High-Level Forum on European Standardisation

“A strategy to promote and develop, through standardisation, a European vision of smart cities, inclusive, democratic, and sustainable”

Elaborated by Work stream 8 - Sustainable and smart cities

Leader member	France	
Supporting members	Belgium	AIOTI
	Cyprus	ANEC
	Italy	CEN
	Portugal	ELA
	Spain	ETNO
		Eu.bac
		T&D Europe

Final report

Executive summary

Context

Work stream 8 (WS8) aims to promote and develop, through standardisation, a European vision of smart cities, inclusive, democratic, and sustainable.

- The singular place of European cities: 75% of EU citizens live in cities; cities account for more than 70% of global CO2 emissions; they are centres of economic activity, knowledge generation, innovation…
- Cities are the cradle of economies that can reduce the climate impact of business: many of the solutions for climate change mitigation and adaptation, circular economy, renewable energy production, energy saving, and nature-based solutions can be designed and deployed at the local level.
- As investors for infrastructures, cities are one of the pillars of Europe's competitiveness and technological sovereignty.
- The potential for digital activities is immense (blockchain, AI, digital twin…) in the management of the cities, and the evolution of sectors such as decentralized energy (smart grids), or electric mobility (the use of charging stations). To develop them, we need to organize an overall vision at the city and regional level.
- Because of their proximity to citizens, they are in the front line for the protection of European values, and EU social and environmental ambitions.

Standardisation is well suited to helping cities adapt to climate change and the digital revolution: in its absence, cities approach these challenges in an isolated and dispersed way, as these subjects are of an infra-regulatory nature. Ex.: tools to guide cities on their low-carbon journey, adaptation of cities to climate change (infrastructures, water management, risk prevention, emergency management, etc.).

Standardisation can also play a key role in the dissemination and scaling of R&D results and urban initiatives supported by the European Commission (EC) in their efforts towards green and digital transitions. These initiatives include the Horizon EU Mission for 100 Climate-Neutral and Smart Cities, the Intelligent Cities Challenge, the Tech4Good Marketplace, the Mission for Adaptation to Climate Change, the Smart Cities Marketplace, and others.

The international context is highly competitive, between European partners, but above all with the United States (energy and digital) and with China, which is very active in city standardisation, but which is developing very different conceptions of the city and on a very different scale.

Findings

WS8 was set up with the aim of drawing up a shared overview of European and international standardisation in this field and the challenges it faces, as well as outlining possible solutions.

The findings, largely developed in the report and its appendices with the aim of constituting a reference tool for further work, can be summarized as follows:

- An abundance of standardisation, particularly at international level, whose guidelines are not very readable, the effective use of standards not proven: so defining strategic priorities likely to guide European participation is urgent and must be coherent with the European goals. Attempts to organize this European vision within CEN have so far been limited, due to the lack of mobilization of stakeholders.

- European cities should promote and defend their models and practices in the standards, regarding:
    - sustainable development goals: the sustainable city sets high low-carbon targets, takes biodiversity into account, and is resilient towards climate change;
    - land-use planning: port cities, infrastructure networks, tourism, etc.
    - digital issues: the smart city makes a restraint use of resources and serves citizens' quality of life rather than social control.

- European stakeholders are insufficiently present in standardisation to support this model:
    - Horizontal standardisation of integrating sustainability at the territorial level is aimed primarily at local authorities, but European cities and local authorities, even via cities NGO, are not very present, and make little use of the standards produced: problem of the cost of standardisation, time spent and lack of awareness of the benefits of standardisation.
    - Weak presence of environmental associations.
    - Despite the French presidency of ISO/TC 268, limited number of Member States taking part in work, especially on international level (poor participation of European countries in the working groups and their leadership), lack of strategic cooperation on European level, compared to the strong Chinese but also Japanese and Korean involvement.
    - Vertical" thematic standardisation absorbs corporate stakeholders who see more direct outlets for their business.

- Opposite, the mobilization of Asian countries, particularly China, is very strong, with a very different scale of city size, and with climate objectives set on a more distant time horizon than those of the EU. They promote a globalized vision of regional planning in the service of:
    - trade flows (see Belt and Road Initiative, maritime and digital): the "territories" subject addresses a lot of thematic subjects, which are of strong impact on our economies and businesses, such as sustainable mobility, and lately sustainable port cities,
    - the use of digital technology for security purposes and social control.

- Absence of coordination between the Commission's various DGs on this subject, difficulties to ensure a good connection with the research programs that could be involved; no existing standardisation request dedicated to cities, so no link between regulations and standards on cities, even though harmonised standards are a strong incentive for European stakeholders.

- Suggestion of works and projects on the specific problems of cities in developing countries, which could be initiated and supported by multilateral development organizations, and European cooperation organizations.

Recommendations.

1- Recommendations to the Commission

<u>Recommendation 1:</u> Europe should consider the standardisation of sustainable and smart cities and communities as a strategic issue, justifying strengthening the influence of European countries on international standards.

This can be achieved by:

- enshrining in the **Annual Union Work Programme on European Standardisation** (AUWP) key standards for cities, linking firmly regulation and standardisation on this topic (see recommendations 6, 7 (aim: AUWP 2026) and 8 (AUWP 2025).
- **Inter-DG Cooperation**: Integration of standardisation issues in the inter-DG cooperation, which should include DG REGIO, DG CNECT, DG ENV, DG CLIMA, DG ENER, DG MOVE, DG RTD, DG GROW. JRC could extend the mandate and represent the Commission also in the CEN/TC 465.
- **Create a standardisation forum for local and regional authorities** at European level with a specific European public funding which would allow the group to coordinate on standardisation activities, on the model of Annex III-type organization under the 1025:2012 regulation implemented for SMEs, consumer organisations and environmental and social stakeholders.
- **Stakeholder Forum**: ensuring (including through financial support) that existing organisations for cities and other stakeholders (business organisations, academia, consumers, environmental and social organisations…) address standardisation and providing a platform for members to discuss on the scope and implementation of standards.

<u>Recommendation 2</u>: Europe should promote the contribution to, and use of, standardisation through European initiatives and programmes supporting innovation and sustainability in cities.

European initiatives related to cities and territories, concerning technology, process or evaluation, should include standardisation as a key element of their dissemination objectives, both at the European and international levels. These organizations should actively participate in the development of relevant standards.

The European Commission/ JRC should support these efforts by integrating standardisation into the funding conditions of the calls for research projects concerning cities and territories.

<u>Recommendation 3</u>: Europe should consider European international investment policy and rules, including those of the Global Gateway, from the perspective of international standardisation:

- by promoting European standards, rules and approaches in international standardisation,
- by promoting international standards: advocating for the adoption of the relevant international standards in the rules and processes that govern these projects,
- by integrating international and European standards into capacity building and project support initiatives.

To achieve these objectives, a working group should be established, involving European bilateral agencies (AECID, AFD, BGK, CDP, KFW…) and multilateral agencies (BEI, BERD, CEB…).

Recommendation 4 (to be linked with the 4th paragraph of recommendation 1): Europe should support and fund standardisation activities of public and nonprofit organisations in particular

The Commission should support standardisation activities, by considering a model that funds access to standards and participation in standardisation activities (see the HLF recommendations on efficient funding for standardisation activities on international level https://ec.europa.eu/docsroom/documents/62954). This model should focus on organizations such as public administrative agencies, cities, civil society organizations, and the academic community:

- funding participation: provide funding for relevant organizations to engage in standardisation activities, including access to standards, standardisation officers, experts and associated mission costs,
- supporting research: support research contribution for standardisation, including the development of European scientific networks and the participation of academic experts,
- support for internationally engaged European experts: fund experts at the international level to serve as working group secretaries and convenors at ISO and IEC.

This approach should complement national funding efforts.

2- Key topics to be encouraged

Recommendation 5: develop a management system of sustainability of cities and communities that allows integration of European policies at local level[1]:

- engage with the Commission's DGs and relevant stakeholders a standard (a Technical Specification TS) adapting the ISO 37101 management system to the European context of city charters and legal framework, linked to the ISO revision of the EN ISO 37101

Recommendation 6: Initiate a project on carbon neutrality of cities and communities in conjunction with international institutions and scientific experts (to prepare for AUWP2026)[2]:

- ensure coordination through CEN/TC 465's ad hoc group "Climate-Neutral and Smart Cities",
- collaborate with the EU Cities Mission and related EU R&I projects with view to scale European innovative solutions (methods, processes, blueprints, technical solutions) and close the knowledge value chain from R&I to standards to market. Mobilize the 100 Climate Neutral Cities initiative and other relevant European organizations,
- firmly base international standards development on European experiences and use cases, by facilitating the participation of European cities in international exchanges on use cases to counterbalance the actions of the International Smart Sustainable City Club (ISSCC) and promote European cities' experiences in achieving climate neutrality.

[1] Details in 6.1. The sustainability management, governance and information systems

[2] Details in 6.2. Mitigation and net zero cities and communities, and a complete landscape of EU initiatives can be found in Annexe 3 §3.3

Recommendation 7: Initiate a project on adaptation to climate change and resilience of cities and communities (to prepare for AUWP2026)[3]:

- integrate organizational and sectoral norms on adaptation into the international ISO standardisation, focusing on the management of cities (ISO 37101), and adapt to the European context, particularly in relation to policies and programs on adaptation; leverage advancements in clean technologies and process, digital technologies such as local digital twin.
- collaboration with the EU Mission on Adaptation to Climate Change and related projects (e.g. Regilience, Pathways to Resilience and others) with view to scale European innovative solutions (methods, processes, technical solutions) and close the knowledge value chain from R&I to standards to market.

Recommendation 8: Initiate a project on the digital twin of cities and territories relying on European research and development programs and multi-country projects (AUWP2025):

- utilize digital twins for smart city service implementation, to inform indicators, and to assess sustainability,
- ensure the integration of digital twins into the management and governance systems of cities and territories.

Recommendation 9: Prioritize the theme of citizens in standardisation as a differentiating factor for Europe

- strengthen the participation of European institutions and ad hoc stakeholders in CEN TC 465 WG2 and facilitate the development of draft European standards,
- actively participate in the ISO work on citizen-related subjects undertaken by China and Japan,
- begin to standardise Citizen Services (to prepare for AUWP 2025 and possible 2026).

3 - Recommendations to be promoted at the Member State level.

Recommendation 10: Foster Member State engagement in standardisation for smart and sustainable cities and communities in coordination with European measures

- Establish a stakeholder forum process at the Member State level.
- Support and fund the engagement of national city organizations, civil society associations, and research organizations to participate in both national and European standardisation efforts.
- Recommend the use of EU standards as a basis for implementing policies and legislation.
- Enhance contributions to the development of international standards.

[3] Details in 6.3. Adaptation to climate change and resilience of cities and communities, and a complete landscape of EU initiatives can be found in Annex 3 §3.4

Final report

Context

A sustainable city is designed to be environmentally viable, economically prosperous and socially equitable. European cities, where most Europeans live, play a decisive role in achieving European sustainability goals. However, each city is unique, with specific characteristics developed by history, geography, people, and socio-political systems. The challenges they face vary widely. European orientations, shared principles of governance and evaluation are giving rise to a common model of cities. This model transcribes the systemic invariant of the relationship of every community with its territory.

The coherence of these guidelines with the objectives of international organizations, in particular the Sustainable Development Goals, and standardisation framework can serve as a reference at the international level.

Standardisation can help cities become more sustainable, climate neutral, adapt to climate change, and embrace the digital revolution in a more efficient and sustainable way. Given the cross-cutting nature of urban sustainability issues, standardisation can facilitate the integration, at local scale, of sectoral policies and approaches, as well as the interoperability of information systems, when implemented in the relationship with suppliers and service providers, or when organizing actions with partners and building calls for action.

Within the framework of the European standardisation strategy, which promotes competitiveness and European commitments and values, standardisation for sustainable and smart cities and territories is of strategic importance.

However, differing visions for cities and competing economic interests create a highly competitive international context for standardisation.

Enhanced integration of standardisation is needed into European policies and research, as well as by European organizations and networks focused on cities and territories.

Part 1: General information about the WS 8

WS8 was created to contribute to the European standardisation strategy for **Smart and Sustainable Cities**, during 5 sessions held on the following days: WS8-1 19th September 2023, WS8-2 10th October 2023, WS8-3 6th November 2023, WS8-4 1st March 2024, and a final consultation online from 14 to 24th October 2024. Exchanges and contributions were made on the Wiki made available by the Commission. The draft version was open to sherpa comments from 28th October to 15th November 2024. The final version was submitted to the Forum from 9th to 27th December 2024.

Following participants in the work:

- European Commission: DG GROW, DG CLIMA, DG CNECT, DG RTD
- Member States: leadership France; supporting members: Belgium, Cyprus, Italy, Portugal, Spain.

Trade and business organizations:

- **Alliance for IoT and Edge Computing Innovation (AIOTI)**
- **European association of the electricity transmission and distribution (T&D Europe)**
- **European Building Automation and Controls Association (EU.BAC)**
- **European Lift Association (ELA)**

- **European Telecommunications Network Operators' Association (ETNO)**

NGOs:

- **ANEC**: European consumer voice in standardisation

Expert Invited: president of CEN TC 465 and of ISO TC 268.

The project resulted in an interim report published in October 2023 and a framework for standardisation for a AUWP2025 proposal.

The value of exchanges between the Commission's services, Member States, and relevant European stakeholders in the Work Stream 8 supports the proposal to continue this exchange process through a forum that also includes representatives from cities (see **Recommendation 1**).

Part 2: Context and relevant issues

2.1 The crucial issue of cities for sustainability

Cities are a global issue "*Over half of the global population currently resides in urban areas, a rate projected to reach 70 per cent by 2050. Approximately 1.1 billion people currently live in slums or slum-like conditions in cities, with 2 billion more expected in the next 30 years. Today, around 55 per cent of the world's population lives in towns and cities, with the level of urbanization projected to reach almost 70 per cent by 2050*" UN.[4] This is why one of the goals of the United Nations' 2030 Agenda: SDG 11, intend to Make cities inclusive, safe, resilient and sustainable.

In the European Union, 75% of EU citizens already live in cities.

Cities occupy only 3% of the Earth's land, but account for 60-80% of energy consumption and 75% of carbon emissions. Uncontrolled urbanization leads to an increase in soil artificialization and sealing. The use of resources and the pressure on the environment of cities go beyond their territorial borders and concern their hinterland and distant territories.

Together with member countries and regions, cities are an essential component of European contribution to sustainable development.

a. Contribution of cities to European citizenship and sustainability

Proximity in cities, combined with the use of digital technology, fosters inclusive governance, facilitating the ecological and digital transition while reducing inequalities and bridging the social divide to encompass all levels of society. The close physical presence of services and stakeholders in urban and rural areas enables direct and frequent interaction among citizens, businesses, and local governments. This interaction promotes civic participation, allowing residents to more easily engage in local decision-making, voice their needs and concerns, and actively contribute to community life.

Digital technology plays a crucial role in democratizing access to information and knowledge. By leveraging digital tools, communities can disseminate information more broadly, provide educational resources, and encourage collaboration and innovation making it possible to develop new urban services that are more ecological and resource efficient.

[4] https://www.un.org/sustainabledevelopment/cities/

Nevertheless, this needs to ensure that all citizens, regardless of their socioeconomic status, can benefit from ecological and digital transitions by addressing environmental inequalities and the digital divide.

At the local level, environmental issues create a nexus connecting climate change, biodiversity, and ecological services like water resources. This interconnectedness fosters demand-driven, local, social, and frugal innovations, which can play a significant role in European commitments and policies.

Because of their proximity to citizens, cities are at the forefront of protecting European values and the EU's social and environmental ambitions.

b. Market challenges of cities and European competitiveness

The issue of sustainable development in cities and territories has two components that contribute directly and indirectly to European competitiveness:

- Directly, through the value created by business in the territories, through innovations and technological and organizational solutions that contribute to the Green Deal, climate change mitigation and adaptation, the protection of biodiversity and the management of energy, water resources, etc... all issues for which standardisation allows the dissemination of innovations and the organization of public and private contracts and the relationship between project owners and project management.
- Indirectly, through the ability of cities and territories to lead the transition, to use appropriate solutions, to coordinate their implementation, and to set up governance and management to this end, supported by digital technology.

Cities are the cradle of economies that can reduce the climate impact of business: many of the solutions for climate change mitigation and adaptation, circular economy, renewable energy production, energy saving, and nature-based solutions can be designed, adapted and deployed at the local level.

The innovation potential of digital activities in these areas is immense (blockchain, smart grids), such as decentralized energy production, electric mobility, the use of charging stations, etc.

The industrial challenges of the **Smart City** are many and varied, including data collection and analysis: IoT sensors, information platforms, algorithms and models, processes and interfaces with public and private decision-makers and citizens.

Businesses contribute to design, deploy, and manage these digital infrastructures, but cities play a central role.

As **investors in infrastructure**, cities are one of the pillars of Europe's competitiveness and technological sovereignty. As economic actors, they organize markets, validate solutions, and ensure the dissemination of innovations.

To deploy infrastructures and services, ensure their integration and adaptation to local conditions and resources, cities, territories and regions must **develop a global vision**, implement governance that involves private and public stakeholders and information and evaluation systems (digital twin).

The European economic and technological offer for cities considers these European values and contributes to disseminating them at international level.

The international context is very competitive, between European partners, but especially with the United States (energy and digital) and with China, which is very active in cities standardisation, but which is developing very different conceptions of the city and on a very different scale.

2.2 - Usefulness for UE and relevance of standards for cities

Voluntary standards provide a common framework for action, allowing the same language to be spoken from one country to another, from one profession to another, with precise and harmonised terminology. In the digital domain, they enable the interoperability of information systems.

Voluntary standardisation is a valuable tool for sustainable and smart cities, for efficiency and credibility of their policies and their relationship with various stakeholders.

a. Use by cities and communities.

Standardisation is well-suited to help cities adapt to climate change and the digital transition.

For example, there is currently no reference tool to guide cities in their transition to a low-carbon economy. Even less is known about the adaptation of cities to climate change, which is insufficiently integrated into urban planning (infrastructure adaptation, water management, risk prevention, emergency management, etc...).

Cities may choose to use voluntary standards to ensure their sustainability for several reasons:

Common terms of reference: Voluntary standards provide a common framework for economies of scale achieved through shared tools that lower engineering costs and provide tools for harmonizing practices and benchmarking with common indicators for sustainable cities so that cities can measure, monitor and compare their sustainability performance.

Recognition and credibility: Adherence to recognized standards can strengthen the city's credibility in terms of sustainability and the trust of national and European authorities, investors, civil society and citizens.

Decision support and continuous improvement: Voluntary standards enable cities to put in place practices, governance and management to integrate, evaluate and improve different sectoral policies. Otherwise, cities approach challenges in an isolated and dispersed manner, as these topics are sub-regulatory in nature.

Long-term economic development and cost reduction: thanks to demand oriented digitalization and better urban planning, standards enable more efficient management of natural resources and energy and value creation at the territorial level.

Positive environmental and social impact: improvement of the living conditions of the inhabitants.

b. A variety of concerned stakeholders

Standardisation for sustainable cities, which covers the governance and management system, project management and evaluation, is **in the public interest and is useful for a wider set of stakeholders**, to facilitate private public relations, or relations between various levels of public institutions.

Europe and the Member States have an interface for the implementation of their policies. For example, by making it possible to organize calls for expressions of interest and project funding for cities on a single generic format reducing administrative costs[5]

Cities and territories organize their sustainability policy, set shared objectives and associated indicators, organize governance and relations with stakeholders, implement and monitor management through an information system, deploy digital smart city tools, etc.

Other local authorities exchange knowledge and experience based on shared processes and indicators.

The private sector, infrastructure and service providers use common specifications to meet the expectations of local authorities and more easily offer their innovations for ecological and digital transition.

Finance and bilateral and multilateral cooperation organizations strengthen the capacity of recipient countries, the quality of project management, etc.

Civil society organizations can better target their role and intervention in city governance.

The scientific community can promote R&D results and models and can have fields for experiments, samples for study organized on a common basis.

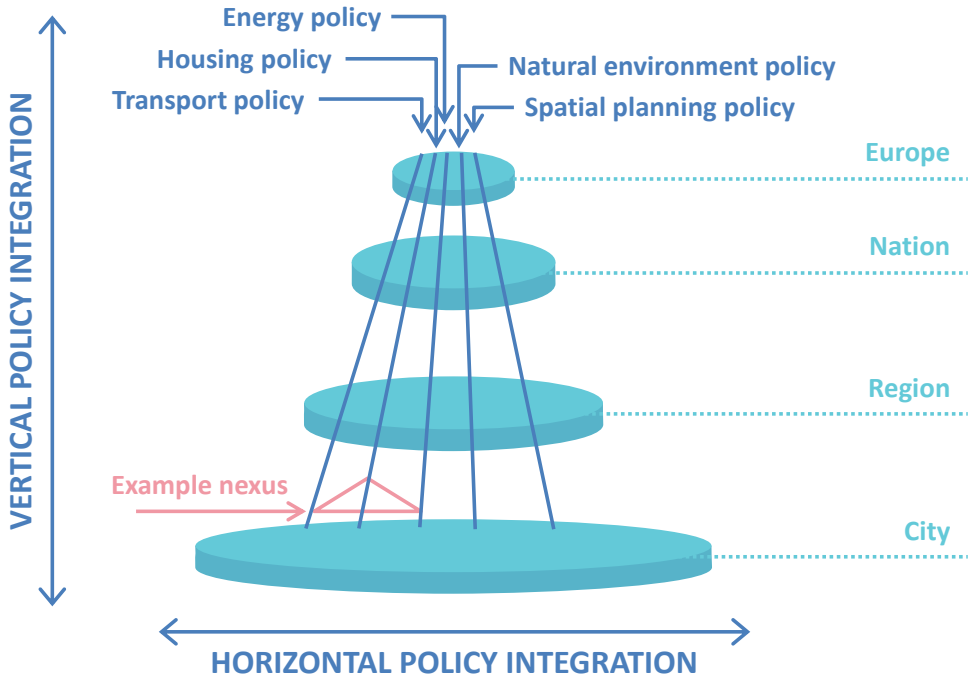

Figure 1: Vertical and horizontal policy integration[6]

[5] According to the experience of France which has used ISO 37101 for this purpose.

[6] European Environment Agency. Urban sustainability in Europe — A stakeholder-led process. 2021 — 37 pp https://south.euneighbours.eu/publication/eea-report-urban-sustainability-europe-stakeholder-led-process/

c. Role of standardisation in support to policy objectives and regulatory implementation

Smart and sustainable cites and territories standardisation can play a crucial role in advancing European policies by fostering **vertical policy integration** between Europe, Member State, regions and cities and **horizontal policy integration** at local level by facilitating the management in a cohesive manner of the nexus between various sectors such as transport, housing, energy, natural environment preservation, spatial planning...

Numerous European initiatives, regulations, programs and projects promote the sustainability of cities and territories in Europe (see Annex 1). Implementation and coordination of these initiatives involve various collaboration between EU institutions and policies, national governments, regional authorities, cities, business and other stakeholders. Cities must be able to integrate a wide variety of initiatives at their level through management and information system.

To strengthen efforts around standardisation, a coordinated mobilisation of associations representing cities and regions is essential. This could include establishing structured channels of communication and collaboration between city organizations and the European Commission, along with its respective Directorates-General (DGs), while also engaging other relevant stakeholders through a dedicated forum.

Additionally, the creation of a specialized organization of cities focused on standardisation, could further support this initiative. It could participate in the High-Level Forum (HLF), as a member.

A **Stakeholder Forum on Sustainable and Smart Cities and Communities** that continues and expands the WS8 of the High-Level Forum (HLF) to identify strategic priorities and foster collaboration within the European standardisation system:

- Identifying strategic standardisation needs for supporting EU policies and legislation and analysing future trends and industry needs.
- Considering international leadership of Europe in standardisation landscape
- Ensuring coherence and addressing cross-cutting themes that impact standardisation across different sectors beyond CEN TC 465 scope.
- Enhancing engagement of stakeholders

Different stakeholders could be involved (see detail in Part 3 and Annex 1):

- Cities, local governments and their associations
- Associations or organisations representing citizens and consumer interests.
- Private sector organisations interested in cities and communities, of both SME's and industries.
- Institutions, associations or initiatives driving research & innovation for sustainability and sustainable development in cities and communities.
- Institutions driving financing and investment for sustainability and sustainable development in cities and communities.
- European institutions driving policies, strategies, and funding programmes addressing sustainability and sustainable development in cities and communities.

The activities of cities and territories on standardisation, and the mobilisation of their expertise, must be able to be supported, financially (see proposals 4)

Recommendation 1: Europe should consider the standardisation of sustainable and smart cities and communities as a strategic issue justifying strengthening the influence of European countries on international standards.

This can be achieved by:

- enshrining in the **Annual Union Work Programme on European Standardisation** (AUWP) key standards for cities, linking regulation and standardisation on this topic: see recommendations 6, 7 (aim: AUWP2026) and 8 (AUWP 2025)
- **Inter-DG Cooperation:** Integration of standardisation issues in the inter-DG cooperation, which should include DG REGIO, DG CNECT, DG ENV, DG CLIMA, DG ENER, DG MOVE, DG RTD, DG GROW". JRC could extend the mandate and represent the Commission also in the CEN/TC 465.
- **Create a standardisation forum for local and regional authorities** at European level with a specific European public funding which would allow the group to coordinate on standardisation activities, on the model of Annex III-type organization under the 1025:2012 regulation implemented for SMEs, consumer organisations and environmental and social stakeholders. **Stakeholder forum:** ensuring (including by financial support) that existing organisations for cities and other stakeholders (business organisations, academia, consumers, environmental and social organisations…) address standardisation, and providing a platform for members to discuss on the scope and implementation of standards.

It could contribute to a stakeholder-based strategy that would make it possible to identify key strategic normative processes, which can inform the Annual Union Work Programme (AUWP) and the Business Plan of CEN TC 465, as well as other relevant CEN Technical Committees.

This direction should also lead to an expansion of the High-Level Forum's composition by appointing representatives from European city associations and economic sectors involved in territories who are not yet members of the Forum.

2.3 - International Issues

a. A European model of sustainable cities

International forums, the SDGs and in particular SDG 11, the World Urban Forum, etc., have defined the goal of an inclusive, sustainable and resilient city. Behind an apparent unanimity, very different visions of the city are proposed in connection with the institutional and political framework of the countries.

A North American model, where regulations are judicialized, relies on technology and the private sector, including large digital companies, to develop a smart city.

A Chinese model where land ownership is held by the state and local authorities. Digital technology is put at the service of social control.

The European model of the democratic, open, sustainable, and inclusive city is that of a private public approach, framed by citizen-centred institutions that guarantee fundamental freedoms.

The promotion of this model and the positioning of European companies in the urban market at the international level can be supported by European bilateral and multilateral financing

agencies, as well as by global infrastructure investment policies (as Global Gateway), but also by standardisation.

Standardisation can contribute to European competitiveness by facilitating the dissemination of best practices and innovations in member countries, by efficiently organizing the green and digital transition, and at international level by facilitating market access.

b. Dual issues: competitiveness and promotion of EU values

Standards for cities and communities can support a resilient, green and digital EU single market while fostering EU values, policy objectives and regulatory implementation.

Establishing global standards in this domain will enhance Europe's competitiveness, technological sovereignty, and ability to reduce dependencies, while simultaneously protecting and promoting EU values, including social and environmental ambitions.

Standardisation in the field of cities is particularly concerned with these two dimensions. Of the 52 standards currently being developed or revised in the field of the city, most have a dual economic and political dimension (see Figure 2)[7].

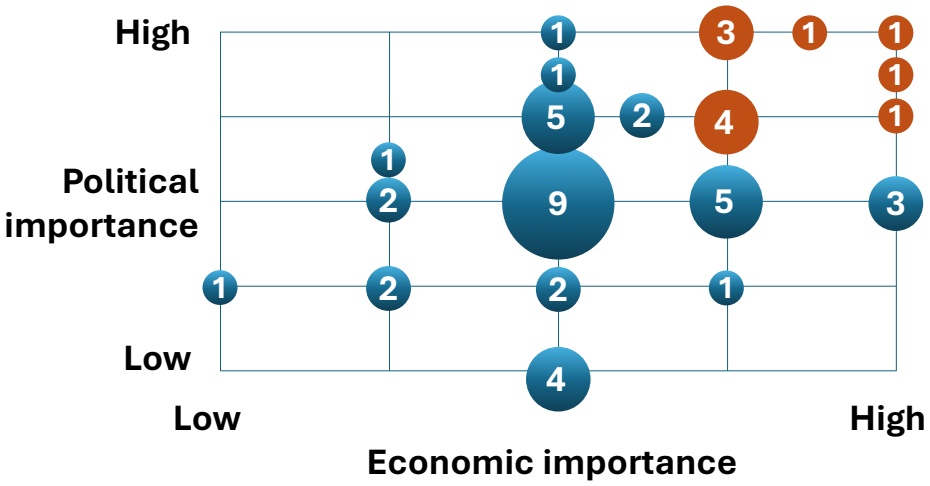

Figure 2: Balance of political and economic importance for 52 standards

2.4 - Standardisation as a process.

a. Standardisation as cycle

Standardisation is not limited to the writing of a text, but to a cyclical process[8] that allows its relevance to be verified through experience, implementation, and continuous improvement. In each of the stages, the stakeholders are different.

[7] A questionnaire was circulated in WS8 to note the respective level of economic importance regarding the competitiveness of European companies and policy regarding European regulation and values. 4 responses were received from various stakeholders, details in Annex 2. This evaluation method could be more widely used, outside of WS8 participants, to interest a wider range of stakeholders.

[8] China's presence in standardisation is based on the mastery of this entire cycle, see §4.3.

Standardisation cycle steps	Stakeholders
Identification of topics for standardisation or need for updating standards	EU, cities, Member States, businesses, civil society, consumer associations...
Prenormative research: state of knowledge, proposals for models and processes, mobilization of experts, etc.	University, industry, local authorities, civil society, consumer associations, …
Use Case collection	CEN/TC and ISO/TC convenors, and NSBs
Standardisation Process: NWIP, Standard Drafting, Voting	CEN/TC and ISO/TC convenors, members and experts
Dissemination of standards through platforms and networks	Knowledge platform, communication, academics
Implementation experience and evaluation in Pilot Cities	Academics, cities, companies

b. Smart standardisation and knowledge dissemination

"*SMART standards refer to the formats, processes, and tools necessary for a user (human and technology-based) to interact with standards. These digital solutions serve the needs of all stakeholders, from industry, regulators, and end users to society as a whole. (…)*

The next generation of IEC and ISO standards will provide tailored and up-to-date content at the right time to the relevant users - whether they are humans, computers, complex machines, or small intelligent devices. IEC and ISO standards will be embedded into product development supply chains and become much more integrated into everyone's daily life."[9]

ISO has proposed that the revision of the ISO37101 standard be done in the context of smart standardisation.

Smart standardisation opens an opportunity to develop platform-based tools for knowledge dissemination, and interconnection between existing platforms.

Europe should resolutely commit to smart standardisation.

Part 3: Overview of European strategic initiatives, policies and directives, projects, fundings, and initiatives of cities.[10]

European policies promote the regulatory framework for urban sustainability and for the development of digital solutions. Within the context of research and development funding, a multitude of initiatives are being supported. These initiatives focus on fostering innovation, improving infrastructure, and enhancing the quality of life for citizens. By encouraging collaboration between public and private sectors, these policies aim to create sustainable, smart, resilient cities and communities that are well-equipped to tackle future challenges.

[9] https://www.iso.org/smart

[10] details in Annex 1

3.1 - Institutional framework

Different European documents create a **comprehensive framework** that supports the **sustainable, inclusive, and resilient transformation of European cities**:

The **Urban Agenda for the EU (2016)** focuses on improving the quality of life in urban areas by promoting an integrated and cross-sectoral approach to urban development, covering key areas like housing, air quality, mobility, and urban poverty…

The **European Urban Charter III (2023)** focuses on social rights, democratic governance, and inclusive cities, emphasizing social justice and participation.

The **New Leipzig Charter (2020)** is more about sustainable, resilient, and green urban development, with a strong focus on climate neutrality, digitalization, and multi-level governance.

Some institutional initiatives and policies have a direct impact on at cities: **European Climate Adaptation Strategy**, **Circular Economy Action Plan**…

Some other have a wider scope including business but can have strong implication on cities, their sustainability, and their contribution to European competitiveness: **European Green Deal**, **Fit for 55**, **A sustainable bioeconomy for Europe**., **European Sustainability Reporting Standards (ESRS).**

3.2 - Innovation and research development

Standardisation is a key element in the diffusion of innovation, facilitating collaboration, knowledge sharing, and collaborative innovation.

It facilitates interoperability and integration of new technologies into existing systems, boosts adoption confidence, reduces costs and risks through proven frameworks and specifications, accelerates adoption by stakeholders and the European and international market.

It supports sustainability and social responsibility through environmental and social criteria, encouraging innovations that respect these principles.

EU Missions relating EU's research and innovation, three of the five missions, are relevant for cities: Adaptation to climate change, including societal transformation; Climate-neutral & smart cities; Soil health & food.

In terms of research, two pillars of the **Horizon Europe program** relate to issues that may concern cities:

- **Horizon Europe's Pillar 2, Global Challenges and European Industrial Competitiveness,** structured into six clusters. Five of these research areas may concern cities and territories: **2: Culture, Creativity and Inclusive Society**; **3: Civil Security for Society**; **4: Digital, Industry, and Space**; **5: Climate, Energy, and Mobility**; **6: Food, Bioeconomy, Natural Resources, Agriculture, and Environment**.
- **Horizon Europe's Pillar 3, Innovative Europe** encompass three initiatives: **European Innovation Council (EIC); European Innovation Ecosystems**; **European Institute of Innovation and Technology (EIT).** The later encompassing Knowledge and Innovation Communities (KICs): **Climate-KIC; EIT Digital; EIT Food, EIT InnoEnergy, EIT Raw Materials; EIT Urban Mobility…**

Other programmes:

- **NetZeroCities**
- **Urban Innovative Actions (UIA)** founded on ERDF budget
- The **European Regions Research and Innovation Network** (ERRIN)
- **Interreg programs**.
- **Smart Cities and Communities European Innovation Partnership (EIP)**.
- **City Science Initiative (CSI)**
- **The Intelligent Cities Challenge (ICC)**
- **Tech4Good Marketplace**
- **Open & Agile Smart Cities & Communities (OASC)**
- **Smart Cities Marketplace and Scalable Cities**

European initiatives concerning cities and territories should integrate standardisation into their dissemination objectives both at European and international level. These organisations should participate to the elaboration of relevant standards. The Commission should support the integration of standardisation into those initiatives and by increasing fundings.

Beyond innovations programs some academic networks are devoted to urban planning, and specific issues for cities and communities such as climate, biodiversity, disability, finance…: **JPI Urban Europe**, **ANED**, **COST**, **ENHR**, **ESPON**, **EURA**, **GRASFI**, **ENTU**, **SDSN Europe**, **UERA**…

Their contribution to standardisation should be encouraged and supported.

The **HS Booster program** provides support for standardisation expert services for R&D program, but it is not fully mobilized. It should be strengthened and expanded by being fully integrated into the standardisation strategy and priorities.

Recommendation 2: Europe should promote the contribution to, and use of, standardisation through European initiatives and programmes supporting innovation and sustainability in cities.

- European initiatives related to cities and territories should incorporate standardisation as a key element of their dissemination objectives, both at the European and international levels. These organizations should actively participate in the development of relevant standards.
- The European Commission should support these efforts by integrating standardisation into the funding conditions of these initiatives and providing adequate financial resources to facilitate this integration.

3.3 - Finance

Europe has leverage for the financing sustainable infrastructure and services in cities, either directly through its programmes or indirectly through regulations that frame public and private funding.

The Corporate Sustainability Reporting Directive (CSRD) requires large companies, listed SMEs, and parent companies of large groups to report on sustainability matters. The European

Sustainability Reporting Standards (ESRS) aim to specify sustainability information that companies must disclose in accordance with the CSRD Directive. The information includes details about business models, targets, policies, due diligence processes, adverse impacts, risks, and relevant indicators…

Aligning standardisation for cities and territories with ESRS could facilitate: (1) The joint management of risks, opportunities and resilience between companies and the territories where they operate and/or exploit their resources; (2) Access to localized information that enhances companies' ability to report on their assessment of physical transition, and systemic risks throughout their value chain.

Funding bodies that support investments in cities and territories covers all level (see detail in Annex A.1.3): national (**CDC, KfW, BGK**…), European (**ESIF, ERDF, CEB…),** European and international (**EIB, NIB)**, International Bilateral Cooperation, (**AFD, GIZ, AECID**), International multilateral (**EIB, BSTDB, EBRD).**

Common frameworks for the management and evaluation of the sustainability of the projects and infrastructures they finance would make it possible to achieve economies of scale, reduce transaction costs and better capitalize on experiences.

The Global Gateway is the EU's contribution to narrowing the global investment gap worldwide. It is in line with the commitment of the G7 leaders from June 2021 to launch a values-driven, high-standard and transparent infrastructure partnership to meet global infrastructure development needs. The Global Gateway is also fully aligned with the UN's Agenda 2030 and its Sustainable Development Goals, as well as the Paris Agreement. It could serve as a flagship for the promotion of standards incorporating European values.

Recommendation 3: Europe should consider European international investment policy and rules, including those of the Global Gateway, from the perspective of international standardisation:

- by promoting European standards, rules and approaches in international standardisation,
- by promoting International Standards in the rules and processes that govern these projects,
- by integrating international and European standards into capacity building and project support initiatives.

To achieve these objectives, a working group should be established, involving European bilateral and multilateral agencies and national banks.

3.4 - Organizations of cities and territories

Organisations representing cities and territories play a crucial role in promoting local and regional interests to national governments, European and international institutions. They promote sustainable development, climate resilience and urban innovation initiatives, provide support for local policies and projects, contribute to networking and sharing good practices and innovations, contribute to capacity building through information and training for local elected officials and municipal officials, and facilitate their access to finance and grants.

A variety of associations remain limited at the national level in the member countries and may or may not belong to European or international networks. They can be generalist or specialised on energy, transport, waste management, etc.

Some are exclusively European, as European Committee of the Regions.

Some relate to international organisations with European participation (or chapter):

- **United Cities and Local Governments (UCLG)** with the European section **Council of European Municipalities and Regions** (CEMR)
- **Global Covenant of Mayors** (including **Urban Transitions Mission)**,
- ***ICLEI – Local Governments for Sustainability***
- **C40**
- **International Association of Francophone Mayors AIMF**

These organisations have developed specific approaches and benchmarks, which could usefully feed European and international standardisation, their convergence through common management and evaluation standards, could facilitate the global dissemination of innovations and solutions.

3.5 - Civil society NGOs

- **The European Consumer Voice in Standardisation (ANEC)** (member of WS8)
- Bureau Européen des Unions de Consommateurs (BEUC)
- Environmental Coalition on Standards (ECOS)
- European Trade Union Confederation (ETUC)

3.6 - Trade and business associations[11]

Organizations whose focus is directly or indirectly on cities:

- **Alliance for IoT and Edge Computing Innovation (AIOTI)** (member of WS8)
- **European association of the electricity transmission and distribution (T&D Europe)** (member of WS8)
- **European Building Automation and Controls Association (EU.BAC)** (member of WS8)
- **European Lift Association (ELA)** (member of WS8)
- **European Telecommunications Network Operators' Association (ETNO)** (member of WS8)
- **Association of the European Heating Industry (EHI)**
- **DIGITALEUROPE**
- **EPIA SolarPower Europe (EPIA)**
- **Home Appliance Europe (APPLiA)**
- The European Construction Industry Federation (FIEC)[12]

Alongside companies, these organizations and initiatives are the key elements of a **European innovation system** for sustainability. This diversity necessitates the **use of a common language and framework for evaluation and comparison**. Establishing shared standards will

[11] In bold are the members of the HLF

[12] Non-member of the HLF

facilitate better understanding, collaboration, and measurement of sustainability progress across different projects and innovations.

The participation of cities organizations and civil society organizations to standardisation would be essential, upstream to assert their needs and expectations and make their contribution, and downstream to use the standards. This participation remains presently too limited, especially due to a **lack of resources and process of involvement**.

The creation of a **stakeholder forum on sustainable and smart cities and communities** putting together EU, Member States, cities, organisations and networks can organize this participation (see Proposal 1).

Recommendation 4 (to be linked with the 4th paragraph of recommendation 1): Europe should support and fund standardisation activities in particular of public and nonprofit organisations

The Commission should support standardisation activities, by considering a model that funds access to standards and participation in standardisation activities (see High-Level Forum recommendations on increasing funding for standardisation activities at international level https://ec.europa.eu/docsroom/documents/62954). This model should focus on organizations such as public administrative agencies, cities, civil society organizations, and the academic community:

- funding participation: provide funding for relevant organizations to engage in standardisation activities, including access to standards, the appointment of standardisation officers and experts and associated mission costs;
- supporting research: support research contribution for standardisation, including the development of European scientific networks and the participation of academic experts;
- international expert support: fund experts at the international level to serve as working group secretaries and convenors at ISO and IEC.

This approach should complement national funding efforts.
Figures for the related costs can be found in Annex 4

Part 4: Overview of international standardisation activities.

4.1 - The ISO IEC standardisation framework13

ISO/TC 268 Sustainable cities and communities

Created in 2012, ISO/TC 268 focuses on the smart city in the context of sustainability in different dimensions: strategy and management of projects and infrastructure, and addresses the territorial dimension of sectoral issues that are addressed by other TCs (biodiversity, climate, circular economy, energy, etc.). ISO/TC 268 has published 43 standards and 20 are under development.

Two subcommittees have been set up, **ISO/TC 268/SC 1 Smart community infrastructures** and **ISO/TC 268/SC 2 Sustainable cities and communities - Sustainable mobility and transportation**.

[13] Details can be found in Annex 2

France is the only European Union Member State steering working groups. Countries represented: Japan (8), China (6), France (4), United Kingdom (1), Canada (1), Brazil (1).

ISO-IEC JTC 1 WG 11 on Smart Cities soon being transformed in JTC 4

Th ISO-IEC Joint Technical Committee (JTC 1) is a consensus based, voluntary international standards group focussing on information technology (IT) issues with a significant activity of 3416 standards published and 479 under development. Only a small number of them concern smart cities: 13 published and 4 under development.

The Joint Technical Committee JTC 1 on Smart Cities was established on ISO/IEC JTC 1 "Information technology" 30th Meeting on October 2015.

ISO TMB (Technical Management Board) and IEC SMB (Standards Management Board) has adopted in June 2024 the ISO/IEC JTC 1 proposal for the establishment of a JTC IT for smart cities. The scope of this new committee and its relationship with ISO TC 268 are under discussion (summer 2024).

4.2 - The standard system with the keystone standard: ISO 37101:2016

The standards developed in ISO TC 268 are in the perspective of sustainable development and refer to a keystone standard: ISO 37101

ISO 37101:2016 Sustainable development in communities — Management system for sustainable development — Requirements with guidance for use is intended to help local and regional communities become more resilient, smart and sustainable, in the implementation of strategies, programmes, projects, plans and services, by adopting a continuous improvement approach. It aims to integrate sectoral issues through management and governance for the benefit of six *purpose of sustainable development*: attractiveness, preservation and improvement of the environment, resilience, responsible use of resources, social cohesion and well-being.

ISO 37101:2016 is a keystone standard of a coherent system, with standards, covering vocabulary (ISO 37100), indicators and implementation in specific contexts:

- A series of indicator standards have been developed on complementary issues facing cities: ISO 37120 indicators for city services and quality of life; ISO 37122 indicators for smart cities; ISO 37123 indicators for resilient cities; ISO/DIS 37125 Environmental, social, and governance (ESG) indicators for cities. Work is underway on indicators for carbon neutrality.
- implementation in specific contexts: business districts (ISO 37108), project developers (ISO 37109), and open data management (ISO 37110).

Standards also deal with the structure of the city and its functions, which can form the basis of information and decision-making systems. These standard states "*Indicators should be used to collect relevant data and ensure that strategies, programs, projects, plans and services meet their objectives throughout the operational phases in their respective life cycle*." ISO 37101:2016 §8.2.

The indicators measure the performance of sustainable cities and communities in support of policy management and dissemination.

All indicators are constrained by data availability and data processing methodologies, that raises the question of information and its management as developed in "*ISO/WD 37114:*

Sustainable cities and communities — Appraisal framework for datasets and data processing methods that create urban management information".

The envisaged revision of ISO 37101 is key for the entire standards system. It is a political issue for Europe, with France as convenor (see proposal 5).

Part 5: Overview of European standardisation activities.

5.1. - CEN TC 465 Sustainable Cities and Communities

CEN TC 465 Sustainable Cities and Communities was created in 2020 in response to ISO/TC 268 creation.

Chair DIN Germany, Vice Chair: AFNOR France, UNI Italy, BSI UK. Secretariat: AFNOR France

A first business plan and work program have been adopted: "*Standardisation will focus on the development of a holistic and integrated approach in response to the needs of European Cities and Communities in both rural and urban areas. It is proposed that the standardisation activities focus on the purposes of urban sustainable development as defined by ISO 37101 related to Sustainable Cities and Communities, namely resilience, attractiveness, well-being, social cohesion, preservation and improvement of environment, responsible resource use, aligned with the main pillars of sustainable development (economic, environmental and social*. »

The standards under development at CEN TC/465 Sustainable Cities and Communities are considered in coherence with the ISO TC 268 system of standards.

a. Working groups in operation

Three working groups have been implemented:

CEN/TC465/WG1 on Nature-based Solutions (NBS) (Italy, Spain):

> Early development work concerns the **NWIP Sustainable Cities and Communities – Nature Based Solutions (NBSs) –Vocabulary**

CEN/TC465/WG2 "Citizen Services": (UK BSI, ANEC Coordinator).

> First work concerns the **prCEN/TR A framework for standardisation of services to the citizen.** Document for survey in August 2024

CEN/TC 465 WG3: Territorial Resilience (France AFNOR

> First work on **Territorial Resilience Development –review of concepts, methods, tools**

A new WG could be created on a standardisation proposal on industrial symbiosis:

> **PWI - Industrial Symbiosis to support Sustainable Cities – Core Elements and Implementation**

b. Climate neutral cities issue

During its 13 June 2024 plenary, CEN/TC 465 has created the ad hoc group "Climate-Neutral and Smart Cities" which "aims to create and consolidate synergies with existing initiatives, programmes, and platforms at the European level in the space of "climate-neutral and smart cities." The ad hoc group references the EU Mission "100 climate-neutral and smart cities".

Other works on consideration

- Local Digital Twins
- Localization of the SDGs

c. CEN CENELEC and ETSI

The CEN-CENELEC-ETSI Sector Forum on Smart Sustainable Cities and Communities (SF-SSCC) had been established to coordinate activities of the three organisations and to provide advice on European interests and needs for SSCC standardisation as part of the overall approach to smart sustainable cities, considering existing ISO/IEC/ITU results and activities for international coherence. The sector forum has ceased to function, leading to a regression in coordination between these organisations. The creation at the international level of JTC 4 formalising the ISO/IEC cooperation at the international level should be followed by CEN TC 465.

Nevertheless, cooperation between CEN CENELEC and ETSI should be strengthened through Mode 4 or Mode 5 cooperation.

5.2. Participation of European countries to international activities

Despite the involvement of France (presidency and secretariat of ISO TC 268), Europe's influence is weak due to:

- Weak capacity of National Mirror Committees (NMCs) to conduct working groups and standard-setting processes on these topics.
- High number of proposals for standards from other regions (especially Asia), together with the lack of European standards initiatives
- Limited options for European exchange to coordinate positions and involvement.

Reasons for the low participation of EU actors

- Thematic focus: relatively new, limited information available to relevant stakeholder groups
- Limited capacity of relevant stakeholder groups to participate in standard-setting processes (time, travel)
- Limited political support from the European Commission/EU Member States
- Cities and urban organisations – as a key stakeholder group – are not used to standardisation processes and standardisation formats that are too time consuming and unsuitable.

CEN/TC 465 is an option for organising European exchanges.

Proposal

- More EU members in various working groups ISO/TC 268 and ISO/IEC JTC 1/WG 11 (consider financial compensation for non-commercial experts)
- Take the lead on the following items (adaptation, mitigation and digital twin) proposed for the AUWP2025 and possibly AUWP2026.
- Offer exchanges processes on European perspectives and experiences.

5.3. Influence based on Vienna Agreement

The Vienna Agreement could consolidate European influence.

The Vienna Agreement is a cooperative framework between the International Organization for Standardisation (ISO) and the European Committee for Standardisation (CEN). It aims to prevent duplication of efforts and ensure that standards developed by both organizations are consistent and widely applicable.

CEN can adopt ISO standards as European standards (EN) through a parallel voting process. Conversely, ISO can adopt European standards. ISO and CEN can set up joint work programs to develop standards together, with regular coordination meetings.

The final text is likely be the original standard developed by the leading organization (e.g., ISO). But CEN can issue a separate document referencing the recognized standard and outlining any specific regional considerations.

It might be appropriate for project to be developed in cooperation with ISO within the framework of the Vienna Agreement, for example for climate neutrality of cities that is already on the agenda of ISO TC 268.

Part 6: Key Topics

6 subjects are strategic both in terms of economic competitiveness and the promotion of European values and commitments and require European involvement:

1. The sustainability management, governance and information systems for cities and communities.
2. Mitigation and carbon neutrality of cities and communities
3. Adaption to climate change of cities and communities
4. Local Digital twin for sustainability.
5. Harbour cities
6. Citizenship issues

The digital twin is the subject of a proposal for a standardisation request for AUWP2025. As the subjects of mitigation and adaptation are not sufficiently advanced to define a mandate, work should be done with the Commission, mainly DG CLIMA, to consider a new work item (NWIP), which considers the European projects already underway. These could then be proposed for the AUWP 2026 (details can be found in Annexe 3).

These projects could be developed within the framework of the Vienna Agreement (§5.3.). This approach ensures that Europe's regulatory and policy frameworks could both be respected at Community level and propagated internationally, thus strengthening Europe's global influence in standardisation.

TC	Why is it key?	EU participation
1. ISO/TC 268 Sustainable cities and communities	*Standard development*: System of connected norms Revision of key stone standard ISO37101 governance sustainability. *Political issues:* Compatibility with European policies and values	French Secretariat and convenor of WG1 in charge of revision ISO 37101 EU MS: 11/42 Participating Members 5/30 Observing Members Other WG: SAC (China): 6; Japan (JISC): 2 France (AFNOR): 2; Brazil (ABNT): 1 UK (BSI): 1 EU NGOs: 2/12: European Lift Association; RESIN - Climate resilient cities and infrastructures

2. ISO/TC268/ in connection with ISO TC 207 SC7 Climate Change **GHG emissions mitigation**	*Standard development*: Create work item on Carbon-neutral cities aligned with fit for 55. *Political issues:* EU influence on climate change agenda, contribution to international commitments Response to China's networking with Russia, Iran, etc.	Ongoing standardisation initiatives: ISO 37115 Use cases (China) Indicators (Korea) EUMS ISO 37115 3/10 France Italy Portugal
3. ISO/TC268/ in connection with ISO TC 207 SC7 **Climate Change adaptation** and ISO/TC 292 on Security and resilience	*Standard development*: Create work item on adaptation of cities in coherence with ISO 14090, ISO 14091 and ISO 14092 *Political issues:* strategic issue for EU cities and contribution to international agenda and cooperation with developing countries	No ISO Agenda Connection with CEN/TC 465 WG3 resilience.
4. ISO/TC268/ in connection with ISO/IEC JTC 1/WG 11 "Smart cities"	*Standard development*: Create work item on **environmental digital twin for cities**. *Political issues:* Various initiative ISO/IEC with no reference to sustainability. Promotion of European R&D organisations and projects as Digital Twin & Citiverse EDIC and DestinE	No ISO Agenda ISO/IEC JTC 1/WG 11 chairman and secretariat: China 3, India 3, Japan 3, **Germany 1, United Kingdom 1, Switzerland 1.**
5. ISO/TC 268/AHG "PWI Harbour Cities"	*Standard development*: new project proposed by China. *Political issues*: Element of Chinese strategy (Belt and Road Initiative), necessity of European response (Global Gateway)	Initiative of China Only 2 experts from Europe (Italy, France)

Tableau 1: Key strategic standardisations

6.1 The sustainability management, governance and information systems

Various European documents collectively form a comprehensive framework that supports the sustainable, inclusive, and resilient transformation of European cities: the **Urban Agenda for the EU** (2016), the **European Urban Charter III** (2023), and the **New Leipzig Charter** (2020). Though each has distinct but complementary objectives, they all promote an integrated, cross-sectoral approach to urban development, emphasizing multi-level, democratic governance, and advancing inclusive cities with a focus on sustainability, climate neutrality, and digitalization.

On international standardisation level the ISO 37101:2019 City Management and Governance System was adopted by CEN in 2022 (EN ISO 37101:2022).

ISO 37101:2016 establishes requirements for a management system for sustainable development in communities, including cities, using a holistic approach, with a view to ensuring consistency with the sustainable development policy of communities. It is based on continuous improvement process. ISO 37101:2016 is intended to help communities become more resilient, smart and sustainable, through the implementation of strategies, programmes, projects, plans and services, and demonstrate and communicate their achievements.

ISO 37101 is a keystone standard at the heart of a system of complementary standards.

This standard should be revised soon in the WG1 group of ISO/TC 268 with France (AFNOR) as convenor. In order to bring the international standard closer to European approaches by integrating principles and objectives detailed in the European Charters, and the European legal framework, it is proposed to start work on adapting it to the European context.

This will strengthen the capacity of European countries to contribute at the international level. This will allow European cities and companies operating in the territories to benefit from relation to all international standards.

The Smart and sustainable cities and territories standardisation framework can play a crucial role in advancing European policies by fostering vertical integration across various sectors such as transportation, housing, energy, natural environment preservation, spatial planning... and horizontal policy integration by facilitating the management at the local level of the nexus between environmental sustainability and socio-economic development in a cohesive manner.

Recommendation 5: develop a management system of sustainability of cities and communities that allows integration of European policies at local level:

- engage with the Commission's DGs and relevant stakeholders a standard (or a Technical Specification (TS)) adapting the ISO 37101 management system to the European context of city charters and legal framework, linked to the ISO revision of the EN ISO 37101.

6.2 Mitigation and net zero cities and communities14

CEN/TC 465 has listed climate-neutral cities as a priority for future standardisation and engaged collaboration with EU Mission on Climate-neutral and smart cities and exchange with European Commission Services on possibility for standardisation. An ad hoc group "Climate-Neutral and Smart Cities", has been implemented by CEN/TC 465.
NetZeroCities project in collaboration with CEN/TC 465 and HS Booster develops a roadmap to standardisation.
Another CEN/TC 465 initiative, the WG 1 Working Group on Nature-based Solutions, which has started its work on vocabulary, can contribute to this work as NBS are among the key solutions for climate neutrality and resilience.
Mitigation has given rise to many voluntary international standards providing a methodology for quantifying, reporting GHG and management for organizations, projects, products, in transport chain operations, but yet no for cities at whole. As this agenda was opened in ISO by Chinese and Korean initiatives, Europe should develop its own approach based on the European projects (especially NetZeroCities), experience of cities and companies providing services to cities.

The European Climate-Neutral and Smart Cities Mission has specific requirements regarding monitoring, evaluation, and learning (MEL).

The carbon neutrality of cities offers the opportunity of implementing European commitments at the local level, particularly the reduction of emissions by 55% by 2030.

Standardisation of cities climate neutrality should address two main issues: the management and the quantification. For the European context of the climate city contracts of NetZeroCities[15] it must meet requirements regarding monitoring, evaluation, and learning (MEL). Indicators needs to serve four main purposes: 1) to monitor the commitments cities

[14] A complete landscape can be found in Annexe 3 §3.3

[15] **Comprehensive indicator framework,** NetZeroCities Research and Innovation Action (RIA)

make, 2) to track their progress towards their climate neutrality goals, 3) to assess co-benefits of their journey towards climate neutrality and 4) to monitor the quality of the transition process to inform and enable mutual learning between the cities.

This standardisation framework, consistent with technologies and solutions implemented in Europe, will be a factor in promoting European companies on the international market, particularly regarding the Chinese strategy.

The initial orientation given by the Chinese leaders' of "case studies" is limited to sectoral approach to decarbonisation focuses on technological solutions, sidelining global policies that involve societal transformations and lifestyle changes. This approach suits China because:

- It is easier to apply from the top down, whereas societal transformations must come from the bottom up and involve the implementation of democratic processes of citizen participation!
- It encourages the use of technological equipment that China can export.
- It avoids questioning globalisation, and the over-consumption of manufactured goods often produced by China.
- It avoids questions regarding the overall neutrality of the territory and the methods used to account for a reduction trajectory.

As an alternative to the Chinese controlled International Smart Sustainable City Club (ISSCC) the collection of use case should rely on a European centred dissemination network (ex. Construction 21).

Recommendation 6: Initiate a project on carbon neutrality of cities and communities in conjunction with international institutions and scientific experts (to prepare for AUWP2026):

- ensure coordination through CEN/TC 465's ad hoc group "Climate-Neutral and Smart Cities",
- collaborate with the EU Cities Mission and related EU R&I projects with view to scale European innovative solutions (methods, processes, technical solutions) and close the knowledge value chain from R&I to standards to market. Mobilize the 100 Climate Neutral Cities initiative and other relevant European organizations,
- firmly base international standards development on European experiences and use cases, by facilitating the participation of European cities in international exchanges on use cases to counterbalance the actions of the International Smart Sustainable City Club (ISSCC) and promote European cities' experiences in achieving climate neutrality.

6.3 Adaptation to climate change and resilience of cities and communities:[16]

Establishing European leadership on adaptation issues in alignment with the EU Adaptation Strategy 2030 and the EU Mission on Adaptation to Climate-change and the support of CEN-CENELEC Adaptation to Climate Change Coordination Group (ACC-CG)

CEN/TC 465 has listed city resilience as a standardisation priority

CEN/TC 465 WG 3: standard development on 'Territorial Resilience' based on CWA 17300, 17301, 17302 (City resilience)

CEN/TC 465 WG 1 'Nature-based solutions (NBS) Vocabulary: Development of related standard in response to NBS being a key solution area for climate-neutrality and resilience.

[16] A complete landscape can be found in Annex 3 §3.4

Cities are particularly vulnerable to the effects of climate change, as they concentrate large populations and critical infrastructure in a small area. They are therefore on the front line to deal with the impacts of climate change, such as the increase in the frequency and intensity of extreme weather events and temperature peaks, the increase in respiratory and cardiovascular diseases, freshwater shortages, degradation of ecosystems and the services derived from them, etc.
In the face of these challenges, cities must adapt to reduce their vulnerability and improve the resilience of their populations and infrastructure.
Adaptation to climate change has been the subject of abundant standardisation: Integrated in the management system of organisations with published standards ISO 14090:2019 and ISO 14091:2021, ISO/TS 14092:2020 and ISO 14093:2022 on finance.
A standard concerns cities and communities: ISO/TS 14092:2020 Adaptation to climate change — Requirements and guidance on adaptation planning for local governments and communities. European standardisation should assess ISO/TS 14092/2020's relevance to European requirements and develop its own vision adapted to our territories.
The draft of a new standard will have also to be conceived in the dual context of:

- the ISO 37101 management system in the revision of which he will be able to contribute.
- the digital twin and data to which it brings a particular field of application.

The standardisation of climate change adaptation of cities and communities may cover the management, planning and governance processes at the community/city level; sectoral policies, with diagnostic and monitoring indicators; management and evaluation of projects and solutions; and the anticipation and forecasting of situations to prepare for.

Recommendation 7: Initiate a project on adaptation to climate change and resilience of cities and communities (to prepare for AUWP2026):

- integrate organizational and sectoral norms on adaptation into the international ISO standardisation, focusing on the management of cities (ISO 37101), and adapt to the European context, particularly in relation to policies and programs on adaptation; leverage advancements in digital technology, such as local digital twin.
- collaboration with the EU Mission on Adaptation to Climate Change and related projects (e.g. Regilience, Pathways to Resilience and others) with view to scale European innovative solutions (methods, processes, technical solutions) and close the knowledge value chain from R&I to standards to market.

6.4 Interoperability of data for a local digital twin17.

CEN/TC 465 has listed 'Urban Platform Architecture' and 'Local Digital Twins' as a standardisation priority. A roadmap document was developed, but not published, as part of the CEN/CENELEC/ETSI SF-SSCC.

The digital twin of cities is a real-time virtual representation of a city, or a specific part of a city, using data and advanced technologies for digitally modelling infrastructure, buildings, networks, public spaces, and other urban and environmental aspects.

It provides data for:

[17] A complete landscape can be found in Annex 3 §3.5

- planning and design by simulating potential scenarios, including extreme ones, to improve resilience,
- resource management (energy, water, waste, ecosystem services, etc.),
- infrastructure maintenance and management,
- citizen participation improvement...
- improved operational efficiency and reduced maintenance and resource management costs.

The digital twin represents a significant economic challenge with wide-ranging implications for competitiveness, investor attractiveness, cost efficiency, risk management, and innovation stimulation.

The digital twin can also represent environment domain: living systems, natural flows and cycles (air, soil, water) and they resource for city consumption and use water, energy, matter, green infrastructure … providing access to information and indicators that facilitate the assessment of sustainability of the territory as a whole.

It should ensure that datasets from different sources, from space sources (such as those provided by DestinEarth programme), data managed at European (EEA) and national level, and local data accessible through innovative sensors and/or algorithms can be integrated into a data lake accessible to various users acting in specific contexts.

Data from space-based sources can be leveraged effectively.

Standards could address data interoperability and data access, data governance and personal data management, descriptive framework for Cities and Communities, integration into management and governance, indicators.

Many European organisations and projects can contribute to this work, including Citiverse EDIC and Destination Earth (DestinE) (see Annex 3).

Recommendation 8: Initiate a project on the digital twin of cities and territories relying on European research and development programs and multi-country projects (AUWP2025) with a view to:

- utilize digital twins for smart city service implementation, to inform indicators, and to assess sustainability,
- ensure the integration of digital twins into the management and governance systems of cities and territories.

Verify that the data architecture, metadata and IA implemented within the twins are under common licenses and can be shared by each city or local community involved in a sustainable and smart development process.

6.5 Harbour cities

China has pushed for standardisation in the harbour city sector within ISO/TC 268. Following discussions within WG1 and the creation of an Ad Hoc Working Group, a proposal for a new working group (WG6) dedicated to harbour cities has been submitted. This move reflects China's growing interest in shaping global standards in this domain in the context of Belt and Road Initiative.

The Chinese have an interest in demonstrating the openness of the process and the participation of other countries to their work. This explains why SAC paid for the mission of an expert from the French delegation to fly to Beijing to present Marseille's experience, due to the lack of French or European funding.

China's vision differs from Europe's, and key points for a European position include:

- Standardising harbour cities can improve port efficiency and urban sustainability, creating synergies between harbour and other urban activities.
- Moreover, the European Union should view this standardisation as a chance to align sustainable development policies with the global trade facilitated by ports. Incorporating knowledge and control over the nature, origin, and quality of goods traded in ports into the standard has significant implications for the environment, public health, and the local and broader economy.
- As critical nodes in global supply chains, ports play a pivotal role in the sustainability performance of value chains. This makes them essential components in the control and accountability mechanisms outlined in the ESRS directive.
- New standards can lead to regulations protecting the European economy and values, positively impacting environmental protection, human dignity, and working conditions in exporting countries.

A mobilisation of European stakeholders is necessary.

6.6 Citizenship and citizen services

Several projects directly concern citizens and therefore European values.

At European level, CEN TC465 has established a Working Group (WG2) convened by ANEC to work towards a standard for citizens services. The digital age offers considerable opportunity not only for citizens to have an improved living environment in which they can benefit from effective and sustainable services, but also for them to influence matters affecting their daily lives.

The digitalization of local services for citizens has been focused on the benefits of technological advance, particularly in terms of cost and overall convenience for those providing the service. However, until now, the basic service-level requirements for citizens have not been codified.

The WG's first step is finalizing a CEN Technical Report that sets out the basic elements of citizen-oriented service design before the end of 2024. It will aim to provide guidance for cities to create a strategy that explains how to move from a technology-based approach to one focused on citizen participation. The Technical Report is intended to provide the basis for the creation of a formal standard., based on recommendations of an earlier report, (ETSI TR 103 455 V1.1.1 (2020-09) Human Factors (HF); Smart cities and communities; Standardisation for citizens and consumers). and on recent developments in communities and territories, where a growing number of initiatives for sustainable and smart development are being taken by local civil society entities or bottom-up approaches for sustainable goals).

Several other international projects take different approaches to citizen aspects.

ISO TC 268 has an Adopted Work Item to prepare a Technical Report entitled Sustainable cities and communities — Survey and best practices of integrated citizen-centric services. This work, proposed by China, should be complementary to the more detailed CEN work in TC465 WG2, which has the European perspective. WG2 is in liaison with the ISO WG.

Japan has initiated a work on Human-*centred transition trajectories*. The proposal builds on a 2022 workshop agreement*: IWA 39 - Gap analysis for standardisation on sustainable and human-centred societies enabled with cyber physical systems*.

<u>Recommendation 9:</u> Prioritize the theme of citizens in standardisation as a differentiating factor for Europe - strengthen the participation of European institutions and ad hoc stakeholders in CEN TC 465 WG2 and facilitate the development of draft European standards, - actively participate in the ISO work on citizen-related subjects undertaken by China and Japan, - begin to standardise Citizen Services (to prepare for AUWP 2025 and possible 2026)

Part 7: Recommendations to Member States.

In addition to Europe's commitments, the European strategy gives a special role to Member States and National Standardisation Bodies. "*The Commission encourages EU Member States to support the participation of civil society, SME experts, trade unions and consumer representatives in international standardisation activities*."[18]

Pursuant to Article 7 of Regulation 1025/2012, member countries should take the necessary measures to encourage the participation of public authorities in national standardisation activities aimed at the development/revision of standards, especially in this highly sensitive topic that concerns them.

Recommendation 10: Foster Member State engagement in standardisation for smart and sustainable cities and communities according to European measures • Establish a stakeholder forum process at the member state level. • Support and fund the engagement of national city organizations, civil society associations, and research organizations to participate in both national and European standardisation efforts. • Recommend the use of EU standards as a basis for implementing policies and legislation. • Enhance contributions to the development of international standards.

[18] An EU Strategy on Standardisation. Setting global standards in support of a resilient, green, and digital EU single market COM(2022) 31 final. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions

Annex 1: Landscape of European organizations and programs for cities

The landscape of policies, initiatives, and stakeholders that must be considered for standardisation encompasses a diverse array of factors and actors.

This complex ecosystem should include policies and European regulations, and international agreements, initiatives and various projects and programs aimed at promoting approaches and innovations in cities and territories.

A wide range of stakeholders carry these elements, including government agencies, industry groups, non-governmental organizations, academic institutions, and consumer advocacy groups. Each actor brings a unique perspective and set of priorities, contributing to a more comprehensive and balanced approach to standardisation.

This landscape of policies, initiatives and actors should be considered as inputs for standardisation and stakeholder in the standard setting, development and use of standards.

Access to these actors could be facilitated through a **Stakeholder Forum for Smart and Sustainable Cities and Communities** (SFSSCC) or a dialogue process that allows engagement and coordination.

A1.1. Institutional initiatives and policies.

Some of these initiatives are aimed directly at cities:

- **Urban Agenda for the EU: a platform** for cooperation between EU institutions, Member States, cities, and stakeholders to address urban challenges, in thematic areas such as air quality, climate adaptation, housing, and circular economy.
- **European Climate Adaptation Strategy**: aiming to increase the resilience of cities and territories to climate-related risks and impacts through measures such as green infrastructure, flood management, and urban greening.

Some policies focus on EU-wide measures and targets business but can have strong implication on cities, their sustainability, and their contribution to European competitiveness:

- **European Green Deal**: a comprehensive policy initiative which outlines a roadmap for making the EU's economy sustainable by transforming it into a resource-efficient and circular economy, with the goal of achieving climate neutrality by 2050. The Green Deal encompasses various strategies and initiatives related to energy, transport, biodiversity, agriculture, and sustainable cities...
- **Fit for 55** have implications for cities and urban areas in several domains: transportation, buildings, renewable energy, circular economy.
- **A sustainable bioeconomy for Europe** encompasses the production, utilization, and valorisation of biological resources, including agricultural, forestry, marine, and waste resources, to produce food, energy, materials, and other bio-based products.
- **European Sustainability Reporting Standards (ESRS).** Although the scope does not concern cities, aligning standardisation for cities and territories with ESRS could facilitate: (1) The joint management of risks, opportunities and resilience between companies and the territories where they operate and/or exploit their resources; (2) Access to local

information that improves companies to address and report on their consideration of physical, transition and systemic risks.

A1.2. R&D initiatives

In line with the objectives of the European Green Deal, European innovation policy covers a very broad field. There are many innovations that can contribute to sustainable and smart cities and can feed into standardisation related to their field and economic sector.

Standardisation in the field of sustainable and smart cities can play a role at another level, that of organizing the management of innovations by cities and their integration into strategies, programmes, projects, plans and services.

Standards help to bridge the gap between research and market and increase the probabilities of market up-take of technological innovations. Standardisation has an important role in research and innovation (R&I) investment agendas as it helps paving the way for large-scale deployment of new and strategic technologies.

Standardisation can organize innovation processes, project management, collaboration between stakeholders, data collection and development of standardised evaluation metrics.

In doing so, they will facilitate their dissemination by making them more easily transferable and replicable, facilitating their interoperability.

- **Horizon Europe** is a research and innovation funding program of the European Union that runs from 2021 to 2027. It is the successor to the Horizon 2020 program. The program aims to tackle climate change, achieve the United Nations' Sustainable Development Goals, and boost the EU's competitiveness and growth.

Different type of European Partnerships (Co-Programmed, Institutionalized or Joint Programs) can be mobilized to participate to standardisation.

Horizon Europe's Pillar 2, Global Challenges and European Industrial Competitiveness, is structured into six clusters. These clusters encompass various thematic areas of research and innovation five of them may concern cities and territories.

- **Cluster 2: Culture, Creativity and Inclusive Society**: This cluster aims to foster cultural and social innovation, enhance social cohesion, and promote inclusive and participatory approaches to societal challenges.
- **Cluster 3: Civil Security for Society**: This cluster is dedicated to enhancing the resilience of European societies to natural and man-made disasters, including cybersecurity threats, terrorism, and other security challenges.
- **Cluster 4: Digital, Industry, and Space**: This cluster focuses on advancing digital technologies, supporting European industrial competitiveness, and harnessing the potential of space for research, innovation, and societal benefits.
- **Cluster 5: Climate, Energy, and Mobility**: This cluster addresses the challenges related to climate change, sustainable energy, and smart mobility solutions, aiming to support the transition to a low-carbon and sustainable future.
- **Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture, and Environment**: This cluster focuses on promoting sustainable agriculture, fostering the bioeconomy, protecting natural resources, and addressing environmental challenges.

Horizon Europe's Pillar 3, Innovative Europe, aims to stimulate breakthrough innovation, support the growth of innovative enterprises, through three initiatives:

- **European Innovation Council (EIC):** support innovations with breakthrough and disruptive nature and scale up potential that are too risky for private investors.
- **European Innovation Ecosystems**, interconnected network of actors, resources, and institutions that support innovation and entrepreneurship across Europe.
- **European Institute of Innovation and Technology (EIT):** The European Institute of Innovation and Technology is an independent EU body that aims to promote innovation and entrepreneurship across Europe. It operates through a network of Knowledge and Innovation Communities (KICs), that bring together businesses, research centres, and universities, covering various thematic areas relevant for cities:
  Climate-KIC (Knowledge and Innovation Community on Climate Change Mitigation and Adaptation) (see infra); **EIT Digital** (Knowledge and Innovation Community on Information and Communication Technologies) including digital cities ; **EIT Food** (Knowledge and Innovation Community on Food); **EIT InnoEnergy** (Knowledge and Innovation Community on Sustainable Energy); **EIT RawMaterials** (Knowledge and Innovation Community on Raw Materials): including, recycling, and sustainable materials; EIT Urban Mobility (Knowledge and Innovation Community on Urban Mobility).

- **EU Missions** aiming at relating EU's research and innovation better to society and citizens' needs; with strong visibility and impact. Three of the five missions are relevant for cities: Adaptation to climate change, including societal transformation; Climate-neutral & smart cities; Soil health & food.
- **The European Regions Research and Innovation Network (ERRIN):** platform that gathers around 120 regional organizations from more than 20 European countries. Established in 2001, ERRIN supports members to enhance their regional and local research and innovation capacities and further develop their R&I ecosystems. The network maintains a long-standing relationship with the EU institutions and other organizations to strengthen the regional and local dimension in EU Research and Innovation policy and programs**.**
- **Interreg** supporting cooperation across borders through project funding, for sharing knowledge, expertise, and best practices.
- **NetZeroCities** helps Europe in its ambition to achieve climate neutrality. The project comes in support of the EU's Mission "100 Climate-Neutral and Smart Cities by 2030" and provides cities with world-class expertise and services tailored to their needs. NetZeroCities assists cities to overcome the current structural, institutional, and cultural barriers they face in order to achieve climate neutrality by 2030.
- **Climate KIC**: a Knowledge and Innovation Community, working to accelerate the transition to a zero-carbon, climate-resilient society. Supported by the European Institute of Innovation and Technology, Climate KIC identify and support innovation that helps society mitigate and adapt to climate change. Climate KIC bring together partners in the worlds of business, academia, and the public and non-profit sectors to create networks of expertise, through which innovative products, services and systems can be developed, brought to market and scaled-up for impact.
- **Smart Cities and Communities European Innovation Partnership (EIP)**: brings together cities, industry, and research to address urban challenges through innovation. It fosters collaboration on innovative projects in areas like energy, mobility, and digitalization. The lessons learned from these projects can inform the development of standards for smart and sustainable cities.

- **Scalable Cities** aims to create an innovative, sustainable and city-led community of smart and climate-neutral cities in Europe. Scalable Cities represent 124 unique cities involved in 20 Smart Cities and Communities (SCC) projects funded by the Horizon 2020 and HorizonEurope, that have implemented more than 550 demonstrations of technological and social innovations.
- **European Structural and Investment Funds (ESIF);** its programs, including the European Regional Development Fund (ERDF) and the Cohesion Fund, support regional development and investments in cities and urban areas. These funds often prioritize projects that align with EU policies, including those related to smart and sustainable cities. Standards may be developed or applied in projects funded by ESIF to ensure compliance with EU objectives.
- **Urban Innovative Actions (UIA);** it is an EU initiative that provides funding, founded on ERDF budget, for innovative projects in urban areas. These projects often pilot new solutions and approaches in fields such as energy efficiency, digitalization, and social inclusion. The results and experiences gained from UIA projects can contribute to the identification of standardisation needs in these areas.

Transformative initiatives

- The **Intelligent Cities Challenge (ICC)** is a European Commission initiative supporting European cities towards the green and digital transition of their local economies, through Local Green Deals.
- **Tech4Good Marketplace** is a gateway to exploring innovative, smart, sustainable and human-centred technological solutions from cities and communities participating in the Intelligent Cities Challenge and beyond.
- **Open & Agile Smart Cities & Communities (OASC)** is a global network of communities that assists local administrations of all sizes in their digital transformation, to create sustainable impact for communities via their digital tools and systems, focused on interoperability, to combine datasets from different sources.
- The **Smart Cities Marketplace** aims to engage cities and towns of all sizes to deliver more sustainable urban environments and offers all the information needed to explore solutions, shape sustainable urban projects, and successfully close a deal for financing them.

Some thematic innovation initiatives

Living-in.EU:

The European way of digitally transforming cities and communities. 158 signatories of a declaration on joining forces to boost sustainable digital transformation in EU cities and communities.

DS4SSCC:

Preparatory action for the creation of a data space for smart communities. Develop a multi-stakeholder data governance scheme by bringing together European cities and their local stakeholders.

CHI-USE:

Innovative solutions for user-centric CHarging infrastructure

Collectors:

An EU-funded Horizon 2020 project that aims to identify and highlight existing good practices in waste collection and sorting.

ULaaDs:

Urban logistics as an on-demand service

SHOW:

SHared Automation Operating Models for Global Adoption. 69 partners from 13 EU countries, covering the entire urban mobility chain

ROCK:

Cultural Heritage at the Forefront of the Urban Future (Horizon Program)

European scientific networks concerning cities.

Beyond innovations programs some academic networks are devoted to urban planning, and specific issues such as climate, disability, finance…

JPI Urban Europe brings together a large community of stakeholders from urban administration, business and societal actors to engage together with researchers with the aim to exchange research needs, discuss research results and promote good practice and reflect future R&I priorities and strategies.

- Academic Network of European Disability Experts (ANED)
- European Cooperation in Science and Technology (COST)
- European Network for Housing Research (ENHR)
- European Spatial Planning Observation Network (ESPON)
- European Urban Research Association (EURA)
- Global Research Alliance for Sustainable Finance and Investment (GRASFI)
- Network of European Technological Universities (ENTU)
- Sustainable Development Solutions Network (SDSN) Europe
- Urban Europe Research Alliance (UERA)…

A1.3. Finance

The financing of sustainable infrastructure and services in cities and territories is based on direct funding through European programmes and indirectly through the proposed rules for private finance. Financial institutions that support investments in European cities and territories covers all level national, European and international:

National level, ex.:

- France - **Caisse des Dépôts et Consignation (CDC)**
- Germany - **Kreditanstalt für Wiederaufbau (KfW)**
- Poland - **Bank Gospodarstwa Krajowego (BGK)**…

European level, ex.:

- **European Structural and Investment Funds** (ESIF); including the European Regional Development Fund (ERDF) and the Cohesion Fund.
- **Council of Europe Development Bank (CEB)**

European and international

- **European Investment Bank (EIB)**
- **Nordic Investment Bank (NIB)**

International Bilateral Cooperation, ex.:

- France - **Agence Française de Développement (AFD)**
- Germany - **Gesellschaft für Internationale Zusammenarbeit (GIZ)**
- Spain - **Spanish Agency for International Development Cooperation (AECID**)…

International multilateral:

- **European Investment Bank (EIB)**
- **Black Sea Trade and Development Bank (BSTDB)**
- **European Bank for Reconstruction and Development (EBRD)**

A1.4. Organizations of cities and territories

Exclusively European

European Committee of the Regions: the assembly of local and regional representatives of the European Union that allows subnational authorities to make their voices heard within the EU's institutional system. His good knowledge of institutional processes can be a contribution to European political relations and standardisation.

Eurocities: a network of 200 of Europe's major cities from 38 countries, which aims to create a better future for all by striving for a Europe where cities are genuine partners with the EU 2. It focus on various areas such as healthy and moving cities, digital and automated mobility, clean and active mobility, inclusive cities, poverty and social exclusion, housing and homelessness, childcare and education, migration and integration, solidarity and volunteering, innovative city governments, metropolitan areas governance, citizen engagement, gender equality, multi-level governance, localizing global challenges, Ukraine climate change and energy transition, smart cities & digital transformation, COVID-19 and recovery, prosperous cities, jobs and skills, finance and investments, circular economy, new business models and trends, local innovation ecosystems, vibrant cities, culture and creativity, open public and private spaces, green areas and biodiversity.

It also has a call to action for low-carbon and more inclusive culture. Eurocities is headquartered in Brussels.

Energy Cities: network of energy-centric cities

International with European participation (or chapter)

Council of European Municipalities and Regions (CEMR) is the European section of the world organisation United Cities and Local Governments (UCLG), through which we represent European local and regional governments on the international stage. CEMR encourages the implementation of SDGs at the local and regional levels across Europe.

CEMR's work focuses on five thematic areas, which affect all aspects of the lives of European citizens as well as the local and regional governments that represent them: Governance, democracy and citizenship, environment, climate and energy, international cooperation, economic, social and territorial cohesion, local and regional public services management. The **Local4Action** HUBs platform, powered by UCLG, is the space to connect with, learn from, and get inspired by ground-breaking projects led by members of our constituency to foster more sustainable ways of living.

Global Covenant of Mayors: European initiative that encourages local authorities to commit to ambitious climate and energy targets. It promotes local actions for energy efficiency, renewable energy, and climate resilience. **Innovate4cities** project is a city-focused research

and innovation agenda. The outcomes, innovations and best practices from Covenant of Mayors signatory cities can influence the development of standards related to urban sustainability.

Urban Transitions Mission, a Global Covenant of Mayor initiative, has been launched in the framework of Mission Innovation, which is a global initiative of 23 countries and the European Commission (on behalf of the European Union) catalysing a decade of action and investment in research, development, and demonstration to make clean energy affordable, attractive and accessible for all.

Launched alongside the Paris Agreement in 2015, Mission Innovation (MI) brings together governments, public authorities, corporates, investors and academia to enable widely affordable clean energy globally and achieve the goals of the Paris Agreement. The UTM has established 7 exchange clusters, topical (energy, nature-based solutions, water, transport & mobility) and cross-cutting (finance, city-scale data, governance)

ICLEI – Local Governments for Sustainability is a global network of more than 2500 local and regional governments committed to sustainable urban development. Active in 125+ countries, it aims to influence sustainability policy and carries out local actions for low emission, nature-based, equitable, resilient and circular development. Members and team of experts work together through peer exchange, partnerships and capacity building to create systemic change for urban sustainability.

C40. International Association of Francophone Mayors AIMF: www.aimf.asso.fr. 325 capitals and metropolises in 55 countries.

A.15. Trade and business associations[19]

Organizations whose focus is directly or indirectly on cities:

- **Alliance for IoT and Edge Computing Innovation (AIOTI)**
- **European association of the electricity transmission and distribution (T&D Europe)**
- **European Building Automation and Controls Association (EU.BAC)**
- **European Lift Association (ELA)**
- **European Telecommunications Network Operators' Association (ETNO)**
- **Association of the European Heating Industry (EHI)**
- **DIGITALEUROPE**
- **EPIA SolarPower Europe (EPIA)**
- **Home Appliance Europe (APPLiA)**
- The European Construction Industry Federation (FIEC)[20]

A1.5. Civil society NGOs

- **The European Consumer Voice in Standardisation (ANEC)**
- Bureau Européen des Unions de Consommateurs (BEUC)
- Environmental Coalition on Standards (ECOS)

[19] In bold are members of the HLF

[20] Non-member of the HLF

- European Trade Union Confederation (ETUC)

Annex 2: Landscape of standardisation process and standards.

A2.1. International Landscape of Sustainable and Smart Cities Standardisation

The topic of sustainable and smart cities is part of two international standard-setting organizations with partial overlap: ISO/TC 268 and ISO-IEC JTC 1 WG 11

A2.1.1. ISO/TC 268 Sustainable cities and communities: organisation

Chair and *Secretariat*: France AFNOR

Created in 2012, ISO/TC 268 aims to address the smart city in the context of sustainability in different dimensions: strategy and management of projects and infrastructure, and to address the territorial dimension of sectoral issues that are addressed by other TCs (biodiversity, climate, circular economy, energy, etc.). ISO/TC 268 has published 43 standards and 20 are under development.

Forming a coherent system, the standards focus on the management and governance of cities (around the pivotal standard ISO 37101:2016 « *ISO 37101:2016 "Sustainable development in communities — Management system for sustainable development — Requirements with guidance for use"*), and related standards, covering vocabulary (ISO 37100), indicators (ISO 37120, ISO 37122, ISO 37123) and implementations in specific contexts: business districts (ISO 37108), project developers (ISO 37109), and open data management (ISO 37110).

Two sub-committees have been set up, one on smart infrastructure and the other on transport. The standards developed there are in the perspective of sustainable development and refer to ISO 37101.

Figure *1* shows the structure and responsibilities of the different working groups demonstrating strong Chinese and Japanese mobilization. France chairs ISO TC268 and leads WG1 on management systems.

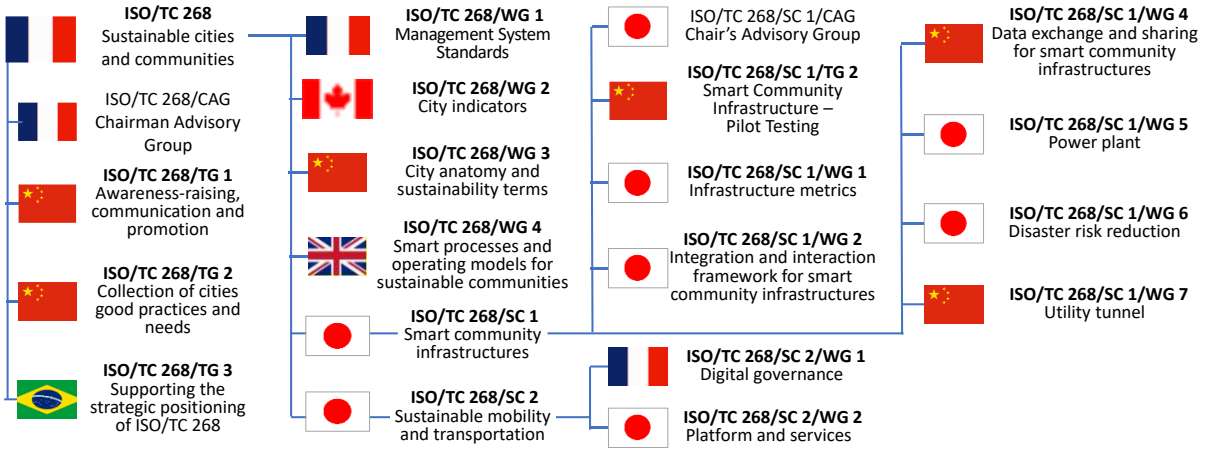

Figure 3: structure of ISO TC268 and country commitment.

CEREMA (French Public Establishment for Technical Support for French Public Policies) is the moderator of ISO TC 268 WG1 on sustainable development management.

Apart from France, the member countries of the European Union are absent from the steering of the working groups. Countries represented: Japan (8), China (6**), France** (4), United Kingdom (1), Canada (1), Brazil (1).

ISO TC 268 Published standards

- **ISO 37100:2016** Sustainable cities and communities — Vocabulary
- **ISO 37101:2016** Sustainable development in communities — Management system for sustainable development — Requirements with guidance for use
- **ISO 37104:2019** Sustainable cities and communities — Transforming our cities — Guidance for practical local implementation of ISO 37101
- **ISO 37105:2019** Sustainable cities and communities — Descriptive framework for cities and communities
- **ISO 37106:2021** Sustainable cities and communities — Guidance on establishing smart city operating models for sustainable communities
- **ISO/TS 37107:2019** Sustainable cities and communities — Maturity model for smart sustainable communities
- **ISO 37108:2022** Sustainable cities and communities — Business districts — Guidance for practical local implementation of ISO 37101
- **ISO 37109:2023** Sustainable cities and communities — Recommendations and requirements for project developers — Meeting ISO 37101 framework principles
- **ISO 37110:2022** Sustainable cities and communities — Management requirements and recommendations for open data for smart cities and communities — Overview and general principles
- **ISO 37111:2024** Sustainable cities and communities — Urban settlements — Guidance for a flexible approach to phased implementation of ISO 37101
- **ISO/TR 37112:2024** Sustainable cities and communities — Case studies in how smart city operating models support an effective public-health emergency response
- **ISO 37120:2018** Sustainable cities and communities — Indicators for city services and quality of life
- **ISO/TR 37121:2017** Sustainable development in communities — Inventory of existing guidelines and approaches on sustainable development and resilience in cities
- **ISO 37122:2019** Sustainable cities and communities — Indicators for smart cities
- **ISO 37123:2019** Sustainable cities and communities — Indicators for resilient cities
- **ISO 37124:2024** Sustainable cities and communities — Guidance on the use of ISO 37120, ISO 37122 and ISO 37123

ISO TC 268 standards under development

- **IEC/AWI 63205** Smart Cities Reference Architecture (SCRA)
- **ISO/WD 37100.2** Sustainable cities and communities — Vocabulary
- **ISO/DIS 37111** Urban districts, towns, counties and neighbourhoods − Guidelines for flexible approaches to phased implementation of ISO 37101 (**China**)
- **ISO/FDIS 37113** Sustainable cities and communities — Guidance for managing a public-health emergency response in smart city operating models (**China**)
- **ISO/DIS 37114** Sustainable cities and communities — Appraisal framework for datasets and data processing methods that create urban management information (WG4 project led by the **United Kingdom**)

- **ISO/AWI TR 37115** Sustainable cities and communities — Use Cases on Net Zero Carbon Cities Pathways (**China**)
- **ISO/WD 37116** Sustainable cities and communities — Disaster risk finance — Principles and general requirements for finance for ex-ante investment in risk reduction
- **ISO/PWI 37117** Sustainable services in Harbour cities **(China)**
- **ISO/AWI TR 37118** Sustainable cities and communities — Survey and best practices of integrated citizen-centric services
- **ISO/DIS 37124** Guidance on the use of ISO 37120 series of standards for cities — ISO 37120, ISO 37122 and ISO 37123
- **ISO/PRF 37125** Sustainable cities and communities – Environmental, social, and governance (ESG) indicators for cities (**Canada**).[21]
- **ISO/NP 24830** Disaster risk financing (voted by January 2024), (**Japan**)
- **ISO/PWI** Indicators for carbon neutrality (**Korea**)

ISO/TC 268/SC 1 Smart community infrastructures, published standards

- **ISO/TR 6030:2022** Smart community infrastructures – Disaster risk reduction – Survey results and gap analysis
- **ISO/TR 37150:2014** Smart community infrastructures — Review of existing activities relevant to metrics
- **ISO/TS 37151:2015** Smart community infrastructures — Principles and requirements for performance metrics
- **ISO/TR 37152:2016** Smart community infrastructures — Common framework for development and operation
- **ISO 37153:2017** Smart community infrastructures — Maturity model for assessment and improvement
- **ISO 37155-1:2020** Framework for integration and operation of smart community infrastructures — Part 1: Recommendations for considering opportunities and challenges from interactions in smart community infrastructures from relevant aspects through the life cycle
- **ISO 37155-2:2021** Framework for integration and operation of smart community infrastructures — Part 2: Holistic approach and the strategy for development, operation and maintenance of smart community infrastructures
- **ISO 37156:2020** Smart community infrastructures — Guidelines on data exchange and sharing for smart community infrastructures
- **ISO 37160:2020** Smart community infrastructure — Electric power infrastructure — Measurement methods for the quality of thermal power infrastructure and requirements for plant operations and management
- **ISO 37166:2022** Smart community infrastructures — Urban data integration framework for smart city planning (SCP)
- **ISO 37170:2022** Smart community infrastructures — Data framework for infrastructure governance based on digital technology in smart cities
- **ISO/TR 37171:2020 Report of pilot testing on the application of ISO smart community infrastructures standards**

[21] In red, the standards that have been identified as strategic both economically and politically (see § 2.3b).

- **ISO/TS 37172:2022** Smart community infrastructures — Data exchange and sharing for community infrastructures based on geographic information
- **ISO 37173:2023** Smart community infrastructure — Guidance for the development of smart building information systems
- **ISO 37174:2024** Smart community infrastructures — Disaster risk reduction — Guidance for implementing seismometer systems
- **ISO/TR 37178:2023** Smart community infrastructures — Data exchange and sharing for the lamppost network in smart community

ISO/TC 268/SC 1 standards in development

- **ISO/PRF 37151** Smart community infrastructures — Principles and requirements for performance metrics
- **ISO/PRF 37153** Smart community infrastructures — Maturity model for assessment and improvement
- **ISO/FDIS 37175** Smart community infrastructures — Operation and maintenance of utility tunnels
- **ISO/PRF 37176** Smart community infrastructure — Responsiveness assessment and maturity model
- **ISO/DIS 37179** Smart community infrastructures — Disaster risk reduction — Basic framework for the implementation of disaster risk reduction
- **ISO/AWI 37186** Smart community infrastructure — Guidance on data acquisition and utilization of resident communities to address health emergency
- **ISO/AWI 37187** Smart community infrastructures — Requirements for data framework and functions based on city information modelling platform
- **ISO/CD 37189** Smart community infrastructure — Guidance for data-driven visualization in newly developing areas
- **ISO/CD 37190** Guidance for practical implementation of ISO 37155 series for supervising at each life cycle phase of smart community infrastructures
- **ISO/AWI 37194** Smart community infrastructures — Disaster risk reduction — Guidance for the process of selecting seismometer systems suitable for specific purposes

ISO/TC 268/SC 2 Sustainable cities and communities - Sustainable mobility and transportation, published standards

- **ISO/TR 16497-1:2024** Sustainable mobility and transportation — Sustainable mobility services — Part 1: Use cases
- **ISO 37154:2017** Smart community infrastructures — Best practice guidelines for transportation
- **ISO 37157:2018** Smart community infrastructures — Smart transportation for compact cities
- **ISO 37158:2019** Smart community infrastructures — Smart transportation using battery-powered buses for passenger services
- **ISO 37159:2019** Smart community infrastructures — Smart transportation for rapid transit in and between large city zones and their surrounding areas
- **ISO 37161:2020** Smart community infrastructures — Guidance on smart transportation for energy saving in transportation services

- **ISO 37162:2023** Smart community infrastructures — Smart transportation for newly developing areas
- **ISO 37163:2020** Smart community infrastructures — Smart transportation for parking lot allocation in cities
- **ISO 37164:2021** Smart community infrastructures — Smart transportation using fuel cell light rail transit (FC-LRT)
- **ISO 37165:2020** Smart community infrastructures — Guidance on smart transportation with the use of digitally processed payment (d-payment)
- **ISO 37167:2021** Smart community infrastructures — Smart transportation for energy saving operation by intentionally driving slowly
- **ISO 37168:2022** Smart community infrastructures — Guidance on smart transportation by Electric, Connected and Autonomous Vehicles (eCAVs) and its application to on-demand responsive passenger services with shared vehicles
- **ISO 37169:2021** Smart community infrastructures — Smart transportation by run-through train/bus operation in/between cities
- **ISO 37180:2021** Smart community infrastructures — Guidance on smart transportation with QR code identification and authentication in transportation and its related or additional services
- **ISO 37181:2022** Smart community infrastructures — Smart transportation by autonomous vehicles on public roads
- **ISO 37182:2022** Smart community infrastructures — Smart transportation for fuel efficiency and pollution emission reduction in bus transportation services
- **ISO 37183:2023** Smart community infrastructures — Smart transportation by facial recognition payment (f-payment)
- **ISO 37184:2023** Sustainable mobility and transportation — Framework for transportation services by providing meshes for 5G communication

ISO/TC 268/SC 2, standards in development

- **ISO/WD 16481** Sustainable mobility and transportation — Digital governance — Strategic needs regarding the ISO 37101 purposes of sustainability
- **ISO/CD 16499-1** Sustainable mobility and transportation — Automated mobility using physical and digital infrastructure — Part 1: Service role architecture

A2.1.2. ISO-IEC JTC 1 WG 11 on Smart Cities soon being transformed in JTC4

Th ISO-IEC Joint Technical Committee (JTC 1) is a consensus based, voluntary international standards group focussing on information technology (IT) issues with a significant activity of 3416 standards published and 479 under development. Only a small number of them concern smart cities: 13 published and 4 under development.

The Joint Technical Committee JTC 1 **Working Group 11** on Smart Cities was established on ISO/IEC JTC 1 “Information technology” 30th Meeting on October 2015.

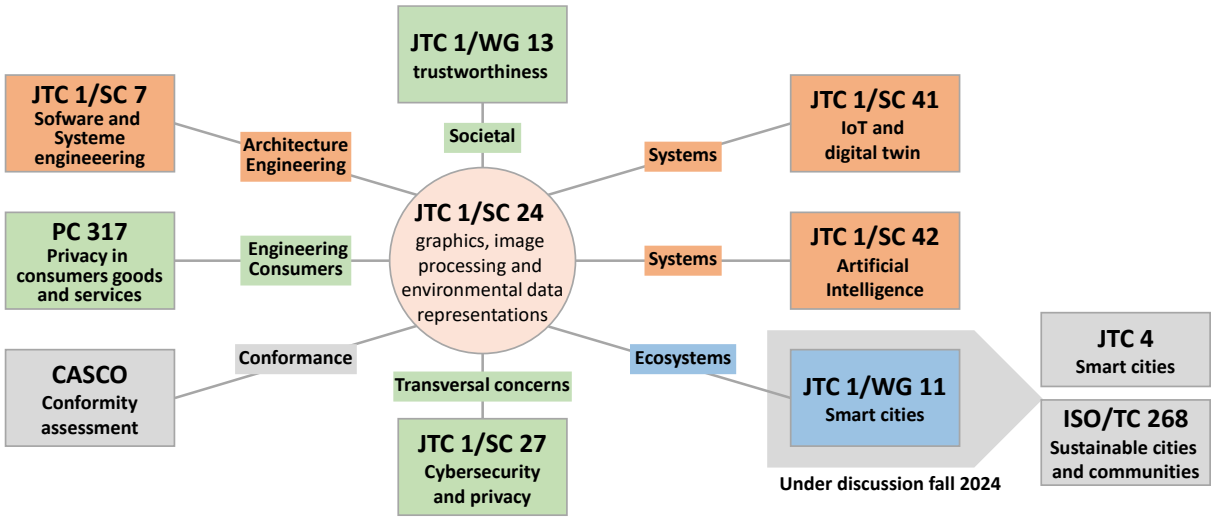

Figure 4 : Landscape of Standards having to be integrated to support the CitiVerse in Landscape of CitiVerse Standards completed[22]

"*CitiVerse could be said to be a combination of Local Digital Twins and Metaverse. It therefore follows that standardisation for CitiVerse includes standards related to both. The term "Local Digital Twin" is used here as a description of a Digital Twin of a physical geographic area that is a part / parts of a city, a whole city or a municipality, region, country, or even larger area. It should be noted that the term "Local" might, in some languages and countries, be interpreted as "small" or "narrow", which can be misleading. Nevertheless, our use of "Local Digital Twins" is as an equivalent of "Urban Digital Twins", "City Information Modelling", "City Digital Twins" and similar terms (...). Local Digital Twins (LTDs), in turn, use Digital Twin technologies in combination with technologies for digital 3D representation of physical areas, buildings, constructions, and objects. Standards for AI trustworthiness, semantic communication and interoperability are an integral part of CitiVerse.*"[1.]

ISO TMB (Technical Management Board) and IEC SMB (Standards Management Board) has adopted in June 2024 the ISO/IEC JTC 1 proposal for the establishment of a subcommittee (SC) on IT for smart cities.

The scope of this new committee and its relationship with ISO TC 268 are under discussion (summer 2024). The challenge is the integration of sustainability into activities that are mainly driven by technology.

[22] Report of TWG CitiVerse: Landscape of CitiVerse Standards. Antonio Kung, Joel Myers, Torbjörn Lahri. December 2023

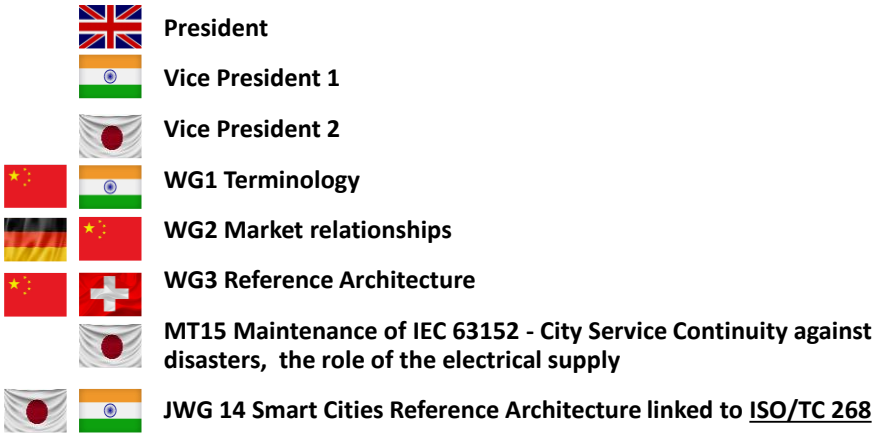

Figure 5: Structure of JTC1 WG11 on Smart Cities.

The Member States of the European Union are absent from the steering of the working groups. Countries represented: China (3), India (3), Japan (3), Germany (1), **United Kingdom (1**), Switzerland (1).

Joint Working Groups (JWG) may be established to undertake a specific task in which more than one committee is interested. A JWG can be established between ISO committees, between IEC committees or between ISO and IEC committees. The role of the committees is defined for each of the stages: proposal stage (NP), preparatory stage (WD), committee stage (CD) and for enquiry and approval ballots.

A Joint Working Group between has been established (July 2024) between JTC 1 and ISO/TC 268/SC 1 on Smart City Infrastructure Planning, with a JCT1 administrative responsibility.

While the standards developed under ISO/IEC JTC 1 are primarily a matter of European trade and technological sovereignty, the activities of ISO/TC 268 also address sustainability policy issues which concern European environmental and social commitments.

Published

- **ISO/IEC 21972:2020** - Information technology — Upper-level ontology for smart city indicators
- **ISO/IEC 24039:2022** - Information technology — Smart city digital platform reference architecture — Data and service
- **ISO/IEC 30145-1:2021** - Information technology — Smart City ICT reference framework — Part 1: Smart city business process framework
- **ISO/IEC 30145-2:2020** - Information technology — Smart City ICT reference framework — Part 2: Smart city knowledge management framework
- **ISO/IEC 30145-3:2020** - Information technology — Smart City ICT reference framework — Part 3: Smart city engineering framework
- **ISO/IEC 30146:2019** - Information technology — Smart city ICT indicators
- **ISO/IEC 5087-1:2023** - Information technology — City data model — Part 1: Foundation level concepts
- **ISO/IEC 5087-1:2023** - Information technology — City data model — Part 1: Foundation level concepts
- **ISO/IEC 5087-2:2024** Information technology — City data model — Part 2: City level concepts

- **ISO/IEC 5153-1:2024** Information Technology — City service platform for public health emergencies — Part 1: Overview and general requirements.
- **ISO/IEC DIS 5087-2** - Information technology — City data model — Part 2: City level concepts.
- **ISO/IEC DIS 5153-1** - Information Technology — City service platform for public health emergencies — Part 1: Overview and general requirements.

Soon to be published by JTC 1/SC 40

- **ISO/IEC 17917** Smart Cities - Guide to establishing a decision-making framework for sharing data and information services.

Ongoing work

- **IEC/AWI TS 63526** Gap Analysis on Standards Related to City Information Modelling and Urban Digital Twins
- ISO/IEC AWI 21252 Information technology — Guidance on smart city ICT infrastructure planning — Overview
- **ISO/IEC AWI 25005-1** Information technology — Data use in smart cities — Part 1: Framework
- **ISO/IEC AWI 5087-3** Information technology City data model Part 3: Service level concepts -Transportation planning
- **ISO/IEC AWI TR 20169** Information technology — Overview of information technology standards for smart cities
- **ISO/IEC AWI TR 25005-2** Information technology — Data use in smart cities — Part 2: Use case analysis and common considerations
- **ISO/IEC AWI TS 25005-3** Information technology — Data use in smart cities — Part 3: Measurement, evaluation and reporting
- **ISO/IEC PWI 10235-4** Information technology — City data model — Part 4: Service level concepts for public health emergencies
- **ISO/IEC PWI 10267-1,2,3** Information technology — Data use in smart cities —Part 1: Framework, Part 2: Use case analysis and derived requirements, Part 3: Measurement, evaluation and reporting
- **ISO/IEC PWI 10311-2** - Information technology — City service platform for public health emergencies —Part 2: Response resource management
- **ISO/IEC PWI 20822** - Information technology — Domain knowledge trustworthiness evaluation for smart cities
- **ISO/IEC PWI 5217** - Information technology — Guidance on smart city digital infrastructure planning — Part 1: Overview
- **ISO/IEC PWI TS 10267-3** - Information technology—Data use in smart cities — Part 3: Measurement, evaluation and reporting

The **IEC-ISO-ITU Joint Smart Cities Task Force (J-SCTF**) is a collaboration between the International Electrotechnical Commission (IEC), the International Organization for Standardisation (ISO) and the International Telecommunication Union (ITU) to coordinate the international standardisation of smart cities, in line with Sustainable Development Goal 11 (SDG11) *"Make cities inclusive, safe, resilient and sustainable "*. The J-SCTF aims to engage stakeholders in identifying standardisation demands and provide leadership in guiding the supportive collaboration of ITU, ISO and IEC and the broader standardisation ecosystem.

The J-SCTF conducts an in-depth dialogue by engaging relevant stakeholders in identifying standardisation solutions for smart cities. Its mandate and scope include creating synergies and promoting the minimization of overlap *between* the ongoing work of ITU-T, IEC and ISO related to smart cities.

One ITU initiative with a United Nations organization, the U4SSC KPIs project, has developed key performance indicators to achieve the SDGs. It is not connected with ISO and IEC.

These elements do not form a complete vision of the European presence about the city, which has multiple thematic implications. For example, within the IEC SyC Smart Energy, the European representation is very important: **France** (3), Germany (1) and Japan (1).

SyC Smart Cities

- IEC SRD 63302-1 ED1 Smart city use case collection and analysis - Intelligent operations centre for smart cities - Part 1: High Level Analysis
- IEC SRD 63302-2 ED1 Smart city use case collection and analysis - Intelligent operations centre for smart cities - Part 2: Use Case Analysis
- IEC SRD 63320-2 ED1 Smart city use case collection and analysis - Smart urban planning for smart cities - Part 2: Use case analysis

JWG 14 Smart Cities Reference Architecture with convenor Japan & members JP (6), US (5), CN (4), KR (4), MX (1), RU (1), DE (2), GB (1).

A2.2. European standardisation

The theme of sustainable and smart cities concerns two European standard-setting organizations.

A2.2.1. CEN TC 465 Sustainable Cities and Communities

Chair DIN Germany, Vice Chair: AFNOR France, UNI Italy, BSI UK

Secretariat: AFNOR France

CEN TC 465 Sustainable Cities and Communities was created in 2020 in response to international initiatives. A first business plan and work program have been adopted to meet European needs.

"Standardisation in the field of Sustainable Cities and Communities, covering the development of requirements, frameworks, guidance and supporting tools and techniques. (…). Standardisation will focus on the development of a holistic and integrated approach in response to the needs of European Cities and Communities in both rural and urban areas. It is proposed that the standardisation activities focus on:¿ the purposes of urban sustainable development as defined by ISO 37101 related to Sustainable Cities and Communities, namely resilience, attractiveness, well-being, social cohesion, preservation and improvement of environment, responsible resource use, aligned with the main pillars of sustainable development (economic, environmental and social),¿ all innovative approaches to solution and service delivery, designed for use by all Cities and Communities, Citizens and their interested parties as a means of achieving the sustainability of urban and rural development,

with the aim of continuously improving solutions and services. and rural development, with the aim of continuously improving solutions and services. »

The standards under development at CEN TC/465 Sustainable Cities and Communities are integrated into the ISO TC 268 system of standards (see Figure 3).

Three working groups have been set up:

CEN/TC465/WG1 on Nature-based Solutions (NBS) (Italy, Spain):

- NWIP Sustainable Cities and Communities –**Nature Based Solutions** (NBSs) –Vocabulary

CEN/TC465/WG2 "Citizen Services": BSI, ANEC Coordinator.

- prCEN/TR “A framework for standardisation of services to the citizen”

CEN/TC 465 WG3: Territorial Resilience Development–review of concepts, methods, tools. AFNOR

WG to come:

- PWI - Industrial Symbiosis to support Sustainable Cities – Core Elements and Implementation

Works on consideration:

- Carbon neutrality
- Local Digital Twins
- Localization of the SDGs

Other documents:

- CWA 17727 ICS 13.020 13.200: City Resilience Development - Guide to combine disaster risk management and climate change adaptation - Historic areas

A2.2.2. CEN-CENELEC-ETSI Sectoral Forum on Sustainable and Smart Cities and Communities

Chair: France, Secretariat: AFNOR France

" SSCC-CG advises on European interests and needs relating to standardisation on SSCC within the overall smart and sustainable cities approach, considering existing ISO/IEC/ITU deliverables and activities in view of consistency at the international level. The development of the smart and sustainable city framework is done in partnership with cities and communities (e.g., through their networks) particularly those that are implementing strategies to become smarter and more sustainable. The SSCC-CG receives and provide input to the European Commission, in particular through the EIP-SCC, to align the SSCC-CG activity and the EIP Operational Implementation Plan, for the development of a common landscape and strategic program for SSCC. One of the objectives of strengthening links with European Commission activities is to develop a holistic and integrated approach and not to limit the SSCC-CG range of actions to the three vertical areas of the EIP-SIP (Strategic Implementation Plan) but to widen the focus on other aspects such as well-being, citizens and city awareness, life cycle assessment."

This forum is currently inactive, and CEN TC 465 takes up its objectives by considering the work that takes place in the JTC 1 Working Group 11 on Smart Cities.

Part of its mandate and the issue of strengthening the links with the European Commission and the mobilization of stakeholders that took place in WS8 could be pursued through an ad hoc process *(see recommendation 1)*

A2.3. Current normative framework of Sustainable and Smart Cities and Territories

International standardisation is developed in ISO/TC 268 "Sustainable cities and communities" and ISO/IEC JTC 1/WG 11 "Smart cities", and at the European level in CEN/TC 465.

A2.3.1. Core standards organisation

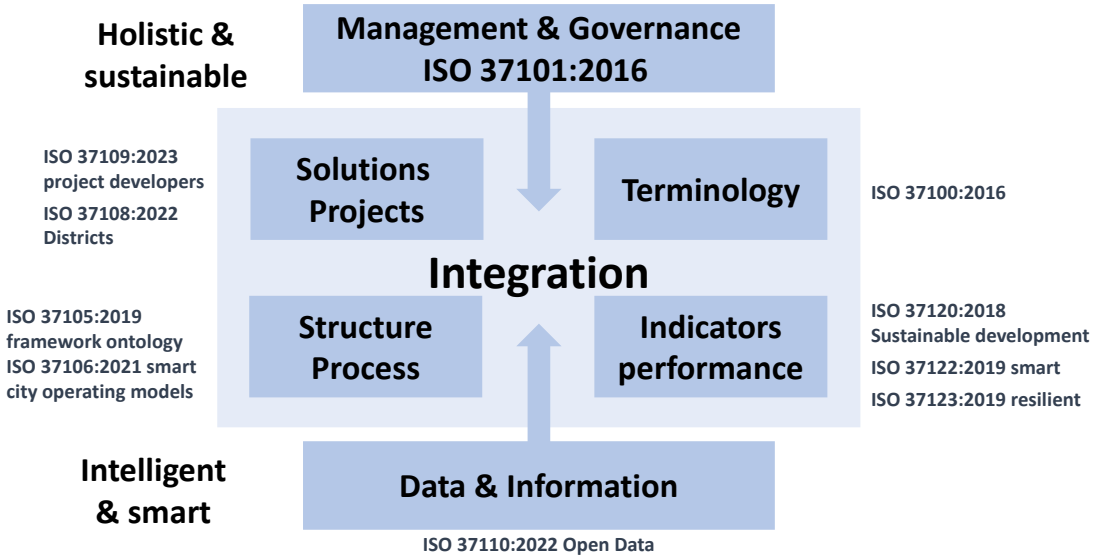

Figure 6 : Scope of standards by ISO/TC 268 Sustainable cities and communities

ISO/TC 268 has gradually developed a system of coherent standards grouped around a keystone standard: ISO 37101 (see Figure 6).

ISO 37101 is intended to help local and regional communities become more resilient, smart and sustainable, in the implementation of strategies, programmes, projects, plans and services, by adopting a continuous improvement approach. It aims to integrate sectoral issues through management and governance for the benefit of six *purpose of sustainable development*: attractiveness, preservation and improvement of the environment, resilience, responsible use of resources, social cohesion and well-being.

ISO 37101 has been supplemented by standards to explain or adapt to the context of small towns, neighbourhoods, or for application to projects.

Standards deal also with the structure of the city and its functions, which can form the basis of information and decision-making systems. This standard states "*Indicators should be used to collect relevant data and ensure that strategies, programs, projects, plans and services meet their objectives throughout the operational phases in their respective life cycle*." ISO 37101:2016 §8.2.

The indicators are used to provide a measure of the performance of sustainable cities and communities in support of policy management and dissemination.

A series of indicator standards have been developed on complementary issues facing cities: ISO 37120 indicators for city services and quality of life; ISO 37122 indicators for smart cities;

ISO 37123 indicators for resilient cities; ISO/DIS 37125 Environmental, social, and governance (ESG) indicators for cities. Work is underway on indicators for carbon neutrality.

All indicators are constrained by data availability and data processing methodologies, that raises the question of information and its management as developed in "*ISO/WD 37114: Sustainable cities and communities — Appraisal framework for datasets and data processing methods that create urban management information*".

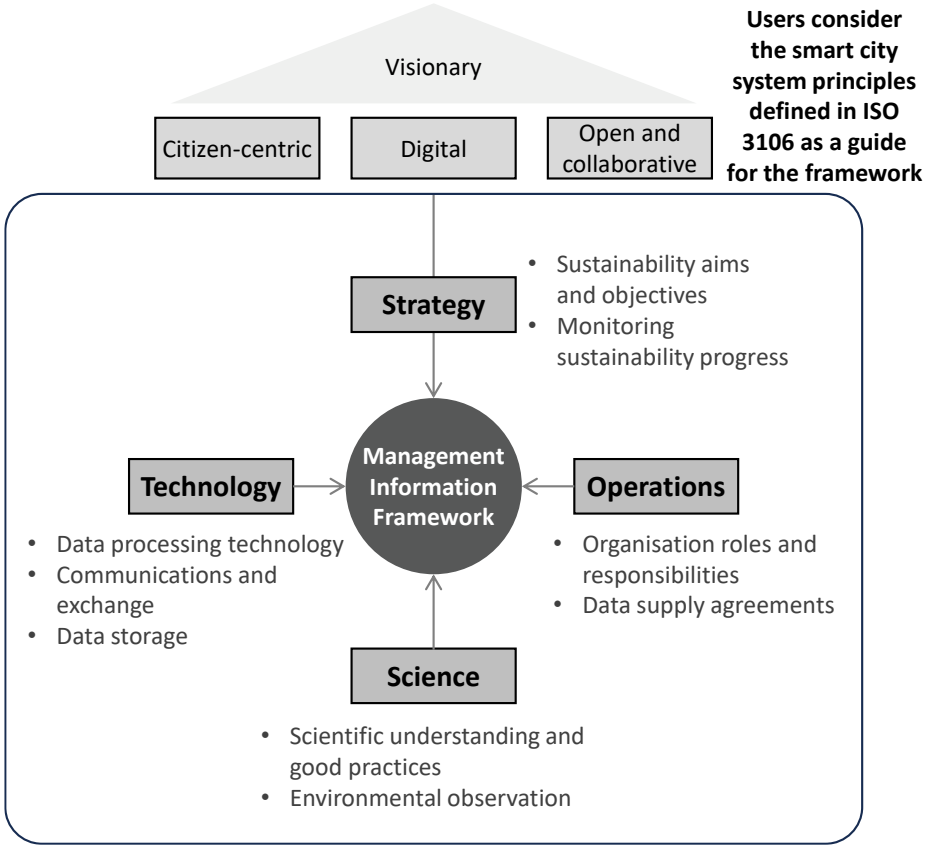

Figure 7 : Management of Information Conceptual Framework (ISO 37114 DIS 24-2-2024)

This standard is aligned with ISO 37101, which organizes the use of information in the management and governance of cities.

"*For efficiency, sustainable cities and communities should understand:*

— The rationale and purpose of the urban management information and its intended use.

— The algorithms and processing methods used for creating urban management information.

— The raw data obtained from multiple sources that are waiting to be further processed for creating urban management information." ISO 37114 DIS

The proposed urban management information framework aims to integrate different and complementary perspectives: strategic, operational, technical, and scientific (see Figure 7):

The developments in perspective concern local digital twins that integrates data from various sources to create a dynamic model that simulates and analyses real-world conditions and processes in the city, at the service of decision-making, management, and governance processes.

This capacity makes it possible to go beyond the use of indicators, to allow modelling, simulation, and forecasting.

A2.3.2. Planned developments

A model developed by the CityProtocol project, which has been the subject of the 37105 standard, proposes a systemic architecture of the city with different functional layers allowing to organize governance, management and the information system. Its interpretation in this context is proposed in Figure 8.

This organization makes it possible to identify two types of digital twins. The first is oriented towards the planning, management and maintenance of built infrastructure and services. The second "environmental" digital twin considers the functioning of ecosystems, and the various services derived from them. It is at this level that questions of planetary and local boundaries, carrying capacity, and breaking points can be considered.

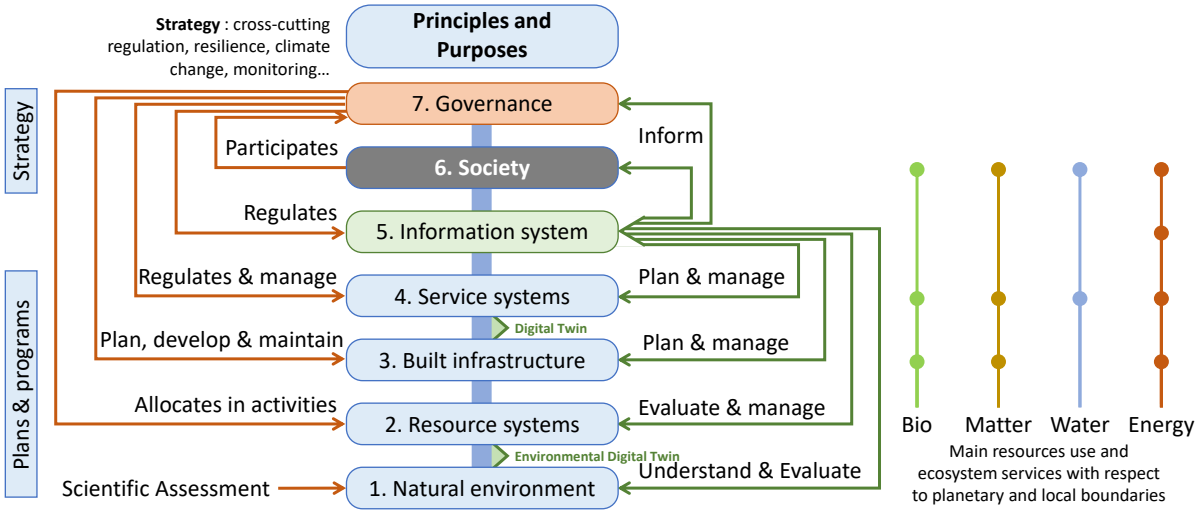

Figure 8 : Proposal of descriptive framework for cities and communities.

A2.4. Rating of current standards and their strategic, economic and political stakes

Standardisation for cities and communities is particularly concerned with political issues. If we consider the 52 standards currently being developed, revised or planed in the field of the city 11 of them have both a high economic and political importance (in red on figure and in the text):

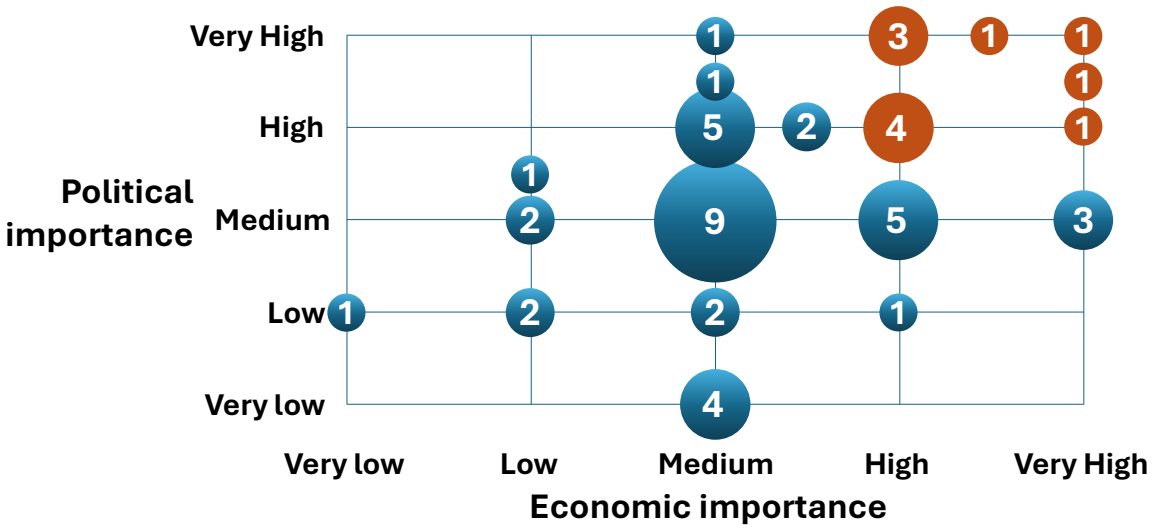

Figure 9 : Ranking of 52 standards in project.

Proposal for AUWP2025:

- **Integration and interoperability of environmental data for a local digital twin**

Proposals to be developed for a possible presentation for the AUWP2025

- **Adaptation to climate change**
- **Carbon neutrality**

And 8 others:

- CWA 17727 ICS 13.020 13.200: City Resilience Development - Guide to combine disaster risk management and climate change adaptation - Historic areas
- IEC SRD 63302-1 ED1 Smart city use case collection and analysis - Intelligent operations centre for smart cities - Part 1: High Level Analysis
- IEC SRD 63302-2 ED1 Smart city use case collection and analysis - Intelligent operations centre for smart cities - Part 2: Use Case Analysis
- IEC SRD 63320-2 ED1 Smart city use case collection and analysis - Smart urban planning for smart cities - Part 2: Use case analysis
- IEC TS 63526 ED1 Gap Analysis on Standards Related to City Information Modelling and Urban Digital Twins
- ISO/AWI 37187: Smart community infrastructures — Requirements for data framework and functions based on city information modelling platform
- ISO/CD 37125: Environmental, Social and Governance (ESG) Indicators for Cities
- ISO/WD 37114: Sustainable cities and communities — Appraisal framework for datasets and data processing methods that create urban management information

Method: A questionnaire was circulated in WS8 to note the respective level of economic importance regarding the competitiveness of European companies and policy regarding European regulation and values. Respondents only had access to the title and must quote 0 Very low, 1 medium and 2 very high. The small number of responses (4 business, consumers institutions and expert) does not make it possible to differentiate between stakeholders but does provide a relevant overview. This method deserves to be extended. It would make it possible to steer standardisation by identifying the stakeholders interested in each of the subjects.

Annex 3: Background document for AUWP 2025 and 2026.

A3.1 Objectives of the proposal

The Annual Union Work Programme on European Standardisation (AUWP) sets out European priorities on all activities related to standards.

WS8 proposed several topics of different maturity levels.

The subject of the local digital twin has been taken up in the 2025 programme (AUWP2025).

The topics of adaptation to climate change and neutrality were considered strategic both because of their importance and the commitment of other countries to international standardisation on these subjects. However, due to the multiplicity of European initiatives on these subjects, and the complexity of the various standards involved, it was premature to include it in the European standardisation programme 2025.

On the other hand, the implementation during 2024-2025 of a close reflection between the Commission (in particular DG CLIMA), city organisations, CEN TC 465 and stakeholders on these subjects, adaptation and mitigation, should both ensure Europe's presence in international standardisation and to prepare a possible mandate in the AUWP 2026.

Finally, these approaches must be integrated into the framework of the sustainability management and governance system of the ISO 37101 standard. The digital twin, by being at the heart of this system, can play a key role in providing accurate knowledge and relevant indicators for informed decision-making. These elements may contribute to the planned revision of ISO 37101.

The standardisation proposals are part of a wider context that aims to support the development of EU legislation/a policy initiative): “a sustainable bioeconomy for Europe / strengthening the connection between economy, society and the environment” COM/2018/673; “Fit for 55” and the 2021/1119 Regulation establishing the framework for achieving climate neutrality.

Objectives expected impact and beneficiaries.

A great deal of standardisation work is already underway on cities, both at ISO-IEC and CEN CNELEC. But there is no European strategic framework, integrated vision and guidance; to guide them and to give the impetus they need to encourage stakeholders to contribute. There is also a lack of liaison between CEN and CENELEC and the existing coordination group is inactive, for lack of active participants. The 100 carbon neutral cities initiative should absolutely contribute to the standardisation works at European as at international level to bring its experience to the standards and avoid an only Asian-centred perspective.

This system of standards should provide support and clarification to decision-makers, territorial administrators, technical staff, infrastructure managers, involved in disaster risk management, climate change adaptation, and resilience. It also caters to other stakeholders such as socio-economic stakeholders, NGO's, consultants, and academic stakeholders who may find it useful.

Objective: Develop a set of standards for sustainable and smart cities and territories that facilitate the implementation at local level of European policies in the field of climate change, mitigation and adaptation, and access to information and interoperability of environmental data for the local digital twin. The action will be set up within **CEN/TC 465** - Sustainable cities and communities involving the other relevant TCs and WSs such as CEN-CLC/JTC 21 Artificial Intelligence, CEN/WS ARCH city resilience development - framework and guidance for

implementation in historic areas, CEN/WS SCS description and assessment of good practices for smart city solutions CEN/CLC/WS DSO digital sovereignty, CEN/SS S26 environmental management…

It could involve the organisations involved in the HLF WS 8, the Commission services, and relevant European stakeholders and actors.

This proposal is based on the recommendations of HLF's WS8 and aims to address the twin challenge of green and digital transition at local level.

A3.2 Presence on different strategic work

The standardisation proposal on adaptation, mitigation and the digital twin is part of an ISO 37101 management and governance system that will soon be revised. The three proposals are part of this future context.

A3.2.1. ISO/TC 268 Sustainable cities and communities in all

Despite involvement of France (chair and secretariat of ISO TC 268) there is a low influence of Europe due to:

- Low capacity of NMCs to run WGs and standardisation processes on those topics.
- High number of standard proposals from other regions (Asia, in particular), no European initiatives on standards
- Limited options for European exchange to coordinate positions and involvement.

Reasons of weak participation of EU players

- Topical focus relatively recent, limited information available to relevant stakeholder groups
- Limited means of relevant stakeholder groups for participation in standard processes (time, travel)
- Limited political support at EC/MS level
- Cities and cities organizations – as key stakeholder group - are not used to standardisation processes and standardisation formats too demanding/not fitting.
- CEN/TC 465 is relatively recent, but an option to organise European exchange.

Proposal

- More EU Members in various ISO/TC 268 WGs and ISO/IEC JTC 1/WG 11 (consider financial compensation for non-business experts)
- Taking the lead on following items -adaptation, attenuation, and digital twin - proposed for 2025 AUWP.
- Offer exchange on European perspectives and experiences.
-

A3.2.2. Climate Change GHG emissions attenuation (ISO/TC268/ in connection with ISO TC 207 SC7)

Weakness

- Too low EU participation in present WG,
- EU Carbon neutral initiatives for cities are not connected with standardisation.

Proposal

- CEN/TC 465 has listed climate-neutral cities as a priority for future standardisation and prepared collaboration with EU Mission on Climate-neutral and smart cities and exchange with EC Services
- CEN/TC 465 has created an ad hoc group “Climate-Neutral and Smart Cities” to drive standardisation on this subject.
- NetZeroCities project in collaboration with CEN/TC 465 and HS Booster develops roadmap to standardisation.
- Mobilization of EU cities for use cases
- Taking European leadership in ISO/TC 268.

A3.2.3. Climate Change Adaptation ISO/TC268/ in connection with ISO TC 207 SC7 and ISO/TC 292 on Security and resilience

Weakness

- EU policies and programs on adaptation are not connected with standardisation.

Proposal

- CEN/TC 465 has listed city resilience as a standardisation priority.
- Taking European leadership on adaptation issue related to the EU Adaptation Strategy 2030 and the EU Mission on Adaptation to Climate-change.
- Standardisation and capacity building of least Developed Countries for effectiveness of global adaptation funds, and European bi and multilateral aid.
- CEN/TC 465 WG 3: standard development on ‘Territorial Resilience’ based on CWA 17300, 17301, 17302 (City resilience)
- CEN/TC 465 WG 1 ‘Nature-based solutions Vocabulary: Development of related standard in response to NBS being a key solution area for climate-neutrality and resilience.

Context: In the context of the ISO General Assembly to be held in France in 2025, the theme of adaptation to climate change could be highlighted. This could be an opportunity to promote Europe's position on this subject.

A3.2.4. Local Digital Twin ISO/TC268/ in connection with ISO/IEC JTC 1/WG 11 "Smart cities

- Medium influence

Proposal:

- Taking European leadership
- CEN/TC 465 has listed ‘Urban Platform Architecture’ and ‘Local Digital Twins’ as a standardisation priority. A roadmap document was developed as part of the CEN/CENELEC/ETSI SF-SSCC.

A3.2.5. ISO/TC 268/AHG “PWI Harbour Cities”

- Very low influence
- EU policies and programs and stakeholders in this domain are not connected with standardisation.

Proposal:

- Need to mobilize European Harbour Cities organisations and Bi and Multilateral funds.
- Funding expertise for participation

TC	Why is it key?	EU participation
1. ISO/TC 268 Sustainable cities and communities	*Standard development*: System of connected norms Revision of key stone standard ISO37101 governance sustainability. *Political issues:* Compatibility with European policies and values	French Secretariat and convenor of WG1 in charge of revision ISO 37101 EU MS: 11/42 Participating Members 5/30 Observing Members **Other WG:** SAC (China): 6 Japan (JISC): 2 France (AFNOR): 2 Brazil (ABNT): 1 UK (BSI): 1 EU NGOs ? 2/12: European Lift Association. RESIN - Climate resilient cities and infrastructures ICLEI Europe
2. ISO/TC268/ in connection with ISO TC 207 SC7 Climate Change **GHG emissions attenuation**	*Standard development*: Create work item on Carbon-neutral cities aligned with fit for 55. *Political issues:* EU influence on climate change agenda, contribution to international commitments Response to China's networking with Russia, Iran, etc.	On going standardisation initiatives: ISO 37115 Use cases (China) Indicators (Korea) EUMS ISO 37115 3/10 France Italy Portugal
3. ISO/TC268/ in connection with ISO TC 207 SC7 **Climate Change Adaptation** and ISO/TC 292 on Security and resilience	*Standard development*: Create work item on adaptation of cities in coherence with ISO 14090 and ISO 14091 *Political issues:* strategic issue for EU cities and contribution to international agenda and cooperation with developing countries	No ISO Agenda Connection with CEN/TC 465 WG3 resilience.
4. ISO/TC268/ in connection with ISO/IEC JTC 1/WG 11 "Smart cities"	*Standard development*: Create work item on **environmental digital twin for cities**. *Political issues* Various initiative ISO/IEC with no reference to sustainability. Promotion of European R&D organisations and projects as Digital Twin & Citiverse EDIC and DestinE	No ISO Agenda ISO/IEC JTC 1/WG 11 chairman and secretariat: China 3, India 3, Japan 3, **Germany 1, United Kingdom 1, Switzerland 1.**
5. ISO/TC 268/AHG "PWI Harbour Cities"	*Standard development*: new project proposed by China. *Political issues* Element of Chinese strategy (Silk Roads), necessity of European response (Global Gateway)	Initiative of China Only 2 experts from Europe (Italy, France)

A3.2.6. Standardisation context

As the objective of the standardisation of cities and territories is the territorial integration of different subjects, links must be considered with different technical committees.

CEN TC 467 **Climate Change** European mirror of ISO TC 207 Environmental management and ISO/TC 207/SC 7 - **Greenhouse gas and climate change management and related activities**

CEN TC 473 **Circular Economy** European mirror of ISO TC 323

CEN/TC 383/WG 3 - **Biodiversity and Environmental Aspects** and ISO TC 331 **Biodiversity**.

ISO/TC 224 **Drinking water, wastewater and stormwater systems and services**

A3.2.7. International actors and their positions in standardisation

Very different visions of the city are proposed in connection with the institutional and political framework of the countries. A North American model relies on technology and the private sector, including large digital companies, to develop a smart city, where regulations are judicialized. A Chinese model where land ownership is held by the state and local authorities and where digital technology is use for surveillance and population control.

The European model of the democratic, open, sustainable, and inclusive city is that of a private public approach, framed by citizen-centred institutions that guarantee fundamental freedoms.

These visions underpin countries' positions on normalization.

The international context of standardisation for cities is very competitive, between European partners, but especially with the United States (energy and digital) and China.

China has a strong investment in standardisation, with a leadership on a significant number of working groups and standards initiatives. China develops an integrated approach across the entire standardisation cycle: experimentation, drafting, and evaluation. This approach is fostered in China, where standardisation is deeply embedded in political governance, enabling the coordination of innovation, pilot cities, and knowledge sharing networks.

China has initiated an organization: the International Smart Sustainable City Club (ISSCC). By entrusting its chairmanship to the Chair of ISO TC/268, it ensured its institutional legitimacy (see details in Annex 4).

A3.2.8. Proposals for the organization of standardisation work

The standardisation request will focus on integration and interoperability of data for a local environmental digital twin, addressing access to the data, data governance and personal data management.

Particular attention will be paid to the interface of the information system to climate change adaptation and mitigation, but also to other issues that are the subject of standardisation work: at the European level with nature-based solutions (CEN/TC 465/WG1) and resilience (CEN/TC 465/WG3), and at the international level the standard on the management system of cities, ISO 37101, for which preliminary work for its revision is underway (ISO TC 268 WG1).

Digital twin modelling could be based on the standard: ISO 37105:2019 Sustainable cities and communities - Descriptive framework for cities and communities.

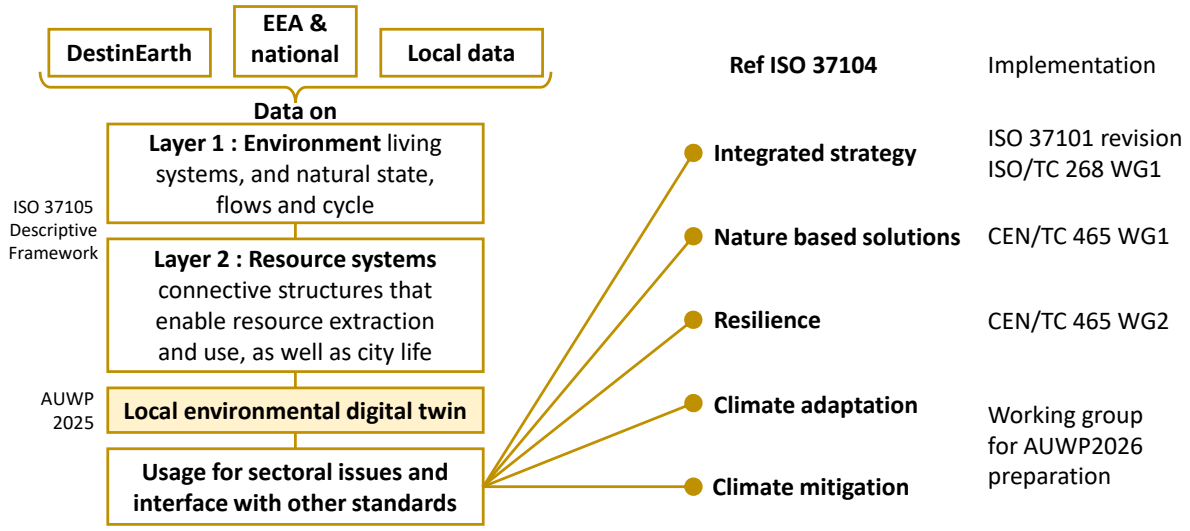

Figure 10 : The context of AUWP proposal.

Beyond the impact on European cities, the project aims to strengthen European representation in international normalization to promote European interests, commitments, and values.

Consideration could be given to mobilizing the Vienna Agreement to consolidate European influence.

In this context, CEN can adopt ISO standards as European standards (EN) through a parallel voting process. Conversely, ISO can adopt European standards. ISO and CEN can set up joint work programs to develop standards together, with regular coordination meetings.

A3.3. Mitigation

Mitigation has given rise to many voluntary international standards providing a methodology for quantifying, reporting GHG and management for organizations, projects, products, but yet no for cities at whole. As this agenda is open with Chinese and Corean initiatives, Europe should develop its own approach based on the European projects (as NetZeroCities), experience of cities and companies providing services to cities.

A3.3.1. Challenges for cities

The carbon neutrality of cities offers the opportunity of implementing European commitments at the local level, particularly the reduction of emissions by 55% by 2030.

It is based on various issues that can be integrated into a standardisation scheme:

- Governance and coordination of multiple public entities, organizations, companies, academics, and stakeholders, to define and engage a shared trajectory,
- Long-term stakeholder engagement and mobilization,
- Identification of high-performance and relevant processes, technologies, and solutions,
- Identification and allocation financial and human resources to support carbon reduction initiatives,
- Monitoring, measurement and verification for continuous improvement and trajectory adjustment,
- Management of technological and political innovations and uncertainties to adapt these trajectories.
- Data management and development of indicators for monitoring, in connection with the digital twin.

This standardisation framework, consistent with technologies and solutions implemented in Europe, will be a factor in promoting European companies on the international market.

A3.3.2. Current normative framework

Standardisation in the field of climate change mitigation is the subject of a normative heritage built and enriched in coherence with existing documents.

These voluntary international standards provide methodologies for quantifying and reporting GHG emissions.

Areas covered:

- GHG quantification for organizations, for projects, for products, in transport chain operations
- Framework for the Verification and Validation of GHG Claims
- Carbon neutrality: achievement of the target and associated claim
- Sectoral transition plans for the decarbonization of industry.

But there are no standards that deal specifically with cities and territories.

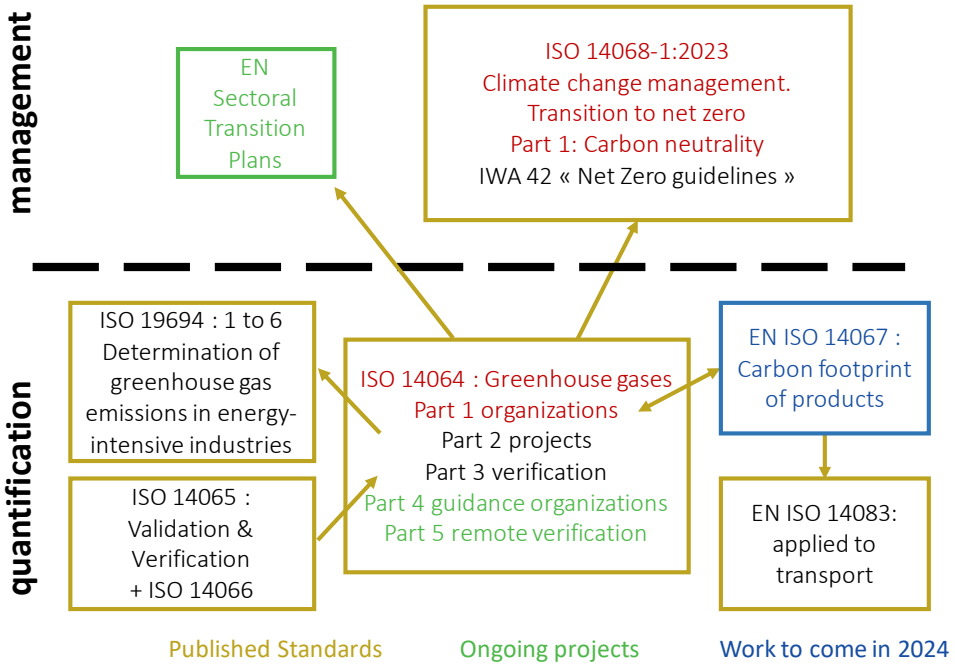

Figure 11 : Organization of main standards for quantification and management of mitigation.

<u>European Technical Committee</u>

Objective: To develop European standards and facilitate the exchange of information between National Standards Bodies (NSBs) on projects under development within the ISO/TC 207/SC7 Working Groups. This aims to enhance the effectiveness of their participation at the ISO level.

The business plan for CEN/TC 467 (dated 2023-02-01) identifies “Standardisation on Climate Change Mitigation for the Local Authority Level” as a focus area.

First work of <u>CEN/TC 467/WG 1 - Mitigation</u> :

- prEN 18074 - Industrial decarbonization - Requirements and guidelines for sectoral transition plans. Under Approval

European Member States:

DIN SPEC 91637 Impact measurement of interventions for municipal, regional and national climate protection. An approach developed by **ClimateView** to create a curated library of transition models and data, based on the climate mitigation methods identified by the IPCC Working Group III. It provides Models, Taxonomy, Ontology, and calculation guidelines for mitigation methods, filling the gap left by the IPCC and establishing unified transition metrics across national and subnational governments.

ISO/TC 207 Environmental Management,

SC7 Greenhouse gas and climate change management and related activities has 21 published standards or under development. The main ones are:

- **ISO 14064:** provides guidelines for quantifying and reporting greenhouse gas (GHG) emissions and removals. It comprises three parts:
  Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.
  Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.
  Part 3: Specification with guidance for the verification and validation of greenhouse gas statements. Provides guidance at the project level for activities related to land-use, land-use change, and forestry (LULUCF).
  Two other parts are under development:
  Part 4 (ISO/CD TS 14064-4): Quantification and reporting of greenhouse gas emissions for organizations — Guidance for the application of ISO 14064-1
  Part 5 (ISO/WD 14064-5): Guidelines for the use of remote methods in conducting verification and validation greenhouse gas statements.
- **ISO 14065**: General principles and requirements for bodies validating and verifying environmental information.
- **ISO 14066**: Environmental information — Competence requirements for teams validating and verifying environmental information.
- **ISO 14067**: Carbon footprint of products — Requirements and guidelines for quantification
- **ISO 14068-1** Transition to net zero — Part 1: Carbon neutrality
- **ISO 14083:** Quantification and reporting of greenhouse gas emissions arising from transport chain operations.
- **ISO 19694-1**: Stationary source emissions. Determination of greenhouse gas emissions in energy-intensive industries. Part 1: General aspects
- **ISO/AWI 14070** Greenhouse Gas (GHG) Emission Measurements in Urban Environments - Part 1: GHG Concentration Measurements in Urban Atmospheres with Surface-Based Observing Networks
- **ISO 14097:2021** Greenhouse gas management and related activities — Framework including principles and requirements for assessing and reporting investments and financing activities related to climate change

- IWA 42 The Net Zero Guidelines is an agreement published by ISO in 2022 at COP27, which is being transposed into standardisation that will complement ISO 14068-1.
  The Net Zero Guidelines set a common path for the definition of “net zero” and related terms, high-level principles for all actors who want to achieve climate neutrality, and transparent communication, credible claims, and consistent reporting on emissions, reductions, and removals.
  This International Workshop Agreement is available free of charge online.

Presently, no work has been undertaken within **ISO/TC 207/SC 7** on the management and measurement of greenhouse gas emissions and alleviation for cities and territories.

On the other hand, two initiatives have been taken within ISO/TC 268.

ISO/TC 268 Sustainable Cities and Communities

ISO/PWI TR 37115 Use Cases on Net Zero Carbon Cities Pathways, on the proposal of China.

ISO/PWI Indicators for carbon neutrality on the proposal of Korea.

As carbon neutrality according to IWA42 must consider scope 3, i.e. emissions from sources that are not owned or directly controlled by the organization, the application to communities, (governance organizations according to IWA42), must consider the carbon footprint, i.e. imported emissions.

In the logic of integration at the territorial level, the approach to carbon neutrality must be consistent with policies and programmes on biodiversity or resources.

It would be a question of addressing multi-criteria environmental approaches and in particular life cycle approaches.

Life cycle analysis and associated environmental management tools for products and organizations is the subject of a standardisation corpus. It includes the assessment of eco-efficiency and resource use efficiency throughout the life cycle and aims to consider a life cycle perspective when assessing impacts, from the extraction of raw materials to the final disposal of waste.

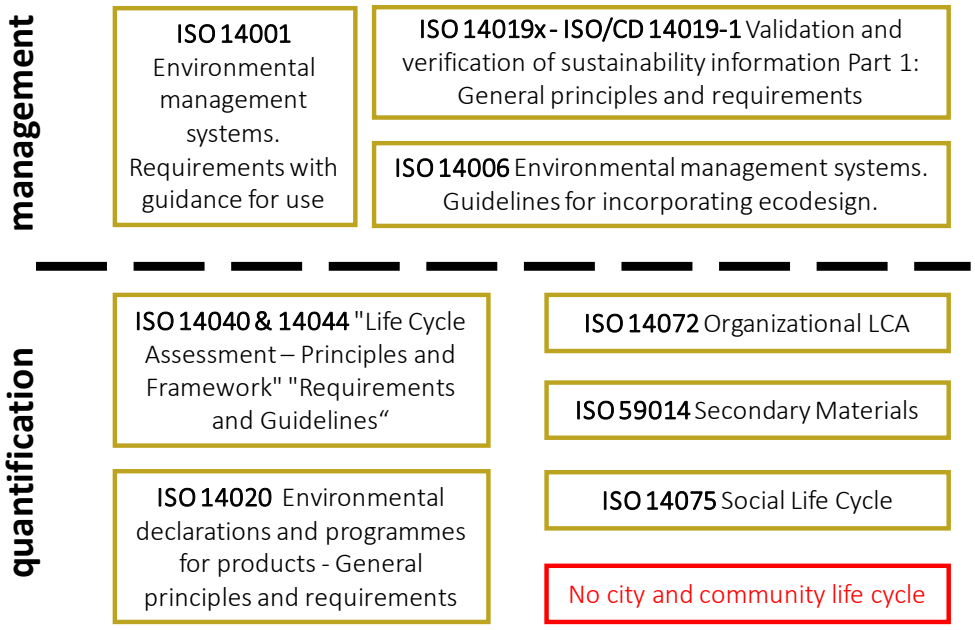

Figure 12 : Organization of main standards for quantification and management of life cycle.

- **ISO 14001:2015**: Environmental management systems. Requirements with guidance for use
- **ISO/CD 14019-1**: Validation and verification of sustainability information. Part 1: General principles and requirements
- **ISO/CD 14019-2**: Validation and verification of sustainability information. Part 2: Verification process
- **ISO/CD 14019-4** Validation and verification of sustainability information. Part 4: Requirements for bodies providing validation and verification.
- **ISO 14006:2020**: Environmental management systems. Guidelines for incorporating eco-design.
- **ISO 14040:2006**: Environmental management. Life cycle assessment. Principles and framework
- **ISO 14044:2006**: Environmental management. Life cycle assessment. Requirements and guidelines
- **ISO 14020:2022**: Environmental statements and programmes for products. Principles and general requirements
- **ISO/TS 14072:2014**: Environmental management. Life cycle assessment. Requirements and guidelines for organizational life cycle assessment
- **ISO/FDIS 59014**: Environmental management and circular economy. Sustainability and traceability of secondary materials recovery. Principles and requirements
- **ISO/FDIS 14075**: Environmental management — Principles and framework for social life cycle assessment.

A3.3.3 European institutional framework, directives and projects

Fit for 55: The Fit for 55 legislative packages, including the **Energy Efficiency Directive (EED)** which covers planning, building renovation, district heating and cooling systems, efficiency in public services and the **Renewable Energy Directive (RED III).**

Corporate Sustainability Reporting Directive (CSRD) and the **European Sustainability Reporting Standards (ESRS).**

In December 2023, the European Commission published the Delegated Act and annexes - adopted on 31 July 2023 - concerning the first set of European Sustainability Reporting Standards (ESRS), in the Official Journal. On Climate change (ESRS E1) the Commission (and before EFRAG) adopted a specific approach that could be considered. The disclosure requirement E1-4 – Targets related to climate change mitigation and adaptation.

It includes disclosure requirements regarding climate-related hazards that may result in physical climate risks to the business and adaptation solutions that can reduce those risks. These issues can be related to the territories in which they operate.

This directive concerns companies, but its link with the territories can be considered: in the field of risk assessment and accountability transparency of information.

The proliferation of information and indicators, instead of improving accountability, could create redundancy and reduce the effectiveness of information/disclosures. Since the Commission has stated that ESRS are compatible with the Global Reporting Initiative standards and that for GHG emissions, GRI 305 refers to the GHG Protocol, it might be convenient to refer directly to the ESRS standards.

This normalization could open the way to the accountability of local authorities. The Commission may wish to consider the work of the International Public Sector Accounting Standards Board® (IPSASB®) works to improve public sector financial reporting worldwide through the development of IPSAS®, international accrual-based accounting standards, for use by governments and other public sector entities around the world.

A3.3.4. Research and development projects.

Horizon Europe European Union Research and Innovation Funding Programme (2021-2027) in particular **Cluster 5: Climate, Energy, and Mobility, Climate-KIC**, **EIT InnoEnergy, EU Mission Climate-neutral & smart cities, ERRIN....** See details above (§1d).

The **NetZeroCities** project is a leading European initiative that can make significant contributions toward potential standardisation efforts. Its process of establishing Climate City Contracts, which shapes the relationship between European institutions and city policies, promotes the development of clear requirements for monitoring, evaluation, and learning (MEL)[23]. It proposes indicators to serve four main purposes: 1) to monitor the commitments

[23] NetZeroCities projects have produced various relevant documents for standardisation : **Comprehensive indicator framework; Identified climate impact indicators based on existing indicators review**; **Report on assessment methodologies for planning and monitoring GHG**

cities make, 2) to track their progress towards their climate neutrality goals, 3) to assess co-benefits of their journey towards climate neutrality and 4) to monitor the quality of the transition process to inform and enable mutual learning between the cities.

Following non-exhaustive a list of examples of **Horizon Europe Projects:**

- **MUSES Project**: This project aims to develop multi-source energy systems that integrate renewable energy sources, energy storage, and demand-side management to reduce greenhouse gas emissions and promote energy efficiency.
- **CO2PERATE Project**: Focused on developing innovative carbon capture and utilization technologies to reduce CO2 emissions from industrial processes.
- **CIRCULAR BIOCARBON Project**: Aims to develop circular bioeconomy solutions that contribute to reducing greenhouse gas emissions while promoting sustainable land use and resource efficiency.

European Research Council (ERC) Projects:

- **GREENCYCLES II Project**: Researching carbon cycling processes in ecosystems to better understand and mitigate greenhouse gas emissions.

European Green Deal Mission Projects:

- **GREENCOOK** Project: Developing sustainable and energy-efficient cooking solutions for households in developing countries to reduce reliance on traditional biomass fuels and associated greenhouse gas emissions.

EIT Climate-KIC Projects:

- **URBAN TRANSITIONS HUB Project**: Supporting urban areas in transitioning towards low-carbon, resilient, and sustainable development pathways, thus contributing to mitigating greenhouse gas emissions from cities.

INTERREG

- **D2Grids** is an Interreg North West Europe (NWE) project for 5th Generation District Heating and Cooling (5GDHC) an urban thermal energy grid for heating and cooling,

A3.3.6 Mapping of international actors and their positions

On climate change, China's 30-60 strategy aims for peak emissions in 2030 and neutrality in 2060. This, of course, is far behind the European commitments of -55% in 2030 and neutrality in 2050.

As an example, China places clean coal one of the highlights of green technology, which certainly reduces local pollution but contributes significantly to the greenhouse effect. It is important to remember that China has successfully integrated coal into the Sustainable Development Goals (SDGs) of the 2030 Agenda.

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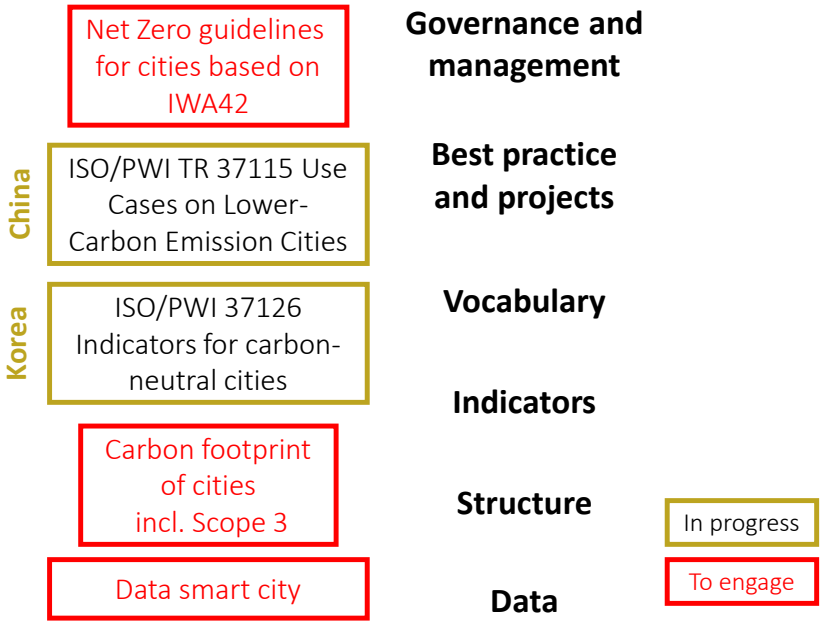
emission reductions through urban greening and nature-based solutions; Report on indicators & assessment methods for social innovation action plans; Indicators for capital / finance needs and replication potential; Evaluation-Report-for-CCC…

A3.3.7 Proposals for the organisation of standardisation work (who? what? how? with what means?)



Foreword
Introduction
1. Scope
2. Normative references
3. Terms and definitions
4. Case study framework
5. Good practice cases (around 20-30 cases globally):
5.1 Generic management approach, such as planning, targets, leadership and commitment, blueprint, policy, action plan, adaptation plan, implementation, monitoring and evaluation, adjustment and improvement, reporting and communication, education and capacity building, culture and community identify, etc.
5.2 Governance, empowerment and engagement, involved interested parties, government, etc.
5.3 Industry and sustainable production and consumption, such as waste management, sustainable production practices, etc.
5.4 Power and energy supply, such as energy efficiency, solar, wind or geothermal power, electricity, renewable energy use, waste reduction, etc.
5.5 Building and construction, such as phases, planning and design, and operation, infrastructures, etc.
5.6 Mobility and transportation, such as public transportation, electric vehicles, infrastructure development, mobility, etc.
5.7 Carbon sequestration, such as biodiversity and ecosystem services, trees, wetlands or agriculture, forestry and other land use etc.
5.8 Living and working environment, such as citizen lifestyle, sustainable consumption, etc.
5.9 Other
Bibliography

Tableau 2 : ***Draft Outline of ISO 37115 Use Cases on Net Zero Carbon Cities Pathways***

A3.4. Adaptation to climate change and resilience of cities and territories

Standardisation may cover management, planification and governance processes at the territorial/city level, and sectoral policies, with diagnostic and monitoring indicators, and the management and evaluation of projects and solutions.

The standardisation of climate change adaptation may cover management, planning and governance processes at the community/city level; sectoral policies, with diagnostic and monitoring indicators; management and evaluation of projects and solutions; and the anticipation and forecasting of situations to prepare for.

A3.4.1. Challenges for cities

Cities are particularly vulnerable to the effects of climate change, as they concentrate large populations and critical infrastructure in a small area. They are therefore on the front line to deal with the impacts of climate change, such as the increase in the frequency and intensity of extreme weather events, the increase in respiratory and cardiovascular diseases, freshwater shortages, degradation of ecosystems and the services derived from them, etc.

In the face of these challenges, cities must adapt to reduce their vulnerability and improve the resilience of their populations and infrastructure.

Adaptation to climate change must be an integrated approach, involving all policies. It must involve all the city's stakeholders in the adaptation process: companies, citizens, NGO and scientific institutions.

It requires coordinated efforts at different levels, European, national and local, for policy development, planning, governance and project implementation.

Climate change risks and adaptation measures need to be considered in *strategies, programmes, projects, plans and services.*

European standardisation should play a crucial role in harmonising approaches, ensuring compatibility between different contexts, and promoting solutions adapted to the characteristics of European territories and policies.

The European Union Strategy on Adaptation to Climate Change [COM (2013) 216 final] has identified standards as an effective instrument for improving the climate resilience of infrastructures across Europe. The sectors identified as priority sectors in the EU Strategy are: Transport infrastructure; Energy infrastructure; Buildings/construction.

A3.4.2. Current normative framework for adaptation of Sustainable and Smart Cities and Territories and related sectoral standards

International

Several international standards and frameworks address resilience and adaptation to climate change.

- **ISO 14090:2019** - Adaptation to climate change: provides principles, requirements, and guidelines for adaptation to climate change, including the integration of adaptation within an organization’s policies, practices, and functions.
- **ISO 14091:2021** - Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment, provides guidance on assessing the vulnerability of sectors, systems, and

populations to climate change impacts, as well as identifying and prioritizing adaptation options.

On going works:

- **ISO/TS 14092:2020** is a Technical Specification titled "Environmental management -- Guidelines for incorporating vulnerability and resilience into environmental management systems." It provides guidance on integrating vulnerability and resilience considerations into environmental management systems (EMS). It aims to help organizations better understand and address the potential impacts of climate change and other stressors on their operations, products, and services.
  European standardisation should appreciate if ISO/TS 14092/2020 is adapted to European requirements and develop its own vision adapted to our territories. Soon to be published as an international standard
- **ISO 14093:2022**: Mechanism for financing adaptation to climate change at the local level — Performance-based grants for climate resilience — Requirements and guidelines. Standard outlining a methodology for a country-specific mechanism to channel climate finance to local governments to support climate change adaptation and improve local resilience.
- **ISO/NP 14094** Adaptation to climate change — Requirement and guidance for monitoring and evaluation

Planning of upcoming projects within ISO/TC 207/SC 7 on the ISO 14090 series of standards:

- **ISO 14090-1**: Risk assessment
- **ISO 14090-2**: Threshold analysis
- **ISO 14090-4**: Identifying uncertainties.

SC 7/TG 2 Request for the Creation of a 14090 Application Guide

ISO Guide 84 (2020): Provides broad, global guidelines for addressing both climate change adaptation and mitigation within ISO standards. It includes guidance on incorporating climate change considerations across a wide range of industries and geographic contexts.

Water and adaptation of water services are major issues for cities, developed in the ISO 24566 series, two of which are already published in ISO TC 224 and two are and:

Published:

- **ISO 24566-1:2023** Drinking water, wastewater and storm water systems and services — Adaptation of water services to climate change impacts - Part 1: Assessment principles
- **ISO 24566-2:2024** Drinking water, wastewater and stormwater systems and services — Adaptation of water services to climate change impacts - Part 2: Stormwater services

Under international investigation for publication in early 2025:

- **ISO/DIS 24566-3** Drinking water, wastewater and storm water systems and services — Adaptation of water services to climate change impacts - Part 3: Drinking Water services.
- **ISO/DIS 24566-4** Drinking water, wastewater and storm water systems and services — Adaptation of water services to climate change impacts - Part 4: Wastewater services.

European standardisation activities

The European Union Strategy on Adaptation to Climate Change [COM (2013) 216 final] has identified standards as an effective instrument for improving the climate resilience of infrastructures across Europe. The sectors identified as priority sectors in the EU Strategy are Transport infrastructure; Energy infrastructure; Buildings/construction; ICT infrastructures. This resulted in the Standardisation Request (Mandate M/526) "*How to include adaption to climate change (ACC) in European infrastructure standards (March 2022*)" addressed to the European Standardisation Organizations (ESOs) in support of implementation of the EU Strategy on Adaptation to Climate Change [COM (2014) 3451 final].

AUWP 2023§44 Climate resilience of infrastructure.
Reference: COM (2021)82 Forging a climate-resilient Europe -the new EU Strategy on Adaptation to Climate Change - point 2.3.2
Deliverables: Revise - according to state-of-the-art knowledge - a broader range of standards for assets (including non-infrastructure) that are vulnerable to climate impacts, with a view to improving their climate resilience.
Specific objectives: Improving the climate resilience of the existing infrastructure stock and new major infrastructure.

In 2014 CEN and CENELEC established the Adaptation to Climate Change Coordination Group (ACC-CG) to coordinate standardisation activities and to foster collaboration in standardisation work in the field of adaptation to climate change. ACC CG was also responsible for coordinating the delivery the European Commission standardisation request.

The Guide for addressing climate change adaptation in standards emphasizes the importance of adapting standards to account for climate impacts and resilience, particularly in European climates and sectors.

On a more general level the European Climate Adaptation Platform (Climate-ADAPT) supports climate change adaptation across all policy levels and in all relevant policy areas in Europe. A total of 311 regional and local authorities from 25 EU Member States have signed the Mission' Charter on Adaptation to Climate Change thereby committing to strive towards climate resilience by 2030 by boosting regional and local adaptation efforts to reach their adaptation goals. 17 other signatories come from countries associated or potentially associated with Horizon Europe, the EU's research and innovation programme.

It has developed a Regional Adaptation Support Tool (RAST) is designed to help local and regional authorities with climate change adaptation strategies and plans – from development and implementation to monitoring, evaluating and updating them. This flexible and iterative tool adapts to the progress of local or regional authorities' policymaking and to the specific local context. It can help structure the standard.

The Smart Mature Resilience project, funded by European Union's Horizon 2020, has delivered in 2019 a Resilience Management Guideline to support city decision-makers in developing and implementing resilience measures in their cities. This project a lead to three standards by the CEN on city and water resilience:

- **CWA 17300:2018 (E)**: General Principles of City Resilience: This standard establishes the core principles for building territorial resilience, such as risk assessment, stakeholder engagement, and integrated planning.
- **CWA 17301:2018**: City Water Resilience: This standard might focus on building resilience specifically related to water resources, including drought management, flood control, and ensuring access to clean water during disruptions.
- **CWA 17302:** Assessment of City Resilience: This standard might provide a framework for assessing a territory's current level of resilience and identifying areas for improvement.

Within **CEN/TC 465/** a working group has been created on Territorial Resilience Development: WG 3.

Its first work, launched in 2024 “review of concepts, methods, tools related to resilience”.

Its scope of application considers the progress of the European work on resilience in a consistent manner with multiple approaches and ongoing standardisation works, for harmonization on the concepts of resilience and the base of future a roadmap for standardisation.

In this panorama, the question of the local adaptation management policy and the risk analysis system consolidating the data of the territory is not considered.

The standardisation project could develop a specific approach to resilience within the ISO 37101 management system and linked to information from the digital twin.

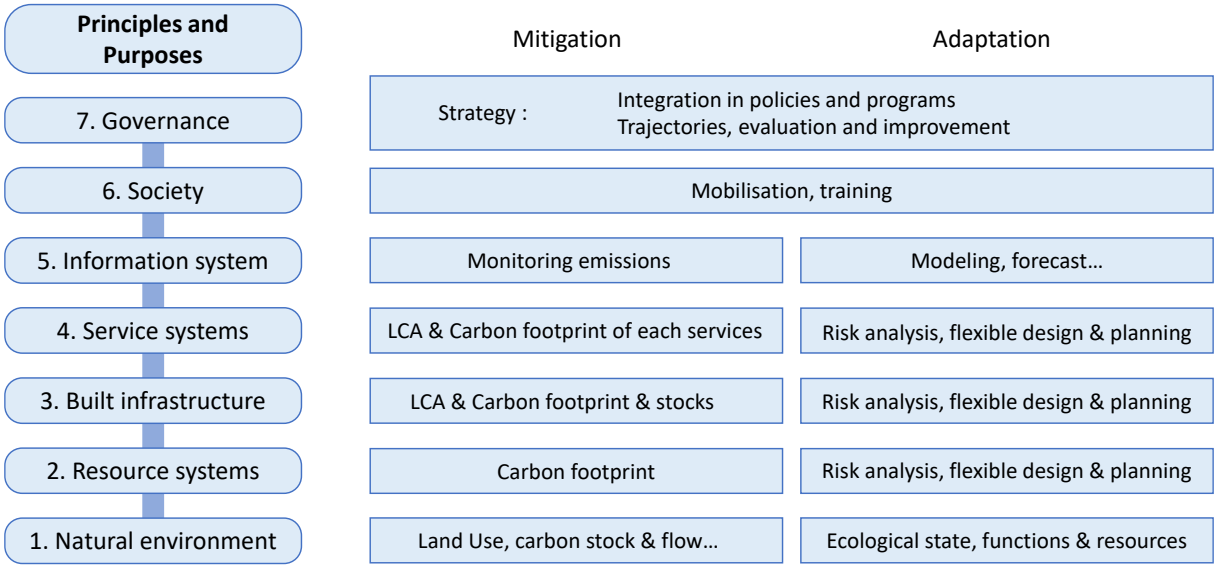


Figure 13 : Climate change / Descriptive framework.

A3.4.3. European institutional framework, directives and projects

Several directives, regulations, and initiatives of European Union (EU), address adaptation to climate change in cities.

- **EU Adaptation Strategy:** The European Commission adopted the EU Adaptation Strategy in 2013, aiming to enhance the resilience of the EU and its Member States to the impacts

of climate change. While not specifically focused on cities, it provides a framework for adaptation actions at various levels of governance, including local authorities.

- **European Green Deal:** The European Green Deal, launched in 2019, sets out the EU's ambition to become climate-neutral by 2050. It includes initiatives and policies aimed at fostering sustainable growth, reducing greenhouse gas emissions, and promoting adaptation to climate change. The Green Deal emphasizes the importance of urban areas in achieving these objectives.
- **Urban Adaptation Support Tool:** developed by the European Environment Agency (EEA), the Urban Adaptation Support Tool aims to help cities assess their vulnerability to climate change and identify appropriate adaptation measures. This tool provides guidance and resources for local authorities to develop and implement adaptation strategies.

A3.4.4. Research and development projects.

Horizon Europe, the European Union's research and innovation funding programme has supported different research projects focused on climate change adaptation, the results of which can contribute to the standardisation framework. These include:

- **Implementation Plan for Adaptation to Climate Change that support at least 150 European** regions and communities to become climate resilient by 2030
- **AGORA** promotes societal transformation to empower local communities to address the climate crisis.
- **Regions4climate** project addresses the escalating impact of climate change on extreme weather events and aims to build resilient communities and a socially-just transition by integrating best practices and innovations.
- **RESIST** is a five-year project of 4 Large Scale Demonstrators, that will test adaptation solutions to key climate challenges.
- **VALORADA** aims to raise awareness regarding the untapped potential of existing data in effectively adapting to climate change.
- **Smart Mature Resilience** a project delivering in 2019 a Resilience Management Guideline to support city decision-makers in developing and implementing resilience measures in their cities. This project has leaded a leaded to three CWA.
- **HORIZON-CLIM:** A project focusing on advancing the understanding of climate variability and change, including the development of climate adaptation strategies. It aims to provide scientific knowledge and tools to support adaptation efforts at various scales.
- **COACCH (CO-designing the Assessment of Climate Change costs):** This project focuses on assessing the economic costs of climate change in Europe and developing adaptation strategies to mitigate these costs. It aims to provide decision-makers with information on the economic implications of climate change and the benefits of adaptation measures.
- **RESIN (REsilient cities and infrastructures):** is a project focusing on enhancing the resilience of cities and urban infrastructure to climate change impacts. It aims to develop innovative tools and strategies to help cities adapt to climate-related challenges, such as heatwaves, floods, and sea-level rise.
- **PLACARD (PLAtform for Climate Adaptation and Risk Reduction):** is a project that aims to enhance collaboration and knowledge-sharing among various stakeholders involved in climate adaptation and risk reduction. It focuses on improving the uptake of adaptation measures and enhancing the resilience of communities and ecosystems.

- **CASCADES (Cascading Climate risks: towards ADaptive and resilient European Societies):** is a project focusing on understanding and addressing cascading climate risks, which occur when climate-related hazards trigger multiple interconnected impacts. It aims to develop strategies to enhance the resilience of European societies to cascading climate risks.
- **EU-CIRCLE (European Union Critical Infrastructure Resilience to Climate Change):** focuses on assessing the resilience of critical infrastructure systems, such as energy, transport, and water, to climate change impacts. It aims to develop risk assessment methodologies and adaptation strategies to enhance the resilience of critical infrastructure networks.

A3.5. Integration and interoperability of data for a local digital twin

The digital twin aims to integrate multi-scale information from data of spatial origin, data managed at European and national level, and local data accessible through innovative sensors and/or algorithms. Standardisation could focus on data interoperability, data governance and access, personal data and privacy of individuals, etc.

The integration into the normative system of cities will make it possible to consider the use of the digital twin in management and governance, based on a common descriptive framework of cities and communities, and making it possible to provide information on certain indicators.

A3.5.1. Challenges for cities

The digital twin of cities is a real-time virtual representation of a city, or a specific part of a city, using data and advanced technologies.

Integration and interoperability of environmental data for a local digital twin represents a critical endeavour in urban planning and sustainability efforts. By harnessing technology to consolidate, analyse, and visualize diverse environmental datasets, cities can make informed decisions to enhance their resilience, efficiency, and liveability.

Digital twin can address two main level:

Build domain: by digitally modelling infrastructure, buildings, networks, public spaces, and other urban and environmental aspects that provides data for

- planning and design by simulating potential scenarios, including extreme ones, to improve resilience.
- infrastructure maintenance and management
- improved operational efficiency and reduced maintenance and resource management costs.

The digital twin is an economic challenge for competitiveness, attractiveness for investors and companies, reduction of collective costs and risks, and stimulation of innovation.

Environment domain: by representing living systems, natural flows and cycles (air, soil, water) and they resource for city consumption and use water, energy, matter, green infrastructure …

It should help to ensure that datasets from different sources, from space sources (including the DestinE programme), data managed at European (EEA) and national level, and local data accessible through innovative sensors and/or algorithms can be integrated, into a data lake accessible to various users acting in specific contexts.

The project should make it possible to identify at the local level the state of the environment, the pressures and the impacts of activities. Integration into decisions and strategies will make it possible to address the driving forces in the diagnosis and to simulate the relevance and impact of the responses. It could thus be developed in line with the European Environment Agency's (EEA) framework "Driving Forces-Pressures-State-Impacts-Responses (DPSIR)".

The mobilization of local data, models and processes for the development of planning scenarios allows for better identification of risks and opportunities, sustainable resource management, assessment of climate change exposure, establishment of ecological thresholds, assessment of the effects of ecosystem restoration, regeneration and transformation, etc.

It can be used by

- decision-makers, stakeholders and citizens for local sustainability strategies, diagnosis, monitoring, and evaluation.
- Regional, national, and European institutions for the evaluation of the impact of their policies.
- private actors and companies for their contribution to sustainability, risk management, opportunities, and resilience in the territories where they operate and/or exploit resources and their extra-financial reporting obligations, especially the European Sustainability Reporting Standards (ESRS) in support to Corporate Sustainability Reporting Directive (CSRD).

A3.5.2. Current normative framework: The Sustainable and Smart Cities and Territories Framework and related sectoral standards

A wide variety of standards have been developed within ISO and IEC in a concurrent or in coordinated manner within ISO/IEC JTC 1. If they are not directly related to the proposed project, they should still be considered.

ISO/TC 268 Sustainable Cities and Communities including SC1:

- ISO 37105:2019 Sustainable cities and communities — Descriptive framework for cities and communities
- ISO 37110:2022 Sustainable cities and communities — Management requirements and recommendations for open data for smart cities and communities — Overview and general principles
- ISO/WD 37114: Sustainable cities and communities — Appraisal framework for datasets and data processing methods that create urban management information.
- ISO 37156:2020 Smart community infrastructures — Guidelines on data exchange and sharing for smart community infrastructures.
- ISO 37166:2022 Smart community infrastructures — Urban data integration framework for smart city planning (SCP)
- ISO 37170:2022 Smart community infrastructures — Data framework for infrastructure governance based on digital technology in smart cities.
- ISO/TS 37172:2022 Smart community infrastructures — Data exchange and sharing for community infrastructures based on geographic information.
- ISO/AWI 37187 Smart community infrastructures — Requirements for data framework and functions based on city information modelling platform.

ISO/TC 207/SC 1/WG 14

- ISO CD 14054:2024, Natural Capital Accounting for Organizations – Principles, requirements and guidelines

IEC/TC 56

- IEC CD 63273-1, Systems Reference Deliverable (SRD) - Use Case Collection and Analysis: City Information Modelling - Part 1: High Level
- IEC CD 63273-2, Systems Reference Deliverable (SRD) - Use Case Collection and Analysis: City Information Modelling - Part 2: Use Case

IEC SyC Smart Cities/WG 1

- IEC SRD 63476-1 ED1 Smart city system ontology - Part 1: Gap analysis

IEC SyC Smart Cities/WG 2

- IEC SRD 63301-1 ED1 Smart city use case collection and analysis - Water systems in smart cities - Part 1: High-level analysis.

ISO/IEC JTC 1/SC 41

- ISO/IEC AWI 30173, Digital twin — Concepts and terminology
- ISO/IEC AWI 30172, Digital Twin — Use cases

ISO/IEC JTC 1/WG 11 "Smart cities

- IEC/AWI TS 63526: Gap Analysis on Standards Related to City Information Modelling and Urban Digital Twins

JWG16 with ISO/IEC JTC1 – City Information Modelling and Urban Digital Twins

- IEC TS 63526 ED1 Gap Analysis on Standards Related to City Information Modelling and Urban Digital Twins

OGC Urban Digital Twin (UDT) Standards Working Group

- The Open Geospatial Consortium (OGC) has established a working group focused on developing standards for Urban Digital Twins (UDT). The working group aims to define a framework for representing, modelling, and sharing urban data in digital twin environments, including standards for data formats, APIs, and interoperability.

IEEE P2784: The Institute of Electrical and Electronics Engineers (IEEE)

- Working Group is developing a standard for Urban Data Models (UDMs) to support the creation and integration of digital twins for urban areas. The standard aims to define common data structures and schemas for representing urban data, facilitating interoperability and collaboration among stakeholders.

Recent initiatives

- ITU-T Y. Sup.DTw-concept-use cases, Concept and use cases of a digital twin in smart sustainable cities.

Th ISO-IEC Joint Technical Committee (JTC 1) is a consensus based, voluntary international standards group focussing on information technology (IT) issues with a significant activity of 3416 standards published and 479 under development. Only a small number of them concern smart cities: 13 published and 4 under development in the JTC 1 **Working Group 11** on Smart Cities.

ISO TMB (Technical Management Board) and IEC SMB (Standards Management Board) has adopted in June 2024 the ISO/IEC JTC 1 proposal for the establishment of a JTC on IT for smart cities.

The scope of this new committee and its relationship with ISO TC 268 are under discussion (summer 2024).

JTC1 Working Group 11 will be transformed into JTC 4 and more precisely integrate sustainability in relation to ISO/TC 268[24]. Regardless of the future position of ISO TC 268, JTC 4 should better integrate environmental information and beyond sole infrastructure and buildings.

A3.5.3. European institutional framework, directives and projects.

Access to environmental data is subject to different institutional frameworks and European initiatives.

- **Directive 2007/2/EC (INSPIRE Directive)**: The INSPIRE Directive establishes an infrastructure for spatial information in the EU to support environmental policies and activities, including adaptation to climate change. It aims to facilitate the sharing of geospatial data, which is essential for assessing climate risks and vulnerabilities in urban areas.
- The **Rolling Plan for ICT Standardisation** provides a unique bridge between EU policies and standardisation activities concerning information and communication technologies (ICT). This helps to increase convergence of standards makers' efforts towards achieving EU policy goals. This document is the result of an annual dialogue involving a wide range of interested parties as represented by the European multi-stakeholder platform on ICT standardisation (MSP). The Rolling Plan focuses on actions that can support EU policies and does not claim to be as complete as the work programmes of the different standardisation bodies.
- European Innovation Partnership on Smart Cities and Communities towards Open Urban Platforms for Smart Cities and Communities. In a memorandum of understanding the group is committed to support the effort of the related standardisation bodies by supporting technical specifications, reference implementations, and conformance and interoperability tests.
- **Smart Cities Marketplace**: aims to **engage** cities and towns of all sizes to deliver more sustainable urban environments and offers all the information needed to **explore** offers a complete catalogue of support such as calls for free technical assistance, consultancy services…
- **Scalable Cities**: aims to create an innovative, sustainable and city-led community of smart and climate-neutral cities in Europe. 124 unique cities involved in **20 Smart Cities and Communities (SCC) projects** funded by the **Horizon 2020** and **HorizonEurope** programmes that are working in consortia with academia, industry, associations and consultants. Together, they have implemented more than 550 demonstrations of technological and social innovations.

The European Environment Agency (EEA) offers several offers in the field of location-based environmental information, including:

[24] The merger of ISO TC 268 into JTC 4 is even being considered.

- **Corine Land Cover (CLC):** which aims to establish a database on land use and land cover in Europe. This data, collected from satellite imagery, is geolocated and provides valuable information on land use change, habitat fragmentation, and other environmental aspects.
- **Eionet Spatial Data**: a European network for environmental information and observation, which includes a platform for the exchange of space data. This data includes geolocated information on various environmental aspects such as air quality, biodiversity, water resources, etc.
- **EEA Data and Maps Portal:** providing a variety of geolocated data and maps on air quality, greenhouse gas emissions, waste management, and other environmental topics.
- **European Environment Information and Observation Network (Eionet):** a network that brings together national environmental agencies and other organisations to collect, share and harmonise environmental data, including location-based data, on a European scale.

Minimal Interoperability Mechanisms (MIMs) is a flagship initiative of Europe's digital future, ensuring seamless data exchange across the continent. Interoperability supports different systems to communicate and share data effectively between one another. MIMs are standards and technical specifications that help cities, communities, and suppliers to replicate data or let data easily flow between systems.

In Europe, MIMs Plus was developed based on the original MIMs framework to cater to the specific needs of European cities and legislation. This is a Living-in.EU initiative, which promotes digital sovereignty and aims to harmonise smart city solutions across Europe. By adopting MIMs Plus, European cities can not only ensure compliance with EU standards such as the Interoperable Act, but also enable the integration of open data from various sources, like the datasets at data.europa.eu.

Local digital twins (CityVERSE) are the subject of several European initiatives: the digital twin call for projects: DIGITAL-2023-CLOUD-AI-04 and LDT CitiVERSE EDIC.

Networked Local Digital Twins to CitiVERSE (LDT CitiVERSE EDIC) is a project of the European Digital Infrastructure Consortium (EDIC), which is a legal framework helping Member States to set up and implement multi-country projects. The **CitiVERSE** initiative aims to connect existing local digital twins across Europe, forming the basis of the EU's CitiVERSE. Local digital twins are virtual representations of a city's physical assets, processes, and systems. Digital twins use data, analytics, and AI to create real-time simulation models that mirror the cities they represent. The CitiVERSE focuses on advancing generative AI applications in smart cities, including simulations addressing (among other things) the impact of changing traffic conditions on air quality, decarbonization, and congestion. Additionally, it explores generative AI-based virtual reality applications to improve citizen interaction (for instance, simplifying the consultation and understanding of planned urban changes).

A3.5.4. Research and development projects (Horizon Europe)

Destination Earth (DestinE) project funded under Digital Europe Programme (DEP), and Horizon Europe for R&I activities. The initiative aims to develop a very high precision digital model of the Earth (a digital twin of the Earth) to monitor and simulate natural and human

activity, and to develop and test scenarios that would enable more sustainable development and support European environmental policies.

Various projects formalize the supply and demand of information regarding different environmental perspectives: climate change, circular economy, biodiversity or adaptation...

The **NetZeroCities** project, which is mainly interested in the climate aspect (§A3.3.4), also considers the interface with other issues such as nature-based solutions Report on assessment methodologies for planning and monitoring GHG emission reductions through urban greening and nature-based solutions.

In the field of the circular economy **CityLoops - Closing the loop for urban material flows** is a EU Horizon2020 project developing urban circularity assessment (UCA) methodology, based on Material Flow and Stock Analysis Accounting (MFSA) methodologies. CityLoops is a project of **Metabolism of Cities** an academic approach to study the sustainability of cities by quantifying and unpacking material and energy flows.

The project **VALORADA** aims to raise awareness regarding the untapped potential of existing data in effectively adapting to climate change.

Annex 4: financing support, estimated standardisation participation costs

The following figures are average estimates that vary according to the technical committees and standardisation commissions, the subjects and the countries.

On such a basis, it can be estimated that 'holding' an ISO Technical Committee with a presidency and secretariat and a sufficient participation in the expertise can cost more than 200 k€ per year.

	Responsibility	Number of days	Allowances Number of days x 1k€/day	Missions	Total
ISO	Chair of Technical Committees or Subcommittees	50	50 k€	12 k€	62 k€
	Technical Committee secretariat, NSB	40	58 k€	12 k€	70 k€
	Working Group secretariat, NSB	15	22 k€	(4 k€)	22 k€ (26k€)
	Working Group Convenor	15	15 k€	(4 k€)	
	Expert in Working Group	10	10 k€	-	
	Participation to international meeting	5	5 k€	2 k€-4 k€	7-9 k€
CEN	Chair of Technical Committees or Subcommittees	50	50 k€	5 k€	55 k€
	Technical Committee secretariat (NSB)	30	44 K€	6 k€	50 k€
	Working Group secretariat (NSB)	10	14 k€	(4 k€)	14 k€ (18 k€)
	Working Group convenor	10	10 k€	-	10 k€
	Expert in working groups	5	5 k€	-	5 k€
	Participation to European meeting	2	2 k€	1 k€ - 2 k€	3 k€ - 4 k€
ONN	Chair of national standardisation commission	30	30 k€	3 k€	33 k€
	Commission secretariat	30	43 K€		43 k€
	Working Group convenor	10	10 k€		10 k€
	Expert in Working Group	5	5 k€	-	5 k€

The cost of the experts is usually borne by the companies and organizations involved in standardisation, in which case it is a donation in kind.

The secretariat of Technical Committees (TC) and Working Groups (WG) is provided by a national standards body which must cover its costs through membership of the standards committees and the sale of standards.

The daily rate of an expert varies depending on the organization and can be between €600 and €1200. We will take here as a basis for calculation €1000/day as the average rate. Given the particular mobilization of expertise, the daily rate for a standardisation body can be higher (e.g. €1450/day for AFNOR).

Given the remote work and the working arrangements on texts, the CEN and ISO experts participating in the WG are not expected to travel systematically. Despite this, physical meetings of the working groups may be organised, on the margins of plenary meetings.

To convert man-year percentages into days, we consider an annual basis of 200 days.