Horizon 2020 Programme

NET ZERO CITIES

Specifications for the access to the Solutions Catalogue within the Knowledge Repository

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Specifications for the access of the Solutions Catalogue in the Knowledge Repository

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Deliverable D10.4

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Abbreviations and acronyms

Acronym	Description
CESF	City Expert Support Facility
CRM	Customer Relationship Management
EoI	Expression of Interest
GM	Grant Management
JRC	Joint Research Centre
MEL	Monitoring, Evaluation and Learning
NZC	Net Zero Cities
P2P	Peer to peer
SL	Service Level
TRL	Technology Readiness Level
UC	Use Case
WP	Work Package

Summary

The technical solutions and services of WP10 will be available through the Knowledge Repository access, embedded in the NZC Portal, and will be available to any interested cities and individuals in an open source, flexible and adaptive way (referring to Service Level 1 – SL1). Additional functionalities regarding, for example, specific consultation, capability and capacity request, advisor and expert support, etc., will be offered to Mission Cities (Service Level 2 – SL2) and Pilot Cities (Service Level 3 – SL3) through specific modules of the platform, which access channels and pathways are still in progress and under discussion.

This deliverable D.10.4 is related to Task 10.3 *Expert services for deploying climate neutral city actions*, and it is dedicated to present the **Specifications for the Knowledge Repository**, that although will cover more content coming from other WPs (6,7,8,9), it will be here focused on the access to the Catalogue of Solutions developed in WP10. In sum, this report aims at defining the requirements of WP10 to structure the access – through the One-Stop-Shop Platform – to the R&I climate neutral solutions and services, that will be available for cities in the Knowledge Repository module of the NZC Portal.

The Knowledge Repository will be nourished through a collaborative work between NZC and other initiatives, that will gather a framework of state-of-the-art solutions towards climate neutral cities. Besides, different workstreams in NZC will also contribute to the Knowledge Repository development and provision of content, that will be open access and flexible enough to allow continuously updating. Transversal discussions are planned to happen cross-WP, and results regarding the final specifications on the content to be provided, accessibility, available functionalities, among others, will be defined and included in further NZC deliverables.

The use cases presented in this report indicate the access roadmap to facilitate the search of services and solutions included in the Knowledge Repository, that will return not only a concrete list of individual solutions per se, but also present them in bundle of solutions that, through a smart tagging system, will interconnect them with other related ones (connecting them by means of co-benefits, keywords, barriers, thematic areas, etc.). The presentation of results as bundled solutions and services may contribute to their potential implementation under a systemic approach towards the transition to being a net-zero city.

The content of this report is focused on developing the accessibility specifications exclusively for SL1 (all cities), while SL2 (Mission Cities) and SL3 (Pilot Cities) access to the specified content and support will be detailed in the following deliverable (D.10.5).

Keywords

Net zero cities; Smart catalogue; Knowledge Repository; Access specifications; Service Levels; Use cases; Solutions and services.

Introduction

Report D10.4 presents the results of Task 10.3 *Expert services for deploying climate neutral city,* within WP10 of the NZC project. The aim of this task is the definition of the requirements of WP10 to structure the access – through the One-Stop-Shop Platform – to the R&I climate neutral solutions and services, that will be available for cities in the Knowledge Repository module of the NZC Portal. The Knowledge Repository will be nourished through a collaborative work between NZC and other initiatives, that will gather a framework of state-of-the-art solutions towards climate neutral cities. Besides, different workstreams in NZC will also contribute to the Knowledge Repository development and provision of content, that will be open access and flexible enough to allow the incorporation of users´ feedback and continuously updating.

The technical solutions and services of WP10 will be available through the Knowledge Repository access, and will be available to any interested cities and individuals in an open source, flexible and adaptive way (SL1). Additional functionalities regarding, for example, specific consultation, capability and capacity request, advisor and expert support, etc., will be offered to Mission Cities (SL2) and Pilot Cities (SL3) through specific modules of the platform, which access channels and pathways are still in progress and under discussion.

The content of this report is focused on developing the accessibility specifications exclusively for SL1, and is structured as follow:

- Chapter 1 outlines the work performed in the task covered by this deliverable, in the context of the NZC project and more specifically in the context of WP10, and its main objectives. This chapter also includes a short description of the Solutions Catalogue and its Solutions Factsheet as developed up to the moment.

- Chapter 2 describes the detailed use cases for accessing the Knowledge Repository at the Service Level 1, i.e. to all interested city or individual.

- Chapter 3 focuses on the compilation of specifications and recommendations for the Knowledge Repository, considering the access structure suggested and described in previous chapter.

1 Contextualization

1.1 Context of Net Zero Cities

Net Zero Cities (NZC) is part of the Horizon 2020 Research and Innovation Programme in support of European Union's Green Deal. NZC has been designed to help cities overcome the current structural, institutional and cultural barriers they face to achieve climate neutrality by 2030 and, as such, it will support the EU's Mission of "100 Climate-Neutral and Smart Cities by 2030" newly launched as part of the Horizon Europe programme.

Essential to the NZC programme is a service-oriented One-Stop-Shop Platform (WP3) supported by world-class practitioners. This platform will promote new and existing tools, resources and expertise in order to support the 100 Mission Cities. However, some of these resources will also be available to all cities, beyond those initially selected to join the Mission. In addition, NZC will provide a higher level of support to 30 selected Pilot Cities to help drive rapid learning about how to achieve climate neutrality at city scale, which will be twinned with c.90 Twin Cities to drive replication and scale-up.

The One-Stop-Shop Platform, or *Mission Platform*, will comprise of three main elements:

1. An **Online Portal** (**¡Error! No se encuentra el origen de la referencia.**), with log-in access to individual interlinked modules, including a Knowledge Repository, Monitoring, Evaluation and Learning (MEL) dashboards (e.g. City Dashboard and the NZC Barometer), and a Community Blog. For the Mission Cities, Pilots and Twins, there are bespoke Peer-to-Peer (P2P) Collaborative Spaces & Social Network, and Interactive Tools hosted on the portal, encompassing mutual innovation and community social network. (the representation in the figure is only an indicative outline of the service, which will be fully specified in Deliverable 3.1 – Platform Design Specification).
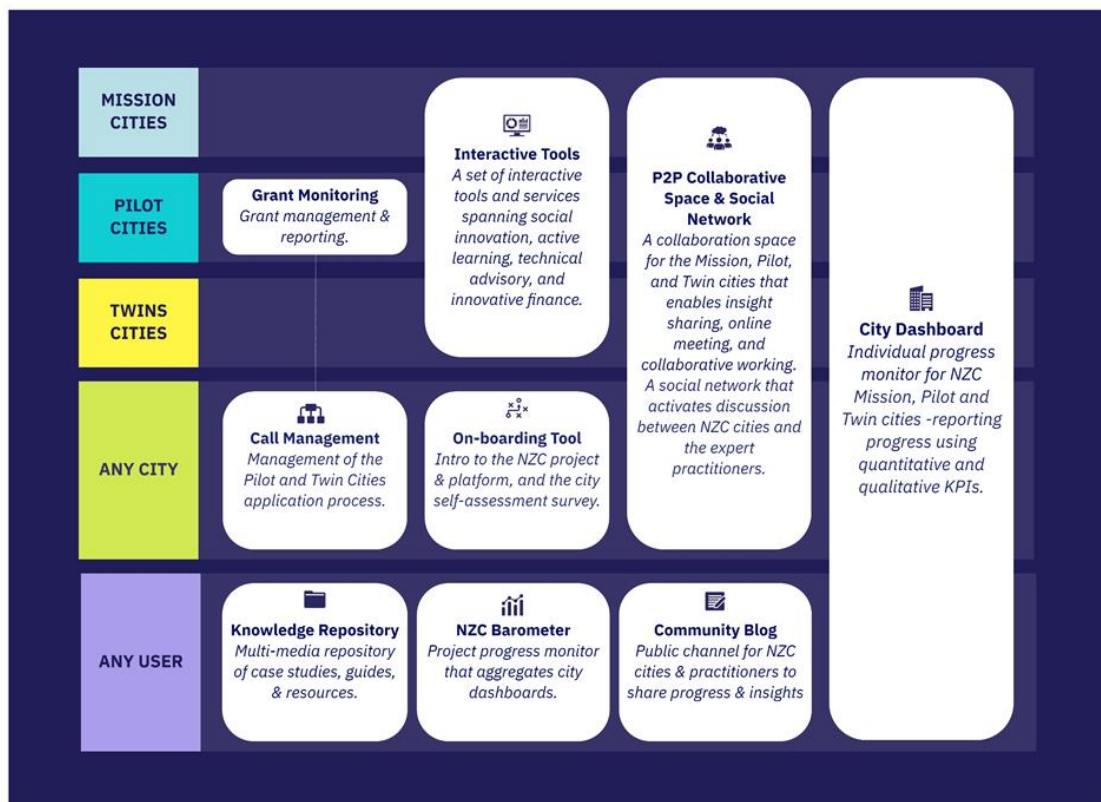

Figure 1: Different modules of the NZC Portal Design and their accessibility channels

2. The **Climate-Neutral City Advisors**, 10 full-time staff managed via WP13 partners, will help cities navigate the tools and services of the Platform (WP3), facilitating exchange and matching cities and project partners and experts. An indicative structure for their support levels for Mission Cities, Pilots and Twins is set out in Table 1.

Mission City (100)	Support clusters of cities to develop their Cities Mission Climate City Contract (commitments, action and investment plans), by signposting to resources on Portal and advice from WP6-10, animating Portal collaboration spaces, planning training events delivered by WP6-10 and check-ins re-engagement with national government.
Pilot City (30)	Inspire (at the application stage), and build detailed relationships (when Pilot Cities are selected), and work with them to ensure they can deliver Mission-level work to advance to climate neutrality by 2030 and enable learning about how to replicate and advance climate-neutral transformations.
Twin City (90)	Lead implementation of the Twinning Programme including the coordination process between 3 Pilot and up to 3 Twin Cities per Pilot (12 cities total) and forge effective collaboration and learning, and acceleration of the journey towards climate neutrality.
Other City	Direct cities to available resources on the Portal & signpost CCC process. Answering any questions not covered by standard FAQs.

Table 1: Climate-Neutral City Advisor Support levels

3. **Back-end administration systems**, including a Customer Relationship Management tool (CRM), Grant Management tool (for Pilots and Twins) and an overarching tagging system which will link together Portal modules, and manage identification and delivery of expertise from the consortium to cities. This tagging structure will enable content-management across the service.

The catalogue of solutions and services provided by WP10 will be embedded in the *Knowledge Repository* module, and accessible also through the *Interactive Tools* module. The *Knowledge Repository* will provide a set of technical and non-technical solutions, case studies, tools and other resources for achieving climate neutrality in cities, properly structured to provide searchable, indexed, and tagged resources. The access through the *Interactive Tools* module will be potentially done as a personalised assessment, based on some cities' profile, to be provided through the *On-Boarding Tool* module by answering a self-assessment survey. This self-assessment process is a work-in-progress, and although a selected panel of cities have already trialled it, there will be further discussions that may end in structural changes.

1.2 Context of Work Package 10

WP10 "*State of the art expert services on thematic areas*" is aimed at sourcing solutions (above Technology Readiness Level 4 – TRL 4) that can support cities in their climate neutrality pathway. WP10 design services to facilitate cities' local demonstration and uptake through a Solution Catalogue and different services to support cities in their climate neutrality journey. It also assesses co-benefits of the solutions, as well as the relation and integration or combination between them, to provide concepts or bundles of solutions to be implemented together to meet a certain city challenge or need.

The main objectives of WP10 are:

- **Map and characterise solutions in the defined thematic areas**, i.e. relevant sectors needed in the climate neutral city transition (stationary energy, energy generation, mobility and transport, and green industry) and enabling fields (circular economy, nature-based solutions, and digital solutions), as well as define the requirements for their **suitable design environment** (referred to the context for successful and systemic deployment of solutions in terms of policy, governance and regulatory aspects, finance and business models, citizen and stakeholder engagement, social innovation, metrics and technical foundations including cross-cutting elements such as data spaces and interoperability mechanisms).

- **Map and analyse how cities can achieve different co-benefits** when deploying solutions.

- **Design three levels of services for the cities** with different access to information and support, according to their way or degree of engagement in the Cities Mission through the Mission Platform. These services will feed WP3, which is responsible for the One-Stop-Shop Platform design and development and will integrate the different WP10 levels of services into the corresponding platform modules.

Concretely, Task 10.3 "*Expert services for deploying climate neutral city actions*" focuses in the last WP10 objective. Thus, it is meant to structure the access to the services in the form of three levels (Figure 2):

- **Service level 1 (SL1)** is an information service which will be accessible through the **Knowledge Repository** and will have a public access to all users and cities. The catalogue of solutions (developed in Task 10.2), which will be embedded in this Knowledge Repository, will be based on current existing catalogues and state-of-the-art literature and demonstrations. It will be organised in a dynamic way: **tagging** the information to provide smart access to it, as well as to ease the connection of the WP10 solutions and services to the ones deployed in WP7, WP8 and WP9. It will also be connected to external websites and repositories with further information and details. In addition, feedback from users will be gathered to improve both the information available and accessibility (through Task 10.4).

- **Service level 2 (SL2)** is a tailored advisory service which will be accessible through the **P2P Collaborative Space & Social Network** module to the Mission Cities (those selected by the Cities Mission to have support to develop a Climate City Contract, including the Twin Cities from WP5). Such support could be provided either through the **City Advisors** (WP13) or through dedicated meetings, calls, workshops, webinars or other **Capacity Building** activities with experts and among themselves via the NZC Portal.

- **Service level 3 (SL3)** is a tailored advisory service to the NZC Pilot Cities (WP4). It will be accessible through the **City Expert Support Facility (CESF)** available at the **Grant Management (GM)** module, although the **P2P Collaborative Space & Social Network** module will also be used in further interactions with Pilot Cities, and potentially include additional bespoke developments in the **Interactive Tools** module. Such support will consist on **expertise to design and demonstrate solutions** (or combination of solutions) in their Pilots. Experts can be either from project partners or from the Community of Practice and a strong support from the City Advisors.
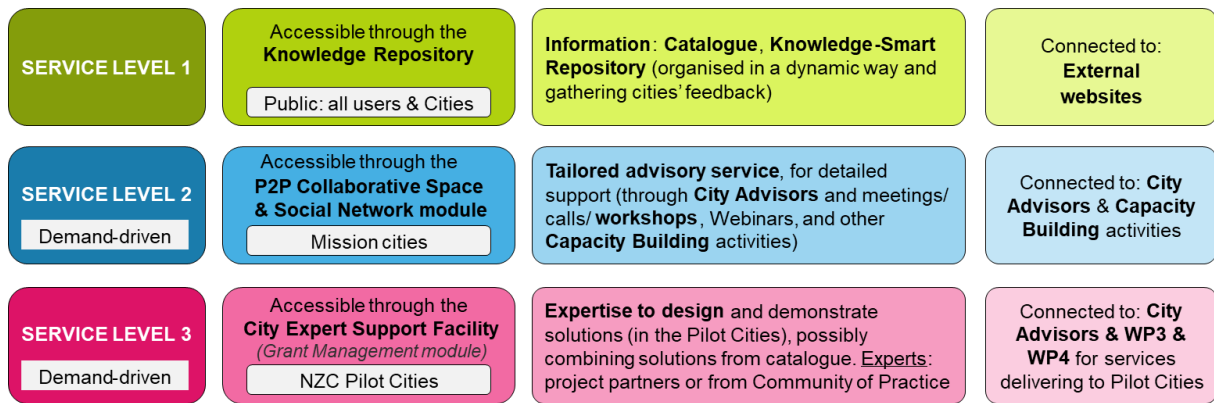
Figure 2: Service levels to be deployed through the One-Stop-Shop Platform

This present Deliverable 10.4 "*Specifications for the Knowledge Repository*" is focused exclusively in the access to the Service Level 1 (i.e. through the Knowledge Repository), without considering the access to the other two demand-driven SL2 and SL3. Both Mission and Pilot Cities will access the solutions and services available in the Knowledge Repository the same way as any other city, although the access specifications on specific additional functionalities to be offered are to be decided. Discussions are in progress and more in-depth definitions depend on advances and transversal discussions in place in other WPs of NZC, and are to be included in future reports.

1.3 Content of the Smart Catalogue of Solutions

The process followed by the Task 10.2 "*Analysis of solutions, co-benefits and barriers to adoption*" to develop the Smart Catalogue of solutions is closely linked to this report, since both T10.2 and the present document are interdependent to define the parameters of the smart and dynamic access of the repository. The basis was set during the development of the first Task 10.1 entitled "*Taxonomy of thematic areas*", which structured the solutions into categories to characterise both the application domains (thematic areas) and aspects of enablers (technical and non-technical), as well as solutions and products.

Figure 3 shows the taxonomy built across relevant sectors for the climate neutral city transition (stationary energy, energy generation, green industry, mobility and transport), and its enabling fields (circular economy, nature-based solutions, and digital solutions), besides a cross-sectorial block of related instruments. The solutions of the Smart Catalogue that, among others, will feed the Knowledge Repository, in principle, will be grouped by those thematic areas.

That taxonomy might evolve with the progress of the project, although cities will, in any case, be able to browse solutions in different ways and using different keywords.
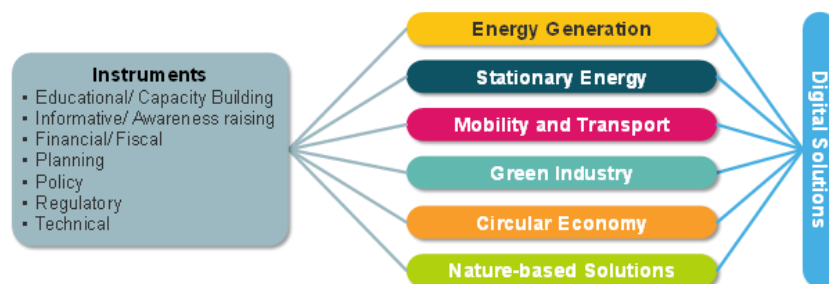

Figure 3: NZC Thematic areas taxonomy, including Instruments cross-cutting area (WP10)

Furthermore, when deploying the taxonomy, **associated co-benefits** were also considered, including synergies and impacts from different actions covering climate resilience, health, social, economy, resource efficiency and biodiversity, ensuring a cross-sectoral integration. This list of co-benefits is not yet definitive and will continue to evolve throughout the development of the project and according to the involvement of cities. For now, the list is organised in the categories, as presented in Figure 4[1].
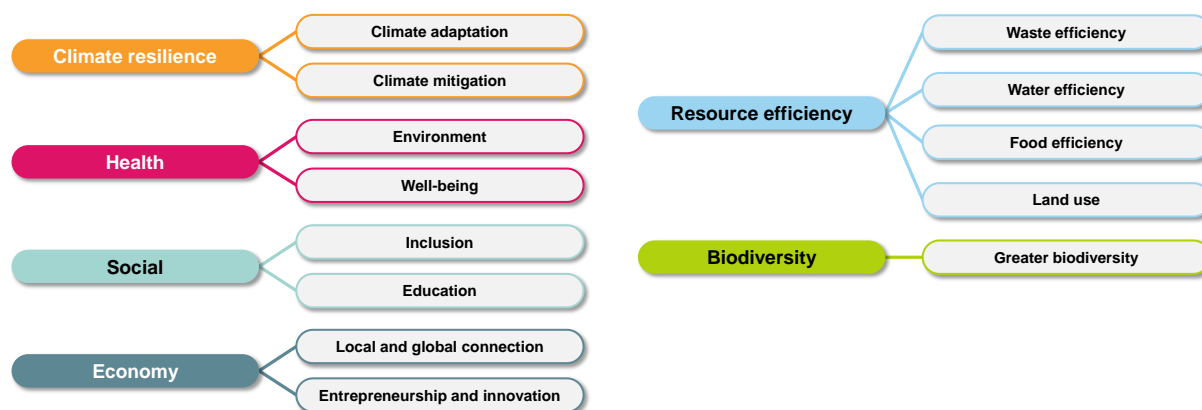

Figure 4: Co-benefits categories (WP10)

While the proposed taxonomy is meant to classify and collect the sector specific solutions needed in the climate neutral cities, it aims also considering them in a **holistic, systemic and integrative approach**. In the cities´ journey towards climate neutrality, they will be offered (and maybe also offer themselves, by sharing their successful experiences as case studies) support on how to foster that systemic approach. Within the current taxonomy structure, there are solutions and instruments that would require a clear interoperability and system integration between different (traditional) technology areas and city's operative departments in order to be properly implemented.

It is worth mentioning that there is a joint effort between NZC WP10 team and the Joint Research Centre (JRC) in order to align and define common taxonomy, thematic areas and solutions to be described and included in the Solutions Catalogue. Since the work of both initiatives in some cases overlap, there is a clear need for a close collaboration, that is currently under discussion, and which goal is mainly defining scope and shared responsibilities. Results from this collaboration will be reflected on the development of activities of T.10.2.

Overall, in the context of T.10.2., solutions will be identified and grouped into categories, concepts (e.g., "smart cities and communities" or "positive energy districts"), or bundle of solutions through a smart tagging system. Likewise, the solutions and bundle of solutions will be linked together to shape pathways which a city could follow to address a specific objective.

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[1] Task 10.2. is currently under development, so that the definition of categories, distribution of solutions and identification of categories of co-benefits are not yet definitive and may be object of substantial changes in the following months.

A template for the **Solution Factsheet**, which main goal is to organize and facilitate the gathering of key information about each solution to be included in the catalogue, is under development. The factsheet will allow the introduction of related links on existing implementation and respective case studies, as well as enable a tagging system that promote the connection of those solutions to thematic areas, concepts, instruments, related solutions, etc. The Solution Factsheet will allow expert partners from NZC to share their knowledge and expertise on different solutions that can help decarbonise cities, and that will consist the first content of the NZC Portal. Additionally, the catalogue could be potentially fed by alternative sources – such as external platforms, methods, intervention, case studies that some city or stakeholder may want to propose themselves.

At the moment, the preliminary factsheet is organized in two parts, each to be completed at a different stage. The first stage (Figure 5) includes basic information from the solutions (description and co-benefits), while the second (Figure 6) covers more complex inputs, which counts, for example, on correspondent design environment, barriers, case studies and impacts.

SOLUTION FACTSHEET

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SOLUTION	Name in short version		
DESCRIPTION	Description of the solution, why is it useful, what can be achieved by deploying the solution, how it can be connected with other solutions/areas, …		
TRL	**Indicate TRL (above 4)**	*Explain if needed*	
THEMATIC AREA(S)	Thematic area	Add more thematic areas if necessary	…
CATEGORIES (within related previous Thematic Areas)	Add related categories	…	…
	…	…	…
CO-BENEFITS (and related SUB-CATEGORIES)	ADD CO-BENEFIT	…	…
	ADD co-benefit CATEGORY	…	…
	ADD co-benefit SUB-CATEGORY	…	…
KEYWORDS	ADD Keywords for a systemic approach	To link with other solutions/ WPs connections…	…
	…	…	…
VISUAL	To add images, videos, photos…		
EXTERNAL LINKS	To add relevant links to Websites, other catalogues, Case Studies…		
	…		
	…		
	…		

Figure 5: Solution Factsheet Template – first stage

IDEAL DESIGN ENVIRONMENT (Pre-conditions)	Potential enablers, conditions for success (political, economical, governance, social, legal, technical, etc.) OR what is needed in the city environment ideally to ensure a successful implementation of the solution		
	…		
	…		
CONSTRAINTS/ BARRIERS (Prior to the implementation)	Main barriers/ obstacles that should be considered and what are the most typical barriers found that can hinder the implementation of the solution		
	…		
	…		
DRAWBACKS/ PROS/CONS OF THE SOLUTIONS (After implementation)	Lessons learnt: What went wrong in some Case Studies. What are the pros/cons after the implementation (with links to examples)		
	…		
	…		
TARGET AUDIENCE OF THE FACTSHEET/	Useful to filter solutions depending on who is searching	…	…
IMPACTS	INDICATORS	Relevant indicator to measure impact of the solution	…
		Focusing on GHG emissions reduction and cost of the solution	…
	DNSH	**Identified risks infringing DHNS**	**Recommendations to avoid it**
		Risks infriging the DHNS principle (to the environmental objectives of the EU) when deploying in a city environment	…
		…	…

Figure 6: Solution Factsheet Template – second stage

In sum, the Knowledge Repository to be encompassed into the NZC Portal to support the climate neutral transition in cities will contain the WP10 Solutions Catalogue, of which core content will be captured in the above-described solution factsheets. Besides, it will also include a mapping of Innovation Ecosystems (from T10.2 as well), a framework for Financing Solutions (WP7), methods and case studies on Citizens' Engagement and Urban Stakeholders' engagement (WP8), and on Social Innovation (WP9).

Along the last decades, there has been exhaustive research and development efforts towards the development of solutions addressing climate neutrality, so that the NZC Portal will also consider and link to other relevant external knowledge repositories and catalogues, and as so, not restricted to NZC expertise. A preliminary set of those abovementioned sources are identified on NZC deliverable D10.1 *Thematic areas for service definition,* and a close discussions with some external European entities are already in place in order to align and join efforts (JRC, RTD, DG Regio, DG Clima, etc.). In parallel to this, Task 3.1.3 is mapping initiatives and existing platforms that could be potentially connected to the Knowledge Repository to sign post or integrate data in the future. Furthermore, task 3.1.3 will implement collaboration agreements for the wider success of the portal, aimed at establishing relations and mutual support.

Both the Knowledge Repository and the Solutions Catalogue of WP10 are planned to be continuously updated according to new developments that may emerge, to the feedback from cities (which can request including new information), and also to solutions and case studies provided by cities and external stakeholders, if the development of the system finally allows it.

2 Overview of Use Cases for Knowledge Repository

NZC differentiates cities according to which specific contract they have signed, and each of them will be supported by the NZC Portal through different functionalities and tools. Although, the access to the Knowledge Repository is open and free to any city or individual user interested on navigating the solutions from various thematic areas, which implementation may contribute to the urban transition to climate neutrality.

- **All cities:** any city willing to know more about climate neutrality and the Cities' Mission.

- **Twin Cities:** group of around 90 cities connected to Pilot Cities and selected by a specific call, willing to replicate activities and participate in peer learning. Twin Cities will by matched with Pilot Cities through an alignment process ensuring relevance and fit.

- **Pilot Cities:** group of around 30 cities selected through a dedicated call, which will explore and test pathways to accelerate change towards 2030 climate neutrality goals — relevant to a city's key emission sources — and to generate accelerated learning that can inform subsequent replication and scaling efforts – ideally working across thematic areas and functional silos in support of transforming systems.

- **Mission cities:** the 100 cities selected through the Call for EoI *100 Climate-Neutral and Smart Cities by 2030*. The first step for those cities will be to develop and sign their Climate City Contracts.

The access to the Knowledge Repository will be establish in a way that it may allow potential users and individuals from any city to search, browse, compare and save solutions collected in NZC. Additional information on that will be provided in the fore coming D.3.1, D.3.3 and D.3.6.

2.1 Access to the Knowledge Repository (SL1)

As mentioned, SL1 refers to the access to the Knowledge Repository through an open, flexible and adaptive access via the NZC Portal. This possibility will be open to **any cities and individuals** interested in climate neutrality and the Cities' Mission, allowing any user to access the specific available information. At SL1 the user can display information included in the Knowledge Repository, browsing and searching it in different ways.

2.1.1 Access to Service Level 1

This section describes the main functionalities expected to be provided through the NZC Portal for accessing services and solutions of SL1. This service level will offer browse and search capabilities to help end users (cities mainly) navigate through the Knowledge Repository and learn from it.

Figure 7 shows the general flow of access to SL1, such as registration/identification, search, visualization, selection and saving functionalities. The different steps that facilitate the access to the information available in the Knowledge Repository are defined in detail below.

The main condition to the solutions to be consulted through the Knowledge Repository is that the information is available and properly tagged, either in NZC catalogues of solutions and services, or in external catalogues.
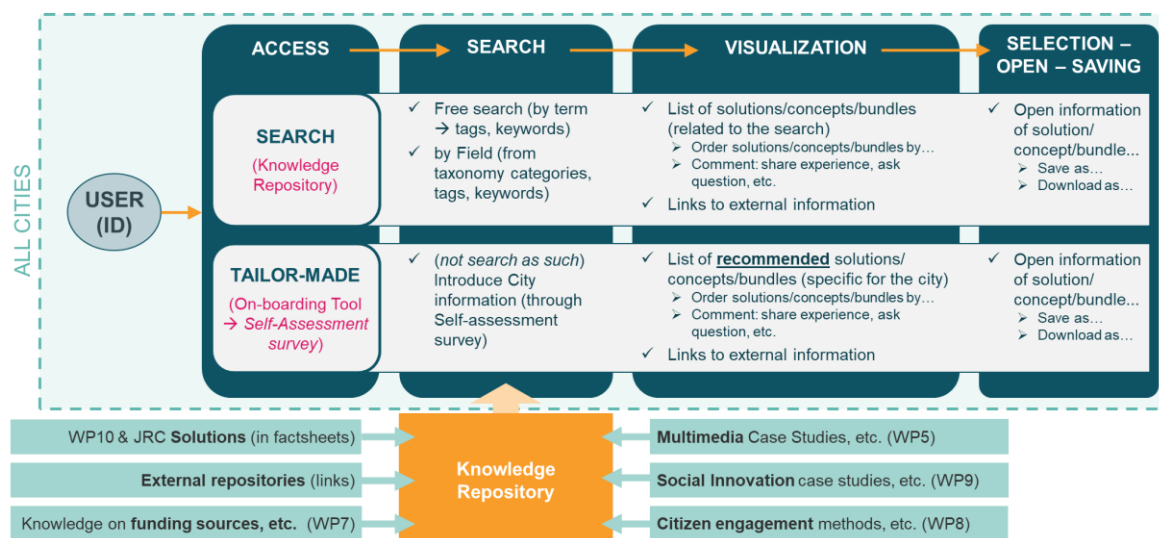
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Figure 7: Flow of access at Service Level 1 (SL1)

Step 1) ACCESS

The user could get into the NZC Portal (WP3) and choose to explore solutions/services towards climate neutrality by means of (i) the Knowledge Repository (fed by the T.10.2. Solution Factsheet and other WPs), or (ii) the Self-assessment functionality (answer questions regarding their cities' context, developed by WP3 and other WPs). Through the self-assessment module, a "city profile" will be identified so that, though a tagging system, solutions can be specially recommended and maybe displayed in the city-panel (to be discussed). In this case, registration to access the information may be compulsory.

Step 2) SEARCH and VISUALIZATION

In principle, the search can be done by two different ways. The first one, and the most direct, would be to open the Knowledge Repository and make a direct consultation. The second, would be through the Self-Assessment module available.

In the first case, the user would navigate the repository, that will offer an extensive number of solutions, services, methods and case studies. To facilitate the search within the repository, different functionalities will be offered to the users. The whole set of solutions included in the repository can be browsed in different ways through keywords, co-benefits a city would like to achieve, categories within the taxonomy, name of the solution, etc. The way on which these solutions will be selected could be by :

- **Free sea**rch into the database (using any term), with perhaps autocompletion (functionality that allows you to complete words that are being typed, and can be implemented on some search engines)

- It could be also **guided by specific tool**, like faceted navigation, that allow to select the field that will interest the user. In this last case, the user can select either single of multiple fields, as well as one or more tags/keywords.

By using the Self-Assessment tool (not yet concretized though), the first step is the contextualization, that will be done by answering a form indicating some key data (the first step was already taken, and some cities have already answer the questionnaire). If the system is prepared for that, a list of solutions or package of solutions could be matched, which may be commonly implemented by each profile of cities. For that, the relation of solutions with common characteristics of cities (e.g., barriers, challenges, etc.) could be presented. For that, an integrated tagging system (under development) must be put in place to allow those connections to happen successfully.

Step 3) SELECTION

A list of solutions will be presented to the user according to the indicated selection. Besides the correspondent factsheets and additional information (which different fields can be visible or not, according to the user configuration), the result will also give information on potential external repository to be searched, as well as showing the bundled solutions to which each belongs, leaving the possibility for visualizing them grouped. The bundles would connect not only technical solutions included in the WP10 repository, but also planned to relate inputs from WP7 *Financing the ambition*, WP8 *Engaging urban stakeholders*, and WP9 *Social innovation*. This will be possible as long as the common tagging system is established and implemented also through all those WPs.

After a list of solutions is presented, the user will have the possibility to consult the data according to the following possibilities:

- Select independent solutions – user can search and visualize the content from each factsheet

- Select by bundles – user will be able to select bundles of solution, either by choosing a specific option of bundle, or by choosing one solution, expecting to view all related solutions (i.e. part of the same package)

- Order by – the typical ordering functionality will be available for all fields available in the solution factsheet (alphabetically or by value)

- Group by – the solutions can be grouped by a specific field selected by the user (coincident co-benefits, barriers, categories, thematic areas, …)

- Filter – the usual filtering options will be available, where the user can restrict the results by indicating a keyword, a range of value, or any other limiting request.

- Compare – this option would be useful for the user and will give the possibility of opening two solutions side by side, and select specific fields to be visualized simultaneously. It is not a comparison functionality as such, although the way the information is presented may allow and easy and direct visual comparison of two different inputs.

Step 4) SAVING

The user would be able to download the search (the single solution, list of solutions, bundle of solutions, solutions compared, etc., with the information they chose).

The user will also be offered the opportunity to save the solution or list of solutions for a future access. In this case, it can aim simply to postpone the consultation, or to share among individuals and city departments for further discussion. This option indirectly nurtures the systemic approach, by offering the possibility of involving key groups of actors to get onboard at different moments of the same consultation.

It would be useful, in order to promote transversality, to opt for a visible search (whenever authorized by the user on the registration), so that one user can see other searches done by colleagues from the same institution/field/project (by choosing CIF, by choosing region, city, scale, or any criteria requested during the registration).

2.1.2 Use Cases (UC) Diagram and Description

The Use Cases (UC) Diagram for the SL1, originated by the functions indicated in the previous section, is represented in Figure 8.
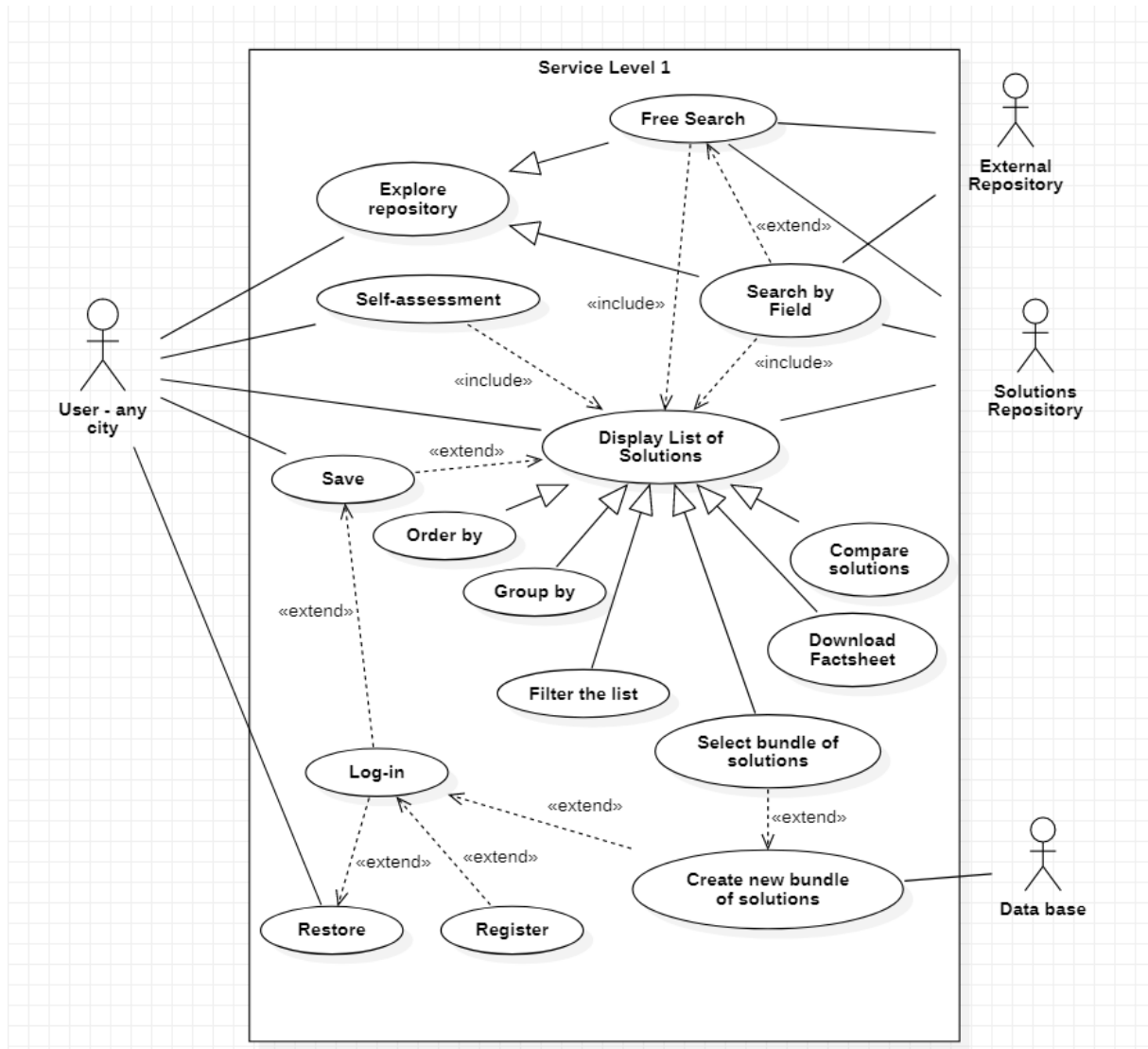
Figure 8: Use cases diagram for Service Level 1

Each of the use cases are described in the Tables 2 to 17, including the following common information:

- Name: Identifier and name of the use case

- Purpose: the description and reason of the case

- Actors: the stakeholders and systems involved

- Pre-conditions: what is needed to enable that specific case

- Post-conditions: the return of the system after the case is finished

- Main scenario: steps defining the main path of the use case

- Alternative scenarios: not compulsory alternative paths

Name	UC1 – **Explore Repository**
Purpose	Explore interventions/solutions towards climate neutrality by searching on the Knowledge Repository
Actor(s)	User – any city
Pre-conditions	User gets into the NZC portal
Post-conditions	The list of solutions which fits the search criteria is presented to the user
Main Scenario	1.- User selects explore repository 2.- System presents the user the different options for the search 3.- End of Use Case
Alternative Scenarios	3.a) if the user is not satisfied with the results obtained, he can modify the search parameters (go to 1)

Table 2: Description of SL1-UC1: Explore Repository

Name	UC2 – **Free Search**
Purpose	Search for solutions within the Knowledge Repository using plain text. User can use any term to launch the search, not only keywords. System will look for the terms into any of the fields.
Actor(s)	User – any city
Pre-conditions	User gets into the NZC portal without any login and choose Explore Repository option to search within
Post-conditions	The list of solutions which fits the search criteria is presented to the user
Main Scenario	1.- User selects free search 2.- User types the term or list of terms to search 3.- System searches into the repository for those solutions containing the terms written by the user. 4.- System shows a list with the search results (UC5 Display list of solutions) 5.- End of Use Case
Alternative Scenarios	4.a) if the user wants to narrow down the search can search with other terms (go to 2) 4.b) If the user wants to narrow down the search can use filters (UC3) 4.c) If the user wants to save the search results (UC11)

Table 3: Description of SL1-UC2: Free Search

Name	UC3 – **Search by Field**
Purpose	Search for solutions within the repository through tags or keywords included into the factsheet. User can define multiple options for tags, keywords and fields.
Actor(s)	User – any city
Pre-conditions	User gets into the NZC portal without any login and choose Explore Repository option to search within
Post-conditions	The list of solutions which fits the search criteria is presented to the user
Main Scenario	1.- User selects search by field 2.- User selects from a list the field or list of fields to search into 3.- User selects from a list the tag(s)/keyword(s) to search into the selected fields 4.- System searches into the repository for those solutions which fit the search conditions. 5.- System shows a list with the search results (UC5 Display list of solutions) 6.- End of Use Case
Alternative Scenarios	5.a) if the user is not satisfied with the results obtained, he can modify the search parameters (go to 1) 5.b) if the user wants to save the search results (UC11)

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Name	UC4 – **Self-Assessment**
Purpose	Search for solutions and services from the Knowledge Repository by answering questions regarding the context of the user.
Actor(s)	User – any city
Pre-conditions	User gets into the NZC portal
Post-conditions	The list of solutions and services which are relevant for the context of the user
Main Scenario	1.- User goes into the Self-Assessment survey of the On-boarding tool of NZC Portal 2.- System presents a set of questions about the general context of the user (such as country, scale or purpose) - for Mission Cities, this will be partially populated by the information submitted in their Expression of Interest 3.- System presents a set of questions about the expected outcomes of the user (such as co-benefits, enablers, barriers…) - for Mission Cities, this will be partially populated by the information submitted in their Expression of Interest 4.- User answer the questions according to his/her context 5.- System creates a "city profile" for the user according to the answers 6.- System searches into the repository for the most appropriate solutions according to the user context through the tagging system. 7.- System shows a list with the search results (UC5 Display list of solutions) 8.- End of Use Case
Alternative Scenarios	7.a) if the user is not satisfied with the results obtained, he can try again the questionnaire (go to 2) 7.b) if the user wants to save the "city profile" (UC11)

Table 5: Description of SL1-UC4: Self-Assessment

Name	UC5 – **Display list of solutions**
Purpose	Show the user the list of solutions obtained from the different search options with relevant information.
Actor(s)	User – any city
Pre-conditions	The system gets from the repository a set of solutions according to the searching criteria
Post-conditions	List of solutions shown to the user
Main Scenario	1.- System displays the list of solutions with some information from the factsheet and if the solution is included in NZC Knowledge Repository or comes from an external repository 2.- User visualizes or hides any of field of information according to his/her preferences 3.- User can display the factsheet of one of the solutions 4.- End of Use Case
Alternative Scenarios	2.a) if the user wants to save the list of solutions (UC 11)

Table 6: Description of SL1-UC5: Display list of solutions

Name	UC6 – **Select bundle of solutions**
Purpose	Visualize pre-assigned bundles or new groups created by the user
Actor(s)	User – any city
Pre-conditions	The list of selected solutions is displayed
Post-conditions	Visualize bundles of solutions
Main Scenario	1.- User selects pre-assigned bundles 2.- System gets pre-assigned bundle of solutions already available with the list of selected solutions (bundles will work based on internal tagging system). 3.- System shows the set of pre-assigned packs including the solutions included in each bundle 4.- End of Use Case
Alternative Scenarios	1.a) User wants to create a new bundle with the list of solutions (UC 16)

Table 7: Description of SL1-UC6: Select bundle of solutions

Name	UC7 – **Order by**
Purpose	Order the list of solutions by a selected criterion
Actor(s)	User – any city
Pre-conditions	The list of selected solutions is displayed
Post-conditions	Visualize solutions ordered by criteria
Main Scenario	1.- User selects the criteria to order the solutions 2.- System orders the list of solutions according to the selected criteria (such as alphabetically, co-benefits, popularity, other) 3.- System shows the list of solutions ordered by the criteria 4.- End of Use Case
Alternative Scenarios	Not applicable

Table 8: Description of SL1-UC7: Order by

Name	UC8 – **Group by**
Purpose	Group the list of solutions by a selected criterion
Actor(s)	User – any city
Pre-conditions	The list of selected solutions is displayed
Post-conditions	Visualize solutions grouped by criteria
Main Scenario	1.- User selects the criteria to group the solutions 2.- System groups the list of solutions according to the selected criteria (such as co-benefits, categories co-benefits or popularity) 3.- System shows the list of solutions grouped by the criteria 4.- End of Use Case
Alternative Scenarios	Not applicable

Table 9: Description of SL1-UC8: Group by

Name	UC9 – **Filter the list**
Purpose	Filter the list of solutions by field
Actor(s)	User – any city
Pre-conditions	The list of selected solutions is displayed
Post-conditions	Visualize solutions filtered by field
Main Scenario	1.- User selects the field to filter the list of solutions 2.- User selects from a list the tag(s)/keyword(s) to search into the selected fields 3.- System filters the list of solutions according to the selected tags, keywords and fields 4.- System shows the filtered list of solutions 5.- End of Use Case
Alternative Scenarios	5.a) if the user is not satisfied with the results obtained, he can modify the filter parameters (go to 1)

Table 10: Description of SL1-UC9: Filter the list

Name	UC10 – **Compare solutions**
Purpose	Allow visual comparison of a solutions or bundle of solutions by a specific field
Actor(s)	User – any city
Pre-conditions	The two selected solutions are displayed side by side
Post-conditions	Visualize a comparative between solutions
Main Scenario	1.- User selects two solutions to compare 2.- User selects the field to compare the list of solutions 3.- System visualise solutions in pairs and select specific fields, so that it facilitates the visualization of the results 4.- User does the analysis and compare them as he/she wishes 5.- End of Use Case
Alternative Scenarios	Not applicable

Table 11: Description of SL1-UC10: Compare solutions

Name	UC11 – **Save**
Purpose	Save the process of the service in the current step to continue later on
Actor(s)	User – any city
Pre-conditions	The search has ended, or the list of solutions is displayed User is registered
Post-conditions	Information about the status of the process is stored in order to be restored
Main Scenario	1.- User selects save 2.- System saves the information about the status of the process (such as search results or list of solutions selected) 3.- End of Use Case
Alternative Scenarios	2.a) if user is not logged in, UC15 – Log-in 2.b) if the user selects wants to add to his/her list of favourites click the corresponding element and the list of favourites is updated

Table 12: Description of SL1-UC11: Save

Name	UC12 – **Restore**
Purpose	Restore the process of the service in a step previously saved
Actor(s)	User – any city
Pre-conditions	A process has been previously saved User is registered
Post-conditions	Process is restored with the information about the status previously saved
Main Scenario	1.- User selects restore 2.- System restore the information in the previous situation 3.- End of Use Case
Alternative Scenarios	2.a) if user is not logged in, UC15 – Log-in

Table 13: Description of SL1-UC12: Restore

Name	UC13 – **Download factsheet**
Purpose	Download the factsheet of a selected solution
Actor(s)	User – any city
Pre-conditions	The list of selected solutions is displayed
Post-conditions	The solution factsheet is stored into the computer
Main Scenario	1.- User selects a solution 2.- User selects download 3.- System download the factsheet of the selected solution and stores into the user computer. 4.- End of Use Case
Alternative Scenarios	Not applicable

Table 14: Description of SL1-UC13: Download factsheet

Name	UC14 – **Register**
Purpose	Create a user account in the system
Actor(s)	User – any city
Pre-conditions	User gets into the NZC Portal
Post-conditions	User details are stored in the database
Main Scenario	1.- User selects registration 2.- System asks for registration information (username, password, etc.) 3.- User introduces the required information. 4.- System creates the user account 5.- End of Use Case
Alternative Scenarios	4.a) if the information provided by the user is not correct, system displays an error message and asks the user to re-introduce the information

Table 15: Description of SL1-UC14: Register

Name	UC15 – **Log-in**
Purpose	A user logs into the system
Actor(s)	User – any city
Pre-conditions	User is registered into the system
Post-conditions	User accesses to the system as non-anonymous user
Main Scenario	1.- User selects log-in 2.- System asks for registration details (username and password) 3.- The user enters his/her username and password. 4.- System validates the user details 5.- End of Use Case
Alternative Scenarios	3.a) user is not registered, UC14 – Register 4.a) if user details are not correct, system ask the user to re-introduce the username and password

Table 16: Description of SL1-UC15: Log-in

Name	UC16 – **Create new bundle of solutions**
Purpose	Create a new bundle of solutions with a selection set of solutions from the knowledge repository
Actor(s)	User – any city
Pre-conditions	The list of selected solutions is displayed User is registered
Post-conditions	New bundle of solutions is stored
Main Scenario	1.- User selects create a new bundle 2.- User selects a set of solutions from the list 3.- User writes a name for the bundle and other data requested 4.- System saves the information about the bundle 5.- End of Use Case
Alternative Scenarios	1.a) if user is not logged in, UC15 – Log-in

Table 17 Description of SL1-UC16 Create new bundle of solutions

3 Recommended Specifications for the Knowledge Repository

The use cases diagrams defined in section 2 lead to a series of requirements and recommendations for SL1 in order to put the service access in practice. Each of the specific recommendations, independently whether being mandatory or optional, are summarized in the Table 18.

ID	Requirement / Recommendation	Priority
REQ01	To explore/browse interventions/solutions towards climate neutrality by searching on the Knowledge Repository	Mandatory
REQ02	To explore/browse interventions/solutions by answering questions regarding the context (Self-assessment)	Mandatory
REQ03	To create a "city profile" that is later connected to the Knowledge Repository	Optional
REQ04	To search for solutions within the repository using plain text.	Mandatory
REQ05	To use filters to narrow down a previous search	Mandatory
REQ06	To save search results (it may require registration)	Optional
REQ07	To save a "city profile" (it may require registration)	Optional
REQ08	To show to the user solutions from the Solutions Catalogue	Mandatory
REQ09	To show to the user solutions included into the Knowledge Repository	Mandatory
REQ10	To show to the user solutions included in external repositories	Optional
REQ11	To display the factsheet of one of the solutions	Mandatory
REQ12	To shows the set of pre-assigned bundle based on an internal tagging system	Mandatory
REQ13	To show indicators of one solution (in case information is available)	Optional
REQ14	To select information to show in the list of solutions	Mandatory
REQ15	To get existing pre-assigned bundle of solutions from a list of solutions.	Mandatory
REQ16	To visualize pre-assigned bundle of solutions	Optional
REQ17	To establish new bundles of solutions from a list according to user interest (it may require registration)	Optional
REQ18	To order the list of solutions by different criteria (such as alphabetically, co-benefits, popularity)	Mandatory
REQ19	To group the list of solutions by different criteria (such as co-benefits or popularity	Mandatory
REQ20	To filter the list of solutions by different fields in the factsheet according to tags and keywords.	Mandatory
REQ21	To compare solutions in pairs and display them side by side	Mandatory
REQ22	To display the values of specific indicators of a set of solutions (if available)	Optional
REQ23	To save information about the status of the process in order to be restored (it may require registration)	Optional
REQ24	To add a solution or a set of solutions to a list of favourites	Optional
REQ25	To restore from a previously saved process (it may require registration)	Optional
REQ26	To download the factsheet of a selected solution	Mandatory
REQ27	To allow registering new users	Mandatory
REQ28	To allow logging into the system	Mandatory

Table 18: Specifications for the Knowledge Repository

Conclusion

This deliverable presents the structure for the access of the technical solutions and services to be available in the Knowledge Repository, with the focus on the levels of accessibility defined for any user (Service Level 1). The use cases presented in this report indicate the access roadmap to facilitate the search of those services and solutions included in the Knowledge Repository, that will return not only a concrete list of individual solutions per se, but also present them in bundle of solutions that, through a smart tagging system, will interconnect them with other related ones (connecting them by means of co-benefits, keywords, barriers, thematic areas, etc.), as well as with methods and case studies being developed in other work packages (WP6-WP7-WP8-WP9). The presentation of results as bundled solutions and services may contribute to their potential implementation under a systemic approach towards the transition to being a net-zero city.

The development of the access specifications to the Knowledge Repository is key to the further development of other NZC tasks, such as the mock-up under progress in T.3.1. Besides, since there are many parallel ongoing discussions in terms of content to be included in the Knowledge Repository, as well as the way of presenting and acceding that information, this may be effective as a starting point for further development, update and reflexion.

At the time of delivery of the document there are still open questions that will be clarified along the development of the project tasks. For this reason, the document reflects the situation at the time of delivery and a strong collaboration and communication between tasks and work packages is necessary to advance in the following steps for the definition of services (mock-ups and system requirements, among others).

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