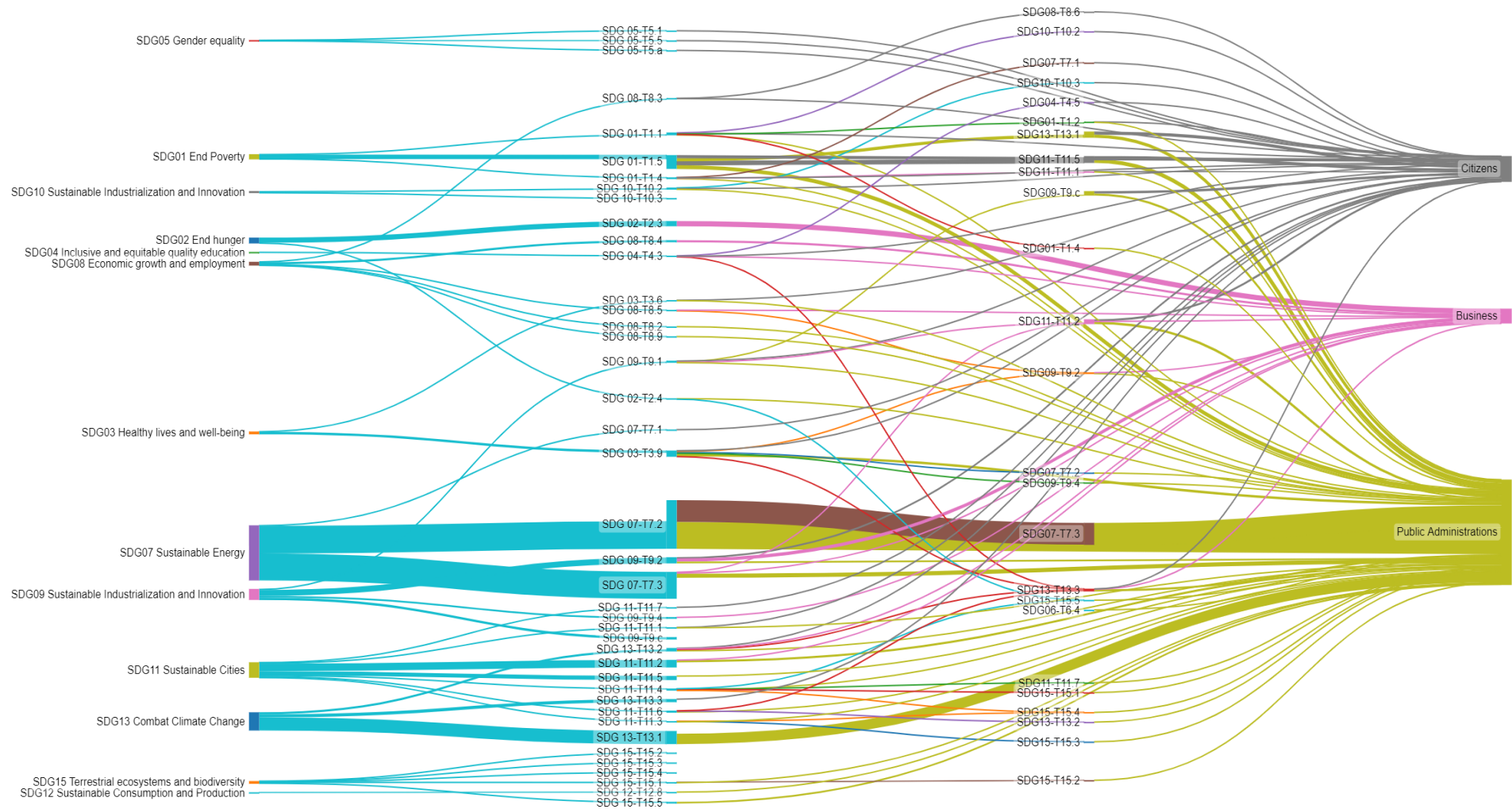
Figure 13 Relation between SDGs targets and relevant stakeholders (resubmission). Source: own elaboration

9. Conclusions

SDGs and SECAPs constitute two powerful instruments at local level to foster the implementation of mitigation, adaptation, and energy poverty actions. Nevertheless, as in many cases actions are interrelated, a holistic approach is necessary to achieve the objectives effectively. The goal of the task and this deliverable was to bring the two initiatives closer and analyse the potential synergies with the aim of aligning the objectives of both programs. Consequently, and with the aim of establishing a first set of proposed indicators connected to both initiatives, four consecutive processes were executed. An initial bibliographic review of local frameworks, a complementary process to align indicators with other work packages, the gathering of feedback from relevant stakeholders and lastly a first initial assessment to analyse the availability of data and the feasibility of implementation.

Initially, the set of 93 indicators constituted an initial draft illustrating the interconnections among the initiatives and highlighting the array of objectives and targets that were subject to influence through local to regional action plans. Concerning the feasibility of implementation, the initial assessment of disaggregation had already identified certain potential challenges that could have arisen during data collection or the downscaled information processing.

During the second phase of the exercise (Resubmission), a comprehensive analysis to re-evaluate the initial set of indicators and tackle the previously identified barriers has been performed. The aim was to validate data source availability and create new methods for acquiring regional-level data. The update was made possible through the progress of other work packages, including D2.5 (Climate change database and other spatial data), D3.3 (Database containing all relevant data for the year 2020), and D5.2 (BEI and RVA dynamic templates for dynamic implementation). These work packages either rely on the SOIs or are concurrently developing information that will be used for SOI calculations.

 The latest procedure involved removing certain original indicators, replacing others with similar ones, finding alternative calculation methods to overcome data availability issues, and breaking down some indicators that initially combined various individual variables. As a result, the list has now expanded to include 234 indicators.

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Annex I

The 30 indicator sets included in the report *Indicators for European cities to assess and monitor the UN Sustainable Development Goals* are the following:

- *Global Urban Indicators Guidelines*
- *Global Urban Indicator Database v.2*
- *City Development Index (UN-Habitat)*
- *City Prosperity Index (UN-Habitat)*
- *City Biodiversity Index Manual*
- *ISO 37120 - Indicators for city services and quality of life*
- *U4SSC Collection Methodology for KPIs for Smart Sustainable Cities*
- *Reference Framework for Sustainable Cities*
- *First generation of EU Common Indicators: Towards a Local Sustainable Profile*
- *Indicators for EU cities - Urban Audit*
- *Perception of Quality of Life - Urban Audit*
- *Mapping and Assessment of Ecosystems and their Services (MAES)*
- *EU Green Capital Award*
- *EU Green City Tool*
- *EEA Urban Metabolism Framework*
- *EEA indicators - Urban vulnerability Map book*
- *EEA indicators - Similarities and diversity of European cities*
- *City Blueprint Framework*
- *Informed Cities - Urban Ecosystem Europe (ICLEI & Ambiente Italia)*
- *POCACITO - Report on Key performance indicators*
- *Indicators for Sustainability*
- *Cercle d'indicateurs des villes suisses*
- *Bertelsmann - SDG indicators for municipalities*
- *Sustainability Tools for Assessing and Rating Communities*
- *Equitable and Sustainable Well-Being in Italy*
- *EU Green City Index*
- *City Region Food System Indicator Framework*
- *US Cities SDG Index - SDG Mapping Worksheet*
- *Urban Data Platform*
- *Euro Cities SDG Index – SDG mapping Worksheet (prototype version)*

Annex II

In this Annex II they can be found below the interviews made with the so-called wise group, with their feedbacks for the proposed questions. As mentioned, some of those goes beyond D5.1 and will be considered for other purposes of LOCALISED.

Questionnaire Introduction

LOCALISED is a European-funded research project which is **developing end-user products and services for local and regional administration and their citizens as well as policy and business decision-makers** in ad co-design process, by providing **downscaled national Decarbonization trajectories**, consistent with Europe's net-zero target, and helping to **upscale the definition and implementation of mitigation and adaptation measures at local level, the establishment of Sustainable Energy and Climate actions plans (SECAPs) and the monitoring of related Sustainable Development Goals**.

The LOCALISED project targets the **NUTS-3 administrative level for all Europe**, to help regions and their local administrations and businesses understand what options they have to adapt to and mitigate the impacts of climate change, and how these can be implemented, taking into account energy justice.

With this it is contributing to achieving the goals of the **European Green Deal** on reducing its net greenhouse gas emissions by at least 55% by 2030 (compared to 1990 levels) in a fair way, leaving no one behind.

WP5 Background and methodology

As a part of WP5 **an extensive review has been done to analyse the Sustainable Development Goals, specifically the targets and indicators reported at local and regional level and the components established and included in Sustainable Energy and Climate Action Plans (SECAPs)** pr**omoted by the Covenant of Majors (CoM) initiative**. The aim of the task was to gather a **set of oriented specific indicators** to help local authorities define the steps and measures **to successfully**

implement both SECAPs and the 2030 Agenda and define mid to long-term scenarios at local level, based on introduced and reliable indicators. The alignment between the two initiatives will provide a clear robust framework to define the necessary measures and effectively allocate resources, leading to comprehensible, feasible, and effective long-term strategies.

An initial search was conducted in order to identify scientific papers and grey literature, such as local reports. **Scientific literature was identified through a methodical literature review using the search engine "web of science"** due to its broad coverage of sustainability journals. **Regarding the grey literature, the approach to identify local indicator frameworks was conducted using the Google engine,** the search engine facilitated the identification of a significant number of reports related to VLR and initiatives that gathered information around the subject, such as Local2030 and SDSN TRENDS. In addition, **other initiatives were found through references in scientific articles or institutional reports and the authors' professional networks**. **A total of 185 resources were identified, and then filtered, leaving a total of 24 documents to be included in the analysis.**

Eight representative cases were selected from the sample considering their scope and relevance with the **aim of identifying similarities and differences between the global SDGs framework and the indicators chosen to downscale the framework by regions and cities**.

At the international level, three relevant reports were selected:

- **The European Handbook for SDGs Voluntary Local Reviews** (Siragusa, Vizcaino, Proietti, & Lavalle, 2020) as it was developed at the European level and contained a detailed guideline to implement SDGs at the local level, with 71 selected indicators.
- **The OECD localized indicator framework for SDGs** (OECD, 2020), developed as a framework to measure the distance towards the SDGs for more than 600 regions and 600 cities
- **The report Indicators for European cities to assess and monitor the UN Sustainable Development Goals** (de Maio, Kuhn, Fons Esteve, & Prokop, 2020), since it is an extensive analysis of the link between SDGs targets and goals listing more than 2000 possible indicators present in 30 existing urban indicators sets.

At the regional and national scale, three representative cases were selected for the analysis:

- **The report Local Indicators for The 2030 Agenda (Sustainable Development Goals)** (Idea Group & Association of Flemish Cities and Municipalities (VVSG), 2019), developed as a manual for Flemish Cities and Municipalities, due to the detailed methodology described including the analysis of

relevant local indicators, their correlation with the global SDGs indicators and their sources and modes of calculation

- **The second edition of the REDS report Los ODS en 100 ciudades españolas** (Sánchez de Madariaga et al., 2020) as it was developed and tested in 100 cities with more than 80.000 inhabitants
- **The framework proposed by the Province of Barcelona** (Diputació Barcelona, n.d.) to monitor the progress of SDGs goals in the region which gives an overview of the indicators and targets selected for monitoring and comparing the progress in 311 different municipalities of the province therefore in a regional scale.

Finally, two case studies at the local level were included in the analysis:

- **The indicator framework developed by the city of Barcelona** (Barcelona City Council, 2022), which has an extensive analysis of indicators and publicly available open database (Barcelona City Council, 2022)
- **The indicator set proposed by the city of Los Angeles** (Bromaghim, 2019). The latter, albeit it was outside the original scope of the study, which was focused on the European territory, was included due to their long experience on developing and implementing VLR.

In order to reduce the list of potential local indicators, the indicators were moved to a second list if they complied with at least one of the following criteria:

- **F1**: indicators proposed by more than one source to monitor the same target
- **F2**: indicators that were linked more than one target, therefore could serve to reduce the total amount of indicators needed to address SDGs.
- **F3**: indicators that were either constructed or based in metrics reported in SECAPs
- **F4**: indicators that could be constructed using open data sources such as Eurostat.

Furthermore, since the task aimed to identify indicators for all NUTS-3 regions in Europe, all indicators based on locally developed surveys were discarded. **After applying the four filters, a total of 314 potential indicators were listed, which contained 191 unique indicators since several were associated to multiple targets**. *Figure 14* reflects the interconnections found between SDG targets and SECAP mitigation pillar.

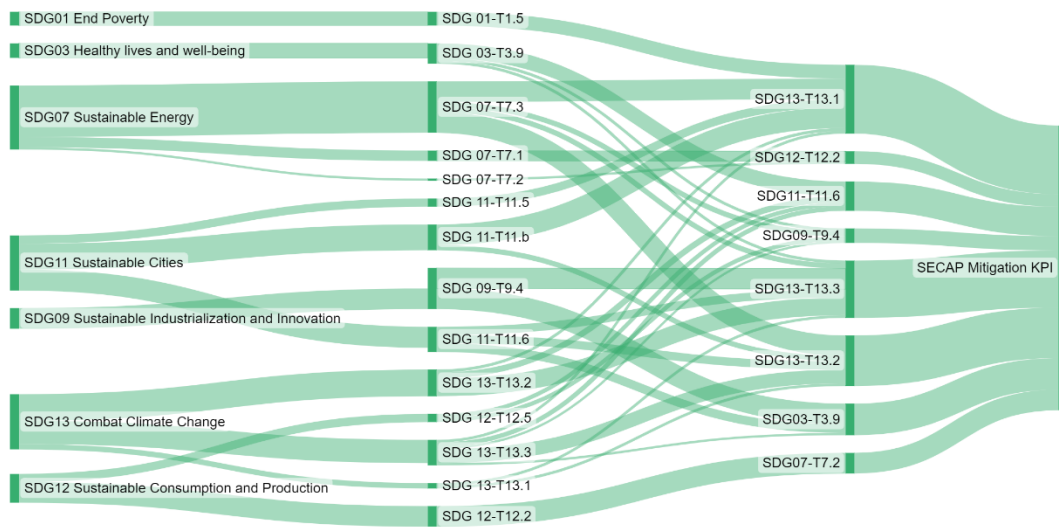*Figure 14. Relation between SDG targets and SECAP mitigation section. Source: own elaboration*

Finally, the indicators were complemented with other metrics in the framework of WP6 (social aspects), WP7 (business) and WP4 (adaptation) and then filtered and prioritized considering the feasibility of having the data in the necessary scope (NUTS-2 or NUTS-3), yielding a total of <u>92 potential indicators</u>.

Feedback from relevant stakeholders

The following questionnaire has been developed as a fundamental part of this task to support the accurate implementation of indicators and the transposition of helpful resources to construct SECAPs. Its purpose is to obtain the feedback of relevant actors involved in the plan development process to have a clear view of the related issues which might arise during the implementation.

LOCALISED stakeholder ID: **27**

Organization: **Join Research Center (JRC)**

Names: **Giulia Melica, Aldo Treville**

Partners participating in the meeting: **Jordi Pascual (IREC), Soledad Ibañez (IREC), Katje Firus (T6)**

Date and place: **01/12/22, online**

General aspects
Does the methodology used seem appropriate? Or is there any relevant aspect/document that you think is worth reviewing?
If the indicators listed in the CoM templates were already reviewed there is no other suggestion to complement the process
Based on your experience, how often do you think it is relevant to update the data/information relative to the implementation of SDGs/SECAPs?
The CoM establish a qualitative mandatory reporting every second year which addressed the level of implementation of the actions and a four-year quantitative report which included the update of the BEI. The main reason behind this timeline is the time needed to fully implement some actions and in other cases the difficulty to obtain updated information in a shorter period. *In addition, before establishing the periods the CoM consulted several practitioners that agreed on the timeline proposed. Nevertheless, there are cities that are updating the information more quicky, if you have the resources to do update the information in a shorter timeframe even better.*
In the process of establish indicators, are there any important aspects you think should be noted? (e.g., difficulty to establish some, lack of clarity, not often used or only used to track action progress)
If you provide the information, then there is no mayor problem detected. The main issue for cities is obtaining this kind of data themselves. However, it would be advisable to clearly indicate the methodology adopted for calculating the metrics so the users have a clear notion of what aspects are being considered, specially if they would be allowed to alter the data.
Considering the relevance of aligning both Covenant of Majors and SDGs initiatives. What do you think are the main difficulties in aligning both initiatives?
Definitely is something that would be useful, even though SDG are broader the link would be valuable to show municipalities how they are contributing to other initiatives that go beyond the scope of CoM. There is also a JRC group that is working on localising the SDGs.
Is there any capability that LOCALISED could implement that would help foster the implementation of actions in either of the initiatives?

Definitely the definition of adaptation indicators and actions. There variety of different definitions and methodologies available can be overwhelming or even difficult to find, so the introduction of a clear set of indicators could be beneficial for several initiatives.

Sustainable Energy and Climate Action Plans (SECAPs)

General

Even though there are visualization sections in the CoM website in detail for the proposes of the project it would be ideal to have more detailed downloadable information.
Is it possible to obtain more detail information about the information reported by the cities? (Signatures, BEI, RVA, measures implemented) or there is any database with relevant information that can be downloaded? Is there a specific contact person who can help us gather data or information?
Is it possible to link the CoM data/website to LOCALISED? Do you think is helpful?

Contrary to LOCALISED project, the CoM initiative is constructed using a bottom-up approach, so they could definitely interact, the CoM data could be used to several proposed such as checking the results the profiler.

Regarding availability of data the JRC releases reports twice a year, the last was published in September 2021, the link to the data is: https://data.jrc.ec.europa.eu/collection/id-00354

As the aim of LOCALISED is to provide relevant information to construct SECAPs by downscaling national pathways, based on your experience so far, what aspects are the most difficult to evaluate or develop by local authorities (or with major gaps) and how we can contribute to improve those?

In the case of BEI, many municipalities, especially the smaller ones, struggle with the energy consumption of transport sector. Oppositely, they work quite well buildings, not only municipals ones but also the private.
In Italy is quite easy to obtain information to fill building consumption, but in other countries it might not be that simple. Sometimes they have information related to the total building consumption, but they don't know which buildings are actually more responsible for that.
In other cases, the property around data can be a problem to access the required information, especially if they are not the ones managing them.

So far, a small number of municipalities have presented monitoring reports (less than 23%), based on your experience which is the reason of such low percentage? Which areas are the least addressed over the years?

There is no certainty if the amount of reports has improved over the years, but currently there are many smaller municipalities which are actively participating in the CoM, although most of the time is dure to the support of regional authorities such as DIBA (Barcelona province.
Nevertheless, the lack of support or subsidies for the monitoring process is the main reason why some municipalities do not present following up reports.

Do you think a comparable feature that would allow municipalities to see how other equivalent regions are dealing with climate change would be useful?

That would be interesting, this is a common aspect many municipalities request. Could be useful for BEI or hazards or even for reviewing the type of actions being implemented.

Do you think that the current situation (price volatility, lack of materials, lack of resources) should be considered in the evaluation/development of SECAPs. If so, how? If there is any guide/initiative where they have begun to analyse the implications of the current global context?

In the context of CoM they are not specifically addressed. The energy crisis is very prominent and the need to reduce the energy consumption is an important aspect in the context of the CoM, and also an aspect that is very relevant for the European commission.
Maybe there are some initiatives at city level but at this point they are not aware of any.
In any case, it would be interesting to have these data in the assessment (energy prices, material scarcity) also to evaluate which actions are actually more effective considering their implications on the emissions.

How do they deal with energy savings that are not directly/clearly applied (awareness campaigns, renovations but in the private sector, implementation of plans, etc.)

That kind of actions are the most common ones in SECAPs, but they don't really verify the energy savings estimations for each action, only the overall saving and energy savings for three key actions.

Is it possible to associate an action to both aspects (mitigation and adaptation)? Or how do you handle (if considered) the interactions between both aspects (which are sometimes counterproductive)

*In the CoM is possible to flag the action to both pillars, they actually encourage it. they also insist a lot to avoid maladaptation. During the developing of training they came up with the concept "**adaptigation**" but this is an aspect that is definitely not so clear for cities.*

Mitigation & BEI

Buildings

The differentiation between public and private buildings has been identified as a potential issue, specifically those which are managed exclusively by local authorities. In the case of our project, this problematic can be even more accentuated since we would have to downscale national data in most of the cases. Is there any methodology or categorization suggested for addressing this issue when the data is not clear?

If they don't have disaggregated data, there is an option on the reporting template to introduce a notation key (not estimated, not available, not disclosable), for example if you have the total by category but not differentiated. The only mandatory information is the subtotal of buildings.

We have detected that industry is the only non-mandatory aspect in the building section. Is it not mandatory because they are difficult to report or because it has little weight in the category? Do you think it would be relevant to provide information of this sector?

They don't really have the power to implement actions or influence them so that's why is considered optional. The access should not be so problematic even though in some cases they might be

Transport

Public vs private categorization has been identified as a potential issue also in the transport sector (and also considering that most of them are managed by different authorities, sometimes local, others regional or national). Which Transport modes would you categorize as public? (Do you agree to our suggestion of categorization: bus, rail, airways, and maritime related data as public, and passenger car and truck as private)

The recommendation is to include the ones they own or manage. There is a guideline on the CoM that could help decide which transport to include.
The CoM makes more emphasis in road transport which causes the majority of the emissions, so if the municipality doesn't have municipal data they can focused on road transport.

How do you define/measure the access and the performance of public transport?

The don't do it

Do you track the occupancy rate of your public transport system?

The don't do it

How do you define the transport demand (passenger-km or vehicle-km) within the boundaries of your region? How do you consider interregional transport of people/goods from outside to your region and the other way round?

The part that should be included is the journey that occurs in the boundaries of the municipality. If the local authority has the opportunity to influence them, they should try to include the data and propose some actions. If there are highways that go beyond the limits of the city the inclusion is optional.

Other sectors (forestry, fishery etc.)

Are these sectors not mandatory because they are difficult to report or since they have little weight? Do you think it would be worthy to provide information about these sectors?

They are responsible for a small share in the total emissions and that's why is optional. If it is an important part should be included

Energy generation

[D5.1] - [SOIs for SECAPs definition and assessment]

As other parts of the reporting template, establishing the limits or defining what can be included as "local production" is a complex problem for some municipalities. Is there any specific recommendation/guideline to address the production of renewables when for example the municipality has production outside the administrative limits? Is there any policies or recent studies that address this problematic specially for municipalities that do not have space to introduce them?

The are some criteria in the guidebook, it depends in the geographical location and ownership. if they own it and they are outside they can include them. At the maximum it should match the energy consumption of the region, but it is exceeding the total, then the other part cannot be counted, it will never be negative.

Adaptation & RVA

The Risk and Vulnerability Assessment (RVA) so far has been done by a qualitative approach that scales the hazards according to different levels (low, medium, high, etc.), is there a specific methodology you recommend to establish which conditions must be present to consider a specific aspect as low, medium etc?

In theory it not supposed to be qualitative, there are guideline which provides some indications, for example more than 20 is hight, 10 to 20 is medium, etc but is not so straightforward for all hazards They are working on having more detailed guidelines.

Linked to the previous questions, which RCP scenario is recommended to be considered when evaluating RVA? Do you think it could be helpful to have those impacts for different RCP scenarios?

Since RCP are most or less similar during the first years (5-10 years) this is not a relevant aspect since SECAPs usually addressing up to 10 years so for that period there are not so dissimilar between each other

Based on our preliminary search biological hazards are difficult to establish and data is mainly absent. To your knowledge is there any database of guideline to address these aspects?

Is the least reporting hazards and also the one that has the least actions proposed. What they have seen is mosquitos in cities but not more, definitely is something that has not been addressed so much up to now.

Energy poverty

Is there a specific methodology that you can facilitate us to properly understand how this aspect should be addressed? (At the moment we could downloaded the document from the website)

At the moment they have only set one mandatory indicator, for the rest they leave total freedom to use the ones listed or others.
A broader methodology around energy access and poverty can be found in the global CoM
https://www.globalcovenantofmayors.org/wp-content/uploads/2022/11/Energy-Access-and-Poverty-Pillar-Annex-to-the-CRF.pdf

Is it projected to link the Energy poverty assessment with other current/future dynamics such as the energy poverty advisory hub?

Already working very closely, the hub is providing some capacity building activities and the covenant is advised to use the resources of the hub

Other complementary aspects

Are you aware of any other initiatives that are linked to improving the implementation of SDGs/SECAPs at the regional/local level?

Not at the moment, but it would be interesting to include more regional authorities in the process because in the end they are responsible for the emissions and also they mostly don't have resources

Organization: **Estudi Ramon Folch (ERF)**

Names: **Ivan Capdevila, Carla, Garcia**

Partners participating in the meeting: **Jordi Pascual (IREC), Soledad Ibañez (IREC)**

Date and place: **02/12/22, online**

General aspects
Does the methodology used seem appropriate? Or is there any relevant aspect/document that you think is worth reviewing?
The process seems good specially since there are thousands of different problematics. In our perspective and based on our experience with several local authorities is important to reduce the number of indicators and establish fewer clearer problems to address.   *Administrations do not have capacity to follow up thousands of different indicators, and overwhelming number of multiple metrics ends up effecting the monitoring process and the actual implementation of actions. That is one of the reasons of why the monitoring process is almost never done*   *The current list of indicators in SECAPs in SDGs is not helping, there are too many problems, specially talking about the SDG, SECAPs at least allow a more tailored view of what needs to be done, even more for small towns.*
Based on your experience, how often do you think it is relevant to update the data/information relative to the implementation of SDGs/SECAPs?
Ideally each year, but if this is not possible, at least during the election years (each 4 years) so the elected authority has a real and accurate vision of the current situation, what has been done so far and which areas need more improvements.
In the process of establish indicators, are there any important aspects you think should be noted? (e.g., difficulty to establish some, lack of clarity, not often used or only used to track action progress)
The availability of data after the initial use of the platform, even though you provide the data for the initial assessment, if you whish to promote a more dynamic process, then municipalities need to be able to obtain the updated data to keep feeding the platform and follow-up the actions.
Considering the relevance of aligning both Covenant of Majors and SDGs initiatives. What do you think are the main difficulties in aligning both initiatives?
Seems interesting if from the SDG point of view, this could help to have a more clear view of the mitigation/adaptation aspects that are covered in local planning.
Is there any capability that LOCALISED could implement that would help foster the implementation of actions in either of the initiatives?
A clear establishment of the objectives to achieve (optimal value), the current data to develop the plans, and also the comparison with other municipalities to see what other regions are doing.   *In the case of Barcelona, the engagement of the municipalities is encouraged by the establishment of support from regionals authorities or the implementation of subsidies. In the same line data collection and disaggregation is done by DIBA and then facilitated to the different majors, but this situation is particular for a specific province and is not always the case. In other regions data is missing and no support is given, then the process is much more complicated.*
Sustainable Development Goals (SDGs)
So far, the implementation of SDG has been addressed by public administration, considering that fact, do you think that the SDGs indicators related to business and citizens are relevant/useful for accelerating the achievement of goals?

The perception is that this has been always green washing. It could be relevant to explain how these actions and goals are related connected to their da to their everyday life, but the inclusion of more indicators doesn't necessary mean that the objectives will be met before or more properly.
What's more, many companies use a large number of indicators to create a kind of confusion and sell an image of innovation, but in fact they don't actually implemented anything.

Do you think it is more relevant to have outcome indicators (e.g., emissions reduction over time) or should they be more directed at overseeing the implementation of actions (% of buildings renovated)?

Outcome indicators for sure, they are fundamental to monitor the overall goals, although metrics to monitor measures are also needed

Related to the last question, several studies also discuss the relevance of using weighted indicators such as emissions by capital instead of absolute number as total emissions. Based on your experience which type of indicators are more appropriate?

Emissions/capita are more relevant for city/regional level, to track changes that can be due to the increase of population instead of bad behaviour.
The absolute number is more valid a national level because the global goal has to be achieved.

Considering that the total number of indicators is a topic frequently discussed in bibliography, based in you experience the quantity proposed (Business:20; Public Administrations: up to 46; Social: up to 26) is adequate or it should be reduced?

The less the better, as we have the GDP as a clear economic indicator, is better to have one or two clear indicators to each part, such as emissions for mitigation.
For example, a work was done to a very active municipalities in the Barcelona area, called Viladencans, which wanted to have a strategy a city level. The total amount in the initiative is around 150, but only 10 are related to SECAPs.
In the Balearic Islands they are working with 23 environmental indicators.
Is also relevant to think who is the person that needs to fill the information, and from where the information is coming from, is the data is national or regional or they have to populate them with local data.
Some of the indicators in the list seem redundant, and even more they are difficult to obtain. DIBA for example gathers all the information coming from national and regional institutes and disaggregates the information for the different municipalities.
Oher important aspect to consider is than then municipalities have to follow up the actions and update indicators, so in the end the data needs to be available on the region after the first use of the platform.

Based on the list of potential indicators proposed (file attached), do you think there is any relevant aspect that has been left out of the list and should be considered?

The monitoring of the indicators, in most cases the impacts are estimated and therefore is also important to have indicators that specifically monitor actions there % of buildings renovated etc.

Linked to the previous one, to your knowledge is there a target/goal that should be a priority for regional/local authorities (NUTS-3 or city scope) considering the current situation?

CO_2 emissions and energy consumption.

Sustainable Energy and Climate Action Plans (SECAPs)

General

Even though there are visualization sections in the CoM website in detail for the proposes of the project it would be ideal to have more detailed downloadable information.
Is it possible to obtain more detail information about the information reported by the cities? (Signatures, BEI, RVA, measures implemented) or there is any database with relevant information that can be downloaded? Is there a specific contact person who can help us gather data or information?
Is it possible to link the CoM data/website to LOCALISED? Do you think is helpful?

They use local or regional data facilitated by the regional authorities. INE/INESCAT have data at national/regional level for Spain.

Do you think that the current situation (price volatility, lack of materials, lack of resources) should be considered in the evaluation/development of SECAPs. If so, how? If there is any guide/initiative where they have begun to analyse the implications of the current global context?

One clear path is to decentralize the production by implementing local production, energy communities and other initiatives, to put people at the center and avoid the dependency on the energy network.
Also, by implementing actions at cost "cero" such as prohibiting exterior heating devices in bars etc. so unnecessary materials and resources can be avoided

How do they deal with energy savings that are not directly/clearly applied (awareness campaigns, renovations but in the private sector, implementation of plans, etc.)

An impact objective is established (always very conservative), for example, a given campaign will have an impact on x% on households. Of these homes, we estimate that there may be a saving of y% over the residential sector (it may be different depending on the energy source). The impact objective must be associated with the budget and the definition of the action. If there is a low investment, we will estimate little or no effect. The objectives and percentages of savings are based on technical criteria and previous experiences, or criteria of the DIBA.

Is there a pre-established list of actions/indicators that you use on a recurring basis in all SECAPs?

There is no pre-established list, but there are key actions that we try to implement, in case they are not there:
Energy transition
- o Municipal energy manager
- o Energy saving plans in equipment and public lighting
- o Deployment of municipal renewables and purchase of certified renewable electricity
- o Public transport improvements
- o Promotion of energy rehabilitation in the domestic sector
- o Promotion of renewables at the private level (rebates ordinances, self-consumption and energy communities, communities in economic activity polygons...)
- o Shared transport options
- o Support for electric vehicles (municipal tax discounts) and charging infrastructure boost
- o Waste prevention and recycling plans

Adaptation
- o Water saving ordinances, consumption reduction, gardening adapted to low consumption, investments in the supply network
- o Updating and homologation of Civil Protection planning
- o Sustainable forest management (maintenance prevention tasks, forest management to obtain biomass, etc)
- o Improved green spaces, climate shelters, heat wave protocol.

Then we review more deeply the reality of each municipality to see if there are issues to address
There are also some resources from the DIBA, but they are a bit outdated
https://www.diba.cat/documents/102577937/111295166/accions_potentials_rev+feb14.pdf/939c2e34-57f0-48a0-91ce-9d60e6134423
https://www.diba.cat/web/alcaldespelclima/eines-i-publicacions (Excel of actions)

As a part of the development of SECAPs we have identified some editable excels, in this case provided by local authorities (DIBA or others), where a first intent of connecting SECAPs and SDGs has been made. Have you followed any methodology to link the goals with the actions or you have used your internal technical knowledge to establish the interactions? – question only for consultancy companies -

In general, is done internally, it is a very simple relationship, and it does not require a great experience in ODS.
DIBA also has resources to publicize the SDGs
https://www.diba.cat/web/ods

Mitigation & BEI

Buildings

We have detected that industry is the only non-mandatory aspect in the building section. Is it not mandatory because they are difficult to report or because it has little weight in the category? Do you think it would be relevant to provide information of this sector?

Is mainly because regional or local authorities don't have data for this sector, mostly it is a matter or ownership and availably, or the impossibility to influence them. But even though there are mostly not included on the BEI sometime actions are foreseen in the plan, same with other sectors.

Transport
Public vs private categorization has been identified as a potential issue also in the transport sector (and also considering that most of them are managed by different authorities, sometimes local, others regional or national). Which Transport modes would you categorize as public? (Do you agree to our suggestion of categorization: bus, rail, airways, and maritime related data as public, and passenger car and truck as private)
The movements that are inside the municipal are included in the plan such as municipal fleet, urban transport if the municipality has it and cars.

Other sectors (forestry, fishery etc.)
Are these sectors not mandatory because they are difficult to report or since they have little weight? Do you think it would be worthy to provide information about these sectors?
Same than industry, is because the difficulty of obtaining data.

Adaptation & RVA
The Risk and Vulnerability Assessment (RVA) so far has been done by a qualitative approach that scales the hazards according to different levels (low, medium, high, etc.), is there a specific methodology you recommend to establish which conditions must be present to consider a specific aspect as low, medium etc?
In general, for the projects in the province if Barcelona the process is conducted using some regional tools (ASVICC) and by conducting detailed meetings with the municipal areas. The assessment is very qualitative. The are some resources also from Barcelona's province: https://www.diba.cat/web/alcaldespelclima/eines-i-publicacions For the Barcelona Metropolitan Area (AMB), work has been done in a different way, although it is also a qualitative assessment. (Page 44 of the doc defines the methodology). https://www.elprat.cat/sites/default/files/documentos_descargables/3_4_3_pla_adaptacio_canviclimatic_prat_0.pdf

LOCALISED stakeholder ID: **58**

Organization: **ICLEI**

Names: **Vasileios Latinos**

Partners participating in the meeting: **Jordi Pascual (IREC), Soledad Ibañez (IREC), Katje Firus (T6), Bernd Hezel (CMF)**

Date and place: **02/12/22, online**

General aspects
Does the methodology used seem appropriate? Or is there any relevant aspect/document that you think is worth reviewing?
Seems appropriate, but it would be relevant to explain the methodology followed and the process in more detail.
Based on your experience, how often do you think it is relevant to update the data/information relative to the implementation of SDGs/SECAPs?
The idea if the Com is to push more to unify more the system and make it more practical, ICLEI has been working in that and they offer a platform so municipalities can upload information whenever they

have new data with the aim of facilitating the monitoring process and to gather data in a structured way. The link is. https://www.cdp.net/en/cities/registrations/new
Even though, the data of SECAPs in CDP and in the CoM is not public, there is potentially sensitive information.
As for the CDP website the CoM also promotes its use but there is no specific mention of SECAPs since they cover some areas but not all of them.

In the process of establish indicators, are there any important aspects you think should be noted? (e.g., difficulty to establish some, lack of clarity, not often used or only used to track action progress)

As for the indicators even though the ISO framework was included in one of the case studies it would be relevant to review in more detail.

Considering the relevance of aligning both Covenant of Majors and SDGs initiatives. What do you think are the main difficulties in aligning both initiatives?

The CoM is quite a successful initiative and is quite old (15 years), so is good and relevant to align both of them since SDGs force to see everything broadly while the CoM is clearly looking to climate neutrality and resilience. In recent years the CoM have tried to push more the adaptation pillar and not only mitigation actions. Nonetheless, is necessary to highlight that the scope of SECAPs is limited.

Sustainable Development Goals (SDGs)

Considering that the total number of indicators is a topic frequently discussed in bibliography, based in you experience the quantity proposed (Business:20; Public Administrations: up to 46; Social: up to 26) is adequate or it should be reduced?

Is not a matter of quantity, but to order them by thematic also to so could see the targets that are related to the same are together,

Sustainable Energy and Climate Action Plans (SECAPs)

General

As the aim of LOCALISED is to provide relevant information to construct SECAPs by downscaling national pathways, based on your experience so far, what aspects are the most difficult to evaluate or develop by local authorities (or with major gaps) and how we can contribute to improve those?

In general, the data sharing is an issue, how to make sure that the data is available and who has it, Regarding the areas, scope and ownership are relevant, what is the geographical scope covered, who is the person who manages It, and if it is possible to implement actions. There are topics that can be more unclear, such as urban green.
It would be valuable to help municipalities monitor or establish some aspects. Air quality is an issue, how to monitor it and how to analyse the information since it is coming from different sources, another common issue is how to determine the boundaries or limits in SECAPs (what to include or not).

Do you think a comparable feature that would allow municipalities to see how other equivalent regions are dealing with climate change would be useful?

It can definitely be useful, but of course it needs a proper analysis. If some resources are dedicated to conduct a proper analysis the feature can be helpful.
There are some methodologies out there related to smart benchmarking
- *Leadership governance*
- *Resources infrastructure*
- *Cooperation collaboration*

Then you can have subtopics. Subdimensions such as climate or geographical scope for example in infrastructure, or and government structure in governance
He will share the link: pending

Do you think that the current situation (price volatility, lack of materials, lack of resources) should be considered in the evaluation/development of SECAPs. If so, how? If there is any guide/initiative where they have begun to analyse the implications of the current global context?

The Com is more focused on policy planning, and is also a political instruments since mayors are involved and commitments are signed, but so far the subject has not been discussed. It would certainly be useful if the project provides and approach.
He would also check with other colleagues to see if this is discussed in other parts of the CoM.

How so you make sure that the information coming from the SECAP is comparable
They should be comparable to some extent, even though municipalities don't have specific guidelines to every aspect included in SECAPs there are many aspects where recommendations are made.
Other complementary aspects
Are you aware of any other initiatives that are linked to improving the implementation of SDGs/SECAPs at the regional/local level?
The contract of CoM ends this year, so it's a good time for proposing improvements or collaborations. Meeting will be held next year in this context to gather feedback around the work done so far and what improvement are needed, and also to see how to take the CoM to the next level. They will invite 4 consultancy offices to help in the process.