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Report on semi-automated methodology to monitor check and maintain the service

D5.5

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LOCALISED

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4. List of Abbreviations

BEI	Baseline Emission Inventory
CAST	Climate Action Strategiser
CoM	Covenant of Mayors
DSP	Data Sharing Platform
D	Deliverable
EPA	Energy poverty Assessment
EUCALC	European Calculator
LAU	Local Administrative Unit
MIDAS	Modular Integrated Decarbonization Adaptation Solver
NUTS	Nomenclature of Territorial Units for Statistics (from French: Nomenclature des Unités Territoriales Statistiques)
RVA	Risk and Vulnerability Assessment
SDG	Sustainable development goals
SECAP	Sustainable Energy and Climate Action Plans
SOI	Sustainable Oriented Indicator
T	Task
WP	Work Package

5. Executive Summary

The primary goal of this document is to provide guidelines for integrating effective monitoring of the adaptation and mitigation measures collected in WP4 by CAST developers in WP8. The developments are also strongly connected with WP3 which is responsible for providing data to the calculation engine and the variables that will be used for monitoring.

This document offers practical recommendations aimed at enhancing the design and functionality of the CAST platform, ensuring alignment with the requirements of the CoM and SECAP initiative. It outlines how the CAST platform should function within the existing framework, detailing how data should be classified, how frequently it should be monitored, and how it should be reported.

To understand how local administrations operate and how the CAST platform might be utilised from a stakeholder perspective, an analysis was conducted on the distribution of municipal-level competencies in four partner regions (Catalonia, Lower Austria, Twente and Toscana). These competencies refer to the set of responsibilities defined by the laws governing municipal administrative bodies, or in other terms, the services managed by local authorities. The results of this analysis help determine whether the SECAP-based classification proposed by the platform aligns with existing municipal departments or whether new classifications or additional information should be incorporated into CAST.

A crucial aspect of the platform is the correct labelling of data provided to the model. The deliverable proposes that each source of information presented to the user should be labelled with the date of the last update and how often future updates will occur. Additionally, a qualitative impact assessment has been assigned to the SOIs related to the adaptation and mitigation measures presented in Task 4.1. In cases where no specific numerical data is available, this feature allows users to foresee expected impacts based on their selected adaptation and mitigation measures. This section also includes a brief description of the semi-automated LOCALISED DSP update, which is designed to support the monitoring aspect of the platform.

The document also introduces the concept of an optimization functionality that could prioritise and classify the measures, indicators, and variables to be monitored based on their importance in achieving decarbonization and adaptation objectives. While this feature is still in development, it is planned for future integration into the CAST platform.

To inspire CAST designers in WP8, the report includes a curated collection of references related to the classification of information, graph displays, and the representation of both SECAP and Sustainable Development Goals (SDG) frameworks. These resources are intended to guide the visualisation of outcomes for monitoring users' decarbonization and adaptation plans. In addition, this section provides a step-by-step guide to platform navigation, with suggestions and requirements to be considered during the implementation of the monitoring guidelines.

Finally, the report proposes the inclusion of a "Tips" section to guide users towards best practices in monitoring. This section would showcase successful monitoring strategies from other administrations and offer examples of local databases available for data collection. This feature is designed to help users prioritise their monitoring efforts and improve data collection efficiency.

This document is an internal confidential report meant to be used internally. It does not feature a scientific outreach.

1.Introduction

Monitoring is crucial for measuring progress in decarbonization and climate adaptation. It helps administrators track advancements toward emission reduction and climate resilience goals while learning from their experiences.

The LOCALISED project aims to provide tailored measure sets to local administrations to help reduce emissions and adapt to climate hazards. Real-time data tracking from the user side is essential for a successful implementation. Continuous monitoring simplifies decision-making, improves performance assessment, allows correcting courses when needed, and increases transparency between citizens and administrations by ensuring policy decisions are based on evidence.

Two main frameworks have been considered for the development of the monitoring framework; SDGs and SECAPs. They both play a key role in reinforcing the CAST tool monitoring alignment with established frameworks and ensuring platform continuity. SECAPs are specifically tailored for local and regional governments, providing practical tools and methodologies for action plans. In contrast, the SDGs present broader, high-level goals that are not always easily adaptable to local contexts, making SECAPs the main framework for designing the monitoring feature.

Moreover, SECAPs align directly with EU climate and energy policies, like the European Green Deal, making it easier for municipalities to access funding and technical support. While both frameworks emphasise monitoring, the SDGs lack local-level indicators, whereas SECAPs offer more advanced methodologies to ensure effective implementation.

This document builds on the Deliverable 5.1 *Report on SOIs*, and focuses on monitoring the SECAPs and SDGs frameworks defined in that deliverable. The significance of these tools for establishing decarbonization and climate adaptation plans at the local level is further detailed in that anterior deliverable.

To create an effective monitoring feature for the CAST, it's crucial to consider several dimensions that will help users during the monitoring phase.

Why: The importance of monitoring is clearly stated in the Covenant of Mayors' commitments; it is a fundamental part of SECAPs, and should be represented in the CAST platform.

Who: Identify who should manage the monitoring of specific measures within local administrations, provide data, or be affected indirectly.

When: Harmonise CAST with the reporting frequency requirements of the SECAP framework. Provide labels to alert users about the last time the variables were updated and indicate how frequently they will be updated in the future.

What: Present the variables associated with the WP4 mitigation and adaptation database. Additionally, a prioritisation of variables could be provided, highlighting those

with the greatest impact on achieving decarbonization and adaptation objectives, and therefore where municipalities should invest their monitoring resources.

How: Guide the user in completing the monitoring steps effectively by including a "Tips" section, featuring case studies of best practices and examples of local databases accessible at the local level.

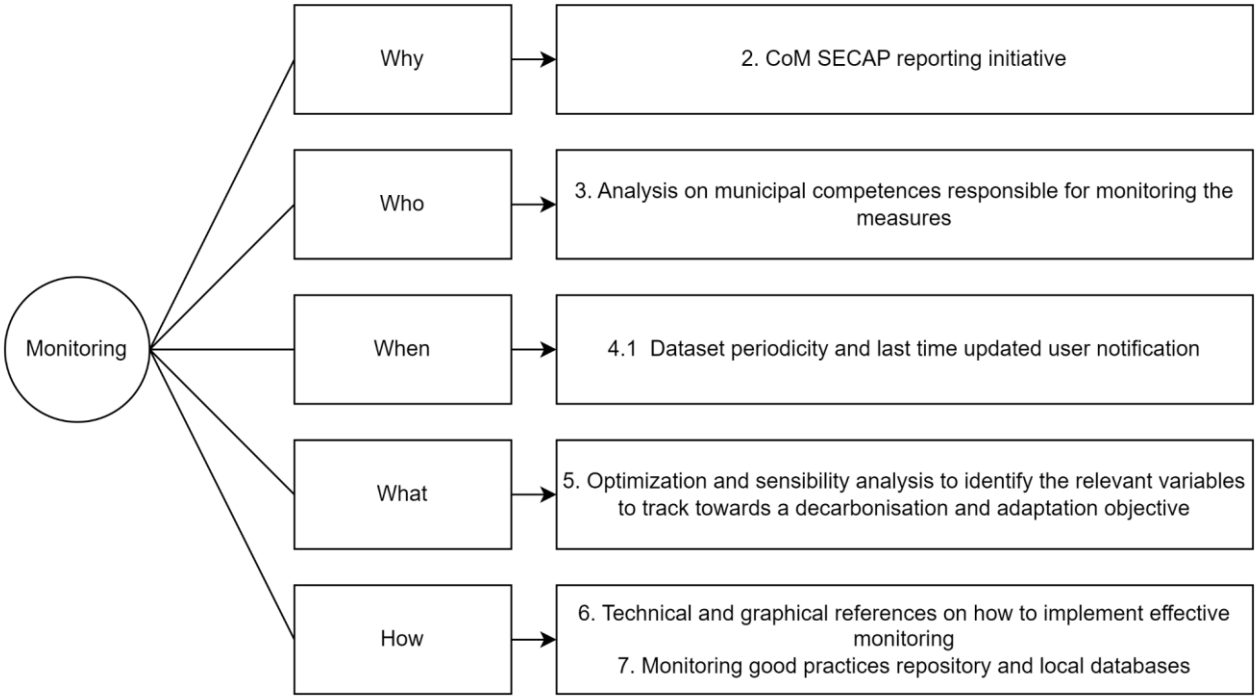


Figure 1 Monitoring essential points

It is important to note that incorporating a monitoring functionality into the CAST enhances the development of multiple work packages. The monitoring feature will source from the DSP and represent the quality labels based on the downscaling and disaggregation strategies defined in WP3, reflect the measure database and MIDAS outcomes from WP4, align with the SOIs and the SECAP completion and monitoring from WP5, and collect all this information as a guide to co-design and co-create the CAST in WP8.

2.Synergies with the CoM SECAP initiative

Monitoring plays a vital role in the SECAP initiative, though it remains an area where the Covenant of Mayors (CoM) has not yet fully developed its framework. The LOCALISED project aims to address these gaps by aligning with the SECAP's implementation needs, ensuring the CAST platform continuity and user-friendliness.

According to what has been mentioned in the latest exchanges with the Joint Research Centre, establishing a robust monitoring process is a key component of the CoM's commitments. It enables local authorities to track progress toward the goals outlined in their Sustainable Energy and Climate Action Plans.

The Covenant of Mayors provides the following key aspects for monitoring SECAPs in their Covenant reporting and monitoring framework Reporting | Covenant of Mayors - Europe (europa.eu):

- "It enables you to compare estimated impacts to what is actually achieved in terms of energy savings, renewable energy production, CO2 emissions reduction, and efforts to improve resilience to the impacts of climate change."
- "Determine whether the action is performing well and to identify corrective measures, in case specific actions are not delivering their expected impacts."
- "Monitoring is furthermore an important exercise to help understanding the barriers to the implementation of your action plan and determine the cause of failure to implement specific measures."
- "It is also a good opportunity to identify and document best practices or success stories to be shared with other stakeholders, for instance using the online Catalogue of Good practices (formerly referred to as Benchmarks of Excellence)."
- "Monitoring energy consumption, CO2 emissions, vulnerability to the impacts of climate change, and adaptation actions allows you to understand whether you are on track to reach the target and to identify factors that affect results, such as weather or population changes."

How does LOCALISED answer the CoM monitoring needs, key points extracted from Reporting | Covenant of Mayors - Europe (europa.eu) "Covenant quick reference guides":

Table 1 CoM monitoring requirements versus CAST assets

CoM key points on monitoring	LOCALISED
Assign a dedicated person to coordinate the process, and if deemed necessary establish a team or committee to meet periodically.	The classification of data per municipal competencies simplifies the coordination of the monitoring process inside the municipal teams.
Identify the data to be collected and consistent methods for data collection.	The platform aims to provide ready to use data to monitor the SECAP. Additionally, an optimization feature highlights the monitoring variables that have a greater impact on the user's decarbonisation plan, helping prioritise what data to collect inside the municipalities.
Identify the data sources, including competencys and external stakeholders that will be able to provide data.	The DSP (Data sharing platform) is included in the project. And a section of "tips" is provided to the CAST user to identify potential local data sources.

Establish the frequency of monitoring.	Information on the periodicity and time of the last update will be provided for each dataset.
Ensure that the data collected is reliable and comparable over time.	An extensive analysis has been performed to select reliable data and establish different levels of data quality in WP3. In the case of not having reliable data comparable over time, the user will be notified to fine-tune certain values.
Define monitoring indicators and set specific benchmarks to compare their performance.	Each measure provided by the CAST will be complemented with a set of monitoring indicators. The idea is to benchmark the evolution of these indicators with objective values and (still an option) with other similar regions.
Define a communication plan to communicate results to policy makers and other stakeholders and tailor the information to address each audience.	The CAST platform will allow the export of decarbonisation plans and BEI, RVA and EPA sections from the SECAPs, SDG reports and measure reports ready to be shared.
Ensure a link between the results of the monitoring report and the municipal budget planning cycles, so that any adjustments to your action plan can be incorporated, if necessary.	An estimation of measure impacts and costs will be provided to the user. Additionally, the user will be able to fine tune the forecasted data and adjust the decarbonisation and climate adaptation planning to its own collected data.

The following Table 2 describes the actual SECAP Monitoring required timeframe:

Table 2 SECAP reporting frequency requirements

Part of the SECAP reporting template	Reporting requirements
Strategy: Any modification on the initial strategy, financial or human resources.	Within 2 years. Every 2 years.
Mitigation: Final energy consumption and CO2 emissions by energy carrier and by sector for the recent monitoring year.	Within 2 years. Every 4 years.
Mitigation: Mitigation measures.	Within 2 years. Every 2 years.
Adaptation: Climate hazards, vulnerabilities, impacts, status of the completeness of the actions.	Within 2 years. Every 2 years.
Adaptation: Adaptation action plan, and adaptation measures.	Within 4 years. Every 2 years.

This part is connected to the periodicity and last time updated of the LOCALISED DSP data provided to the user. If the platform's data isn't aligned with these requirements, it won't be useful for developing and monitoring SECAPs. Therefore, the monitoring feature must incorporate this framework into its processes and time labelling of the data.

In advance, further exchanges with ICLEI and CoM will ensure the harmonisation of the tool with their upcoming directives.

3. Data sorting: Analysis on municipal competencies

When it comes to gathering municipal data, for most of the small/medium municipalities, there used to be limited interdepartmental communication usually provoked by the unawareness of other department needs and the lack of protocols for data sharing. In this regard, this section explores the possibility of sorting the monitoring indicators by municipal competencies or providing advice on the relevant competencies affected by the decarbonization solutions and measures selected by the user in the CAST. These enhancements could simplify the data-gathering task and organise the information in a more understandable way from the municipal administration perspective.

So for example if a measure is classified as "Building" sector and the administration does not have a specific "Building" competency, maybe it could be managed by the "Urban planning" or "Constructions" department. Or for example the measure "Increase bicycle lanes" does not only affect the land use planning department but also the transport one. This interconnection between services could be showcased on the CAST platform and is examined in the current section.

The word competencies refers to the set of responsibilities defined by the laws governing municipal administrative bodies, or in other terms, the services managed by local authorities.

The first part of the exercise consists of analysing what are the most common competencies inside municipal governments and cross this information with the sectors described in task 4.1 (Same as adaptation section from the SECAP): Building, Transport, Energy, Water, Waste, Land use planning, Agriculture and Forestry, Environment & Biodiversity, Health, Civil protection, Tourism, Education, ICT information. In the case of matching, the information could be presented by the already used sectors and meet the proposal requirements. Otherwise, a different strategy could be implemented, such as organising the information by a new list of public competencies or modify the initial sector list to fit in the missing ones.

The selection of municipal departments is not intended to represent all EU regions but rather to provide a meaningful sample that can help validate trends and identify needs for improving the platform's information organisation. This analysis included

municipalities from Catalonia, Lower Austria, Twente, and Tuscany, chosen to reflect diverse realities in terms of area, population, GDP per capita, climate, and environment. The competency distribution of each administration was gathered from local government websites and compiled into a working Excel template. This allowed for an analysis of the similarities among municipalities, including how frequently certain competencies are managed together and their relevance to the main SECAP categories: Mitigation, Adaptation, and Energy Poverty.

The introduction provided for each region acknowledges the diverse climatic, geographic, social, and economic realities that shape the decisions of local administrations.

3.1 Catalonia case

Catalonia, one of Spain's wealthiest and most industrialised regions, boasts a diverse and dynamic economy. It is a major contributor to Spain's GDP, with key sectors including manufacturing, services, agriculture and tourism. The region is home to numerous multinational companies and a thriving startup ecosystem, particularly in Barcelona. Despite its economic strength, unemployment rates, although lower than the national average, remain a concern, particularly among the youth.

Catalonia experiences a Mediterranean climate, characterised by hot, dry summers and mild, wet winters. The region is increasingly affected by climate change, with rising temperatures, prolonged droughts, and more frequent extreme weather events. These climatic changes pose significant risks to agriculture, water resources, forests and coastal areas. The Catalan government is actively promoting sustainability and climate adaptation measures, including renewable energy initiatives, water consumption restrictions and policies aimed at reducing carbon emissions.

The political landscape in Catalonia is marked by a strong independence movement, which has led to tensions with the Spanish central government. While the situation has stabilised since 2017 (Independence declaration and posterior suspension of the autonomy by the national government), political polarisation persists, with ongoing debates about Catalonia's autonomy and its future within Spain. The current regional government continues to advocate for greater self-determination and negotiation with Madrid.

Catalonia is a culturally rich and diverse region with a strong sense of identity and its own language, Catalan. Catalonia's education and healthcare systems are well-developed, contributing to a high standard of living. However, social issues such as inequality, housing affordability, and integration of immigrants remain significant challenges.

A sample of 43 municipalities has been created for the Catalonia area. A municipality has been selected for every supra-municipal region representing different realities in terms of area, population, GDP per capita, climate and environment.

The population, surface and GDP per capita are obtained from the Catalonia statistics institute (IDESCAT), and the competencies/councillors are extracted from the municipal government's websites.

Table 3 shows the competencies identified in Catalonia after analysing 43 municipalities, focusing on those competencies related to the LOCALISED framework. While most competencies could potentially connect to decarbonization or climate adaptation, the bolded ones are clearly related to the LOCALISED framework sectors. The "%" represents the percentage of times this competency has been identified over the total number of cases. So 100% would mean that all the municipalities have this department.

Table 3 Identified municipal competencies and their representation

competency	Representativity	competency	Representativity	competency	Representativity	competency	Representativity
Culture	100.00%	**Elderly**	48.84%	Civil rights	25.58%	**Business**	11.63%
Social services	100.00%	**Works/construction**	48.84%	Cooperation	25.58%	**Roads**	9.30%
Sports	100.00%	**Mobility**	46.51%	**Sustainability**	23.26%	European relations	9.30%
Education	97.67%	Recreation/parties	46.51%	**Green spaces**	23.26%	Planification	9.30%
Urbanism	93.02%	Transparency	41.86%	**Civil protection**	20.93%	Community relations	9.30%
Youth	90.70%	**Municipal services**	37.21%	**Livestock**	20.93%	**ICT**	9.30%
Tourism	83.72%	**Welfare**	37.21%	Consumption	20.93%	**Climatic actions**	9.30%
Economic promotion	83.72%	**Energy transition**	37.21%	Fairs and events	20.93%	Inclusion	9.30%
Health	81.40%	Feminism	32.56%	**Waste**	20.93%	**Animal welfare**	9.30%
Taxes	79.07%	Government	32.56%	Citizenship	18.60%	**Public order**	6.98%
Environment	74.42%	**Maintenance**	30.23%	Training	18.60%	**Solitude strategy**	6.98%
Citizen participation	62.79%	**Children**	30.23%	Leisure	16.28%	**Markets and restaurants**	6.98%
Commerce	60.47%	Districts and neighbourhoods	30.23%	Immigration /Welcome	16.28%	Identity	6.98%
Security	60.47%	**Administration**	27.91%	**Rural areas**	16.28%	**Industry**	4.65%
Housing	58.14%	Economy	27.91%	Finances	13.95%	Peace and human rights	4.65%
Equity	55.81%	**Social policies**	27.91%	Entities	13.95%	**Disabled people**	4.65%
Communication	53.49%	Citizen services	27.91%	Democratic memory	13.95%	**Transit**	2.33%
Human resources	51.16%	**Agriculture**	25.58%	LGTBI	13.95%	**Agenda 2030**	2.33%
New technologies	51.16%	**Public space**	25.58%	**Water**	13.95%	**PAES (Local action plans)**	2.33%
Heritage	48.84%	Occupation	25.58%	**Forestry**	11.63%	**Biodiversity**	2.33%

Table 4 compares the identified competencies with the SECAP adaptation categories used for the measure organisation in task 4.1. The percentage at the right side of each

municipal department represents their representativity on the total amount of municipalities.

Table 4 SECAP Adaptation sectors and the associated municipal competencies

Adaptation							
CoM SECAP template	**Related municipal competencies**						
Buildings	Urbanism (93.02%)	Housing (58.14%)	Works/construction (48.84%)				
Transport	Mobility (46.51%)	Municipal services (37.21%)	Roads (9.30%)	Transit (2.33%)			
Energy	Energy transition (37.31%)	Municipal services (37.21%)					
Water	Municipal services (37.21%)	Water (13.95%)					
Waste	Municipal services (37.21%)	Maintenance (30.23%)	Waste (20.93%)				
Land use planning	Urbanism (93.02%)	Public space (25.58%)	Green spaces (23.26%)				
Agriculture & forestry	Agriculture (25.58%)	Livestock (20.93%)	Rural areas (16.28%)	Forestry (11.63%)			
Environment & biodiversity	Environment (74.42%)	Animal welfare (9.30%)	Biodiversity (2.33%)				
Health	Youth (90.70%)	Health (81.40%)	Elderly (48.84%)	Welfare (37.21%)	Children (30.23%)	Solitude strategy (6.98%)	Disabled people (4.65%)
Civil protection & emergency	Security (60.47%)	Civil protection (20.93%)	Climate action (9.3%)	Public order (6.98%)			
Tourism	Tourism (83.72%)						
Education	Education (97.67%)	Training (18.60%)					
ICT	ICT (9.3%)						

Municipal services can aggregate most of the sectors presented. Basic city services may include sanitation (both sewer and refuse), water, streets, the public library, schools, food inspection, fire department, police, ambulance, and other health department issues and transportation.

The following Table 5 compares the mitigation SECAP categories with the municipal competencies:

Table 5 SECAP Mitigation sectors and the associated municipal competencies

Mitigation	
CoM SECAP template	**Related municipal competencies**

Municipal buildings, equipment/facilities	Culture (100%)	Sports (100%)	Urbanism (93.02%)	Heritage (48.84%)	Works/construction (48.84%)	Administration (27.91%)	Public space (25.58%)
Tertiary (non-municipal) buildings, equipment/facilities	Urbanism (93.02%)	Works/construction (48.84%)	Business (11.63%)	Markets and restaurants (6.98%)			
Residential buildings	Urbanism (93.02%)	Housing (58.14%)	Works/construction (48.84%)				
Industry	Industry (4.65%)						
Transport	Mobility (46.51%)	Municipal services (37.21%)	Roads (9.3%)	Transit (2.33%)			
Waste	Municipal services (37.21%)	Maintenance (30.23%)	Waste (20.93%)				
Local Electricity Production	New technologies (51.16%)	Energy transition (37.21%)					
Local Heat/Cold Production	New technologies (51.16%)	Energy transition (37.21%)					
Other	Planification (9.3%)	PAES (2.33%)	Agenda 2030 (2.33%)				

And for the SECAP energy poverty part:

Table 6 SECAP Energy poverty section and the associated municipal competencies

Energy poverty	**Related municipal competencies**					
CoM SECAP template	Social services (100%)	Housing (58.14%)	Equity (55.81%)	Energy transition (37.21%)	Welfare (37.21%)	Social policies (27.91%)

From the presented tables it can be observed that the categories used in Task 4.1 and the SECAP template, can be directly attributed to a municipal department. Except the building categories, which depending on the type of building can be managed by different competencies inside the local authority.

The second point is that not all the municipalities have specific competencies to manage these sectors or are managed by other ones. For example, water and waste can be controlled by a department called maintenance or municipal services in small municipalities. Or in some small municipalities some competencies could be directly supra-administered.

3.2 Lower Austria case

Lower Austria, the largest and second most populous province in Austria in terms of area, plays an important role in the Austrian economy. Lower Austria is divided into four historical districts - the *Weinviertel, Waldviertel, Mostviertel* and *Industrieviertel* - each characterised by its own special landscape and economic features, from viticulture in the *Weinviertel* to industrial development in the *Industrieviertel*. There are 573 politically independent municipalities in Lower Austria, spread across 20 administrative districts, as well as 4 statutory towns, which function as separate administrative units and are directly subordinate to the state.

Agriculture, viticulture (for example in the Wachau) and energy-intensive industries such as steel and chemical production are particularly noteworthy. Tourism, especially in rural areas and Alpine regions, also contributes to the economic strength of the region. Although Lower Austria does not have as strong a concentration of start-ups and international companies as Vienna or Upper Austria, it is still an important location for traditional industries and agriculture. The unemployment rate is often below the Austrian average (Austrian average 6.8%, Lower Austria 5.9% April 2024), although youth unemployment remains a challenge in certain regions.

The climate in Lower Austria is diverse: the west is dominated by a temperate continental climate, while the east, especially the *Weinviertel*, has a Pannonian climate with hot summers and dry conditions. The effects of climate change can also be felt here, particularly through hot summers and less precipitation, which poses challenges for agriculture. The provincial government actively promotes climate protection measures, in particular through the expansion of renewable energies such as wind and solar energy as well as programmes for sustainable water use.

Politically, Lower Austria is traditionally dominated by the conservative Austrian People's Party (ÖVP). The ÖVP is not only the dominant political force in Lower Austria, but also the state governor, the current top politician in the state, which emphasises the party's strong roots in the region. However, the Austrian Progressive Party is also gaining ground in urban areas.

Culturally, Lower Austria is rich in traditions and known for its historical significance, winegrowing and the many cultural events and festivals. The well-developed education and healthcare systems contribute to a high standard of living in the region. Nevertheless, there are social challenges, such as the integration of migrants and ensuring affordable housing, especially in the areas close to Vienna.

A sample of 10 municipalities has been created for the Lower Austria area. Population was taken from the national centralised statistical system (STATISTICS AUSTRIA). The GDP per capita is only available at NUTS-3 level for Austria, and so it was taken at this level also from STATISTICS AUSTRIA.

Table 7 Identified municipal competencies and their representation

competency	Representativity	competency	Representativity	competency	Representativity
Audit (Inspection of accounts)	90%	**Fire**	30%	**Music school**	10%
Culture	60%	**Safety**	30%	Disciplinary	10%

Municipal council	60%	**Administration**	30%	EU community	10%
Tourism	50%	**Transport**	30%	**Library**	10%
Roads	50%	Economic development	30%	Protocol	10%
Sport	50%	**Regional planning**	30%	**Climate**	10%
Water	50%	**Secondary school**	20%	Art	10%
Finances	40%	**Snow**	20%	Worship	10%
Health	40%	**Civil defence**	20%	Representation	10%
Social affairs	40%	**Public order**	20%	Events	10%
Agriculture	40%	Science	20%	Leisure	10%
Education	40%	**Services**	20%	**Playgrounds**	10%
Youth	40%	**Construction matters**	20%	Clubs	10%
Environment	40%	**Renewable energies**	20%	Head of the village	10%
Waste	40%	Village renewal	20%	**Green spaces**	10%
Family	30%	**Spatial planning**	20%	**Broadband expansion**	10%
Housing	30%	**Digitalization**	10%	**Building yard**	10%
Infrastructure	30%	**Ecology**	10%	**Street cleaning**	10%
Forestry	30%	**Land**	10%	**Cemetery**	10%

The list of the 57 competencies found in the 10 Austrian municipalities is quite similar to the ones found in Catalonia. Nevertheless, the top ones are not the same, and there is less consensus on the available competencies. The Audit department is the most common (90%) followed by culture and municipal council at 60%.

Comparison with the Adaptation SECAP categories:

Table 8 SECAP Adaptation sectors and the associated municipal competencies

Adaptation						
CoM SECAP template	**Related municipal competencies**					
Buildings	Infrastructure (30%)	Housing (30%)	Construction matters (20%)	Building yard (10%)		
Transport	Roads (50%)	Transport (30%)	Infrastructure (30%)	Services (20%)		
Energy	Infrastructure (30%)	Services (20%)	Renewable energies (20%)			
Water	Water (50%)	Infrastructure (30%)	Services (20%)			
Waste	Waste (40%)	Infrastructure (30%)	Services (20%)	Street cleaning (10%)		
Land use planning	Regional planning (30%)	Spatial planning (20%)	Land (10%)	Playgrounds (10%)	Green spaces (10%)	
Agriculture & forestry	Agriculture (40%)	Forestry (30%)				
Environment & biodiversity	Environment (40%)	Ecology (10%)				
Health	Health (40%)	Youth (40%)				

Civil protection & emergency	Safety (30%)	Fire (30%)	Civil defence (20%)	Snow (20%)	Public order (20%)	Climate (10%)
Tourism	Tourism (50%)					
Education	Education (40%)	Secondary school (20%)				
ICT (Information & communication technologies)	Digitalization (10%)	Broadband expansion (10%)				

Comparison with the Mitigation SECAP categories:

Table 9 SECAP Mitigation sectors and the associated municipal competencies

Mitigation								
CoM SECAP template	**Related municipal competencies**							
Municipal buildings, equipment/facilities	Culture (60%)	Municipal council (60%)	Sport (50%)	Infrastructure (30%)	Administration (30%)	Music school (10%)	Library (10%)	Cemetery (10%)
Tertiary (non-municipal), buildings, equipment/facilities	Construction matters (20%)							
Residential buildings	Housing (30%)	Construction matters (20%)	Building yard (10%)					
Industry								
Transport	Roads (50%)	Transport (30%)	Infrastructure (30%)	Services (20%)				
Waste	Waste (40%)	Services (20%)	Street cleaning (10%)					
Local Electricity Production	Renewable energies (20%)							
Local Heat/Cold Production	Renewable energies (20%)							
Other								

Comparison with the Energy poverty SECAP category:

Table 10 Energy poverty part and the associated municipal competencies

Energy poverty	**Related municipal competencys**			
CoM SECAP template	Housing (60%)	Social affairs (40%)	Family (30%)	Climate (10%)

In contrast with the Catalan case, the industry sector does seem to have a department representative in the Austrian municipalities. For the rest, as mentioned before, we have

a greater disparity between municipalities that lead to have poor representativity in some cases, for example in the case of renewable energies with only 20% of representativity.

3.3 Twente case

Twente is a dynamic region in the east of the Netherlands, boasting a strong industrial past and flourishing knowledge-intensive economy. Besides its traditional role as one of the most prominent textile centres in the country, during recent years, Twente has developed manufacturing, technology, logistics, and agriculture. Additionally, it is home to a startup scene enabled by higher education institutions like the University of Twente, which encourages innovation and research. Though the unemployment level in Twente is below average, there is a problem in retaining young people since part of its younger residents later transfer to larger cities to pursue better careers.

Twente has a temperate maritime climate-the summers are cool, the winters mild, and the precipitation approximately equally distributed over the year. Like many other regions, Twente has to deal with the growing impact of climate change: from altered precipitation patterns to more and more frequent weather extremes. The changes in climatic conditions thus pose a challenge not only for agriculture and water management but also for biodiversity in this region. For this reason, local governments respond to these with sustainability initiatives by encouraging renewable energy, improving flood defences, and encouraging climate-resilient farming.

Political situation in Twente is pretty stable, while local politics is directed to economic growth, sustainability of the environment, and social welfare of the inhabitants. Like most parts of the country, however, Twente is also suffering from growing political fragmentation, especially on issues relating to a shortage of housing, migration, and environmental policies.

Twente is culturally vivid, rich in the regional identity intertwined with deep-rooted traditions. Even though not having the popularity nor the impact of its counterparts in the capital cities, the region is also equipped with cultural activities that range from historical sites to modern art and music festivals. The region has a high quality of life, underpinned by comprehensive education and health infrastructure. Nevertheless, social issues in the region remain paramount for its future development, especially those regarding regional inequality, housing affordability, and the integration of newcomers.

A sample of 10 municipalities and competencies was collected for the Twente region. Note that Dutch municipalities usually have 1 mayor plus 3 or 4 councillors responsible for managing the different competencies (See Annex 1). GDP per capita and population were obtained from Statistics Netherlands opendata.

Table 11 Identified municipal competencies and their representation

competency	Representativity	competency	Representativity	competency	Representativity	competency	Representativity
Maintenance of living environment	100%	**Waste**	80%	**Law enforcement**	50%	**Childcare**	20%

Sports	100%	**Health**	80%	**Animal welfare**	50%	**Elderly**	20%
Spatial development	100%	**Mobility**	80%	Representation	40%	Objection and appeal	10%
Social care	100%	**Administration**	70%	External relations	40%	Strategy and Research	10%
Land company	100%	International relations	70%	**Emancipation**	40%	Scientific Board	10%
Living	100%	**Accessibility and public transport and mobility**	70%	**Water & Sewerage**	40%	**Loneliness**	10%
Culture	100%	**Climate adaptation**	70%	**Heritage**	40%	Community-oriented work	10%
Inclusivity	100%	**Housing**	70%	Event permit	30%	Port	10%
Participation act	100%	**Tourism**	70%	Complaints commissioner and ombudsman	30%	**Heat vision**	10%
Sustainability	100%	Labour market	70%	Integrity	30%	**Training**	10%
Finances	100%	Cooperation	60%	Coordination Lobby	30%	**Low literacy**	10%
Economy	100%	**Energy Transition**	60%	Tendering and purchasing	30%	**Asylum**	10%
Education	100%	Youth work	60%	**Security**	30%	**Students**	10%
Welfare	90%	Open Government	60%	Civil rights	30%	**Addiction care**	10%
Rural areas	90%	**Digitalization and ICT**	60%	Coordination of municipal policy	20%	**Women's shelter**	10%
Building permits	90%	Recreation	60%	**Youth prevention and safety**	20%	**Domestic violence and child abuse**	10%
Services	90%	Subsidies	60%	District councillor	20%	Ethics	10%
Business	90%	**Debt assistance**	60%	Shareholdings and participations	20%	Privacy	10%
Public space	90%	**Youth and Family**	60%	**Innovation**	20%	Civil servants	10%
Public order and safety	80%	Staff and organisation	50%	**Zoning**	20%	**Agenda 2030**	10%
Communication	80%	**Industry**	50%	City promotion	20%	**Fire brigade**	10%

Comparison with the Adaptation SECAP categories:

Table 12 SECAP Adaptation sectors and the associated municipal competencies

Adaptation						
CoM SECAP template	**Related municipal competencies**					
Buildings	Building permits (90%)	Housing (70%)				
Transport	Services (90%)	Mobility (80%)	Accessibility and public transport (70%)			
Energy	Services (90%)	Energy transition (60%)	Innovation (20%)			
Water	Services (90%)	Water (40%)				
Waste	Services (90%)	Waste (80%)				
Land use planning	Spatial development (100%)	Land company (100%)	Public space (90%)	Zoning (20%)		

Agriculture & forestry	Rural areas (90%)					
Environment & biodiversity	Maintenance of living environment (100%)	Sustainability (100%)	Animal welfare (50%)	Security (30%)	Fire brigade (10%)	Heat vision (10%)
Health	Welfare (90%)	Health (80%)	Youth prevention (20%)	Childcare (20%)	Elderly (20%)	Asylum (10%)
Civil protection & emergency	Public order and safety (80%)	Climate adaptation (70%)	Law enforcement (50%)			
Tourism	Tourism (70%)					
Education	Education (100%)	Training (10%)	Low literacy (10%)	Students (10%)		
ICT (Information & communication technologies)	Digitalization and ICT (60%)	Innovation (20%)				

Comparison with the Mitigation SECAP categories:

Table 13 SECAP Mitigation sectors and the associated municipal competencies

Mitigation				
CoM SECAP template	**Related municipal competencies**			
Municipal buildings, equipment/facilities	Culture (100%)	Sport (100%)	Administration (70%)	Heritage (40%)
Tertiary (non-municipal), buildings, equipment/facilities	Building permits (90%)	Business (90%)		
Residential buildings	Building permits (90%)	Housing (70%)		
Industry	Industry (50%)			
Transport	Services (90%)	Mobility (80%)	Accessibility and public transport (70%)	
Waste	Services (90%)	Waste (80%)		
Local Electricity Production	Energy transition (60%)			
Local Heat/Cold Production	Energy transition (60%)			
Other	Agenda 2030 (10%)			

Comparison with the energy poverty SECAP category:

Table 14 SECAP Energy poverty part and the associated municipal competencies

Energy poverty Related municipal competencies							
CoM SECAP template	Social care (100%)	Living (100 %)	Welfare (90%)	Housing (70%)	Debt assistance (60%)	Youth and family (60%)	Heat vision (10%)

The list of the 84 competencies found in the 10 Netherlands municipalities has a bigger convergence than the Catalan and Austrian case. With 13 competencies that have a full representativity in all the analysed municipalities.

Most of the selected municipalities for the Netherlands have a high representativity from the SECAP categories perspective.

3.4 Tuscany case

Tuscany, located in central Italy, is renowned for its rich history and cultural heritage. Economically, the region thrives on a diverse mix of industries, including tourism, agriculture (especially wine and olive oil), and manufacturing, particularly fashion and textiles. Tuscany's economy benefits from its strong brand as a destination for cultural tourism, but it faces challenges in balancing this with sustainable growth. Rural areas often struggle with economic stagnation, while urban centres like Florence experience more dynamic development.

Climatically, Tuscany is characterised by a Mediterranean climate, with hot summers and mild winters. However, the region is increasingly affected by climate change, leading to more extreme weather events such as heatwaves, droughts, and heavy rainfall. These climatic shifts pose risks to its agricultural sector and have prompted efforts to integrate more sustainable practices into its economy and tourism.

Politically, Tuscany has been a stronghold of centre-left politics, with the Democratic Party (PD) traditionally holding power. Recent years have seen some political shifts, with a rise in support for right-wing parties, reflecting broader national trends. Despite this, the region remains politically stable with a strong emphasis on social welfare and progressive policies.

Socially, Tuscany enjoys a high standard of living, with well-developed healthcare, education, and social services. The region has an ageing population, and young people often migrate to larger cities for better opportunities, leading to demographic challenges. Nevertheless, Tuscan society values community, culture, and heritage, with a strong sense of regional identity that plays a crucial role in both daily life and policymaking.

A sample of 10 municipalities have been selected for different supra-municipal Tuscany regions representing different realities in terms of area, population, GDP per capita, climate and environment. Population and GDP per capita were gathered from Istitute Nazionale di Statistica (ISTAT).

Table 15 Identified municipal competencies and their representation

competency	Representativity	competency	Representativity	competency	Representativity	competency	Representativity
Public works	100%	**Police**	80%	**Innovation**	50%	**Welfare**	20%

Urban planning	100%	Economic development	70%	Integration	40%	Toponymy	20%
Education	100%	**Businesses**	70%	**Family**	40%	City Walls	20%
Administration	90%	**Social rights**	70%	Relation with institutions	40%	**Birth rate**	20%
Civil rights	90%	Registry	60%	**Hunting and fishing**	30%	**Health**	20%
Environment	90%	**Equity**	60%	**Agriculture**	30%	**Waste**	20%
Tourism	90%	**Housing**	60%	**Maintenance**	30%	**Green areas**	20%
Human resources	80%	**Commerce**	50%	**Floods & Water management**	30%	Transparency	20%
Economy	80%	**Municipal Services**	50%	Districts	30%	Accessibility	20%
Taxes	80%	Communication	50%	Occupation	30%	**PNRR**	20%
Heritage	80%	**Youth**	50%	**Coast and mountains**	30%	**ICT (Information & communication technologies)**	20%
Private construction	80%	**Sustainable transition**	50%	Volunteering	30%	**Hygiene**	10%
Culture	80%	**Animal welfare**	50%	**Cemetery**	20%	**Energy**	10%
Civil protection	80%	**Sport**	50%	**Library**	20%		
Mobility	80%	Participation	50%	**Pharmacy**	20%		

Comparison with the Adaptation SECAP categories:

Table 16 SECAP Adaptation sectors and the associated municipal competencies

Adaptation						
CoM SECAP template	**Related municipal competencies**					
Buildings	Public works (100%)	Urban planning (100%)	Private construction (80%)	Heritage (80%)	Housing (60%)	
Transport	Mobility (80%)	Municipal services (50%)				
Energy	Sustainable transition (50%)	Municipal services (50%)	Energy (10%)			
Water	Municipal services (50%)	Floods & Water management (30%)				
Waste	Municipal services (50%)	Maintenance (30%)	Waste (20%)	Hygiene (10%)		
Land use planning	Urban planning (100%)	Green areas (20%)				
Agriculture & forestry	Agriculture (30%)					
Environment & biodiversity	Environment (90%)	Sustainable transition (50%)	Animal welfare (50%)	Coast and mountains (30%)	Hunting and fishing (30%)	Green areas (20%)
Health	Youth (50%)	Family (40%)	Welfare (20%)	Pharmacy (20%)	Birth rate (20%)	Health (20%)

Civil protection & emergency	Civil protection (80%)	Police (80%)				
Tourism	Tourism (90%)					
Education	Education (100%)					
ICT (Information & communication technologies)	Innovation (50%)	ICT (20%)				

Comparison with the Mitigation SECAP categories:

Table 17 SECAP Mitigation sectors and the associated municipal competencies

Mitigation								
CoM SECAP template	**Related municipal competencies**							
Municipal buildings, equipment/facilities	Public works (100%)	Education (100%)	Administration (90%)	Heritage (80%)	Culture (80%)	Sport (50%)	Cemetery (20%)	Library (20%)
Tertiary (non-municipal), buildings, equipment/facilities	Private constructions (80%)	Businesses (70%)	Commerce (50%)					
Residential buildings	Urban planning (100%)	Private constructions (80%)	Housing (60%)					
Industry	Businesses (70%)							
Transport	Mobility (80%)	Municipal services (50%)	Transport (30%)	Infrastructure (30%)				
Waste	Municipal services (50%)	Maintenance (30%)	Waste (20%)	Hygiene (10%)				
Local Electricity Production	Sustainable transition (50%)	Energy (10%)						
Local Heat/Cold Production	Sustainable transition (50%)	Energy (10%)						
Other	PNRR (20%)							

Comparison with the Energy poverty SECAP categories:

Table 18 SECAP Energy poverty section and the associated municipal competencies

Energy poverty	**Related municipal competencies**					
CoM SECAP template	Social rights (70%)	Equity (60%)	Housing (60%)	Welfare (20%)	Accessibility (20%)	Energy (10%)

From the list of 58 competencies identified across 10 municipalities in Tuscany, there is a notable consensus for the top competencies as it is for the Catalan case, featuring Urban planning, public works, Tourism, Education which have a direct correspondence with the SECAP categories. In contrast, Industry is absent from all the administrations, and Energy is only designated as a specific competency in one of the studied municipalities.

3.5 Results

After gathering the sample of municipalities from the four regions, several conclusions can be drawn with the aim of understanding how municipal responsibilities are interconnected, in order to streamline the monitoring of measures.

Table 19 highlights the competencies with the highest representativity across all the studied municipalities.

Table 19 Most represented competencies in the four studied regions

competency	Representativity
Culture	85%
Urban planning	83%
Education	80%
Social care	78%
Environment	78%
Sports	75%
Tourism	75%
Economy	75%
Transports	65%
Public order and security	63%
Youth	60%
Work & Constructions	55%
Municipal services	50%
Health	50%

As mentioned before, the "municipal services" competencies often include energy, health, transport, water and waste municipal services.

Education, Tourism, Transport, and Environment are highly represented competencies, and their names align with specific SECAP categories. Urban Planning, which ranks among the top two most represented competencies across municipalities, does not directly correspond to a SECAP category but can be associated with the Land Use sector. This highlights that, in many cases, municipal competencies do align with the main

SECAP categories. However, for competencies like Urban Planning, it could be noted on the platform that this falls under Land Use when implementing or monitoring measures. Consequently, Land Use measures will directly impact Urban Planning.

Table 20 highlights the most frequently occurring relationships between competencies, organized by SECAP sectors. The table includes associations that appeared in more than one of the regions studied. Competencies that were present in all four regions are underlined.

Table 20 SECAP sectors and the commonly associated municipal competencies

SECAP SECTOR/competency	**ASSOCIATED competencies**					
Buildings	Land use planning	Work and constructions				
Transport	Civil protection	Water	Agriculture	Environment	Land use	Forestry
Energy						
Water	Waste	Transport				
Waste	Water	Environment & Biodiversity				
Land use planning	Buildings	Economy	Housing	Maintenance	Environment	Mobility
Agriculture & Forestry	Welfare	Transport				
Environment & Biodiversity	Waste	Land use planning	Sustainability	Civil protection	Mobility	Animal welfare
Health	Social services	Welfare	Elderly	Sports	Participation	Youth
Civil protection & Safety	Cooperation	Transport	Education	Law enforcement		
Tourism	Economic promotion	Recreation	Commerce			
Education	Culture	Youth	Equity			
ICT	Transparency	Participation	Municipal services	Culture		
Industry	Tourism	Economy				

These are combinations of competencies that showed a pattern in the analysed municipalities. It doesn't mean that in other cases they could be associated differently. For the energy department, no pattern has been identified, so in most of the cases, the energy competency can be found in combination with multiple others without preference.

One of the valuable insights from Table 20 is that clusters can be formed around the main SECAP categories/competencies, and so, when the user selects a measure for example from the Tourism sector, a message could appear mentioning that other competencies like Economic promotion, Recreation or Commerce could be affected or responsible for some of the measure planification, implementation or monitoring parts.

Now looking back at the WP4 measure database, it can be seen how many of the measures would be attributed to the main SECAP sectors or competencies featuring the exact name, or the clustered ones.

So, for instance, the platform will contain 200 measures (at the moment) that can be attributed to the Building sector, that could also be affecting Land use planning or Work and constructions competencies inside municipal administrations.

The Transport, Land Use Planning, Environment & Biodiversity, and Health competencies are the most interconnected with other competencies.

The "Municipal services" competency has a representativity of 50% and usually includes energy, water, waste etc… So the numbers for those aggregated services could probably be higher in reality. This means that for example the energy competency is declared as an individual service in 25% of the studied administrations but an additional 50% of the administrations could have this service included inside municipal services.

The rest of sectors can be observed in Table 21. The "SECAP SECTOR" column also includes the competencies with the same name and their representativity in percentage.

Table 21 Relation between measures, sectors and municipal competencies

Nº of measures	SECAP SECTOR/competency	ASSOCIATED competencies					
200	**Buildings (48%)**	Land use planning (83%)	Work and constructions (55%)				
107	**Transport (65%)**	Civil protection (63%)	Land use planning (83%)	Environment & Biodiversity (78%)	Agriculture & forestry (43%)	Water (33%)	
137	**Energy (25%)**						
148	**Water (33%)**	Transport (65%)	Waste (17%)				
22	**Waste (27%)**	Environment & Biodiversity (78%)	Water (33%)				
27	**Land use planning (83%)**	Environment & Biodiversity (78%)	Buildings (48%)	Economy (75%)	Transport (65%)	Housing (48%)	Maintenance (40%)
49	**Agriculture & Forestry (43%)**	Transport (65%)	Agriculture (48%)	Forestry (43%)	Welfare (38%)		
51	**Environment & Biodiversity (78%)**	Land use planning (83%)	Sustainability (43%)	Transport (65%)	Civil protection (63%)	Animal welfare (35%)	Waste (17%)

2	**Health (50%)**	Social services (78%)	Sports (75%)	Youth (60%)	Participation (45%)	Welfare (38%)	Elderly (18%)
14	**Civil protection & Safety (63%)**	Transport (65%)	Public order and security (63%)	Education (80%)	Cooperation (33%)		
1	**Tourism (75%)**	Economic promotion (75%)	Commerce (35%)	Recreation (18%)			
6	**Education (80%)**	Culture (85%)	Youth (60%)	Equity (35%)			
2	**ICT (30%)**	Culture (85%)	Municipal services (50%)	Participation (45%)	Transparency (15%)		
80	**Industry (33%)**	Tourism (75%)	Economy (75%)				

In the deliverable 5.4 the national renovation wave programs were analysed for Spain, Netherlands, Austria and Germany regions. The different plans can be attributed to the following competencies: Buildings, Housing, Energy, Industry, Transport, land use, Waste management, Agriculture, Forestry, Education, and Water. Table 22 allows us to anticipate the probable municipal capacity to manage and operate the EU funds.

Table 22 D5.4 National plans with their sectors and the associated municipal competency representation

D5.4 EU Decarbonisation plans affected sectors	Spain nº of decarbonisation plans	Austria nº of decarbonisation plans	Italy nº of decarbonisation plans	Municipal competency representation
Buildings	22	13	10	48%
Energy	23	12	9	25%
Industry	9		3	33%
Transport	5		3	65%
Land use	3		2	83%
Waste management	1		1	27%
Agriculture & Forestry	2		1	43%
Education	2		4	80%
Tourism	1		1	75%
Water	1			33%

The conclusion is that the fundamental competencies to manage the decarbonisation plans may not be commonly represented as an individual department inside the municipalities. So, when it comes to managing the funding of the integration of renewable energies, in 75% of the municipalities, these programs will probably be operated by non-specific competencies, externally or not operated at all.

4. Indicator attributes

To build trust, enhance transparency, and maintain data integrity, it is crucial to provide users with information about the variables presented on the platform. This includes clearly indicating the source of the data, as well as its quality, "expiration date", and the expected evolution of variables when a measure is implemented.

Data quality was assessed in D3.1, where a confidence value was assigned to each variable for representation in the CAST. Time-related attributes were evaluated in parallel during this task, with the results detailed in Chapter 4.1. Additionally, the impact on SOIs is discussed in Chapter 4.2, where users are alerted to how monitored variables could evolve in relation to the established mitigation and adaptation goals.

4.1. Data periodicity and last time updated

The objective of this task would be to identify the variables that are updated with a periodicity higher than 4 years. And inform the user about the last time that the data was updated. If there is a variable that updates every 10 years, but the latest information is not older than 4 years, it can be used directly by the user, if the information is older than 4 years, it should be updated by the user to properly carry on the monitoring. Those time frames are harmonised with the SECAP reporting requirements, where the validity of the reporting lasts 4 years.

The attribution of the time dimension to the variables allows both functions in the monitoring parts:

- Filtering the SOIs by **periodicity**.
- **Assign labels** to the SOIs to **alert the user** about quality based on periodicity and the requirement for user **fine-tuning**.

The periodicity analysis was performed by extracting the list of SOIs from the last version available in PIK's cloud. Then the source providing the necessary information to calculate the SOIs is accessed and the periodicity and last time updated was registered. In the case of having more than one variable used for the SOI calculation, the oldest value dictates. When no specific update date was available, the last day of the provided year was used as the default.

The whole list of SOIs with the assigned periodicity and last time updated is available in **Annex 2.**

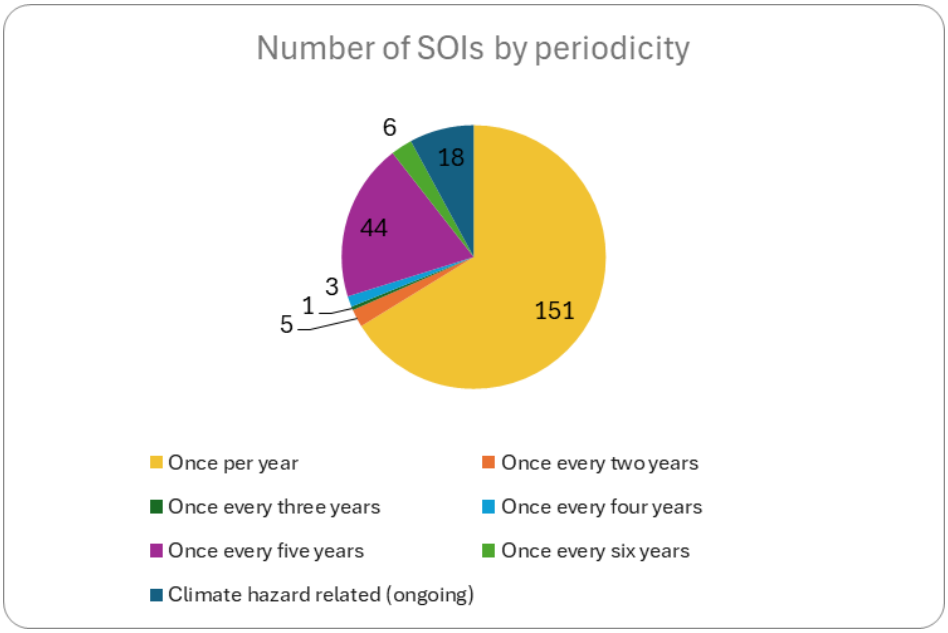


Figure 2 Number of SOIs by update frequency

Of the SOIs listed, 156 have an annual update frequency and 5 are updated biannually. These are ideal for monitoring under the SECAP reporting framework, which requires biannual updates for climate-related measures and a four-year cycle for the BEI. The other variables may still be used if their last update falls within the reporting period.

As for climate hazard-related variables, their development is ongoing, and their periodicity will be assessed at a later stage. Even so, they should be also labelled with the time data frequency attributes like the rest of SOIs.

It is crucial to extend this analysis to the final list of variables from EUCALC or MIDAS, which will also play a role in the monitoring phase. As the final structure of the engine dataset is still being determined, the analysis will be conducted at a later stage, and this document will be updated accordingly.

The data periodicity presented on the platform will also depend on the platform's own update mechanism. The following outlines how the platform's updating process works:

The update of DSP platform variables is semi-automated. Some public databases have associated APIs, allowing data to be imported through pre-written programming scripts. When updates are needed, these scripts are re-run to pull new data from the source. However, the process may encounter the following issues:

1. The data format is changed sometimes, in terms of the units, variable names, table formatting, … Such changes lead to failed scripts. Therefore, the script also requires updating.
2. The data source might have moved to a new location.
3. The data sharing service might be discontinued.

Most data sources do not provide an API. In such cases a manual download and processing of data is necessary. The scripts to process data are already written. If the format of the data is changed, the scripts also need updating.

In conclusion, the updating of the data provided in the LOCALISED project is a tedious process. It requires a lot of man-hours. It is not something that can be updated periodically. Therefore, the variables updating frequency mechanism from the platform should be clearly stated to the user as a data attribute. This information must be processed by platform developers in WP8 to take the appropriate decision based on the project's future developments.

4.2. Impact on SOIs (+, -, 0)

To guide users in anticipating the possible impacts of selected measures, an evaluation has been conducted on the influence of each measure on the aligned SOI indicators. This assessment allows users to evaluate the influence of measures on the different SECAPs and SDGs, as both are interlinked. The exercise allows the monitoring of variables in which the numerical evolution is not clear over time, but the tendency is predictable.

The impact of a measure at the municipal level depends on numerous factors and can be difficult to predict numerically. However, it is possible to determine the resulting tendency toward decarbonization and adaptation goals. A positive impact (+) is assigned to the associated SOI when the measure indicates progress toward these goals, a negative impact (-) if the measure signifies a setback, and (0) when the impact could be either positive or negative depending on implementation factors (geography, socio-economic conditions, climate, energy, environment, etc.).

Table 23 SOI qualification criteria

SOI (+)	The measure implies a step towards decarbonisation or adaptation goals measured with this indicator. Ex: CO2 emissions per capita. If it's positive (+) it means that this variable is being reduced by the measure.
SOI (-)	The measure represents a setback towards decarbonization or adaptation goals as measured by this indicator. For example, if the indicator is CO2 emissions per capita and it shows a negative (-) impact, it means the measure is increasing the emissions per capita.

SOI (0)	The effect on the SOI would rather be positive or negative depending on the context.

The SDGs related to each SOI can also be assessed, as they are aligned. The following Table 25 proves an example of that by showcasing the measure from WP4 "Improve Bus Vehicle Technical Efficiency: Gasoline" and the SOIs nomenclature defined in T5.1, WP5:

Table 24 Measure impact on SOIs and SDGs

Measure	SOIs	SDGs	Impact on SOI	Impact on SDG
Transport: Improve Bus Vehicle Technical Efficiency: Gasoline	K37.2 Transport energy consumption from motor gasoline	**SDG 7.3** By 2030, double the global rate of improvement in energy efficiency **SDG 11.2** By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	Positive (+)	Positive (+)

	K75 CO2 emissions per capita	**SDG 11.6** By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management **SDG 13.2** Integrate climate change measures into national policies, strategies and planning **SDG 13.3** Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	Positive (+)	Positive (+)
	K85 CO2 Emissions from transport	**SDG 13.2** Integrate climate change measures into national policies, strategies and planning **SDG 13.3** Improve	Positive (+)	Positive (+)

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

All the measures have been completed with an SOI impact indicator, ready to be implemented in the platform. The measure compilation is available at the following link: LOCALISED_Measure_Database.xlsx (sharepoint.com)

A further review will be performed before the platform release to verify the quantification or qualification of impacts, and the relation between SOIs and SDGs established previously.

5. Optimization criteria, identifying the most valuable KPIs for the user pathway

One of the main challenges in monitoring regional progress is the vast number of indicators that need to be tracked. But not all indicators are equally relevant in each region. For instance, in an agricultural region, agricultural indicators would be the most relevant, whereas in a region dominated by a large steel plant, steel production-related indicators would take precedence, making others less significant.

The tracking and monitoring of every single indicator requires human resources and time, both of which are frequently in short supply. Thus, it is prudent to minimise the number of indicators tracked without significantly compromising accuracy. For example, dedicating thousands of hours to precisely track an indicator that contributes less than 1% to total emissions would be an inefficient use of time.

To accurately monitor the progress of a region on the way towards emission reduction, it is therefore critical to identify the critical indicators that have a large impact on the decarbonization of the region and have a ranking system that enables the local administration to focus their efforts on the most valuable indicators. However, users' intuition is often flawed when ranking indicators, as personal biases, favoured projects, and other subjective factors can heavily influence individual prioritisation. Moreover,

since the most critical indicators vary by region, a universal ranking system cannot be applied.

LOCALISED aims to support that by offering an automatic ranking system for indicators according to relevance for the region. For this the MIDAS-Model is used.

MIDAS has two modes: optimization and calculation: In optimization mode, the goal of MIDAS is to generate a feasible set of measures for the user that would enable the given region to reach net-zero. In calculation mode, MIDAS tries to quantify how a change by the user in the defined set of measures will affect the emissions and costs.

In order to evaluate the influence of variable changes on the proposed engine solution and test MIDAS, the partner Forschungszentrum Jülich conducted a 'sensitivity analysis.' This analysis assesses how sensitive the engine is to changes in the surrounding parameters.

The sensitivity analysis is done by varying the relevant parameters up and down by a given percentage and then evaluating how much the results change. In early testing an empirical 25% up and down was found to yield reasonable results. One caveat though is that this will not catch indicators that are completely missing due to data errors: For example, if a given region in the data is not registered as having a large steel plant, then varying the steel emissions of zero by plus or minus 25% is not going to push that indicator higher in the rankings. The conclusion from that is that no matter the sensitivity analysis, the users have to perform some basic manual check if the main emitters in the region are included in the data.

Because there are two different modes for MIDAS, there are two different approaches for ranking indicators: How important they are for the optimization process of measures or how important they are for determining the impact of a given solution.

The distinction is subtle but critical: if in a given region a measure is not included in the solution set, then no amount of varying the indicators related to that measure will yield any change in the calculation mode and thus the indicator will never be marked as relevant. For example, there are multiple ways to decarbonize a district heating network. It can be supplied by geothermal energy, CHP plants, heat pumps and other technologies. If in the optimization run, MIDAS decided to pick a heat pump supply, because the geothermal potential is too low in the area, then varying the geothermal potential even by 10-fold will not cause it to show up as a relevant indicator. In optimization mode it will significantly change the outcome though.

Doing the sensitivity analysis for the optimization has some downsides though: first of all, the computational time is far larger: A single calculation for a given solution is purely analytical and can be done in a few hundred milliseconds. An optimization takes about a minute with the settings for a fast solution or can require up to an hour for a very thorough scan of the solution space. This large range is due to the used genetic algorithm for the optimization. Just like other such heuristic algorithms it does not guarantee any optimum, but instead provides the best solution it was able to reach with a given effort. The choice to use a heuristic algorithm was done quite early in the

development, since it was determined that a purely deterministic optimization such as a MILP-Model was not an option in the context of LOCALISED due to the non-linearities and the desire to use fuzzy logic to recommend adaptation measures, since the data for determining adaptation measures is far more sparse than for mitigation measures. So, to perform a full sensitivity analysis for a given region across hundreds of indicators will take about 500-1000 CPU-core-hours with the model at the moment of writing with high detail level. This can of course be parallelized, but it clearly is not feasible to do this on demand. Instead, the plan is to do this analysis in advance and provide the results in the user interface for the end users.

The second downside of doing the sensitivity analysis is that it will ignore customised measure sets for a given region. So, if a user added custom measures to their region, the optimization would have difficulty to take those custom measures into account and still yield an optimal result.

The two different sensitivity approaches are compared in the table below:

Table 25 MIDAS sensitivity approaches to identify the most relevant indicators

	Optimization	**Calculation**
Method	Change the input indicators, then run an optimization	Change the input indicators for a given solution
Calculation time	Hundreds of CPU-Core-Hours	Seconds to Minutes
Result	Find the indicators that change the result, including changing the set of measures	Find the indicators that just change the result of a given measure set
Can introduce new measures	Yes	No
Feasible to do while using CAST	No	Yes

As mentioned in previous deliverables for WP3, every indicator has a confidence value describing how confident we are in the value. Values pulled directly from external databases get a high rating, and the more steps of disaggregation and estimation we include, the lower the confidence becomes. This will integrate synergistically with the sensitivity by enabling us to show both the values that are important and that are most likely to be wrong.

A preliminary optimization study has been performed as a proof of concept for a single region and the influence of the indicators on the emissions. One limitation of the preliminary study is the significant noise in the results, which arises from the heuristic nature of the optimization and the large set of measures. Efforts are underway to reduce

this noise. The relative influence of the indicators is calculated by calculating the absolute change in emissions relative to the average across all calculations and adding up the changes from reducing the indicator by 25% and increasing it by 25%.

The study shows an interesting trend: in most regions evaluated so far there are about 10-20 indicators that have an outsized influence.

In conclusion, the automated sensitivity studies will provide a powerful tool for determining which indicators to focus on for the users of the tool and hopefully significantly reduce time requirements when updating and monitoring the decarbonization process in a given region.

Hence this feature is currently still in development but will be integrated into the CAST by the WP8 developers once its full functionality has been confirmed.

6. Monitoring display and functionalities

Having an intelligent and attractive information distribution in the platform is one of the dimensions that can make monitoring simpler. This section aims at pointing out different effective ways of classifying and presenting the information and present some requirements and suggestions from a user experience point of view related to a correct monitoring tool integration. Each of the projects presented provide valuable insights into the monitoring mechanisms planned for the LOCALISED platform design in WP8, chosen for their effective approaches to measure display and monitoring.

6.1. References from similar endeavours

Several projects related to the implementation and monitoring of measures that closely align with the monitoring goals of LOCALISED have been analysed. The aim is to identify effective methods for representing measure monitoring, simplifying processes, and enhancing user interaction in terms of ergonomics and efficiency. These insights will be shared with the CAST platform developers in WP8 to support the integration of measure monitoring tools.

Both the **SDGs** and **SECAP** frameworks are central to many of the projects cited, highlighting their importance in evaluating measures at regional levels. These frameworks should play a key role in shaping LOCALISED's design and functionality, particularly in monitoring and evaluating the success of decarbonization and climate adaptation measures. Especially, closely aligning to the SECAP initiative could ensure the usability and continuity of the platform due to its local tailored framework.

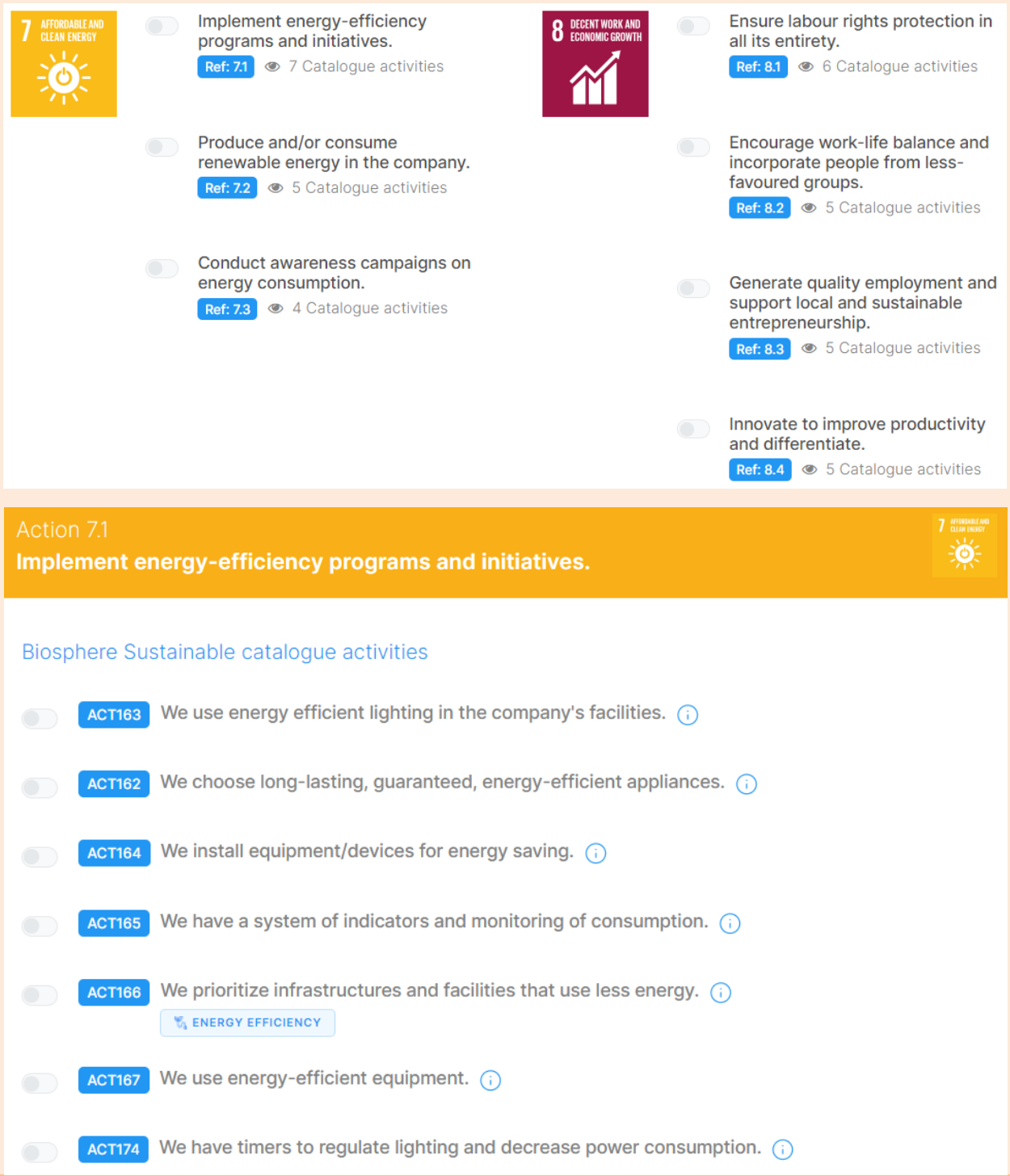
6.1.1. References on Measure Classification and Filtering

Biosphere Project: Utilises a multi-level action classification system, allowing users to filter by SDGs, areas (clusters of SDGs), or themes. This concept could be effectively implemented in LOCALISED, enabling users to filter measures based on SDG goals, stakeholders, municipal competencies, and other criteria.

Navarra Pacto de Alcaldías: Features a measure classification system based on SECAP, aligning closely with LOCALISED objectives. This system also includes indicators for tracking progress, costs, emissions, and energy demand, which can help users evaluate their measure plans.

Name	**Biosphere project**
Web	https://www.biospheretourism.com/es
Description	Biosphere helps you to define, organise and make your sustainable goals and priorities visible. A model to work on your own personalised sustainability plan: you decide which criteria to include in your plan, organising your efforts by Sustainable Development Goals (SDGs) and United Nations goals. Our system contributes to highlighting your good practices and improving your positioning, allowing your organisation to reach a market that is looking for more sustainable experiences.
Screenshots of the platform	

Classification of actions by SDG goals and targets:



Classification of actions by Areas:

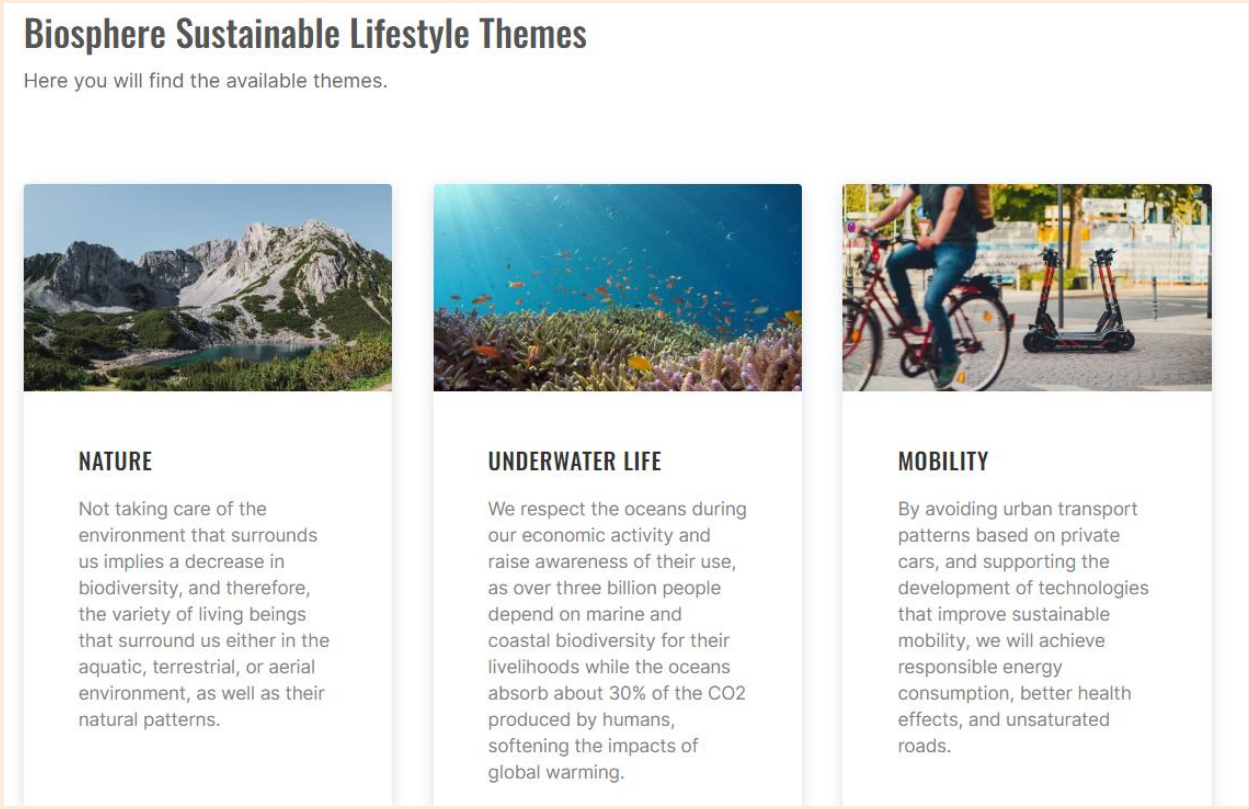
Environment and Climate Change

The environment and climate change mitigation is one of the fundamental pillars for sustainable tourism development in the world. The actions to be taken must be in accordance with the goals and objectives of sustainable development developed by the UN. In this dimension we present actions and activities related to the control of emissions of polluting agents; the sanitation and cleaning of water; the production and use of clean, affordable and non-polluting energies; the responsible production and consumption of products and services; war on plastic and a waste management; or help to prevail the submarine life and the terrestrial ecosystems.

Society and Culture

Respecting the local communities of our environment and sharing their culture and history in a respectful way, are one of the goals to promote the sustainable development of a tourism company. Social equity is part of the path towards a society where everyone has equal opportunities in the face of challenges and towards a better life. In this section we will find objectives such as the end of Poverty; Health and Well-being; Quality Education; Gender Equality; Sustainable Cities and Communities; Peace, Justice and Solid Institutions.

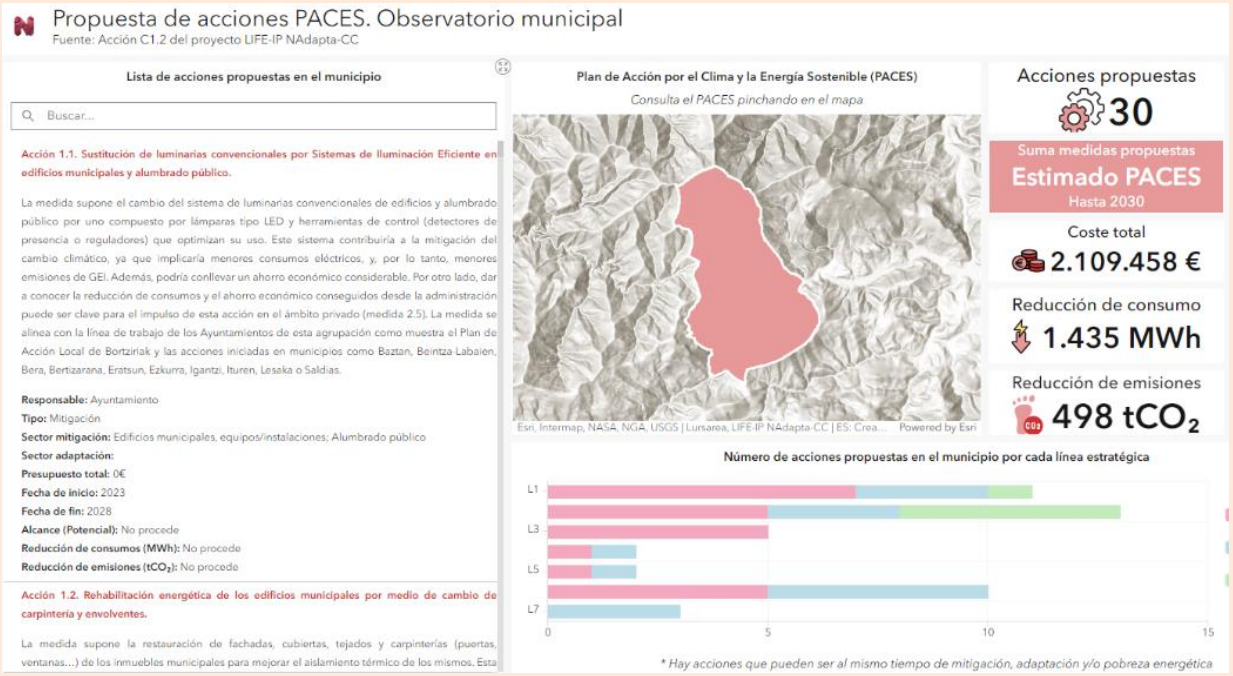
Classification of actions by themes:



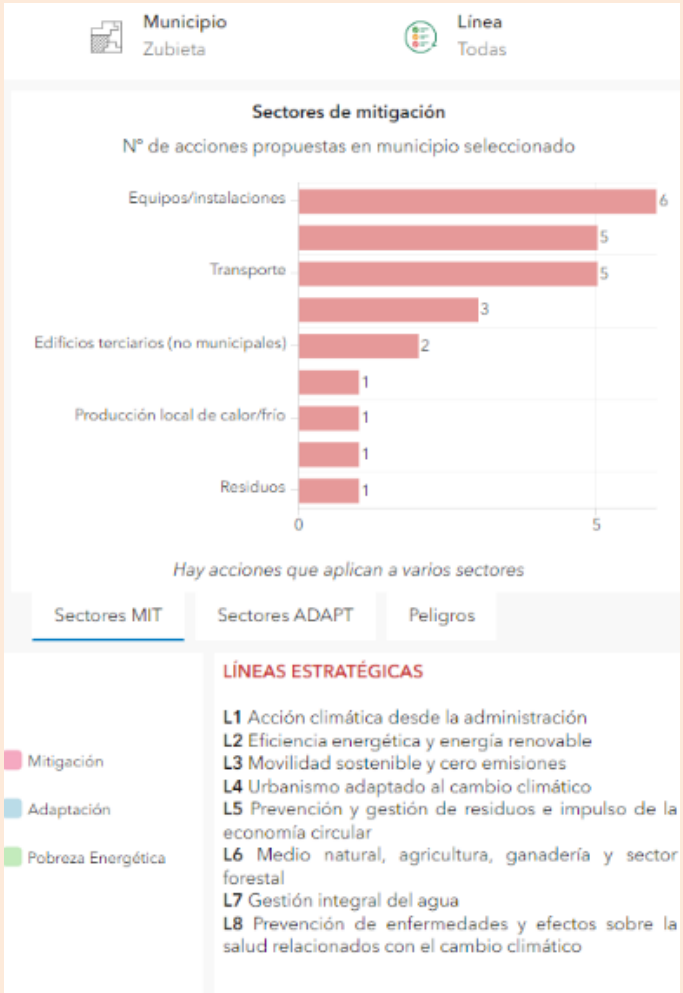
Name	**Pacto alcadias de Navarra**
Web	https://pactoalcaldias.navarra.es/es/
Description	In Navarra, the SECAPs have been drawn up in a grouped manner. They are structured around 8 strategic lines and propose up to 53 actions in the areas of energy, urban planning adapted to climate change, mobility, water and waste, among others. On this website you can consult all the information related to the Covenant of Mayors in Navarra from a municipal, regional and regional perspective. Which municipalities have joined the initiative, which municipalities have approved their action plan, the data regarding the SECAPs, what measures are the municipalities implementing and the level of compliance towards the proposed objectives.
Screenshots of the platform	

Actions proposed at municipal level:

- Proposed measures and relation with the SECAP categories.
- Expected emission reduction, cost, and consumption.

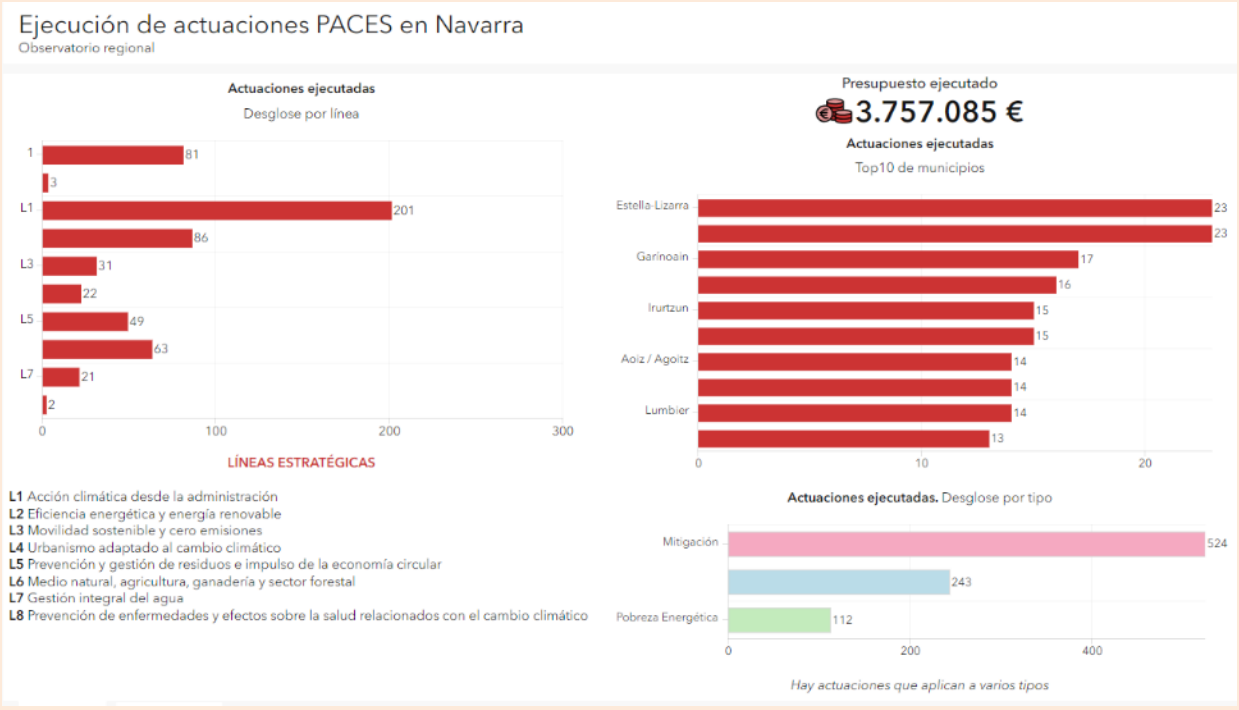


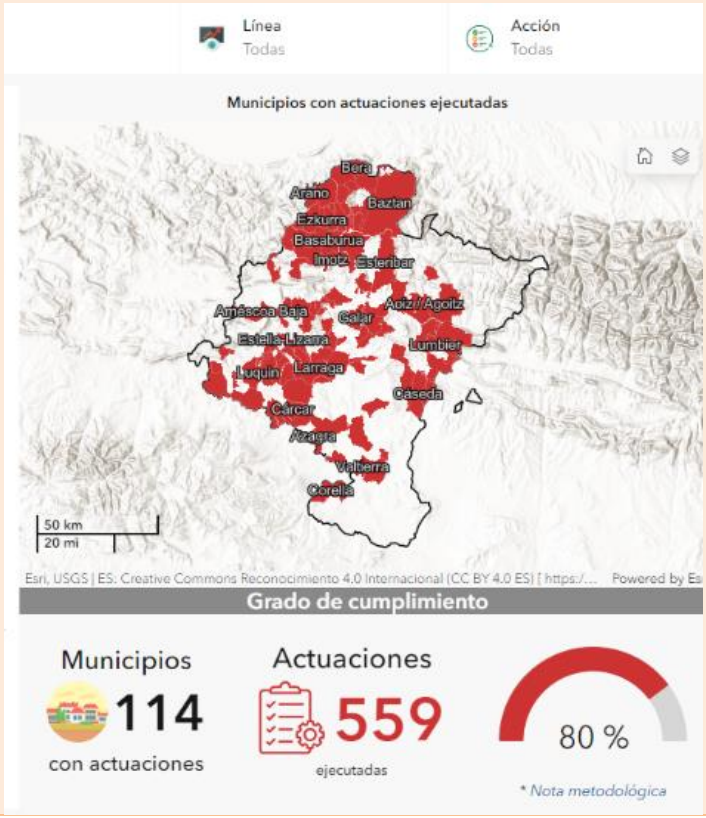
- Sector summary for adaptation and mitigation and expected risks



Monitoring graphs:

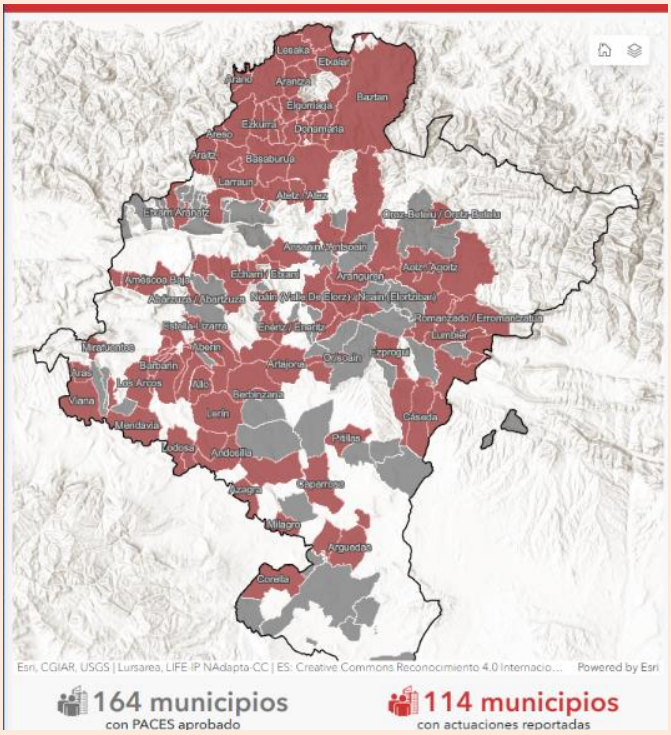
- Measures at municipal level
- At NUTS-3 level it is possible to see the cost distribution, degree of implementation.





Impact and summary:

- Summary of global objectives for the region
- There is also a section with funding tools organised by topics



COMPROMISOS 2030

Las entidades firmantes se comprometen a realizar al menos, **3 acciones clave en mitigación** y otras **3 acciones de adaptación** al cambio climático, además de **1 acción para hacer frente a la pobreza energética**. En mitigación, el compromiso adquirido es la **reducción, para el año 2030, de al menos un 40%** (*) **de las emisiones per cápita** de GEI en el ámbito territorial respecto al año base (2005).

** Los municipios adheridos al Pacto de las Alcaldías a partir de junio del 2021 se comprometen a reducir el 55% de sus emisiones para el año 2030 y a alcanzar la neutralidad climática en 2050.*

Seguimiento

Medidas de mitigación — 3 — mínimo

Medidas de adaptación — 3 — mínimo

Pobreza energética — 1 — mínimo

Reducción de emisiones per cápita
Municipios adheridos

Antes de Junio 2021	Después de Junio 2021
Meta 2030 40% respecto a 2005	Meta 2030 55% respecto a 2005
	Meta 2050 Neutralidad climática

Municipios que cumplen — 65 (0 – 164)

Municipios que cumplen — 36 (0 – 164)

Municipios que cumplen — 60 (0 – 164)

Municipios que avanzan al ritmo necesario

Sin datos. Pendiente de inventario municipal de emisiones

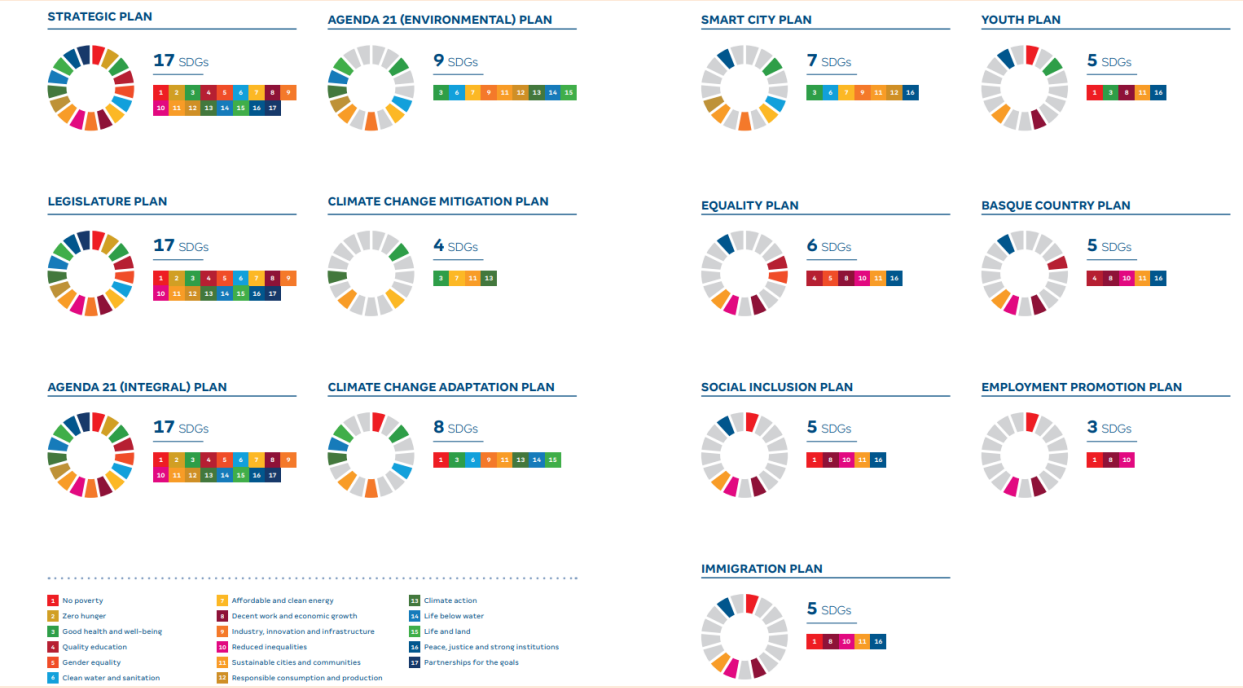
6.1.2. References on SDG compliance visual representation

Euskadi 2030: Introduces a visual tool called "Rosetta," which links each action plan to SDG compliance. This clear and visually appealing approach could serve as excellent inspiration for LOCALISED. Additionally, self-evaluation indicators for each SDG are provided.

SDG Patiala Platform: Offers a multi-indicator visualisation tool that helps users understand SDG compliance and target achievement, which could enhance LOCALISED's reporting capabilities.

Name	**LOCAL 2030 Agenda Euskadi (Basque country)**
Web	http://www.udalsarea2030.eus/we-publish-publications
Description	This Guide seeks to provide the necessary guidance to prepare a Local 2030 Agenda by adapting the Sustainable Development Goals (SDGs) and their targets to the local authority context. Furthermore, the Guide also shows how to adapt the Sustainable Development Indicators to the local context and provides guidelines to measure local authority contribution to SDGs.

Representation of the contribution of municipal plans to SDGs:



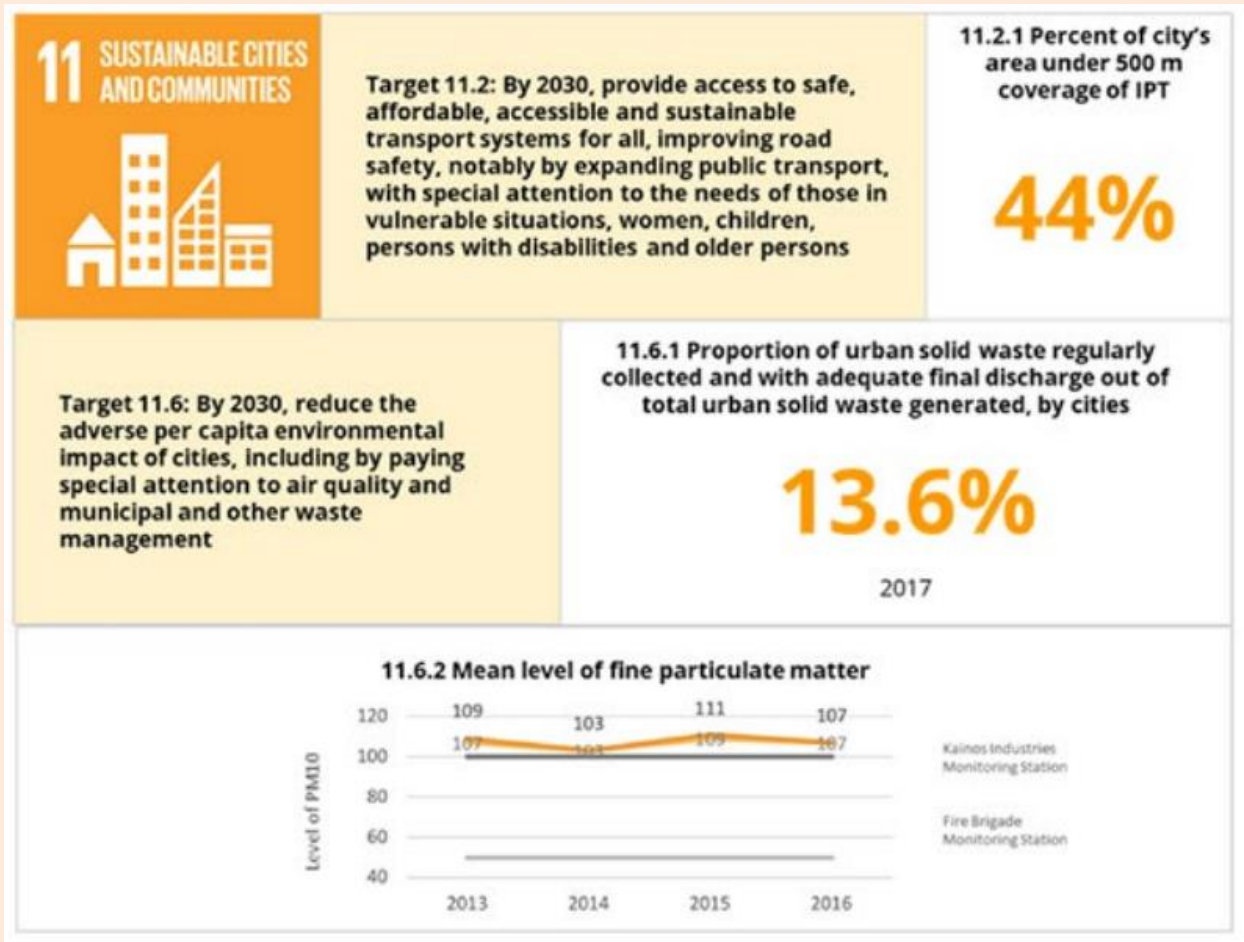
Representations of the contribution of local plans to the SDG targets:

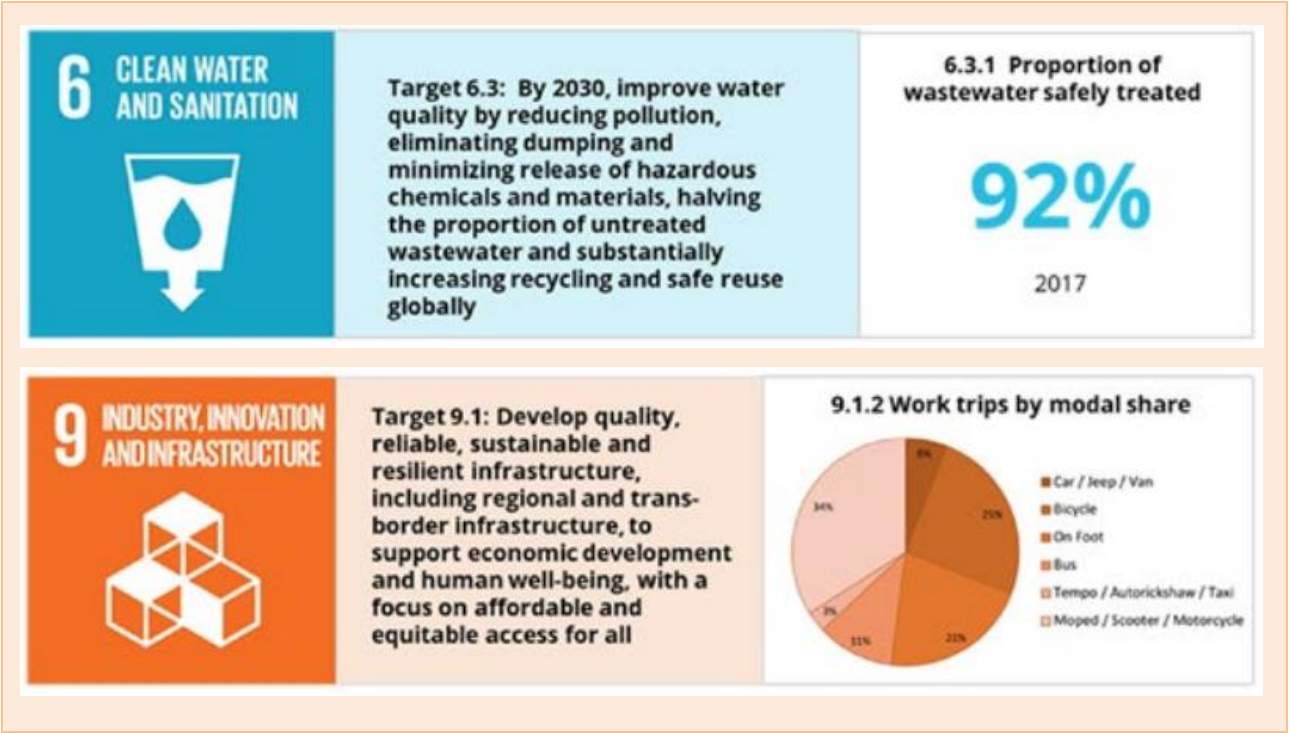
Representation of sustainable indicators that can be part of the municipal strategic scoreboard:

Name	**Valuing the SDGs for Localization in Patiala, India**
Web	Local Data Action Microgrants 2018-2019 — TReNDS (sdsntrends.org)
Description	This brief outlines an easy-to-use, four-step methodology tested in Patiala to demonstrate to cities the simplicity, feasibility, and value of subnational SDG monitoring through data visualisation design and technology. It proposes ways to kickstart localising the goals with "what is available" rather than "what is missing." The aim is to develop a long-term view for sustainability, to optimise municipal efficiency, and to bolster inter-departmental and citizen participation. This is done by setting a precedent for SDG localization for Indian cities that have less exposure to national programs, technical expertise, and the international stage. This model provides a roadmap for initiating a full-scale city-level SDG observatory, inclusive of a living reference data

	dashboard, which can be adapted to other cities irrespective of their size, geographic location, and existing capacities.

SDG target indicators dashboard:





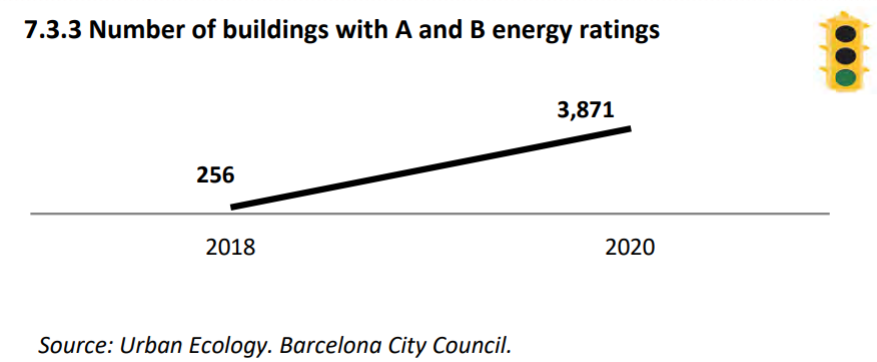
6.1.3. Progress tracking and indicators

Barcelona Agenda 2030: Uses a "red light" system to indicate whether progress toward each SDG target is positive, negative, or uncertain. This simple, intuitive system could be adopted by LOCALISED to track the success of various measures.

Statistics Austria: Employs qualitative SDG indicators to denote positive, negative, or neutral progress over time, a similar approach that LOCALISED plans to adopt for indicators that cannot be measured numerically.

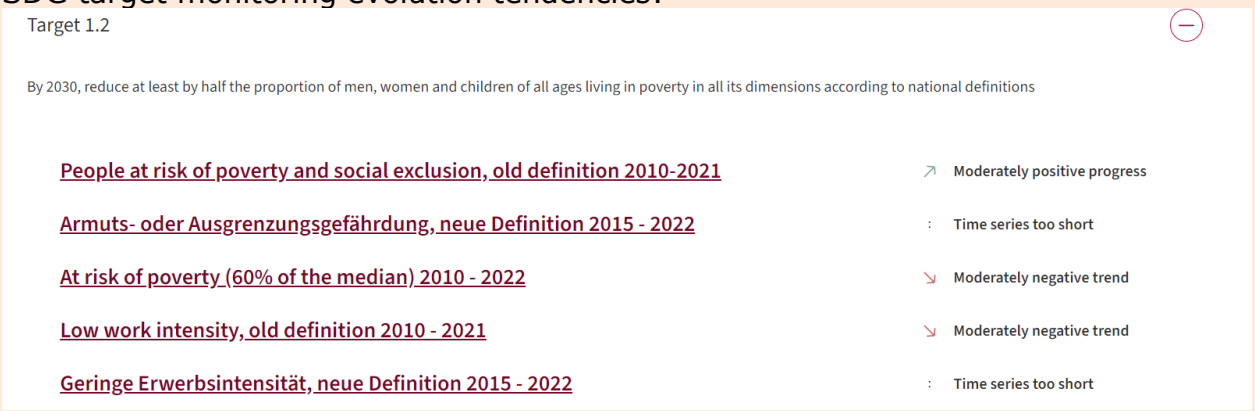
Name	**Barcelona city report on 2030 agenda**
Web	BARCELONA CITY REPORT ON 2030 AGENDA - SDG Local Action
Description	The "Annual Monitoring and Evaluation Report on the Barcelona 2030 Agenda" serves as a beacon of transparency, offering a comprehensive analysis of the city's journey towards achieving the 17 Sustainable Development Goals (SDGs). The report outlines strategic pathways for the next six years, charting a course towards SDG achievement by 2030. From collaboration with companies to societal involvement, Barcelona reaffirms its commitment to building a more sustainable and equitable future for all. Barcelona not only reflects on past accomplishments but also charts a roadmap for continued progress, serving as a beacon of hope and inspiration for cities around the world.

SDG target monitoring evolution tendencies (representation with a red light):



Name	**Statistics Austria**
Web	Goal 7: Affordable and Clean Energy - STATISTICS AUSTRIA - The Information Manager (statistik.at)
Description	In Austria, Statistics Austria, as the National Statistical Institute, has taken over the compilation of the national SDG indicator set in 2017. Currently, about 260 indicators (with multiple entries) are available, the time series start with 2010.

SDG target monitoring evolution tendencies:

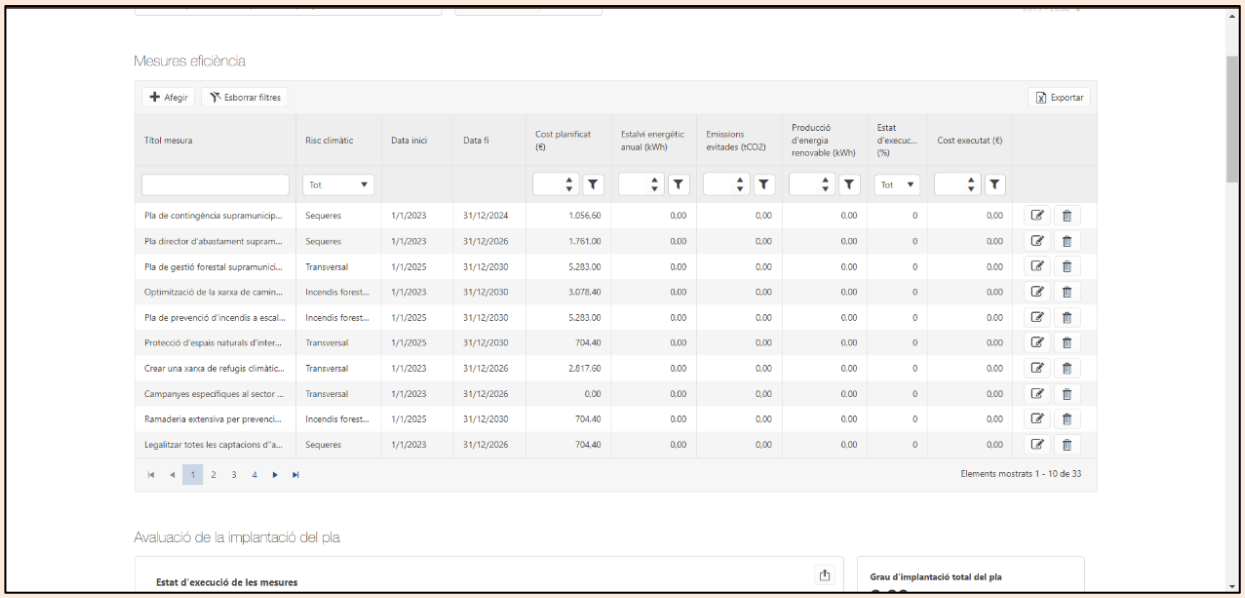


6.1.4. Measure monitoring and editing SECAP framework-based

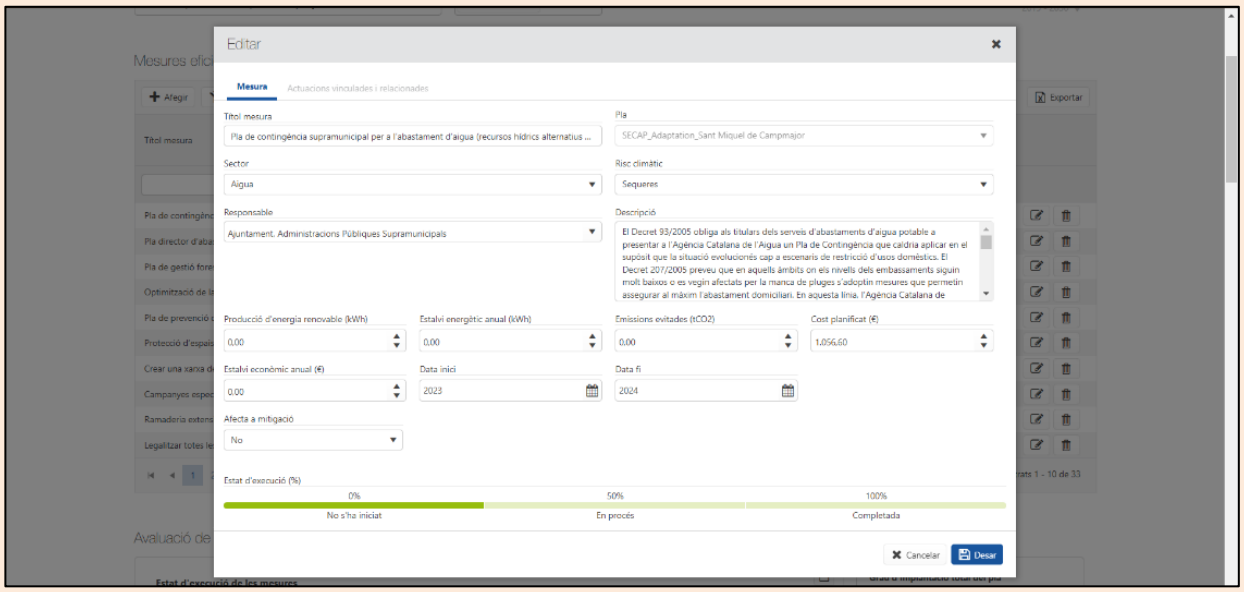
ePlanet Platform: Features a robust interface that integrates measures within a SECAP-based framework, including tools for editing measure parameters and indicators for tracking emissions, costs, energy, and progress. This platform offers strong inspiration for LOCALISED's measure monitoring interface.

Name	ePlanet
Web	ePLANET H2020 Project
Description	The main aim of the ePlanet platform is to support municipalities and supra-municipal entities to 1) Manage the Energy Accounting of their municipality, and 2) Support the monitoring of their SECAPs implementation.

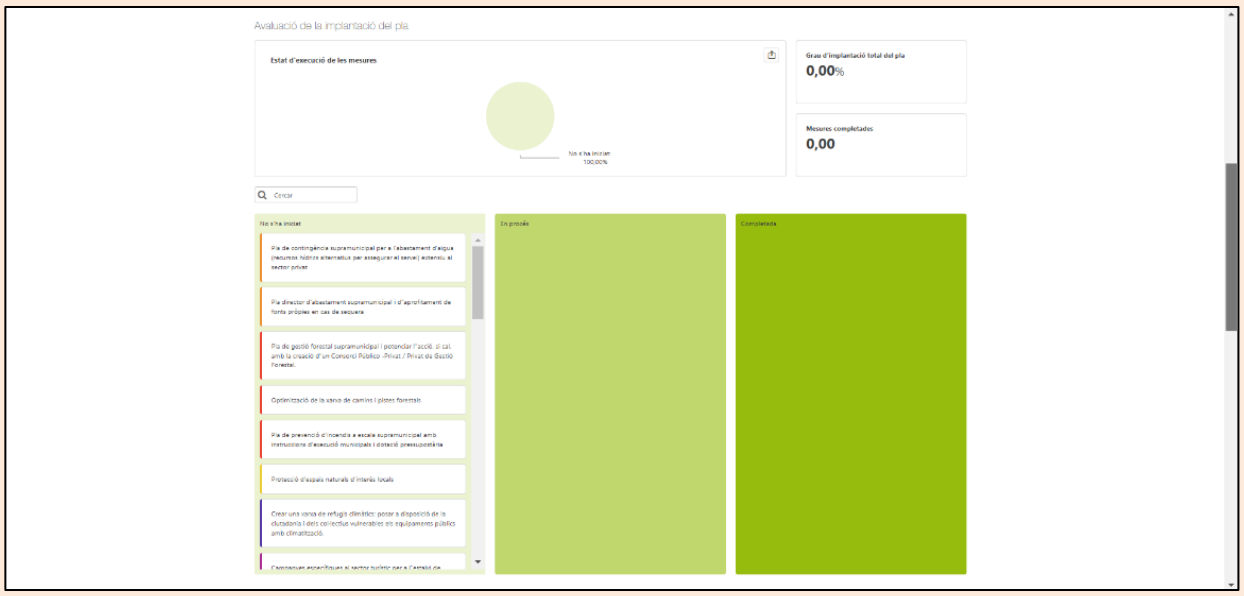
Measure repository display:



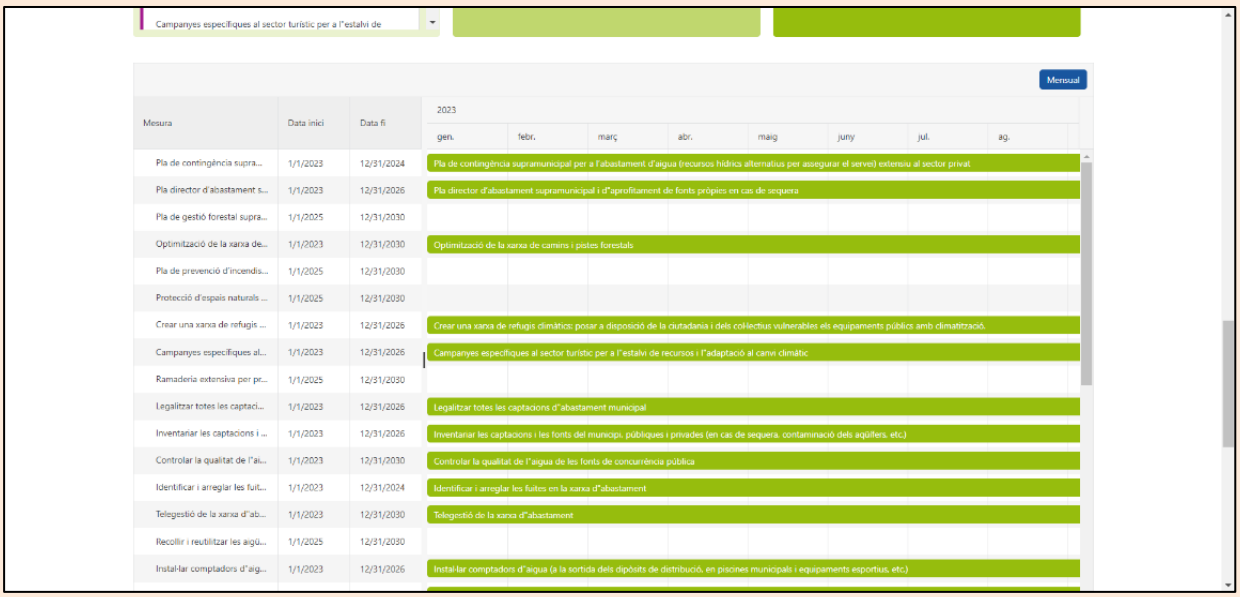
Measure parameters editing window:



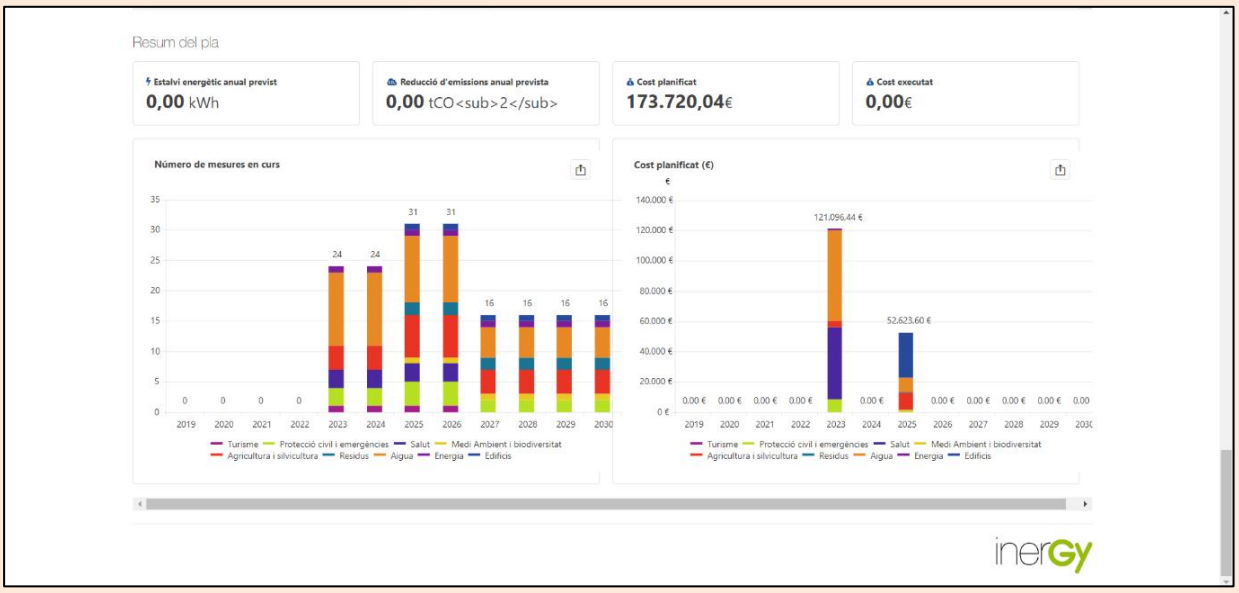
Measure dashboard, containing implementation data:



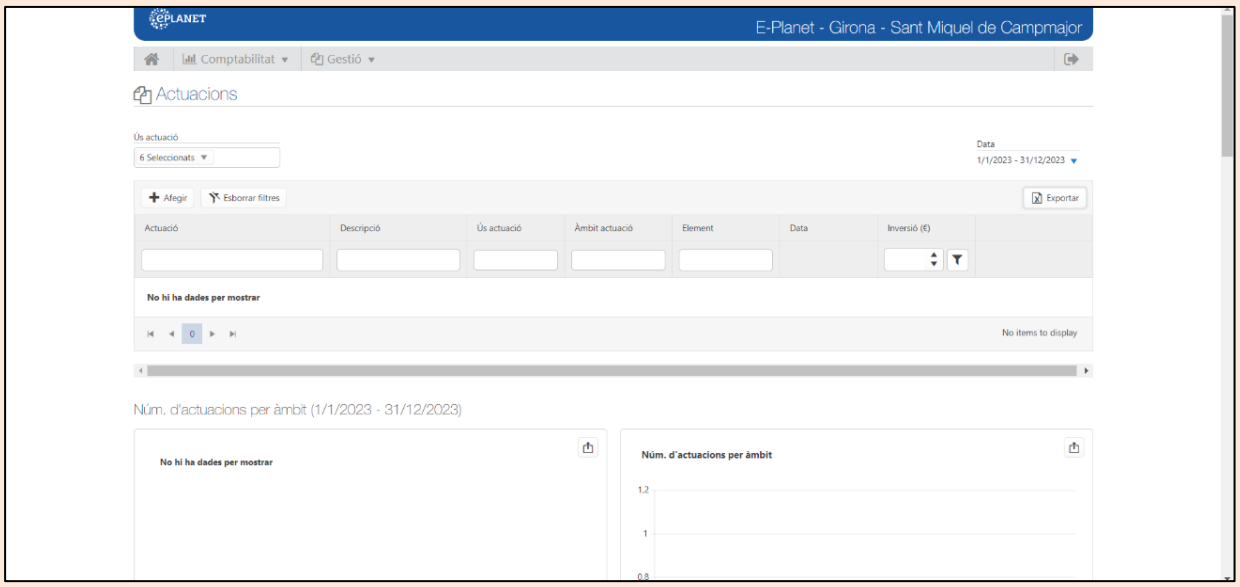
Measure Gantt monitoring display:



Measure summary highlighting the kWh reduction, CO2 emissions, costs and nº of measures per sector implemented:



Template to introduce new actions:



6.2. *Monitoring display & functionalities*

The aim of this section is to set the functionality requirements of the monitoring window of the CAST to be considered by the platform designers in WP8 based on the references from Section 6.1.

To ensure proper monitoring, the entire platform workflow must be harmonised accordingly. Below is a description and outline of the user interaction, from accessing the platform to navigating the monitoring section.

Table 26 Monitoring interface suggestions and requirements

User navigation flow	Functionality requirements/suggestions entangled with monitoring
Step 1. User enters the platform	-
Step 2. User selects its municipality	-
Step 3. User accesses the dashboard	At this point the top ten measures to mitigate the CO2 emissions are presented with the ideal reduction towards 2050 of applying all those measures. **Suggestion:** The user should be able to see what measures are being considered and be able to alter the selection to see the affectation on the 2050 projection graph.

Step 4. User accesses the Explore and customise decarbonisation solutions window	In this section the whole measure list appears along with an associated emission bar indicator and a cost bar indicator. **Suggestion:** A filtering option could be useful to classify the measures not only by SECAP Adaptation sector, but also by stakeholder, municipal cluster defined in Section 3, or SDG impact as mentioned in the Section 6.1 *Biosphere* reference. **Suggestion:** An SDG Rosetta icon could appear next to each measure to represent cross-target impact as seen in the Section 6.1 *LOCAL 2030 Agenda Euskadi* reference to represent the affectation of the measure to the different SDG goals. **Suggestion:** A "switch" icon could appear indicating if the measure is currently active or not.
Step 5. Edit measure parameters	The user can also edit the measure parameters. **Suggestion:** Place special emphasis on clarifying the implementation barriers and measure co-benefits. **Requirement:** The graphs need to reflect the essential monitoring variables: Energy savings, CO2 reduction, Costs, Lifetime and the relevant associated KPIs with the expected impact defined in chapter 4.2. **Requirement:** The list of associated SOIs should be clearly visible as tracking indicators for that specific measure.
Step 6. Monitoring	Once the user has adapted and selected a set of measures, those can be tracked and monitored in a new window. **Requirement:** The list of active measures should appear with their implementation date. **Requirement:** A table should be included summarising the whole achievements in terms of CO2 reduction, kWh reduction, Costs, Time and renewable energy produced. The *E-planet* reference could be a good source of inspiration to draw the measure implementation summary table.

	Suggestion: Additionally, a summary graph including the sectors affected (As seen in Reference: *Pacto alcadias de Navarra* from chapter 6.1) or a Rosetta including all the affected SDGs (As seen in Reference: *LOCAL 2030 Agenda Euskadi 2030* from chapter 6.1). **Requirement:** The associated SOIs to each measure should be classified by sensibility and coloured by data quality/confidence level evaluated in WP3. Even if some SOIs are left without any quantitative values, their apparition can serve as a source of inspiration for the user to develop monitoring indicators and provide data. **Requirement:** All the offered data needs to be labelled with periodicity and last time updated. **Requirement:** Measure associated SDGs should appear next to each affected SOI. **Requirement:** User can input and edit monitoring data and save the values in its personal space. **Suggestion:** The user can insert objective milestones in the monitoring graphs or reduce the timespan. **Suggestion:** The user can compare the real measured outcomes with the expected values (Own benchmark and with the engines prediction). For example, in the CO2 emission reduction case. **Suggestion:** A feature allows the comparison with similar regions. Allows to visualise how they are doing towards their objectives, and what set of measures they are implementing. **Suggestion:** The user can include new indicators to keep track of the implemented measures. **Suggestion:** The user can print a monitoring report/summary.

The following Table 28 summarises the whole variables to be displayed during the measure implementation and monitoring user experience workflow for the example measure from the WP4 measured database "Bus Vehicle Technology Shift: BEV" :

Table 27 Monitoring variables to display, Bus technology shift example

Displayed content	Value
Measure name	Bus Vehicle Technology Shift: BEV
Measure description	Shift fossil fuel bus vehicle drivetrains to battery electric options
Response type	Mitigation
Sector	Transport, Energy
Stakeholder	National government, Subnational government, Private sector
Cost	CAPEX between 240000-276000€/vehicle in 2020. Expected to decrease to between 264000-270000€/vehicle. OPEX between 0,37-0,44€/vkm in 2020. Expected to decrease to between 0,0,33-0,43€/vkm in 2050.
Maintenance cost	
Return of the investment	
Energy savings	Reduced kWh of fuel consumption
CO2 emission reduction	
Lifetime	
Implementation time	
Nº of jobs created	
Associated SOIs	Transport energy consumption from gas and diesel oil (+) Transport energy consumption from electricity (+) CO2 emissions per capita (+) CO2 Emissions from transport (+)
SECAP section	Mitigation – BEI transport
SDGs	SDG 3.9; SDG 7.2; SDG 9.2; SDG 9.4; SDG 13.3; SDG 13.4 SDG 13.5; SDG 10.3; SDG 7.3; SDG 11.2; SDG 11.6; SDG 13.2
Other variables (Used by MIDAS, Or introduced by the user)	Nº of electrified buses

It is important to note, that this is a guideline to be considered by designers in WP8, and the final form will depend on the final available information, therefore, will rely on the DSP and CAST final form.

7. Further user monitoring assistance

Not all the users will have the same level of expertise in monitoring. Having complementary information sections can increase the platform accessibility. The contents presented in this section aim at inspiring and encouraging municipalities to develop effective monitoring practices. These different developments could be summarised in a "Tips" section accessible from the monitoring stage or included in a probable "Q&A" or "Help" window.

7.1. Good practices repository

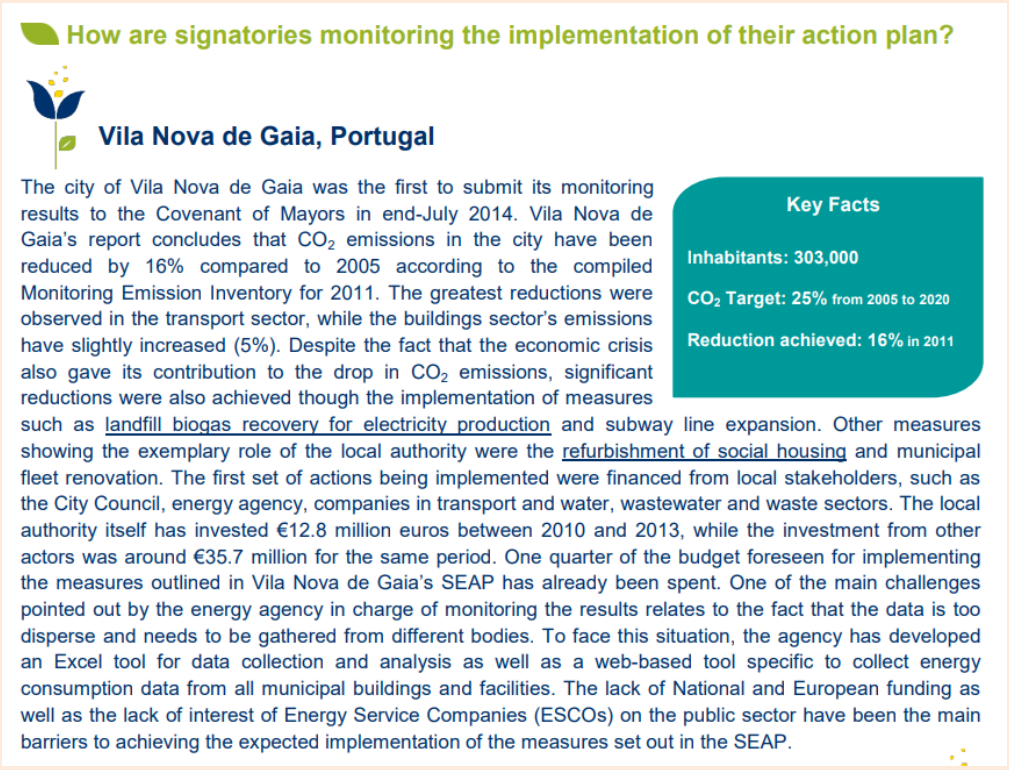
The good practices repository aims to build a series of experiences from municipalities with great knowledge and understanding on monitoring practices.

Connecting regional administrations' experiences is one of the key points for overcoming common challenges, particularly for smaller administrations that may lack the resources or capacity to explore what others have already accomplished. By relying on a community of shared knowledge, these administrations could benefit from proven solutions, making a significant difference when implementing and monitoring mitigation and adaptation plans effectively.

Table 29 highlights two examples of good practices repositories that could be useful as a source of inspiration.

Table 28 CoM good monitoring good practice reference

Reference: Example from Covenant of Mayors (CoM), monitoring good practices, statements



How are signatories monitoring the implementation of their action plan?

Vila Nova de Gaia, Portugal

The city of Vila Nova de Gaia was the first to submit its monitoring results to the Covenant of Mayors in end-July 2014. Vila Nova de Gaia's report concludes that CO_2 emissions in the city have been reduced by 16% compared to 2005 according to the compiled Monitoring Emission Inventory for 2011. The greatest reductions were observed in the transport sector, while the buildings sector's emissions have slightly increased (5%). Despite the fact that the economic crisis also gave its contribution to the drop in CO_2 emissions, significant reductions were also achieved though the implementation of measures such as landfill biogas recovery for electricity production and subway line expansion. Other measures showing the exemplary role of the local authority were the refurbishment of social housing and municipal fleet renovation. The first set of actions being implemented were financed from local stakeholders, such as the City Council, energy agency, companies in transport and water, wastewater and waste sectors. The local authority itself has invested €12.8 million euros between 2010 and 2013, while the investment from other actors was around €35.7 million for the same period. One quarter of the budget foreseen for implementing the measures outlined in Vila Nova de Gaia's SEAP has already been spent. One of the main challenges pointed out by the energy agency in charge of monitoring the results relates to the fact that the data is too disperse and needs to be gathered from different bodies. To face this situation, the agency has developed an Excel tool for data collection and analysis as well as a web-based tool specific to collect energy consumption data from all municipal buildings and facilities. The lack of National and European funding as well as the lack of interest of Energy Service Companies (ESCOs) on the public sector have been the main barriers to achieving the expected implementation of the measures set out in the SEAP.

Key Facts

Inhabitants: 303,000

CO_2 Target: 25% from 2005 to 2020

Reduction achieved: 16% in 2011

In this case, the CoM collected the experience from Vila Nova de Gaia (Portugal) to showcase in the monitoring guidelines. Additionally, some key facts are provided for contextualization.

Reference: Climate-ADAPT (3.2 Finding examples of good adaptation practices (europa.eu))/ 1.8 Finding additional support (europa.eu)

Climate-ADAPT aims to support Europe in adapting to climate change helping users to access and share data and information on:

- Expected climate change in Europe
- Current and future vulnerability of regions and sectors
- EU, national and transnational adaptation strategies and actions
- Adaptation case studies and potential adaptation options
- Tools that support adaptation planning

The Climate-ADAPT platform is a good example on how to offer additional support when it comes to implement adaptation measures. It features a repository of adaptation pilot cases (as seen in the map screenshot), information on how to reach out for more in-depth or personalised knowledge, or a good practices repository that can be filtered by climate Impact and adaptation sector.

In the case of LOCALISED, the repository could be built by gathering experiences through workshops, from the project partner cities, from literature or from an online template in the platform, where the users could share their experience. Figure 4 highlights the different available sources.

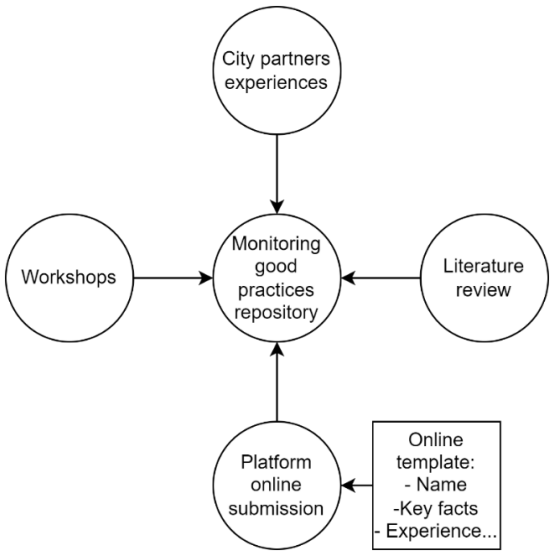


Figure 3 Sources of information to build the repository

7.2. Analysis on regional databases to tackle municipality data barriers

This exercise is closely connected to the "Municipal department analysis" from Section 3 since both endeavours are oriented towards streamlining data exchanges between competencies to address data collection challenges. The former focuses on the municipal level, while the latter extends to collaborations between municipal and supra-municipal organisations.

This feature apart from demonstrating the fact that municipalities could provide information from their granularity level and serve as a hint displayed in the profiler "Look for local datasets, example for some specific regions". It can be included in the "Tips" section, or it can be the start of a data source repository available in the platform in which the user can contribute, hence the information will remain assigned to the municipality in question. Or even, an option of "Municipalities near your area have used these datasets to cover platform blind data spots"

When constructing the NUTS3 variables database (WP3), it was seen that some essential information not accessible from a top-down approach was available in local databases for specific regions. The exercise would demonstrate the existence of local databases which can be searched and accessed by municipalities in order to fill monitoring data gaps. This enhancement would also prove the potentialities of bidirectionality in the platform.

A collection of local datasets has been performed covering: Catalonia NUTS-2 region, Berlin-Brandenburg NUTS-3, Netherlands and Lower Austria. These references would demonstrate that some variables are available at local level and can be used by local administrations to draw their local plans and could be used a base example in the platform.

The full local databases collection is available in Annex 2.

The following section compares the available data associated with the SOIs for each study of the mentioned studied regions.

Table 29 Identified variables at municipal level useful for the SOIs calculation

Case	Data categories	SOI useful variables at municipal level
Catalonia NUTS-2	Population Culture, Language Education Elections Justice and security Health Work Living conditions Dwellings and buildings Income and household consumption Social services Macroeconomy Enterprises and finances Public finances Investments Prices Research and technology Agriculture, Livestock and fisheries Commerce and services. Construction Industry and energy Transportation Tourism Environment Territory	Population Age groups Migration: foreign born population Education level Unemployed Number of residencies Tenancy Monthly family disposable income Utilised agricultural area by type Tourist accommodations Social housing Number of animals per type Number of private transports per type Waste per capita Recycled waste Quality of life index Emissions per energy carrier per sector Water consumption per capita (l/day) Traffic victims Energy consumption per sector
Berlin-Brandenburg NUTS-2	The data is classified into the following themes: population, social and economy. Spatial maps on various themes such as property cadaster, protected areas, road and water networks, traffic volume, habitat, etc.	Population Age groups Migration: foreign born population Unemployed Number of private transports per type Agricultural area Number of animals per type Number of residencies Water consumption Household waste Municipal area per use/type

Netherlands NUTS-1	Agriculture Caribbean Netherlands Construction and housing Education Energy Enterprises Financial and business services Government Health and welfare Income and spending International trade Labour and social security Leisure and culture Macroeconomics Manufacturing Nature and environment Population Prices Regional statistics Security and justice Trade, hotels and restaurants Traffic and transport archive	Population Migration: foreign born population Agricultural area Farmland by crop type Residential and non-residential buildings Housing costs Cost of final residential energy Consumption compared to Gross Family Income Housing satisfaction Energy consumption by sector and energy carrier Land use by type Tourist accommodations GDP per sector Wastewater treatment House rent prices Proximity to facilities Distance travelled per day by transport mode Transport occupation by mode Georegistry
Lower Austria NUTS-3	Labour market Population and society Energy and environment Research, innovation and digitalization Industry, Construction trade and services International trade Agriculture and forestry Tourism and transport National economy and public finance	Population Precipitation Area protected as natural sites Land use Livestock Forest area Grassland area Tourist accommodations Building stock Waste Waste combustion plants emissions

The following table represents the representativity of the identified variables available at municipal level:

Table 30 Top available variables at municipal level

Common accessible SOIs related variables at municipal level		
Population	4	100 %
Land use	4	100 %
Building stock	4	100 %
Livestock	4	100 %
Migration: foreign born population	3	75%
Tourist accommodation places	3	75%
Transport stock	3	75%

Age groups	2	50%
Unemployed	2	50%
Water consumption	2	50%
Waste per capita	2	50%
Energy consumption by sector per energy carrier	2	50%
Gross family income	2	50%
Quality of life	2	50%
Educational level	1	25%
Tenancy	1	25%
Traffic victims	1	25%
Emissions by sector per energy carrier	1	25%
GDP per sector	1	25%
Transport occupation	1	25%
Housing costs	1	25%

Some important variables are available only at higher administrative levels or for specific cities and districts. For instance, in the Barcelona NUTS-3 area, data such as the percentage of organic crops, housing costs relative to family income, percentage of green urban areas, soil sealing, heatwave vulnerability, protected natural sites, and forest area are accessible at the municipal level. Conversely, climate-related data like rainfall, average air pollution (e.g., PM2.5, NO2), wildfires, and recorded earthquakes are available only for certain points within the region.

In Berlin, variables such as traffic accidents, monthly disposable family income, consumption expenses, agricultural land use, education levels, tourist accommodation capacity, and energy consumption by energy source can be found in local databases. However, other relevant data, like energy and CO2 balances, are only accessible at the NUTS-2 level.

In the Netherlands, information on transport, CO2 emissions, and green space percentages is often available only for specific cities such as Amsterdam, The Hague, or Groningen.

For Austria, much of the essential data, such as energy balances, transport statistics, family income, and CO2 emissions, is only accessible at higher levels than municipalities.

The availability of data often depends on factors like a country's size, population density, and the regional landscape. As a result, certain variables may not be meaningful at the municipal level and are instead aggregated at larger territorial units.

In conclusion, some of the data needed for SECAPs or other municipal action plans can be sourced from local databases that are not reflected in national datasets. Therefore, the platform should encourage users to search for missing data locally, a suggestion

that could be included in the "Tips" section or in the monitoring window by WP8 CAST developers.

8. Recommendations summary for implementing monitoring in the CAST

The following table summarises the relevant developments in this document regarding the CAST monitoring conception.

Table 31 Key points from the document sections

Section 2	• This section highlights how the LOCALISED platform utilities answer the SECAP monitoring needs. • It is important to keep in mind the monitoring requirements defined by the Covenant of Mayors while designing the CAST to ensure the continuity of the tool.
Section 3	• This section outlines which municipal competencies are responsible for managing the different measures. • competency clusters can be formed to help the user reach out for monitoring data. It can be integrated in the filtering of measures or as additional information provided to the user throughout the process. For example, when selecting the transport sector measures, a message could highlight the rest of municipal competencies that can be usually entangled with the topic.
Section 4.1	• Assigning data source periodicity and last time updated to the data provided to users is essential. This allows for filtering variables by data quality, alerting users to data validity, and ensuring that the information aligns with reporting frequency requirements.
Section 4.2	• Assigning qualitative impacts to SOIs enables users to anticipate the effects of implemented measures on various indicators that do not have a numerical outlook. An arrow or similar symbol can be integrated next to the indicators in the monitoring or planification phase to indicate a positive or negative impact towards the decarbonisation and climate adaptation goals.
Section 5	• The optimization and sensibility analysis can help the user prioritise the most relevant measures and indicators to monitor in their decarbonisation plan. This feature (still under development) could appear in the monitoring phase and allow the classification of relevant indicators to invest in from the administration side.
Section 6.1	• This section offers graphical and technical formats for organizing the display and monitoring of measures in similar nature projects and endeavours. These examples can serve as a source of

	inspiration for platform designers in WP8. The references encompass measure classification, monitoring variables and indicators, impact summary tables and sustainable goals representations among others.
Section 6.2	• This section highlights a series of technical and graphical requirements and suggestions to be considered by CAST developers when integrating the monitoring feature inside the platform.
Section 7.1	• This section describes a repository of good practices that could be integrated in the "Help" or "Tips" section in the platform to inspire the user.
Section 7.2	• The analysis of the local database revealed the presence of local data that is not accessible through national databases but can be obtained by local administrations. This message should be conveyed through the platform to encourage users to seek out this data and contribute new values, thereby enhancing their monitoring accuracy and overall knowledge. Again, this acknowledgement could be integrated in a "Monitoring tips" or "Help" or "Q&A" platform section.

Annex 1: Collection of municipalities and associated competencies

Collection of municipalities and associated competencies from Catalonia

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencies/ Councillors**
Cruïlles, Monells i Sant Sadurní de l'Heura (Baix Empordà, GIRONA)	1319	99.84	22,4	Habitatge, Indústria i Serveis socials
				Finances, Comerç i Turisme
				Transit, Cultura, Joventut i Patrimoni
				Sanitat i Esports
				Ensenyament
				Urbanisme i Ordre Públic
				Camins i manteniment
				Agricultura i Protecció Civil
Espolla (Alt Empordà, GIRONA)	410	43.55	24,7	Urbanisme i Habitatge
				Economia,Hisenda i Esports
				Ensenyament, Serveis socials
				Promoció econòmica, Energies renovables i Medi ambient
				Agricultura i Ramaderia
				Serveis municipals, Via publica, Transport públic i Seguretat
				Cultura
Quart (Gironès, GIRONA)	4026	38.09	32,5	Ensenyament, Seguretat, Cultura, Comunicació
				Urbanisme, Transició Energètica, Mobilitat, Esports
				Via pública, Serveis, Medi ambient, Gestió Forestal i rural
				Feminisme i igualtat, gent gran, Serveis Socials, Salut
				Cultura, Joventut, Promoció econòmica
				Habitatge, Hisenda i Patrimoni, Participació ciutadana
Banyoles (Pla de l'Estany, GIRONA)	20492	11.05	28,8	Urbanisme, Habitatge, Esports i Consells de barri
				Participació ciutadana i Joventut
				Politiques Socials
				Educació
				Cultura i Patrimoni
				Promoció econòmica, comerç i turisme
				Politiques medioambientals
				Economia i Recursos humans
				Administració
				Seguretat pública i espai públic
	1614	49.01	30,3	Turisme, Promoció econòmica, mobilitat, seguretat, governació i hisenda

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencies/ Councillors**
Santa Pau (Garrotxa, GIRONA)				Cultura, Patrimoni, entitats, educació, joventut i lleure
				Urbanisme, transparència, participació ciutadana, comunicació i noves tecnologies
				Patrimoni cultural, transició energètica i agricultura
				Esports, benestar i gent gran
Santa Coloma de Farners (Selva, GIRONA)	13787	70.64	26,9	Hisenda i promoció econòmica
				Esports, Medi Ambient i Turisme
				Urbanisme i Habitatge
				Cultura, Salut i Comunicació
				Obres públiques, serveis municipals, promoció de la ciutat, transport, mbilitat i aparcament
				Educació i igualtat
				Festes i joventut
				Acció social, benestar i gent gran
Campdevànol (Ripollès, GIRONA)	3215	32.62	24,8	Urbanisme, promoció econòmica, comerç, turisme i afers europeus
				Ciutadania, Juventut, festes i tradicions
				Igualtat, diversitat i comunicació
				Serveis socials i Cultura
				Hisenda, Esports i Recursos Humans
				Salut, Benestar i Ensenyament
				Sostenibilitat i transició energètica
Arenys de Mar (Maresme, BARCELONA)	16280	6.75	21,3	Seguretat ciutadana, Comunicació
				Acció social, Sanitat, Salut pública, Serveis municipals, patrimoni
				Promoció econòmica, Port, Comerç, Consum, Turisme, Ocupació i Fires
				Educació, Cultura, Festes, Barris i Urbanitzacions
				Esports
				Infància, Joventut i Igualtat
				Medi Ambient, Urbanisme, Obres i Serveis, Habitatge, Mobilitat
				Gent Gran, Drets Civls, Participació, Noves tecnologies
				Hisenda, Recursos Humans, Serveis generals, Administració
Granollers (Vallès Oriental, BARCELONA)	62950	14.87	32,4	Comunicació i Imatge, planificació, Participació Ciutadana, Joventut
				Cooperació, Pau i Drets Humans, transformació i Sistemes tecnològics, Esports
				Transperència i Bon Govern, Atenció a la ciutadania, Medi Ambient, Salut pública i consum
				Hisenda, Recursos Humans, Organització, Patrimoni
				Urbanisme, Obres, Projectes i Espais Verds, Comerç i Relacions amb empreses
				Transició energètica i mobilitat, activitats, instal·lacions i protecció civil
				Via pública, neteja i gestió de residus, serveis municipals i manteniment

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencies/ Councillors**
				Educació, Serveis socials i Gent Gran
				Habitatge
				Igualtat de gènere i LGTBI+, Cultura
				Acció comunitària, civisme, barris, Acollida, Seguretat Ciutadana
				Ocupació, Promoció econòmica i Turisme
Sant Pere de Torelló (Osona, BARCELONA)	2571	55.13	30,7	Recursos Humans, Obres Públiques, Coordinació
				Esports, Noves Tecnologies, Personal, Participació ciutadana, Turisme, Igualtat
				Governació, Residus, Brigada, Comunicació
				Educació, Joventut i Infància
				Gent Gran, Resdiència, Comerç
				Cultura, Entitats, Comunicació
				Serveis Socials, Cooperació, Sanitat
				Festes, Promoció econòmica
				Urbanisme, Medi Ambient
				Transició energètica
				Pagesia, ADF
Barcelona (Barcelonès, BARCELONA)	1655956	101.35	38,6	Urbanisme, Transició ecològica, Serveis Urbans i Habitatge
				Drets Socials, Cultura, Educació i Cicles de Vida
				Prevenció, Seguretat, Convivència i Règim Interior
				Economia, Hisenda, Promoció Econòmica i Turisme
				Educació, Pla de Barris, Persones Grans
				Esports
				Salut, Persones amb Discapacitat, Estratègia contra la Soledat
				Treball, Comerç, Restauració i Mercats, Feminismes, Igualtat, Memòria Democràtica
				Cultura, Industries Creatives
				Relacions internacionals, Promoció de la ciutat
				Habitatge
				Acció Social
				Polítiques d'Infància, Adolescència, Juventut i LGTBI
				Relacions Ciutadanes i Diversitat Cultural i Religiosa
				Convivència
Sabadell (Vallès Occidental, BARCELONA)	217968	37.79	31,4	Relacions Externes, Premsa, Comunicació i Imatge, Estratègia de Ciutat i Agenda 2030, Secretaria General, Intervenció General, Atenció Ciutadana, Transparència i Bon Govern
				Transformació
				Habitatge
				Cultura
				Esports
				Educació

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencies/ Councillors**
				Acció Social i Benestar Animal
				Infància i Gent Gran
				Salut i Gestió de Plagues, Drets Civils, Joventut
				Igualtat i LGTBI
				Serveis econòmics, Tecnologia i Transformació Organitzativa, Informació de base, Serveis generals i Compres, Gestió Tributària, Recursos Humans
				Obres públiques, Parcs, Jardins, Mobiliari Urbà i Arbrat, Vialitat i Clavegueram, Infrastructures urbanes, Manteniment, Mobilitat i Via Pública, Neteja, Residus i Tractament, Coordinació dels Serveis comunitaris, Mediació Comunitàroa
				Participació
				Seguretat i Civisme, Planificació i Gestió Urbanistica, Lliències Urbanistiques, Atenció ciutadana d'Urbanisme, Protecció de Patrimoni, Obres d'edificis Municipals, Agenda Urbana, Projectes Urbans
				Transició Ecològica
				Turisme i Projecció de Ciutat
				Comerç i Consum, Llicències d'activitats
				Desenvolupament Econòmic, Suport a l'Ocupació, Dinamització Empresarial
Calders (Moianès, BARCELONA)	1098	33.09	21,4	Hisenda, Medi Ambient, Obres, Urbanisme, Seguretat, Manteniment i Via Pública, Serveis
				Serveis Socials, Gent Gran, Salut, Atenció a les Persones
				Educació, Joventut
				Comunicació i participació ciutadana, Promoció econòmica, Turisme, Consum
				Esports i entitats Esportives
				Entitats esportives
				Cultura
Olost (Lluçanès, BARCELONA)	1218	29.37	30,7	Promoció econòmica, Empresa, innovació, ocupació, Comerç i turisme, Actuacions de promoció, atracció i consolidació d'empreses, Promoció del sòl, la indústria i el turisme, Cases turisme rural, Hisenda i tresoreria
				Participació ciutadana, Comunicació, Organització administrativa, Transparència i bon govern, Comunicació corporativa, Formació, La gestió de la contractació i de les subvencions, Els recursos humans, Atenció ciutadana, Patrimoni
				Urbanisme, Obres i serveis, Espai Públic, Brigada municipal d'obres, Control d'activitats econòmiques
				Protecció civil, Camins rurals i Pagesia, Mobilitat, Residus
				Serveis Socials, Igualtat, Consum, Gent gran, Emergències socials, Solidaritat i Cooperació
				Educació, Escola Bressol, Escolarització i admissió, Cooperació amb administració educativa autonòmica, Formació

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencies/ Councillors**
				Esports, Salut, Equipaments esportius, Hàbits saludables
				Cultura, Joventut, Promoció cultural, Fires i Festes
				Medi ambient, Transició energètica, Cicle de l'aigua, PAES, Biodiversitat
Berga (Berguedà, BARCELONA)	16994	22.57	26,2	Comunicació, Patrimoni històric i Museus, Patum
				Urbanisme
				Educació, Drets Culturals, Participació ciutadana, Feminisme i LGTBI
				Salut i Drets socials
				Hisenda, Polígon Industrial i Transició Energètica
				Medi Ambient i Sostenibilitat, Esports
				Joventut, Contractació, Recursos Humans, TIC
				Producció i Programació cultural, Comerç, Promoció Econòmica i Ocupació, Turisme
Sant Joan de Vilatorrada (Bages, BARCELONA)	10919	16.42	27,2	Persones Grans, Salut
				Benestar Social, Recursos Humans, Promoció Econòmica
				Comerç, Consum, Turisme, Tecnologies, Organització i Transparència
				Esports
				Cultura, Seguretat i Mobilitat
				Urbanisme, Obres i Manteniment
				Habitatge i Educació
				Hisenda, Serveis Interns, Joventut
				Infància, Feminismes i LGTBI, Cooperació, Ciutadania
				Medi Ambient, Acció Climàtica, Participació i Barris
Sant Feliu de Llobregat (Baix Llobregat, BARCELONA)	45956	11.82	32,7	Territori, Sostenibilitat, Activitat Econòmica, Urbanisme, Habitatge, Joventut, Dones i Polítiques d'Igualtat
				Esports, Persones amb Discapacitats, Solidaritat i Cooperació, Salut Pública, Consum
				Organització i Recursos Humans, Cultura, Seguretat Ciutadana
				Hisenda, Tecnologies, Sistemes d'Informació, Planejament, Activitats, Mobilitat
				Gestió d'Equipaments, Medi Ambient, Espai Públic, Serveis Municipals
				Drets de la Ciutadania i Politiques Socials, Serveis Socials, Educació i Infància, Nova Ciutadania i Agermanaments
				Participació i Convivència
				Gent Gran, Comerç i Turisme, Activitat econòmica i Ocupació
Vilanova i la Geltrú (Garraf, BARCELONA)	68768	33.99	19,4	Cultura, Patrimoni Cultural, Escoles, Memòria Històrica, Igualtat, Feminisme i LGTBI, Civisme, Convivència i Mediació
				Participació Ciutadana, Plans d'Actuació als Barris, Habitatge i Rehabilitació, Emergència Climàtica i Espais Naturals

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencies/ Councillors**
				Urbanisme, Projectes i Obres, Transports i Mobilitat, Manteniment i Serveis Urbans, Benestar Animal
				Projecció de Ciutat, Promoció Econòmica i Capitalitat, Empresa i Economia Social
				Recursos Humans, Tresoreria
				Mercats, Alimentació i Consum
				Infància, Adolescència, Acció Social i Dependència, Salut Pública
				Esports
				Gent Gran
				Joventut i Educació
				Innovació i Universitat
				Administració Electrònica, Bretxa Digital, Cooperació i Agermanaments, Ocupació i Inclusió
Subirats (Alt Penedès, BARCELONA)	3245	55.9	29,1	Cooperació internacional, Joventut, Cultura, Educació
				Recursos Humans, Urbanisme, Serveis i Manteniment, Hisenda
				Gent Gran, Habitatge, Esports
				Mobilitat, Cohesió Social
				Participació Ciutadana, Transperència, Comunicació, Acció Climàtica i Agricultura
				Promoció econòmica, Turisme, Feminismes
Jorba (Anoia, BARCELONA)	829	30.9	23,2	Règim intern, Mobilitat Sostenible, Entitats, Igualtat, Serveis Socials, Cultura i Festes, Gent Gran i Joventut
				Manteniment d'espais públics, Obres municipals, Sostenibilitat del Medi Natural i Esports
				Urbanisme, Llicències d'activitats, Habitatge i Energia
				Hisenda, Salut i Educació
Solsona (Solsonès, BARCELONA)	9213	17.7	26,3	Urbanisme, Obres Públiques, Serveis Municipals, Esports i Noves Tecnologies
				Desenvolupament local, Medi Ambient, Parcs i Jardins
				Drets Socials, Feminismes i Transparència
				Educació, Governació i Salut
Puigcerdà (Cerdanya, GIRONA)	9775	18.92	22,5	Atenció Ciutadania, Salut, Recursos Humans
				Promoció econòmica, comerç i turisme, Projectes estratègics, Seguretat i mobilitat
				Cultura, Comunicació, Inclusió i benestar social, Fires, Pobles i Districtes
				Medi ambient, Agricultura, Ramaderia i Pesca, Habitatge, Parcs i Jardins
				Esports, Gent Gran, Joventut i Infància
				Desenvolupament urbà, Activitats, Obres i Serveis
				Hisenda, Educació, Persones nouvingudes
				Festes, Administració, Transparència, Participació Ciutadana
Montferrer i Castellbò (Alt Urgell, LLEIDA)	1093	176.66	23,2	Seguretat Ciutadana, Règim interior i Recursos Humans, Promoció Econòmica i Comerç, Aprofitaments forestals, Medi

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencies/ Councillors**
				Ambient i Espais Naturals, Obres públiques, Contractació, Activitats i Gestió de Boscos
				Ensenyament, Joventut, Igualtat, Immigració, Benestar social, Gent Gran
				Cultura, Atenció Ciutadana, Gestió d'espais públics
				Sanitat, Salut Pública, Protecció civil, Mobilitat, Transport
				Noves Tecnologies i Administració electronica, Esports, Turisme
Sort (Pallars Sobirà, LLEIDA)	2244	105.05	24	Habitatge, Transició ecològica, Projectes Estratègics
				Cultura, Educació, Turisme, Sostenibilitat, Comunicació, Noves tecnologies, Participació Ciutadana
				Promoció econòmica, Comerç, Medi Ambient, Agricultura, Ramaderia, Sector Agroalimentari
				Urbanisme, Serveis, Obres públiques, Pobles
				Hisenda, Governació, Administració i règim interior, Esports
				Joventut, Salut, Benestar Social, Igualtat
Vielha e Mijaran (Aran, LLEIDA)	5740	211.74	30	Serveis Municipals
				Aministració Publica, Economia, Hisenda, Ensenyament i Comunicació
				Medi Ambient, Turisme i Fires
				Seguretat i Emergències, Pedanies, Participació Ciutadana, Innovació i Tecnologia
				Esports, Joventut i Festes
				Cultura, Llengua, Acció Social i Igualtat
El Pont de Suert (Alta Ribagorça, LLEIDA)	2417	148.14	24,1	Activitat Econòmica i Emprenedoria
				Hisenda Local i Tributs
				Urbanisme, Condicionament Urbà, Obres i Serveis
				Poblament Rural i Pagesia
				Iniciatives Ecològiques
				Cultural i de Béns històrics, Artístics i Tradicionals
				Turisme
				Educació i Coneixement
				Esports, Lleure i Festes
				Serveis Socials
				Salut i Educació Sanitària
La Pobla de Segur (Pallars Jussà, LLEIDA)	3042	32.83	24,1	Recursos Humans, Seguretat, Urbanisme, Habitatge, Hisenda
				Promoció económica, Cultura, Participació Ciutadana
				Salut, Cohesió social, Igualtat, Gent Gran
				Juventut, Infancia, Comunicació, Transparència, Educació
				Esports, Obres i Serveis, Acció cívica, Medi Ambient
				Turisme i Festes

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencies/ Councillors**
Ponts (Noguera, LLEIDA)	2684	30.52	30	Urbanisme, Projectes, Obres Públiques, Economia, Hisenda
				Recursos Humans, Participació Ciutadana, Entitats, Ocupació, Transparència, Comunicació
				Noves Tecnologies, Medi Ambient i Sostenibilitat, Sector Primari, Nuclis Agregats
				Serveis Socials, Salut, Gent Gran, Joventut i Infància, Igualtat
				Immigració, Esports, Seguretat Pública, Mobilitat, Senyalització, Obres i Serveis, Manteniment
				Ensenyament, Escola de Música, Promoció econòmica, Ranxo, Turisme
				Comerç, Cultura i Festes, Memòria Històrica
Cervera (Segarra, LLEIDA)	9468	55.19	34,5	Transparència, Comunicació, Relacions Institucionals
				Promoció Econòmica, Comerç, Abastaments, Fires i Mercats, Parcs i Jardins, Medi Ambient
				Turisme, Salut, Benestar Social, Esports
				Polítiques digitals, Civisme, Atenció Ciutadana, Festes
				Treball, Urbanisme, Habitatge, Cementiri, Serveis Municipals, Educació, Joventut, Igualtat
				Brigada i Neteja, Benestar Animal, Medi Rural, Subministraments i Serveis, Protecció Civil
				Mobilitat, Seguretat, Policia Local, Neteja edificis municipal, Patrimoni
				Conservatori, Cultura
Tàrrega (Urgell, LLEIDA)	18189	88.36	28,2	Serveis Municipals, Medi Ambient, Aigua, Transició Energètica
				Urbanisme
				Esports, Salut
				Cultura, Participació Ciutadana i Habitatge
				Promoció econòmica, Governació, Seguretat, Turisme, Treball
				Finances, Transparència
				Educació, Acció Social, Ciutadania, Feminismes
				Pobles, Ruralitat
				Recursos Humans, Comunicació, Patrimoni, Memòria Històrica
Golmés (Pla d'Urgell, LLEIDA)	1907	16.62	30,7	Ordre Públic
				Finances, Sanitat, Benestar Social, Urbanisme, Serveis Públics
				Cultura, Àrea de la dona, Medi Ambient, Participació Ciutadana
				Educació, Esports, Equipaments esportius, Noves Tecnologies
				Festes, Joventut, Turisme, Comunicació
				Patrimoni Municipal, Seguretat, Medi Rural, Indústria, Comerç, Fires i Habitatge
Les Borges Blanques	6199	61.55	22,3	Recursos Humans, Seguretat, Protecció Civil, Agricultura, Sobirania Alimentària, Economia Social, Medi Ambient, Parcs i

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencies/ Councillors**
(Garrigues, LLEIDA)				Jardins, Aigua, Energia i Brossa, Relacions Institucionals, Economia, Hisenda, Fiscalitat
				Salut, Cures i Acció Social
				Cultura
				Cohesió Social, Cures i Acció Social
				Promoció econòmica, Empresa, Economia
				Espai Públic
				Esports
Alcarràs (Segrià, LLEIDA)	10000	114.29	30,5	Recusos Humans, Indústria, Comerç, Promoció econòmica
				Esports, Salut, Benestar Social, Dona, Hisenda, Patrimoni, Comptes
				Cultura, Festes, Joventut, Ensenyament, Patrimoni Històric, Polítiques digitals, Transparència i Comunicació
				Urbanisme Espais Públics, Agricultura, Camins, Medi Ambient
Calafell (Baix Penedès, TARRAGONA)	30482	20.38	17,5	Drets Socials, Govern Obert
				Estratègia Urbana
				Promoció econòmica, Turisme
				Medi Ambient, Via Pública, Promoció de la Ciutat
				Organització, Seguretat
				Esports, Joventut
				Hisenda
				Ocupació, Formació
				Seguretat
Puigpelat (Alt Camp, TARRAGONA)	1220	9.48	33,5	Obres, Urbanisme
				Manteniment i Serveis, Hisenda, Medi Ambient
				Indústria, Treball, Esport, Lleure, Noves tecnologies
				Joventut, Desenvolupament Sostenible
				Cultura, Sanitat, Serveis Socials
Montblanc (Conca de Barberà, TARRAGONA)	7464	91.07	30,5	Habitatge, Gestió de la via Pública, Mobilitat, Promoció econòmica, Emprenedoria, Ocupació, Esports
				Transició Energètica, Serveis de Manteniment, Agricultura
				Infància i Joventut, Educació, Seguretat, Política Lingüística
				Participació i Atenció a la ciutadania, Urbanisme, Obres Públiques, Patrimoni, Llicències, Esdeveniments
				Hisenda, Economia, Recursos Humans, Drets Socials, Gent Gran, Igualtat
				Salut Pública, Aigua, Acció climàtica, Atenció pedanies
				Comerç, Turisme, Cultura, Festes
Tarragona (Tarragonès, TARRAGONA)	138326	57.88	33,3	Seguretat
				Turisme, Promoció Econòmica, Comerç
				Esports, Educació, Turisme esportiu, Salut

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencies/ Councillors**
				Cultura, Festes
				Urbanisme, Llicències, Domini Públic i Patrimoni
				Hisenda, Serveis Interns, Tecnologia
				Medi Ambient, Espai Públic, Joventut
				Relacions Ciutadanes, Neteja, Mobilitat, Protecció Civil
				Igualtat, Serveis a la Ciutadania, Serveis Socials
				Regidories de Barris
Cambrils (Baix Camp, TARRAGONA)	36441	35.21	24,5	Turisme, Platges, Esports
				Urbanisme, Obra Pública, Activitats
				Educació, Ocupació, Cultura, Patrimoni Històric
				Organització, Salut, Igualtat, Inclusió
				Hisenda, Compres, Contractació
				Atenció Ciutadana, Joventut
				Espai Públic, Sostenibilitat
				Festes, Ciutadania, Benestar Social
				Promoció econòmica, Govern Obert, Participació Ciutadana
				Seguretat Ciutadana, Ajuts Europeus
Falset (Priorat, TARRAGONA)	2829	31.62	18,9	Serveis municipals
				Hisenda, Admnistració Pública
				Festes, Participació Ciutadana
				Benestar Social, Esport
				Seguretat, Mobilitat
				Urbanisme, Habitatge
				Cultura, Educació
				Comerç, Turisme
				Medi Ambient, Benestar Animal
				Protecció Civil, Gestió de Residus
Flix (Ribera d'Ebre, TARRAGONA)	3348	116.9	62,4	Hisenda, Treball
				Drets Socials, Règim Intern
				Esports, Serveis Municipals
				Infància, Adolescència, Joventut, Educació, Cultura, Tradicions
				Medi Ambient, Igualtat, Feminismes, Festes
				Turisme, Comerç, Agricultura, Memòria, Patrimoni
				Transició Ecològica, Governació
Horta de Sant Joan (Terra Alta, TARRAGONA)	1172	118.99	27,5	Governació, Urbanisme, Obres Públiques, Espais Públics, Parcs Naturals
				Ensenyament, Cultura, Turisme, Recursos Humans
				Joventut, Festes, Comerç, Associacions, Esports
				Benestar Social, Promoció econòmica, Fires, Agricultura, Ramaderia, Feminisme

Municipality name LAU-2 / NUTS-5	Population (nº)	Surface (km^2)	GDP per capita (Thousand €)	Municipal competencies/ Councillors
				Comunicació, Noves tecnologies, Participació Ciutadana, Salut, Medi Ambient, Hisenda
Tortosa (Baix Ebre, TARRAGONA)	34864	218.51	23,6	Cultura, Agermanaments, Memòria Democràtica, Igualtat, Feminismes, Dret Civil
				Joventut, Oci, Educació, Formació, Esport, Activitat Física, Acció cívica
				Hisenda, Personal, Transparència
				Salut, Comerç, Mercat i Fires, Turisme, Alimentació, Innovació Tecnològica, Gestio de l'Aigua
				Urbanisme, Promoció Econòmica
				Acció Social i Festes
				Obres públiques, Patrimoni, Habitatge, Transició Energètica, Gestió Forestal
				Serveis Municipals, Logística, Manteniment, Gestió de Residus, Neteja de l'Espai Públic, Governació i SAC
				Mobilitat, Seguretat, Participació Ciutadana, Gent Gran
La Ràpita (Montsià, TARRAGONA)	15329	53.72	20,5	Governació, Hisenda, Noves Tecnologies, Recursos Humans
				Urbanisme
				Turisme, Comerç
				Serveis, Parcs i Jardins
				Festes, Fires, Medi Ambient
				Esports, Entitats, Participació Ciutadana i Transparència, Joventut i Salut
				Polítiques socials, Igualtat, Cultura
				Educació
				Identitat

Collection of municipalities and associated competencys from the Netherlands

Municipality name LAU-2 / NUTS-5	Population (nº)	Surface (km^2)	GDP per capita (Thousand €)	Municipal competencys/ Councilors
Enschede	161.741	142,72	22,6	Public order and safety, Maintenance of Public Order, Event permit , Representation , Coordination of municipal policy , General Administrative Affairs , Complaints commissioner and ombudsman , Objection and appeal , Integrity , Regional Cooperation , International relations , Strategy and Research , Scientific Board , Coordination Lobby
				Sport , Welfare (incl. animal welfare) , Sustainability , Energy transition , Youth work , Loneliness , District budgets, Rural area (incl. agriculture) , Community-oriented work , Staff and organization , Tendering and purchasing , Coordinating councilor for youth prevention

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km^2)**	**GDP per capita (Thousand €)**	**Municipal competencys/ Councilors**
				and safety , District councilor for East , Communication , 1st Deputy Mayor
				Finances , Internal and external accessibility and public transport , Maintenance of living environment , Climate adaptation , Permits (building), supervision & enforcement , External security , Waste and environment , Services,Open Government Act , Digitalization and ICT , Shareholdings and participations (policy) , Port Authority , District councilor for South , 5th Deputy Mayor
				Spatial development (including Kennispark, Technology Base, City Campus,city center, Spoorzone projects) , Economy (including circular economy) and acquisition , Innovation , Land company , Real estate company and housing , Living , Heat vision , Zoning plan policy , environmental code , Industrial estates , Tourism and recreation , Event policy and city marketing , Culture , District councilor for the Center , 2nd Deputy Mayor
				Labor market policy (incl. Sheltered Employment) , Vocational training , Education , Low literacy , Income support , Debt assistance , Labor participation, reintegration , Emancipation,inclusivity , Asylum, integration and integration. , Working on a district-by-city basis (social basis in the neighborhood,neighborhood teams) , Coordinating councilor for housing attention groups , District councilor for North , 3rd Deputy Mayor
				Youth & Family , Public health and prevention , Education (including housing) , Childcare , Social supervision & enforcement , Student policy , Social care, , Addiction care , Women's shelter , Domestic violence and child abuse (including KCM and VTT) , WMO (individual facilities) , Protected living , Privacy and Data Protection , Ethics committee , District councilor for West , 4th Deputy Mayor
Almelo	74.355	69,41	22,8	Board and organization , Public order and safety , Surveillance and enforcement , Staff and organization , Communication , External Relation ,
				Finances, including land policy , Planning and control , Economy and labor market , Business parks , Mobility , Recreation and tourism , Almelo Waterstad , Economy and labor market , Urban Development
				Living , Inner city , environmental code , Licensing , Spatial planning , Public space management , Sport , Real estate law; and City marketing , Livable neighborhoods and villages , Neighborhood-oriented work
				Social Support Act (Wmo) , Health care , Participation Act and social affairs , Public health , Welfare , Youth Education , Refugee shelter , animal welfare , Social and vital , Care and safety
				Facilities and ICT , Services , Youth Services , Art and culture , Sustainability , Waste , Rural development , Water and sewerage , Climate and environment
				Primary advisor to the mayor and the council of mayor and aldermen. , General manager , Head of the administrative organization , Link between the daily management of the municipality and the civil servants.

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km²)**	**GDP per capita (Thousand €)**	**Municipal competencys/ Councilors**
Hengelo	83.051	61,83	25	Administrative cooperation , • Advocacy , • External relations and Public Affairs , • Public order and safety , • Enforcement
				Participation Act , Work and Income , Social domain coordination , District councilor Hasseler Es and Slangenbeek , Business management , Services , Manage waste
				Spatial planning , Living , Licensing , District councilor for the City Center and Woolde , (social) real estate , Economic Affairs and ROZ , Railway zone with city center and Hart van Zuid
				Mobility, traffic and transport , Finances , Taxes , District councilor North and Berflo Es , Fundamentals , Management Gray , Citizen and government
				WMO , Concern , District councilor Hengelose Es, Groot Driene and Wilderinkshoek , Welfare , Culture , Coordination of district-oriented approach
				Youth Act , Education , District councilor for rural areas (Beckum and Oele) , Sport , Sustainability and environment , Manage green and blue
Borne	23.877	26,16	-	1. Living and living: Spatial development (Cemeteries and crematoria), Mobility and infrastructure (External rail safety), 3. Inclusive society: Provision and support (Hospice) , Integration and refugees. It does not include the Integration status holders 4. Governance and society: Management (not including Control), Services and digitalization, Safety and public order, Licensing, supervision and enforcement. It does not include public space and mobility permits and RO and building permits.
				1. Living and living : Spatial development (Agricultural affairs), Public space (Adventure Island Wensink-Zuid). 2. Sustainable future: Energy transition, Circular economy 3. Inclusive society: Facilities and support (hospice not included), Social shelter and housing, Youth 4. Governance and society: Participation and communication incl. village and district councils
				1. Living and living: Spatial development (Environmental vision,law), Mobility and infrastructure (External rail safety not included), Public space (Adventure Island Wensink-Zuid not included) 2. Sustainable future: Climate adaptation, Nature, environment and landscape 3. Inclusive society: Sport 4. Governance and society: Management (Control) , Licensing, supervision and enforcement (Public space and mobility licensing) 5. Financially healthy: Finances ,. Property Fundamentals
				1. Living and living: Living and building, Spatial development (Cemeteries and crematoria, Agricultural affairs, Environmental vision,law not included)

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km²)**	**GDP per capita (Thousand €)**	**Municipal competencys/ Councilors**
				2. Sustainable future: Business and business climate, Leisure economy 3. Inclusive society: Integration and refugees (Integration status holders), Education, Culture, Work and Income ,. Licensing, supervision and enforcement (licensing RO and construction)
Dinkelland	26.741	176,83	25.5	Administrative matters , Civil Affairs , Public order and safety , International cooperation , Integrated enforcement , Business management
				Youth (aid) , Young people , My Dinkelland 2030! , Education , Finances , Water (GBA) , Outside area , GGA , Area development Northeast Twente , Agriculture , Sport , Sports facilities , Core councilor of Denekamp, Lattrop, Tilligte and Noord-Deurningen
				Participation Act , Refugees,status holders , Public health , Social Support Act (WMO) , Sustainability , Public housing , Core councilor of Weerselo, Saasveld and Deurningen
				Art, culture and museums , Monument care and heritage , Land matters and municipal real estate , Public space , BOSS , Economics , VTE , Kind 2000 , Recreation and tourism , Permits, spatial planning , Twente Airport , Core councilor of Ootmarsum, Agelo and Rossum , Mobility
Haaksbergen	24.360	105,50	25,3	Fire brigade , Disaster response and crisis management , Integrity , To bury , Civil affairs and elections , Municipal council and municipal administration , Intermunicipal cooperation , Communication and media , Complaints , International contacts , ICT (including information security) , Services , Coordination of related parties , General affairs (facility services) , Enforcement , Staff and organization , Participation coordination
				Spatial development and land policy, green development , Living , Property , Heritage development and monuments , Weigh , Traffic and transport , Utilities and lighting , Public greenery and play facilities , Sewerage and water management , Rural development , Project councilor for educational housing , Project councilor center plan
				Concern , Youth , Education and childcare , Elderly policy , Welfare , Minimum policy and debt assistance , Culture , Sport , Public health , Animal welfare , Participation , Work and Income , Job market , Project councilor for government participation , Chairman Groot Scholtenhagen
				Finances , Economic policy, companies and entrepreneurs , Recreation, tourism and leisure economy , Events , Catering and retail , Innovation (Agenda for Twente) , Industrial estates , Energy transition and sustainability , Environment and waste
Oldenzaal	31.794	21,95	25,4	public order and safety , cultural heritage , maintaining the physical environment , staff and organization , services , facilities and information provision , communication and pr , representation , international cooperation , regional cooperation
				spatial planning , Environmental Act , work, income and debt assistance , land policy , coordination of integrality of the Social Domain , integration & refugees , economic affairs (industry) , WABO , permits , sports policy and accommodations

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km²)**	**GDP per capita (Thousand €)**	**Municipal competencys/ Councilors**
				finance , inner city , economic affairs (retail) , traffic & transport (including rail) , leisure economy , management of public space , purchase
				Social Support Act (Wmo) , housing , public housing , resident participation , culture , energy transition , municipal real estate , public health
				youth , education (housing & policy) , social services, welfare & prevention , waste & environment , area development NOT , poverty policy , animal welfare
Hellendoorn	6.500	45,99	-	Public order and safety , Enforcement , Services , Communication , Business operations (including HR) , Municipal real estate and accommodation policy , APV and events , Art and culture
				Economy , Leisure economy and tourism , Industrial estates , Waste , Public space , Traffic and transport , Nature and landscape , Water , Finance and taxes , Education , Sport , Participation Act, poverty policy and debt assistance , Newcomers (integration)
				Climate and energy Health , Care and welfare , Livable countryside, rural development and agricultural affairs , Democratic renewal , Participation , Spatial planning and permits , Living , Inclusion
Losser	23.380	99,62	24,2	Wmo , Youth Services , Public health , Welfare , Communication and representation , Resident participation , Finance and taxes , Joint scheme Enschede-Losser , Purchasing and tendering policy , Subsidy policy , Animal welfare , Licensing , Services implementation program , Losser's vision for the future , Sports hall De Lutte , Aloysius location , 1st Deputy Mayor , Contact councilor Overdinkel and De Lutte , Replacement for councilor Lahdo
				Climate and energy transition , Environmental policy , Waste , Real estate (including maintenance of sports facilities), property and land matters , Spacial development , Traffic and transport , Design and management of public space, including service company , P&O , Enforcement , Education , Center development De Lutte and Losser , 2nd Deputy Mayor , Replacement for councilor Oosterbroek , Contact councilor Glane and Beuningen
				Work and Income , Participation Act and reintegration , Refugees and status holders , Living , Economics , Recreation and tourism , Cultural heritage , Sports (including rental and operation of sports facilities) and culture , Agriculture and rural areas , Socio-economic structure strengthening Overdinkel , 3rd Deputy Mayor , Replacement for councilor Engels , Contact councilor for the village of Losser
Hof van Twente	35.438	215,41	26,1	Representation , Personnel, organization, business operations, quality , Safety, public order and crisis management , APV, catering policy (including the Drinking and Catering Act), special laws , Information security , Communication , Services,Civil Affairs , Enforcement , SWB–DB , Regional cooperation , P10 and Europe , OLCT , Safety
				Finances: general, taxes , Public space , Agriculture,Rural Development , Area-oriented approach to nitrogen , I&A

Municipality name **LAU-2 / NUTS-5**	**Population (nº)**	**Surface (km²)**	**GDP per capita (Thousand €)**	**Municipal competencys/ Councilors**
				business operations , RES , City bank – DB , Building management – own buildings , Traffic and transport , Land developments , Waste,Green,Biodiversity,Asbestos , Related parties,shareholdings
				WMO (including vulnerable,elderly) and youth care , Care and welfare , Health policy , Education and compulsory education , Living , Neighborhood policy , Special target groups, including housing status holders and refugees , Circular craft center
				Spacial development , Sports and associated Accommodations , Art and culture , ODT , Stadsbank AB , Licensing , SWB – AB , BOSS , Strategic land purchases , Economy and work and income , Recreation and tourism , Climate and sustainability , RES

Collection of municipalities and associated competencys from Zwettl in the Austrian state of Lower Austria

Municipality name **LAU-2 , NUTS-5**	**Population (nº)**	**Surface (km²)**	**GDP per capita (Thousand €)**	**Municipal competencys, Councilors**
Allensteig (municipality in the district of Zwettl in the Austrian state of Lower Austria)	1732	71,65	34,1	Digitalization, Ecology, Tourism
				Family, finances, housing
				Health, social affairs and culture
				infrastructure, land and forestry
Arbesbach (municipality in the district of Zwettl in the Austrian state of Lower Austria)	1587	55,03	34,1	Goods roads, Agriculture, Culture
				Education Community Council, Secondary school committee, Polytechnic Griesbach, Music school Groß Gerungs

Municipality name **LAU-2 , NUTS-5**	**Population (nº)**	**Surface (km²)**	**GDP per capita (Thousand €)**	**Municipal competencys, Councilors**
				Family matters, Youth Community Council, Disciplinary commission
				EU Community Council, Environmental Community Council, municipal council
				Library, Sport, Snow clearance, Fire brigade
				Civil defence officer, Protocol signatory, Audit Committee, Tourism working group
Bad Traunstein (municipality in the district of Zwettl in the Austrian state of Lower Austria)	995	47,42	34,1	Audit Committee,
				Road construction working group
				Wastewater disposal and water supply working group
				Healthy community , Climate alliance
				Civil defence officer
				Youth Community Council
Echsenbach (municipality in the district of Zwettl in the Austrian state of Lower Austria)	1287	23,16	34,1	Municipal council
				Audit Committee
Göpfritz an der Wild (municipality in the district of Zwettl in the Austrian state of Lower Austria)	1779	60,65	34,1	Municipal Council, Finance, Audit Committee
				Public order , safety , health
				Teaching , Education , Sport , Science , Art , Culture , Worship
				Representation , General Administration , Social Welfare , Housing Promotion
				Roads , Hydraulic engineering , Transport , Services
				Agriculture , Economic development
Rappottenstein (municipality in the district of Zwettl in the Austrian state of Lower Austria)	1742	65,77	34,1	Municipal council
				Audit Committee
Sallingberg (municipality in the district of Zwettl in the Austrian state of Lower Austria)	1270	51,63	34,1	Construction matters, sewage treatment plant and waste disposal
				Finance, regional planning, economy and regional development
				Roads and road construction, agriculture and forestry
				Fire brigades, culture, sport and leisure, tourism and events

Municipality name **LAU-2 , NUTS-5**	**Population (nº)**	**Surface (km²)**	**GDP per capita (Thousand €)**	**Municipal competencys, Councilors**
				Environmental Affairs and Renewable Energies, Audit Committee
				Family and generations, education, village renewal and playgrounds
Schwarzenau (municipality in the district of Zwettl in the Austrian state of Lower Austria)	1495	28,14	34,1	Committee for Community Infrastructure
				Committee for Spatial Planning and Construction
				Committee for Tourism and Social Affairs
				Committee for Clubs, Youth and Sport
				Committee for Transport and Safety
				Municipal Council, Audit Committee
Schweiggers (municipality in the district of Zwettl in the Austrian state of Lower Austria)	2051	58,67	34,1	Municipal council
				Head of the village
				Audit Committee
				Secondary school committee
Zwettl-Niederösterreich (municipality in the district of Zwettl in the Austrian state of Lower Austria)	10702	256,32	34,1	Administration, education, research, art, culture, urban development, finance, audit committee
				Tourism, economy, village renewal, energy, water supply and wastewater disposal
				Fire services, property management, nature conservation, agriculture and forestry, public lighting, real estate
				Youth and sport, sports and green spaces, regional planning, public order and safety, transport, broadband expansion
				Social welfare and health, road and hydraulic engineering, building yard, street cleaning and winter road clearance, waste management
				Environmental protection, cemetery administration, Zwettler Bürgerstiftung

Collection of municipalities and associated competencys from Tuscany

Municipality name LAU-2 , NUTS-5	**Population (nº)**	**Surface (km²)**	**GDP per capita (Thousand €)**	**Municipal competencys, Councilors**
San Marcello Piteglio	7617	134.73	7652	Anagrafe, Stato Civile, Elettorale, Leva, Personale, Secretaria e Protocollo
				Economato, Ragioneria, Tributi
				Commercio, Sviluppo Economico, Messi Comunali, Protezione Civile, Segretaria del Sindaco ed Assessori
				Ambiente, Lavori pubblici
				Condono Edilizio, Patrimonio, Servizi Cimiteriali, Servizi al territorio, Urbanistica e Edilizia Privata
				Biblioteca, Cultura, Scuola, Turismo
				Caccia, Polizia Municipale
				Farmacia Comunale
Grosseto	81636	473.46	5649	Personale, Organizzazione generale, Comunicazione, Agricoltora
				Attività produttive, Sviluppo economico, Caccia e pesca, Tradizioni popolari, Demanio
				Istruzione, Pari opportunit+a e Politiche Giovanili, Gentilezza
				Ambiente, Transizione ecologica, Affari animali, Sviluppo sostenibile, Cave
				Urbanistica, Edilizia Privata, Topomastica, Centro storico, Partecipate, Sport
				Cultura, Università, Mura medicee, Affari generali, legale, verifica uttuazione programmi
				Lavori pubblichi, bonifiche, edilizia pubblica, Patrimonio, finanziamenti comunitari.
				Sicurezza, Mobilità, Protezione civile, turismo
				Sociale, politiche della casa, rapporti con il coeso
				Bliancio, entrate
Lucca	89136	185.76	11414	Sport, Edilizia Sportiva, Frazioni, Protezione Civile, Patrimonio delle Ex Circoscrizioni

				Bilancio, Tributi, Organizzazione del Personale, Patrimonio ad esclusione delle Ex Circoscrizioni, Servizi Demografici, U.R.P., Flussi documentali, Archivio e Protocollo e con qualifica di Assessore Anziano
				Lavori pubblici, traffico e strade, Edilizia privata
				Ambiente, Transizione ecologica, Politiche giovanili, Tutela e benessere degli animali
				Commercio, Attività produttive, Innovazione e Decoro urbano
				Sociale e Politiche della casa, Sicurezza, Volontariato
				Cultura e Musei
				Turismo, Mobilità, Valorizzazione e Tutela delle Mura Urbane
				Istruzione, Edilizia Scolastica, Famiglia, Natalità, Pari Opportunità
Prato	198034	97.60	8238	Assessore alla Protezione Civile, Polizia Municipale, Partecipate e Ambiente
				Assessora al Turismo, Gemellaggio e Memoria
				Transizione Ecologica
				Centro Storico, Servizi ai cittadini, Università e Ricerca
				Città Contemporanea
				Politiche Sociali e Politiche dell'Immigrazione
				Mobilità e Bilancio
				Lavori Pubblici, Patrimonio e Frazioni
				Innovazione, Economia Circolare, Sviluppo Economico e Commercio
Livorno	153186	105.07	9318	Affari generali, affari legali, interorganici, contratti, affari istituzionali
				Bilancio, gestione, finanze e tributi, patrimonio
				Sviluppo, programmazione economia, attività produttive, artigianato, commercio, mercati, economato, occupazione, acquedotto, economia marittima, trasformazione sociale aziende
				Urbanistica, edilizia privata, condono, piano strutturale, infrastrutture, toponomastica
				Politiche sociali, politica della casa, politiche giovanili, igiene, protezione civile, sociosanitari, volontariato

				Smaltimento rifuti, verde pubblico e parchi naturali, tutela e prevenzione ambientale, colline, animali, sistema del traffico, polizia municipale, inquinamento
				Turismo, Porti turistici, acquario, promozione culturale, Istruzione, Beni culturali, biblioteche, edilizia e impianti sportivi
				Firitti, Pari opportunità, differenze di genere
Montalcino	5622	310.3936	8352	Contabilità, Finanziaria ed economico-patrimoniale e servizi al cittadino
				Patrimonio
				Polizia municipale, protezione civile
				Urbanistica, edilizia, infrastrutture, suolo, tutela del paesaggio
				attività amministrative, viabilità comunale, traffico, illuminazione pubblica, parcheggi
				Mantutenzione e SUAP, servizi primari, nonché immobili, stabili di proprietà, aree verdi
				Affari Generali
Pontedera	29670	46.03	13920	Sviluppo economico, commercio, turismo, semplificazione e trasparenza amministrativa, patrimonio
				Politiche sociali, cooperazione internazionale, politiche di genere, legalita, diritti di cittadinanza e coesione sociale
				Ambiente, lavori pubblici, manutenzioni e decoro urbano, protezione civile, mobilità e sosta, partecipazione
				Politiche abitative, edilizia residenziale pubblica ed edilizia sociale, personale, sistemi informativi e sviluppo agenda digitale, vivibilità aree ad alta intensità abitativa
				politiche educative, politiche scolastiche, sviluppo ed organizzazione villaggio scolastico, formazione ed impresa.
Massa	65987	93.82	4928	Bilancio, Finanze, partecipazioni e tributi, patrimonio
				Politiche sociali, disabilità, famiglia, abitative, valorizzazione delle periferie.
				Turismo, eventi, giovanili, volontariato, valorizzazione delle aree di costa e delle montagne

				PNRR (Piano nazionale ripresa e resilienza), Qualità vita urbana, sviluppo urbano sostenibile
				Assessore edilizia privata, Semplificazione amministrativa, Performance, politiche del lavoro, Farmacie comunali, Comunicazione.
				Assessore Cultura, Politiche educative e scolastiche, Gemellaggi, Pari opportunità e politiche di genere, Tutela degli animali.
				Assessore Ambiente, Servizi demografici e cimiteriali, Sport, Politiche agricole ed energetiche, Viabilità e mobilità.
				Assessore Attività produttive, Innovazione e tecnologica, Politiche comunitarie, Risorse umane e organizzazione, Partecipazione e trasparenza
				Assessore Pianificazione, Attività estrattive e cave
Arezzo	96426	384.75	10174	Cultura, Polizia Municipale, Giostra del Saracino, Affari Istituzionali, Affari legali, Stampa e informazione
				Politiche sociali e sanitarie, Famiglia, Scuola
				Attività produttive, Comparto orafo, Turismo e grandi eventi, Fiera antiquaria
				Opere pubbliche, manutenzione, decoro urbano, politica delle frazioni e delle periferie, mobilità e traffico
				Innovazione tecnologica, Semplificazione burocratica, Politiche della casa
				Personale, Immigrazione e politiche di integrazione, pari opportunità, politiche per la tutela e la difesa degli animali, rapporti con il Consiglio Comunale
				Urbanistica, Edilizia, Opere di urbanizzazione, Politiche per il paesaggio
				Sport, Politiche giovanili
				Interventi strategici, Ambiente, Protezione civile, Ciclo dei rifiuti, Ciclo delle acque
				Finanze, Bilancio, Tributi, Provveditorato e patrimonio, Rapporti con l'Università, Finanziamenti UE, Società partecipate
Siena	53011	118.51	8352	Segretario generale, e coordinamento PNRR

				Transizione digitale, servizi informatici
				Risore Umane
				Polizia Locale
				Cultura e turismo
				Servizi alla Persona ed Istruzione
				Commercio e statistica
				Risorse Finanziarie
				Opere Pubbliche ed Opere PNRR, Manutenzioni
				Urbanistica, Strutture, PUMS
				Affari Generalli ed istituzionali

Annex 2: SOIs list, periodicity and last time updated

Table 23 Data periodicity and last time updated of the SOIs

Nº	*SOI name*	*Last time updated*	*Source updating frequency*	*Comments*
1	*People at risk of income poverty after social transfers*	*25/04/2023*	*Annual*	
2	*Families or households that allocate more than 40% of their resources to housing expenditures or services or housing cost burden*	*09/07/2024*	*Annual*	
3	*Cost of final residential energy Consumption compared to Gross Family Income*	*31/12/2022*	*Annual*	
4	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Drought*	*31/12/2023*	*Annual*	
5	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Earthquakes*	*31/12/2023*	*Annual*	
6	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Volcanic activity*	*31/12/2023*	*Annual*	
7	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Floods*	*31/12/2023*	*Annual*	
8	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Mass movement*	*31/12/2018*	*Annual*	*Should be updating annually*
9	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Storm*	*31/12/2023*	*Annual*	
10	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Landslides*	*31/12/2023*	*Annual*	
11	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Wildfires*	*31/12/2023*	*Annual*	
12	*Number of deaths, missing persons and persons affected by disaster per 100,000 people - Extreme temperature*	*31/12/2023*	*Annual*	
13	*Population exposed to flood risk or flood prone population*	-	-	
14	*Exposure of vulnerable people to Heat waves*	*31/12/2010*	-	*No update*
15	*number of bovines*	*31/12/2022*	*Annual*	
16	*number of other animals*	*31/12/2013*	*Triennial*	
17	*number of pigs*	*31/12/2022*	*Annual*	
18	*number of poultry*	*31/12/2020*	*Quadrennial*	
19	*number of sheeps*	*31/12/2020*	*Quadrennial*	
20	*Agricultural production - algae*	*31/12/2020*	*Quinquennial*	*Missing source*
21	*Agricultural production - cereal*	*31/12/2020*	*Quinquennial*	*Missing source*
22	*Agricultural production - fruit*	*31/12/2020*	*Quinquennial*	*Missing source*
23	*Agricultural production - energy crop*	*31/12/2020*	*Quinquennial*	*Missing source*
24	*Agricultural production - oil crop*	*31/12/2020*	*Quinquennial*	*Missing source*
25	*Agricultural production - pulse*	*31/12/2020*	*Quinquennial*	*Missing source*
26	*Agricultural production - rice*	*31/12/2020*	*Quinquennial*	*Missing source*

27	*Agricultural production - starch*	*31/12/2020*	*Quinquennial*	*Missing source*
28	*Agricultural production - sugar crop*	*31/12/2020*	*Quinquennial*	*Missing source*
29	*Agricultural production - vegetables*	*31/12/2020*	*Quinquennial*	*Missing source*
30	*Terrestrial protected areas*	*31/12/2021*	*Annual*	
31	*Organic crop area as a percentage of total agricultural area*	*31/12/2018*	*Sexennial*	
32	*Traffic accidents with victims (injuries and deaths) per 100 000 inhabitants*	*31/12/2019*	*Annual*	
33	*Health situation*	*31/12/2023*	*Annual*	
34	*CO_2 emissions from households*	*31/12/2020*	*Quinquennial*	
35	*CO_2 emissions from tertiary sector*	*31/12/2020*	*Quinquennial*	
36	*CO_2 emissions from non-ETS industries*	*31/12/2020*	*Quinquennial*	
37	*Number of deaths due to accidental poisoning by and exposure to noxious substances per 100000 people*	*25/04/2024*	*Annual*	
38	*Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene*	*31/12/2019*	*Annual*	
39	*years of life lost due to air pollution*	*-*	*-*	*Broken link to data. It is possible that this variable is substituted by average air pollution after DSP further analysis.*
40	*Education and Training (female)*	*31/12/2022*	*Annual*	
41	*As Education Index: Population with tertiary education*	*31/12/2022*	*Annual*	
42	*Gender pay gap*	*31/12/2022*	*Annual*	
43	*Share of women in regional assemblies*	*31/12/2022*	*Annual*	
44	*Gini-Index*	*31/12/2020*	*Annual*	
45	*Proportion of population with access to electricity*	*31/12/2021*	*Annual*	
46	*Residential final energy consumption from electricity*	*31/12/2022*	*Annual*	
47	*Residential final energy consumption from natural gas*	*31/12/2022*	*Annual*	
48	*Residential final energy consumption from liquid gas*	*31/12/2022*	*Annual*	
49	*Residential final energy consumption from heating oil*	*31/12/2022*	*Annual*	
50	*Residential final energy consumption from diesel*	*31/12/2022*	*Annual*	
51	*Residential final energy consumption from gasoline*	*31/12/2022*	*Annual*	
52	*Residential final energy consumption from lignite*	*31/12/2022*	*Annual*	
53	*Residential final energy consumption from coal*	*31/12/2022*	*Annual*	
54	*Residential final energy consumption from other fossil fuels*	*31/12/2022*	*Annual*	
55	*Residential final energy consumption from biogas*	*31/12/2022*	*Annual*	
56	*Residential final energy consumption from plant oil*	*31/12/2022*	*Annual*	
57	*Residential final energy consumption from biofuel*	*31/12/2022*	*Annual*	
58	*Residential final energy consumption from other biomass*	*31/12/2022*	*Annual*	
59	*Residential final energy consumption from solar thermal*	*31/12/2022*	*Annual*	
60	*Residential final energy consumption from geothermal*	*31/12/2022*	*Annual*	
61	*Total residential final energy consumption*	*31/12/2022*	*Annual*	
62	*final energy consumption in agriculture, forestry and fisheries from electricity*	*31/12/2022*	*Annual*	
63	*final energy consumption in agriculture, forestry and fisheries from natural gas*	*31/12/2022*	*Annual*	
64	*final energy consumption in agriculture, forestry and fisheries from liquid gas*	*31/12/2022*	*Annual*	
65	*final energy consumption in agriculture, forestry and fisheries from heating oil*	*31/12/2022*	*Annual*	
66	*final energy consumption in agriculture, forestry and fisheries from diesel*	*31/12/2022*	*Annual*	
67	*final energy consumption in agriculture, forestry and fisheries from gasoline*	*31/12/2022*	*Annual*	
68	*final energy consumption in agriculture, forestry and fisheries from lignite*	*31/12/2022*	*Annual*	
69	*final energy consumption in agriculture, forestry and fisheries from coal*	*31/12/2022*	*Annual*	
70	*final energy consumption in agriculture, forestry and fisheries from other fossil fuels*	*31/12/2022*	*Annual*	
71	*final energy consumption in agriculture, forestry and fisheries from biogas*	*31/12/2022*	*Annual*	
72	*final energy consumption in agriculture, forestry and fisheries from plant oil*	*31/12/2022*	*Annual*	
73	*final energy consumption in agriculture, forestry and fisheries from biofuel*	*31/12/2022*	*Annual*	
74	*final energy consumption in agriculture, forestry and fisheries from other biomass*	*31/12/2022*	*Annual*	
75	*final energy consumption in agriculture, forestry and fisheries from solar thermal*	*31/12/2022*	*Annual*	
76	*final energy consumption in agriculture, forestry and fisheries from geothermal*	*31/12/2022*	*Annual*	
77	*Total final energy consumption in agriculture, forestry and fisheries*	*31/12/2022*	*Annual*	
78	*final energy consumption in ETS industries from electricity*	*31/12/2022*	*Annual*	
79	*final energy consumption in ETS industries from natural gas*	*31/12/2022*	*Annual*	
80	*final energy consumption in ETS industries from liquid gas*	*31/12/2022*	*Annual*	
81	*final energy consumption in ETS industries from heating oil*	*31/12/2022*	*Annual*	
82	*final energy consumption in ETS industries from diesel*	*31/12/2022*	*Annual*	
83	*final energy consumption in ETS industries from gasoline*	*31/12/2022*	*Annual*	
84	*final energy consumption in ETS industries from lignite*	*31/12/2022*	*Annual*	
85	*final energy consumption in ETS industries from coal*	*31/12/2022*	*Annual*	
86	*final energy consumption in ETS industries from other fossil fuels*	*31/12/2022*	*Annual*	
87	*final energy consumption in ETS industries from biogas*	*31/12/2022*	*Annual*	

88	*final energy consumption in ETS industries from plant oil*	*31/12/2022*	*Annual*	
89	*final energy consumption in ETS industries from biofuel*	*31/12/2022*	*Annual*	
90	*final energy consumption in ETS industries from other biomass*	*31/12/2022*	*Annual*	
91	*final energy consumption in ETS industries from solar thermal*	*31/12/2022*	*Annual*	
92	*final energy consumption in ETS industries from geothermal*	*31/12/2022*	*Annual*	
93	*Total final energy consumption in ETS industries*	*31/12/2022*	*Annual*	
94	*final energy consumption in non-ETS industries from electricity*	*31/12/2022*	*Annual*	
95	*final energy consumption in non-ETS industries from natural gas*	*31/12/2022*	*Annual*	
96	*final energy consumption in non-ETS industries from liquid gas*	*31/12/2022*	*Annual*	
97	*final energy consumption in non-ETS industries from heating oil*	*31/12/2022*	*Annual*	
98	*final energy consumption in non-ETS industries from diesel*	*31/12/2022*	*Annual*	
99	*final energy consumption in non-ETS industries from gasoline*	*31/12/2022*	*Annual*	
100	*final energy consumption in non-ETS industries from lignite*	*31/12/2022*	*Annual*	
101	*final energy consumption in non-ETS industries from coal*	*31/12/2022*	*Annual*	
102	*final energy consumption in non-ETS industries from other fossil fuels*	*31/12/2022*	*Annual*	
103	*final energy consumption in non-ETS industries from biogas*	*31/12/2022*	*Annual*	
104	*final energy consumption in non-ETS industries from plant oil*	*31/12/2022*	*Annual*	
105	*final energy consumption in non-ETS industries from biofuel*	*31/12/2022*	*Annual*	
106	*final energy consumption in non-ETS industries from other biomass*	*31/12/2022*	*Annual*	
107	*final energy consumption in non-ETS industries from solar thermal*	*31/12/2022*	*Annual*	
108	*final energy consumption in non-ETS industries from geothermal*	*31/12/2022*	*Annual*	
109	*Total final energy consumption in non-ETS industries*	*31/12/2022*	*Annual*	
110	*Share of renewable energy in gross final energy consumption*	*31/12/2022*	*Annual*	
111	*Electricity production with natural gas*	*31/12/2022*	*Annual*	
112	*Electricity production with liquid gas*	*31/12/2022*	*Annual*	
113	*Electricity production with heating oil*	*31/12/2022*	*Annual*	
114	*Electricity production with lignite*	*31/12/2022*	*Annual*	
115	*Electricity production with coal*	*31/12/2022*	*Annual*	
116	*Heat production with natural gas*	*31/12/2022*	*Annual*	
117	*Heat production with gas liquids*	*31/12/2022*	*Annual*	
118	*Heat production with heating oil*	*31/12/2022*	*Annual*	
119	*Heat production with lignite*	*31/12/2022*	*Annual*	
120	*Heat production with coal*	*31/12/2022*	*Annual*	
121	*Percentage of total electricity production that comes from fossil fuels (excluding coal)*	*31/12/2022*	*Annual*	
122	*Percentage of renewable electricity production*	*31/12/2022*	*Annual*	
123	*Renewable sources installed capacity*	*31/12/2023*	*Annual*	
124	*Electricity consumption per capita*	*31/12/2022*	*Annual*	
125	*Final energy consumption of public buildings per year*	*-*	*-*	*Filled by user*
126	*Final energy consumption in homes including all types of energy*	*31/12/2020*	*Quinquennial*	
127	*Energy consumption of households for heating*	*31/12/2015*	*-*	
128	*Vehicle energy consumption - passenger 2-wheeler*	*31/12/2020*	*Quinquennial*	
129	*Vehicle energy consumption - passenger LDV*	*31/12/2020*	*Quinquennial*	
130	*Vehicle energy consumption - passenger aviation*	*31/12/2020*	*Quinquennial*	
131	*Vehicle energy consumption - passenger bus*	*31/12/2020*	*Quinquennial*	
132	*Vehicle energy consumption - passenger rail*	*31/12/2020*	*Quinquennial*	
133	*Transport energy consumption from gas and diesel oil*	*31/12/2022*	*Annual*	
134	*Transport energy consumption from motor gasoline*	*31/12/2022*	*Annual*	
135	*Transport energy consumption from blended biodiesels*	*31/12/2022*	*Annual*	
136	*Transport energy consumption from energy demand in transport from kerosene type jet fuel*	*31/12/2022*	*Annual*	
137	*Transport energy consumption from liquefied petroleum gases*	*31/12/2022*	*Annual*	
138	*Transport energy consumption from electricity*	*31/12/2022*	*Annual*	
139	*Transport energy consumption from natural gas*	*31/12/2022*	*Annual*	
140	*Transport energy consumption from blended biogasoline*	*31/12/2022*	*Annual*	
141	*Transport energy consumption from fuel oil*	*31/12/2022*	*Annual*	
142	*Transport energy consumption from pure biodiesels*	*31/12/2022*	*Annual*	
143	*Transport energy consumption from biogases*	*31/12/2022*	*Annual*	
144	*Transport energy consumption from pure biogasoline*	*31/12/2022*	*Annual*	
145	*Transport energy consumption from other liquid biofuels*	*31/12/2022*	*Annual*	
146	*Energy demand of buildings*	*31/12/2020*	*Quinquennial*	
147	*Energy demand of residencies*	*31/12/2020*	*Quinquennial*	
148	*Energy demand of agriculture*	*31/12/2020*	*Quinquennial*	
149	*Energy demand of manufacturing*	*31/12/2020*	*Quinquennial*	
150	*Index value of GDP growth per employed person*	*31/12/2022*	*Annual*	
151	*Unemployment rate*	*31/12/2022*	*Annual*	
152	*CO_2 emissions generated by the commerce sector*	*31/12/2020*	*Quinquennial*	
153	*Residential energy demand - space heating*	*31/12/2015*	*Annual*	
154	*Residential energy demand - space cooling*	*31/12/2015*	*Annual*	

155	*Non-residential energy demand - space heating*	*31/12/2015*	*Annual*	
156	*Non-residential energy demand - space cooling*	*31/12/2015*	*Annual*	
157	*Generation of residual waste in the municipality by capita*	*31/12/2020*	*Biannual*	
158	*Generation of plastic waste in the municipality by capita*	*31/12/2020*	*Biannual*	
159	*Generation of metal waste in the municipality by capita*	*31/12/2020*	*Biannual*	
160	*Generation of paper waste in the municipality by capita*	*31/12/2020*	*Biannual*	
161	*Generation of organic waste in the municipality by capita*	*31/12/2020*	*Biannual*	
162	*Total male employment*	*31/12/2022*	*Annual*	
163	*Total female employment*	*31/12/2022*	*Annual*	
164	*Number of tourist accommodation places with respect to the residential population*	*30/07/2024*	*Annual*	
165	*Household access to internet*	*31/12/2023*	*Annual*	
166	*Access to public transport*	*31/12/2018*	*Sexennial*	
167	*percentage of people very satisfied with public transport*	*31/12/2023*	*Annual*	
168	*percentage of people rather satisfied with public transport*	*31/12/2023*	*Annual*	
169	*percentage of people rather unsatisfied with public transport*	*31/12/2023*	*Annual*	
170	*percentage of people not at all satisfied with public transport*	*31/12/2023*	*Annual*	
171	*percentage of people with unknown satisfactory level with public transport*	*31/12/2023*	*Annual*	
172	*Volume of freight transport relative to GDP*	*31/12/2021*	*Annual*	
173	*Gross value added (GVA) growth*	*31/12/2022*	*Annual*	
174	*GVA in Agriculture*	*31/12/2022*	*Annual*	
175	*GVA in Manufacturing*	*31/12/2022*	*Annual*	
176	*GVA in Transportation*	*31/12/2022*	*Annual*	
177	*Real Labour productivity*	*31/12/2022*	*Annual*	
178	*Production growth*	*31/12/2023*	*Annual*	
179	*Production in Manufacturing (aggregate)*	*31/12/2020*	*Quinquennial*	
180	*Emissions from manufacturing*	*31/12/2020*	*Quinquennial*	
181	*Emissions from agriculture*	*31/12/2020*	*Quinquennial*	
182	*Income of households*	*31/12/2022*	*Annual*	
183	*Migration: foreign born population*	*31/12/2021*	*Annual*	
184	*Tenancy*	*31/12/2011*	*Annual*	
185	*Transportation passenger (distance aggregate) - 2-wheeler*	*31/12/2020*	*Quinquennial*	
186	*Transportation passenger (distance aggregate) - LDV*	*31/12/2020*	*Quinquennial*	
187	*Transportation passenger (distance aggregate) - aviation*	*31/12/2020*	*Quinquennial*	
188	*Transportation passenger (distance aggregate) - bike*	*31/12/2020*	*Quinquennial*	
189	*Transportation passenger (distance aggregate) - bus*	*31/12/2020*	*Quinquennial*	
190	*Transportation passenger (distance aggregate) - metro-tram*	*31/12/2020*	*Quinquennial*	
191	*Transportation passenger (distance aggregate) - rail*	*31/12/2020*	*Quinquennial*	
192	*Transportation passenger (distance aggregate) - walk*	*31/12/2020*	*Quinquennial*	
193	*share of demand for passenger two-wheelers*	*31/12/2020*	*Quinquennial*	
194	*share of demand for passenger buses*	*31/12/2020*	*Quinquennial*	
195	*share of demand for passenger trains*	*31/12/2020*	*Quinquennial*	
196	*occupancy - two wheelers*	*31/12/2020*	*Quinquennial*	
197	*occupancy - busses*	*31/12/2020*	*Quinquennial*	
198	*occupancy - rail*	*31/12/2020*	*Quinquennial*	
199	*Soil sealing or artificial coverage*	*31/12/2018*	*Sexennial*	
200	*Percentage of total area protected as natural sites*	*18/04/2024*	*Annual*	
201	*Percentage of green urban areas*	*31/12/2018*	*Sexennial*	
202	*Urban Flood Risk or areas exposed to flooding*	*08/03/2024*	*Irregular*	
203	CO_2 emissions per capita	*31/12/2020*	*Quinquennial*	
204	*Percentage of population with access to at least 1 hectare of green urban areas (parks) and forests within 15 minutes of walking*	*31/12/2018*	*Sexennial*	
205	*Number of motor road vehicles per 100 people*	*31/12/2021*	*Annual*	
206	*Average air pollution due to PM2.5*	*31/08/2023*	*Annual*	*Shruthi: I now take this data from EEA (https://www.eea.europa.eu/en/datahub/datahubitem-view/938bea70-07fc-47e9-8559-8a09f7f92494) The problem is*

				that it provides annual data till 2021.. but this data was updated in 2023!
207	*Average air pollution due to NO2*	*31/08/2023*	*Annual*	
208	*Average air pollution due to O3*	*31/08/2023*	*Annual*	
209	*Hazard Current probability (Low, moderate, high, not known) - heatwaves*			*Not clear CORDEX*
210	*Hazards Impact (Low, moderate, high, not known) - heatwaves*	-	-	*Missing source*
211	*Hazards Expected change in intensity (increase, decrease, no change, not known) - heatwaves*	-	-	*Not clear CORDEX*
212	*Hazards Expected change in frequency (increase, decrease, no change, not known) - heatwaves*	-	-	*Not clear CORDEX*
213	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - heatwaves*			*Not clear CORDEX*
214	*Hazard Current probability (Low, moderate, high, not known) - coldwaves*			*Not clear CORDEX*
215	*Hazards Impact (Low, moderate, high, not known) - coldwaves*	-	-	*Missing source*
216	*Hazards Expected change in intensity (increase, decrease, no change, not known) - coldwaves*	-	-	*Not clear CORDEX*
217	*Hazards Expected change in frequency (increase, decrease, no change, not known) - coldwaves*	-	-	*Not clear CORDEX*
218	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - coldwaves*			*Not clear CORDEX*
219	*Hazard Current probability (Low, moderate, high, not known) - Heavy precipitation*			*Not clear CORDEX*
220	*Hazards Impact (Low, moderate, high, not known) - Heavy precipitation*	-	-	*Missing source*
221	*Hazards Expected change in intensity (increase, decrease, no change, not known) - Heavy precipitation*	-	-	*Not clear CORDEX*
222	*Hazards Expected change in frequency (increase, decrease, no change, not known) - Heavy precipitation*	-	-	*Not clear CORDEX*
223	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - Heavy precipitation*			*Not clear CORDEX*
224	*Hazard Current probability (Low, moderate, high, not known) - Fire risk*			*Not clear CORDEX*
225	*Hazards Impact (Low, moderate, high, not known) - Fire risk*	-	-	*Missing source*
226	*Hazards Expected change in intensity (increase, decrease, no change, not known) - Fire risk*	-	-	*Not clear CORDEX*
227	*Hazards Expected change in frequency (increase, decrease, no change, not known) - Fire risk*	-	-	*Not clear CORDEX*
228	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - Fire risk*			*Not clear CORDEX*
229	*Hazard Current probability (Low, moderate, high, not known) - droughts*	-	-	*Missing source*
230	*Hazards Impact (Low, moderate, high, not known) - droughts*	-	-	*Missing source*
231	*Hazards Expected change in intensity (increase, decrease, no change, not known) - droughts*	-	-	*Missing source*
232	*Hazards Expected change in frequency (increase, decrease, no change, not known) - droughts*	-	-	*Missing source*
233	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - droughts*	-	-	*Missing source*
234	*Hazard Current probability (Low, moderate, high, not known) - floods*	-	-	*Missing source*
235	*Hazards Impact (Low, moderate, high, not known) - floods*	-	-	*Missing source*
236	*Hazards Expected change in intensity (increase, decrease, no change, not known) - floods*	-	-	*Missing source*
237	*Hazards Expected change in frequency (increase, decrease, no change, not known) - floods*	-	-	*Missing source*
238	*Hazards Timeframe (current, short-term, medium-term, long-term, not known) - floods*	-	-	*Missing source*
239	*Heating degree-days needed to maintain an average building indoor temperature of 15.5 degree Celsius*			*Not clear CORDEX*
240	*Cooling degree-days needed to maintain an average building indoor temperature of 22 degree Celsius*			*Not clear CORDEX*
241	*CO_2 Emissions from transport*	*31/12/2020*	*Quinquennial*	
242	*CO_2 emissions (per MWh or gigawatt) electricity consumed or Carbon content in electricity*	*31/12/2022*	*Annual*	
243	*CO_2 emissions for buildings*	*31/12/2020*	*Quinquennial*	
244	*Public attitudes to Climate Change and Energy. How likely the impact of climate change will be very bad*	-	-	*Filled by user*
245	*Forest area*	*31/12/2018*	*Sexennial*	
246	*Red List Index*	-	-	*Filled by user*

247	*number of children*	*31/12/2023*	*Annual*	
248	*number of youth*	*31/12/2023*	*Annual*	
249	*number of elderly*	*31/12/2023*	*Annual*	
250	*Political action*	*31/12/2020*	*Quadrennial*	

Annex 3: Local databases

Catalonia NUTS-3 region local databases

A set of data repositories have been listed for the Catalonia region (NUTS-2) covering all the NUTS-3 regions (Girona, Barcelona, Lleida and Tarragona).

Table 33 Catalonia local databases

Database name	Database link	Granularity	Data description
IDESCAT	Idescat. Institut d'Estadística de Catalunya	Data for the Catalonia NUTS-2 region. Different granularities depending on the data, from NUTS-2 level to LAU level.	Compilation of basic information for all the officially produced statistics of Catalonia. The dataset contains more than 10.000 stats, updated whenever the data is available annually, and organized under the following 25 topics: Population Culture, Language Education Elections Justice and security Health Work Living conditions Dwellings and buildings Income and household consumption Social services Macroeconomy Enterprises and finances Public finances Investments Prices Research and technology Agriculture, Livestock and fisheries Commerce and services. Construction Industry and energy Transportation Tourism Environment Territory
XIFRA	XIFRA - Sistema d'Informació Estadística Local. (ddgi.cat)	Data for the Girona (NUTS-3) region at municipal level (LAU-2 level).	Compilation of basic information for all 221 municipalities of the Girona region. The data is updated periodically depending on the data source's periodicity. The information is classified in the following groups: Territory data: Surface, Altitude, Land classification… Demography: Population, households, immigration…

			Life quality: Cultural equipment, Emissions, Waste, Health… Finances: Founding, Periods of payment to suppliers… Tourism: Hotels, touristic equipment… Economic activity: Enterprises, Agricultural census, transports… Labour market: Employment, jobs…
OPEN DATA BARCELONA DEPUTATION	Dades obertes | Portal de dades obertes de la Diputació de Barcelona (diba.cat)	Data for the Barcelona (NUTS-3) region at municipal level (LAU-2 level).	Compilation of open data from the 311 municipalities in the province of Barcelona. Topics: Local administration Territory and natural parks Urbanism and housing Environment Social sustainability Culture Economy and labour Commerce and consumption Education Tourism Public health Sports Digital government
BARCELONA SDG LOCAL VISOR	Visor 2030. Indicador locals ODS (diba.cat)	Data for the Barcelona (NUTS-3) region at municipal level (LAU-2 level).	Platform for the visualization of multidimensional indicators in key to the 2030 Agenda on the economic, social and environmental reality of the municipalities of the province of Barcelona. Multiple indicators at municipal level are provided for every one of the SDG.
231 OBSERVATORI	Observatori 231 - Sistema Informació Socioeconòmica Local. (promocioeconomica.cat)	Data for the Lleida (NUTS-3) region at municipal level (LAU-2 level).	Compilation of basic information for all 231 municipalities of the Lleida region. The data is updated periodically depending on the data source's periodicity. The information is classified in the following groups: Territory data: Surface, Altitude, Land classification… Demography: Population, households, immigration… Life quality: Cultural equipment, Emissions, Waste, Health… Finances: Founding, Periods of payment to suppliers… Tourism: Hotels, touristic equipment… Economic activity: Enterprises, Agricultural census, transports… Labour market: Employment, jobs…
MERCURI	MERCURI - Sistema Informació Socieconòmica Local. (dipta.cat)	Data for the Tarragona (NUTS-3) region at municipal level (LAU-2 level).	Compilation of basic information for all 184 municipalities of the Tarragona region. The data is updated periodically depending on the data source's periodicity. The information is classified in the following groups: Territory data: Surface, Altitude, Land classification…

			Demography: Population, households, immigration… Life quality: Cultural equipment, Emissions, Waste, Heal… Economic activity: Enterprises, Agricultural census, transports… Labour market: Employment, jobs…

Berlin-Brandenburg NUTS-3 region local databases

Table 34 includes different sets of databases covering the Berlin-Brandenburg NUTS-3 region, and Berlin LAU level.

Table 34 Berlin - Brandenburg local databases

Database name	Database link	Granularity	Data description
statistik Berlin Brandenburg	https:,,www.statistik-berlin-brandenburg.de,	Data for Berlin (LAU) and for Brandenburg (NUTS2) at NUTS2 and NUTS3 levels.	The website provides official statistics for the Berlin-Brandenburg area. The data is classified into the following themes: population, social and economy. The basic information such as demography, employment, vehicle fleet, etc. is available at NUTS3 level in Brandenburg. It is note-worthy that some of these NUTS3 regions remain the same at LAU level. For example, the city of Cottbus, located in Brandenburg, is a NUTS3 as well as a LAU region. Some other relevant data such as energy and CO2 balance is only available at NUTS2 level. All the data is available at LAU level for Berlin. The database is updated annually. However, each dataset may have different update cycles.

Regionaldatenbank Deutschland	https:,,www.regionalstatistik.de,genesis,online	Data granularity ranges from federal states' statistics to municipal level.	This database provides regional data for all of Germany. The data is classified into several themes such as territory, population, labour market, health, environment, economic sectors, etc. Individual datasets are available with different spatial granularity. The database is updated annually. However, each dataset may have different update cycles.
Kreisstatistik Landkreis Oder-Spree	https:,,www.landkreis-oder-spree.de,Politik-Landkreis,Kreisstatistik,	Data for Oder-Spree (NUTS3), located in Brandenburg at LAU level.	The database provides basic information such as population, tourism, unemployment, etc for the municipalities within the region. Other relevant data on energy consumption and CO2 emissions is not found.
Geoportal Brandenburg	https:,,geoportal.brandenburg.de,de,cms,portal,start	Data for Brandenburg (NUTS2) at a very fine grid level	The database hosts spatial maps on various themes such as property cadastre, protected areas, road and water networks, traffic volume, habitat, etc. These maps can be processed to obtain data at municipal level.

Netherlands NUTS-3 region local databases

A set of data repositories have been listed for the Netherlands at country level, since the local databases use the same information already downscaled in the national ones.

Table 35 Netherlands local databases

Database name	Database link	Granularity	Data description

Statistics Netherlands	https:,,opendata.cbs.nl,#,CBS,nl,	Data ranges from national statistics to municipality level.	"CBS offers a wealth of figures on the Dutch economy and society. From inflation to population development, the information is clearly classified by theme and freely available to everyone."
Dutch National Georegister	https:,,www.nationaalgeoregister.nl,	Ranges from national scale to province level.	Provides geographical datasets, including socio-economic indicators and regional information.
PBL Netherlands Environmental Assessment Agency	https:,,www.pbl.nl,	Data at different scales, depending on the quality of the spatial analysis.	Contains datasets related to environmental, spatial, and economic policy, including regional development.
Kadaster (Dutch Cadastre, Land Registry and Mapping Agency)	https:,,www.kadaster.nl,	Data ranges from national statistics to land parcels.	Provides spatial data, including land use, property information, and regional statistics.
Municipal Data Portal (Gemeentelijke Data Portal)	https:,,data.overheid.nl,	Data at municipal level.	Contains datasets specific to municipalities in the Netherlands, including socio-economic and demographic data.
Woononderzoek Nederland (WoON)	https:,,woononderzoek.nl,	National scale survey data, disaggregated at regional and city level.	National survey data on housing, living conditions, and demographic characteristics at the regional and city level.

Lower Austria NUTS-3 region local databases

The data repositories listed below include national datasets, some of which are downscaled to municipal granularity, and, in certain cases, specific datasets for the Lower Austria NUTS-2 level.

Table 36 Austria local databases

Database name	Database link	Granularity	Data description
Austria Forum	https:,,austria-forum.org,af,AustriaWiki,Allentsteig	Data for the NUTS 2 and NUTS 3 area	Austria-Forum is a non-profit, non-profit organization that is financed by Graz University of Technology and other universities, federal

			and state organizations and companies. It relies heavily on the participation of volunteers. The entries in the Austria Forum are not anonymous but are provided with the names of the authors or checked by experts. But anonymous feedback is possible on every page
Niederösterreich Atlas	https:,,atlas.noe.gv.at,atlas,portal,noe-atlas,map,Naturraum,Naturschutz	Data for NUTS 3 region at multiple levels	With the online Natura 2000 maps (Lower Austria ATLAS) you can gain an insight into the Natura 2000 conditions and determine at any time exactly to what extent you or your properties are affected. The background is that the European Union requires that Natura 2000 areas cover compact geographical regions. This is to avoid that, for example, B. the smallest dry grass areas can be made into separate Natura 2000 areas. A Natura 2000 area boundary is therefore only the boundary at which the Natura 2000 area begins or ends. The area boundary tells you whether you are inside or outside a Natura 2000 area. This may be relevant for future funding offers that are only possible in Natura 2000 areas (e.g. LIFE projects). However, the territorial boundary (outer boundary) says nothing about the spatial distribution of the actual protected objects.
Statistik Austria	https:,,www.statistik.at,	Data for NUTS 1,2 and 3 Regions	Federal statistics are defined as a (non-personal) federal information system that provides data on the economic, demographic, social, ecological and cultural conditions in Austria to the federal bodies for planning, decision-making and control of measures as well as to science, business and the public provides. It includes the production of all types of statistics, including related analyses, forecasts and statistical models that go beyond the interests of a single federal state
Data.gv.at	https:,,www.data.gv.at,	Data for NUTS 1,2 and 3 Regions	Topics: population and society, education culture and sport, energy, health, international issues, justice, public safety, agriculture, fisheries, forestry and food, government, regions and cities, transport, environment, economy and finance, science and technology
Data Europa	https:,,data.europa.eu,en	Data for NUTS 1,2 and 3 Regions	Topics: Agriculture, fisheries, forestry and food, Economy and finance, Education, culture and sport, Energy, Environment, Government and public sector, Health, International issues, Justice, legal system and public safety,

			Population and society, Provisional data, Regions and cities, Science and technology, Transport
Austriatech mobilitätsdaten österreich	https:,,www.mobilitydata.gv.at,	Data for NUTS 1,2 and 3 Regions	The Mobilsdaten.gv.at platform is increasing as a national access point for Austria within the meaning of the IVS Act. Here, information about mobility data from private and public data holders is collected to generate an overview and make data access easier. At the same time, the Mobilitaetsdaten.gv.at platform serves to forward data from static truck parking space information to the European data portal as part of the "Safe and secure Truck Parking" initiative.
statista	https:,,de.statista.com,	Data for NUTS 1,2 and 3 Regions	Topics: Energy and environment, e-commerce, consumption, pharmaceuticals and health, technology and telecommunications, internet, traffic and logistics, economy and politics
Niederösterreichische Anlagendatenbank	https:,,noe.anlagendatenbank.net,auth,login	Data for NUTS 2,3,4 and 5 regions in Lower Austria	The Lower Austrian system database enables the management of heating and air conditioning systems and test reports.
GISA Gewerbeinformationssystem Austria	https:,,www.gisa.gv.at,fshost-gisa-p,user,formular.aspx?pid=3e8b81d122df415db65b1ec312d5a452&pn=Be2102a48c44b427fa29b85296c7f6b3f#scrollid1	DATA for NUTS 1,2,3,4 and 5	The GISA contains the most important company-related data for all commercial enterprises established in Austria. The interested party can quickly and easily obtain information in GISA, in particular about the name or company, the location and the wording of the trade license of a commercial company. GISA is currently the only authentic source of information for data from sole proprietorships that are not registered in the commercial register.
Elektronischen Datenmanagement - Umwelt	https:,,edm.gv.at,edm_portal,home.do	DATA for NUTS 1,2,3,4 and 5	Electronic data management EDM is a network system of Internet applications and databases to support complex processes in environmental protection-related documentation, reporting and reporting obligations Topics: Waste balances, end-of-life vehicles, batteries,

			accompanying notes, BEMEN registers, landfills, electrical appliances, EPRTR, EMREG OW, central asset register, packaging, shipment, central source register.

www.localised-project.eu