EUROPEAN STANDARDIZATION ORGANIZATIONS

SSCC-CG Final report

Smart and Sustainable Cities and Communities Coordination Group

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0 Executive summary and recommendations

The present report has been produced by the CEN-CENELEC-ETSI Smart and Sustainable Cities and Communities' Co-ordination Group (SSCC-CG) as a first overview of standardization issues at a European level.

The present summary also contains a list of the specific recommendations the Group has made, cross-referenced to the individual sections of the report.

The SSCC-CG participants represent the three European Standardization Organizations, their members, partner bodies and stakeholder representatives of some relevant specific standardization activities.

The first section of the report provides essential background considerations concerning the group and the context to its work. What constitutes smart and sustainable cities is defined, and the added value for standards in the domain is outlined, together with some basic city and community objectives that standardization can help achieve. The range of different standards topics that are within the potential scope of a coherent and co-ordinated approach is specified.

The second part of the report goes into more detail on the city context, and provides information on an overall model for city and community systems, assessing the added-value of standards in terms of city operations.

A third section outlines the various stakeholders that are potentially involved in smart/sustainable-city/community standards issues and reviews different stakeholder category perspectives. It is to be noted that in general, cities (or indeed local authorities) will not be represented currently in standardization activities, so awareness measures will be needed in order to gain their participation. Individual citizens, as the city residents and consumers of goods and services, must remain at the core of the standards work and their interests protected.

Standardization activities have mushroomed recently, together with wider smart city consensus-building measures. The fourth section of the report provides information on these current activities, starting with the European Innovation Partnership on Smart cities and Communities (EIP), where the SSCC-CG set up by the ESOs has put forward in response to the EIP invitation for commitment, a proposal for the creation of an interoperability framework and the online marketplace of the EIP. The report next reviews other European initiatives, including efforts to get cities to endorse common principles, and more local smart/sustainable-city/community approaches. Standardization Work in ISO, IEC, ISO-IEC JTC1 and ITU-T is reviewed, and approaches in other parts of the globe, notably US and China, are noted.

Section 5 of the report assesses the basic requirements for standardization activities, both in terms of standards' potential to help cities with their "smart" strategic planning, and of providing common frameworks as a "glue" to achieve the added-value from combining approaches to city services. Standards can also help with performance benchmarking and evaluation. The report also assesses how some standards topics, such as those related to data sharing and planning issues, can be broadened to factor in smart/sustainable-city/community aspects.

The next section of the report provides an outline of the specific standards needs that the Group has so far identified, although more refinement and detail will need to be added in the light of the activities of the European Innovation Partnership, and indeed the various global activities.

Section 7 of the report proposes an outline strategy for ensuring these standards are developed, together with a proposal for communicating the concepts to stakeholders (especially the local authorities) and the achievement of a standards roadmap at a European level, which also factors in the international work.

Finally, a set of references and links is provided, and the report contains a number of annexes providing more detail on some of the subjects discussed.

The detailed standards issues, and the strategy and roadmap to achieve them, are discussed below in section 6 and 7.

1 Sustainable, Smart Cities and Communities: general background, definition and European specificities

ANNEX A gives more detailed information on the international institutional background on sustainable development as well as on European initiatives linked to smart and sustainable cities

1.1 Smart and sustainable cities and communities coordination group

The SSCC-CG is a Coordination Group established to coordinate standardization activities and foster collaboration around standardization work. The aim of it is to advise the CEN and CENELEC (Technical) and ETSI Boards on standardization activities in the field of Smart and Sustainable Cities and Communities.

The scope of the SSCC-CG, as written in the terms of references is as follows:

The SSCC-CG will advise on European interests and needs relating to standardization on Smart and Sustainable cities and communities.

Note: Interests and needs relating to standardization on resilient cities and communities will be considered and taken into account as well.

These European interests and needs shall fit within the overall smart and sustainable cities approach that is to be developed by the SSCC-CG, taking into account existing ISO/IEC/ITU deliverables and activities in view of consistency at the international level. The SSCC-CG will also receive and provide inputs from the European Commission, in particular through the European Innovation Partnership on Smart Cities and Communities. The group will also have an overview, if relevant, of the progress of ongoing work in other standardization organisations and forums related to smart and sustainable cities and communities. The SSCC-CG will not elaborate standards itself but will deliver a report to the CEN and CENELEC (Technical) and ETSI Boards.

In addition to a strategic and technical coordination, SSCC-CG has the task of encouraging participation of stakeholders.

NOTE : The Coordination Group 'Smart and Sustainable Cities and Communities' (SSCC-SG) was set up by CEN/BT (Decision BT 32/2012), following a proposal for a new work on this topic by AFNOR in 2011 including the creation of a new CEN/TC, which originally failed. Considering the successful outcome of the workshop organised by CCMC in 2012, the broad interested generated, the emergence of pressing needs for specific European standardization, and following discussions at the 44th CEN/BT TCMG meeting, the creation of the Coordination Group under AFNOR Secretariat was agreed at the end of 2012. CENELEC and ETSI were invited to participate and concur.

In January 2013, CENELEC concurred with this Decision (CENELEC Decisions D143/067-069).

ETSI joined in 2014 to cover the ICT aspects. Following an ETSI request, at the 82nd CEN/CENELEC/ETSI Joint Presidents' Group on 2013-11-13 in Brussels, JPG agreed to enlarge the SSCC-CG to the three ESOs.

The group is chaired by Mr Jean Felix (France)(representing Syntec Ingenierie and EFCA/FIDIC), with a secretariat provided by AFNOR and composed of 44 organisations representing NSBs, the European Commission, ESO partner and liaison associations, city networks and other organisations.

1.2 The context that justify the work on that topic

Since industrialization, our world has been considerably weakened by unsustainable development and rampant overconsumption. Humanity faces a number of environmental sustainability challenges including, but not limited to, declining biodiversity, degraded land and soil, depleting natural resources, polluted air and water, and increasingly severe climate risks. Closely interlinked are issues of population increase and rural-to-urban migration, which is occurring at an extraordinary pace: since 2008, more than half of the global population lives in cities. It is the largest wave of urban growth in history. This in turn puts further pressure on resource supply and demand, especially in terms of energy, 80% of which, globally, is derived from fossil fuels, thus further exacerbating climate risks.

Adapting to these challenges will require increased cooperation among local actors, along with comprehensive systems that can create and maintain synergies for sustainable urban societies in which people want to work, live and maximize their well-being.

However, cities are also 'driving forces' in generating European economic and sustainable growth since green economy is also an opportunity for development. Currently, 53 % of the world's population resides in cities, a figure that is expected to rise to

70 % by 2050. Today generate 70 % of the global GDP. Investing in them may be a priority for many governments, but doing so sustainably and effectively can be a challenge.

Cities are expected to deliver 'more and new' services, be globally competitive and meet the EU 20/20/20 energy and climate goals

Cities hold an enormous promise to help meet global energy challenges to reduce costs of government and social services, to spur job creation and economic growth, to help meet important environmental goals to upgrade and improve the existing infrastructure

1.3 The value of standards for smart and sustainable cities and communities

Standards can provide the following benefits to smart and sustainable cities and communities.

1) Enabling integration between systems

One of the most important characteristics of smart cities is interoperability and coherence between separate systems and services. Standards can help to define those points of interoperability.

2) Enabling integration between the physical and the digital

Smarter cities need reliable and resilient physical and technology infrastructures, working together. In particular, new integrations between technology and physical infrastructure are required, and need to be reliable. That can only happen if standards are developed and agreed.

3) Underpinning common understanding

Even within projects in a single industry, it is common for what is delivered to be different from what was required, simply because of misunderstandings between the parties involved. Standards can help to provide a shared language to minimize these misunderstandings, and that will be critically important because of the wide set of stakeholders in smart cities.

4) Helping to obtain funding

Standards can enable city leaders to describe to local and national government and to the finance sector their aims and ambitions for the city, in language that they understand, and can make it easier to develop the evidence finance providers need to underpin their investment.

5) Helping to prevent vendor lock-in

When products and services are built to widely agreed standards, it makes it possible to break things down into smaller parts and find the best provider of each of them, rather than having to contract with a single company to offer the whole product. It also allows much easier substitution of one provider for another and thus maintains a competitive market.

6) Enabling scale

The use of standards ensures cities are following a path taken by many others. Having many cities following a common path will itself stimulate the market to further support this path.

1.4 From sustainable development to sustainable cities

Cities are becoming more and more of a focal point for our economies and societies at large, particularly because of on-going urbanization, and the trend towards increasingly knowledge-intensive economies as well as their growing share of resource consumption and emissions. To meet public policy objectives under these circumstances, cities need to change and develop, but in times of tight budgets this change needs to be achieved in a smart way: our cities need to become 'smart/sustainable-cities/communities'.

It is important that initiatives strive towards a triple bottom line gain for Europe: a significant improvement of citizens' quality of life, an increased competitiveness of Europe's industry and innovative SMEs together with a strong contribution to sustainability and the EU's 20/20/20 energy and climate targets. This will be achieved through the wide-reaching roll out of integrated, scalable, sustainable Smart/sustainable-city/community solutions – specifically in areas where energy production, distribution and use; mobility and transport; and information and communication technologies are intimately linked.

In the past, standards tend to be developed for specific components or areas such as smart meters, smart grids, ICT etc. Today, standards are becoming more horizontal and cross-sectorial (see for example standards for accessibility, the climate change, etc…). With the development of integrated solutions for Smart Cities and Communities a system approach for

standards is also needed. Through standardization the solutions identified by smart cities and communities can deliver cost reductions as well as social acceptance of developed solutions.

1.5 Main objectives of Smart and Sustainable Cities & Communities

1.5.1 Definitions

For the purposes of this report, we are adopting as working definitions the following proposals that ISO TC268 "Sustainable development in communities" (AFNOR) is considering for its own exercise:

Community
group of people with an arrangement of responsibilities, activities and relationships

NOTE A community might not be in the same geographic area

Smartness
Means to contribute to sustainable development and resilience, through soundly based decision making and the adoption of a long and short term perspective

NOTE Smartness implies an holistic approach, including good governance and adequate organization, processes and behaviors, and appropriate innovative use of techniques, technologies and natural resources.

1.5.2 Why be smart?

A community may have any number of reasons to view its future in a "smart" manner. ISO TC268 "Sustainable development in communities" (AFNOR) has attempted to outline these, and, from the results, which specific issues a community needs to address (from Draft International Standard ISO 37101 "Sustainable development and resilience of communities – Management systems – General principles and requirements"). The SSCC-CG decided to focus on those specific concepts.

PURPOSES	Including (in no particular order)
Attractiveness	sense of identity, place, belonging, appeal to investors, residents and other interested parties
Social cohesion	equity, reduction of inequality, inclusiveness, accessibility
Well-being	human capital improvement, access to opportunities, prosperity, quality of life, health, welfare, education, security
Resilience	anticipation, adaptation, preparedness: specifically including climate change, economic shocks and social evolution
Responsible and efficient resource use	application of care in improved land management, respect for scarcity of resources, sustainable production, storage, transport, distribution and consumption, recycling of materials
Preservation and improvement of environment	Improved environmental performance including climate change impacts, protection, restoration and enhancement of the local and global environment, protection of plant and animal diversity and migration, pollution abatement

Although it may not be exhaustive, the ISO list of smart/sustainable-city/community-relevant issues is currently as follows:

- Governance, empowerment and engagement;
- Education and capacity-building;
- Innovation, creativity and research;
- Health and care in the community;
- Culture and community identity;
- Living together, independence and mutuality;
- Economy and sustainable production and consumption;

- Living and working environment;
- Safety and security;
- Smart community infrastructures;
- Biodiversity;
- Mobility.

1.5.3 Strengthen Innovation and European businesses

Cities across Europe are forerunners in this transition towards a low carbon, resource efficient and circular economy. This also holds a great market potential for, not only in smart products, buildings and ICT-systems, but also in knowledge intensive services, architectural services, energy solutions and planning knowledge.

Investments in within the area of developing smart and sustainable cities and communities will in addition to the efficiency gains and added value to the inhabitants of the city, contribute to the competitiveness of European services- and production industry.

Such gains could be; establishing knowledge networks, strengthening creativity and innovation, better connectivity, resilience of city functions, better living and working environment, improving city attractiveness, creating new businesses, promoting local production.

1.5.4 Strengthen attractiveness, liveability and resilience

Urban planning and the integrated planning processes is critical in achieving better efficiency regarding emissions, climate, resilience, climate risks, flooding, biodiversity, energy and material use. This is also important in improving quality of life and taking social responsibility. Tomorrow's city-planning and -development need to be different from today; better founded on circular economy, restricted resource use and efficiency.

To meet the increasingly complex challenges of cities, holistic and integrated approach is needed. This includes efficient and user-friendly technologies and services, in particular in areas of energy, transport, and ICT. Standards for smart cities technologies will benefit European industry in commercial-scale solutions with a high market potential in areas such as energy efficient and smart buildings, neighborhoods and communities, optimization and integration of flows (data, energy, people, goods) and smart services for better-informed citizens.

This integrated approach puts demands on the level of and incentives for research, development of solutions and deployment of technologies. Standardization of integration can facilitate some of these integrated actions.

1.6 CEN-CENELEC-ETSI work with sustainable and smart cities

Needless to say, the ESOs and their members have an enormous number of standards, (developed in several technical committees (see annex D)) existing or proposed, that are relevant to the concept of smart and sustainable cities. At present, these standards broadly concern specific issues rather than dealing with "horizontal" or cross-cutting aspects.

This situation is likely to continue for the near future, since dedicated standards are needed for individual applications such as transport or healthcare, or for those broad concepts such as data protection or IT security that are of more general application than smart/sustainable-cities/communities. These standards will continue to be produced in the relevant technical groups within the ESOs and their members.

So far, we have not identified a genuinely "horizontal" body of new work on smart and sustainable cities that would require the creation of a new dedicated ESO Technical Committee (or similar). In any event, the ESOs should avoid duplicating or conflicting with the global activities that do exist, such as those in ISO TC268. Where there is a need for specific smart-city standards at European level, then we suggest that these should be drawn up by the ESO and its existing technical group closest to the subject-matter, or alternatively by short-term dedicated technical body (technical committee or joint working group if involving the three ESOs) .

At least in the short-term the ESOs will need to continue to collaborate on smart and sustainable cities, and ensure a co-ordinated approach between the different technical groups involved, in particular for three reasons:

- to ensure that the principles outlined in section 1.5 above are taken forward coherently;
- to interface with the EIP - European Innovation Partnership on smart cities and communities – specifically in relation to the selected SSCC-CG invitation for commitment (n° 7352) and proposed Action Cluster "standards";

- to ensure an overview is available of European needs, and as far as possible that these needs are reflected in the global work being carried out.

Assuming that this collaboration continues in the form of a Co-ordination Group (SSCC-CG or successor arrangements), the need should be kept under review on a roughly annual basis.

R1: **There is no requirement at this stage for a dedicated technical committee or joint working group on smart and sustainable cities, but some form of ongoing collaboration/co-ordination between the ESOs will be needed on this topic, at least in the short-term.**

2 Modelling Sustainable and Smart Cities and Communities

Additional explanations in ANNEX C

In order to understand the role of standards in helping a city or community become smarter and more sustainable it is important to develop a model that indicates how such a city or community works.

The SSCC-CG started from the experience of work on smart grid, which concluded that the role of standards in that domain related to supporting the interoperability of the different systems involved. This interoperability did not just involve technical issues, but needed to be addressed over many different layers, including the requirement to link up different systems on a management and strategic level.

Even more than with Smart Grid, a city or community can be understood as a "system of systems" and smart/sustainable-city/community standards therefore need to also cover the interoperability and cohesion of all of these different systems at every layer.

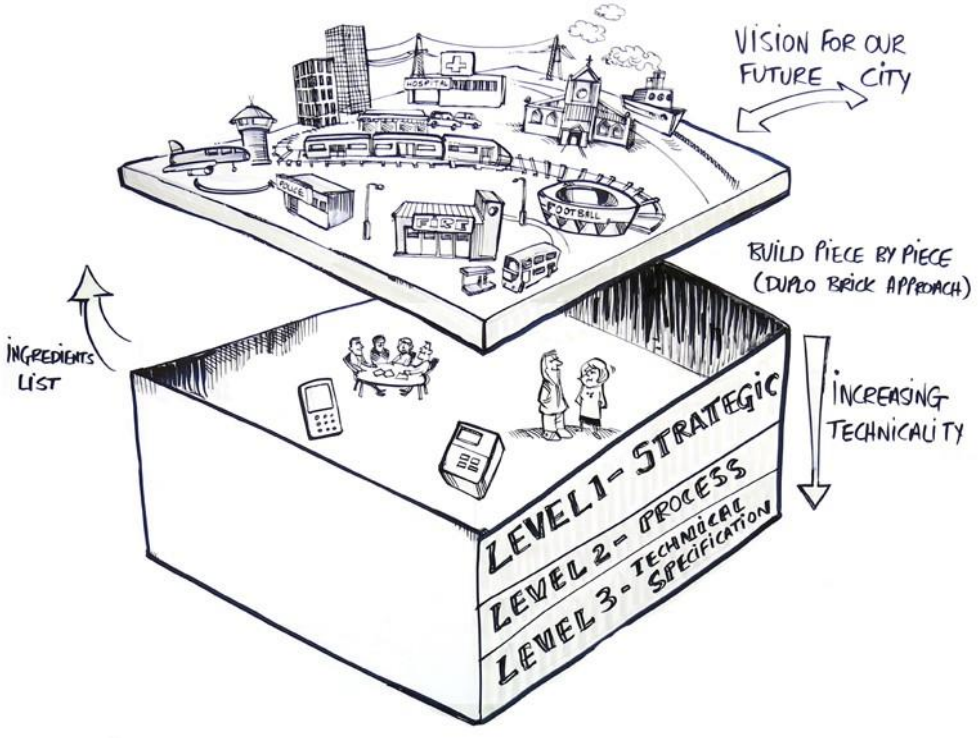

Figure 1 Levels of standards (with thanks to BSI)

The SSCC-CG concluded that the “smartness” of a city or community describes its ability to bring together all its resources, to effectively and seamlessly achieve the goals and fulfil the purposes it has set itself.

In other words, it describes how well all the different city systems, and the people, organisations, finances, facilities and infrastructures involved in each of them, are:

- Individually working efficiently; and

- Acting in an integrated way and coherent way, to enable potential synergies to be exploited and the city to function holistically to best achieve its aims.

Clearly sustainability is a foundational purpose of almost all cities and communities.

However, while sustainability is basic to the life of any city or community, smartness is just as important, since it represents how effectively a city or community will be able to move towards achieving sustainability.

<table>
<tr><td></td><td>City/Community history and characteristics
What is the city or community story, its “brand” and values? Is it a stand-alone city, a hub city or satellite city, or is it a network of rural towns and villages? What is the size of population? Is it growing, stable or shrinking? What is its demographic mix?</td><td></td></tr>
<tr><td>Environmental context

How flat or hilly

On what kind of rock it is built

If it is by the sea or inland

Climate</td><td>City/Community actors
Local authority, Health trusts, service providers, electricity and gas suppliers, police, bus and tram companies, voluntary groups, businesses, banks, investors, and, most important of all, the citizen.
Activities
Planning, managing, purchasing, regulating, building and repairing, providing services, generating profit, gaining finance …
Community facilities and buildings
Homes, hospitals, schools, electricity substations, sports facilities, cinemas, water treatment plants, district heating plants, factories, offices, shops …
Infrastructures
Gas, electricity, water, sewerage, telecoms, roads and rail, district heating systems …
Soft Infrastructures
Business / Science / Community / Innovation networks and collaboration structures
Technical systems
Traffic light management, ticketing, billing and payment, automatic number plate recognition …
City/Community functions or service areas
Employment, Housing, Education, Health, Security, Mobility, Energy, Water, Waste Management, Food Supply chain, Consumer Goods Supply Chain ..
Scale
Citizen, building, block, neighbourhood or village, district or town, city, metropolis …</td><td>Societal context
Laws & regulations

Division of power between national and city/community governments

Division of power between agencies within the city or community

Cultural norms

Economic structures and situation

Political context</td></tr>
<tr><td></td><td>City/Community Governance
The task of City and Community Governance is to ensure that all of the functions of the city or community are delivered effectively at all levels of scale, and are properly co-ordinated to best deliver on the purposes the city or community has set itself.

City/Community Purposes The key challenges facing the city or community that need to be tackled and the opportunities that need to be grasped. Social, Economic, Environmental …</td><td></td></tr>
</table>

Figure 2: A city model

The next steps in developing the model

The model shown above, by listing the many different entities and relationships in the city, points to boundaries across which interoperability, integration and coherence are needed.

In order to make this model more useful for standards work it needs to be developed in two ways. There is a need to:

- map which of these boundaries provide particular challenges around integration at the moment; and
- identify which specific types of integration across which boundaries are needed in order to deliver on which city purposes, in order to help city and community leaders identify where they need to focus their work of integration

R2: The next stage of the work of developing the Smart/sustainable city model therefore needs to be done in partnership with cities and communities, particularly those who are already implementing strategies to become smarter and more sustainable.

The next stage mentioned above should be done jointly with existing city networks within Europe. This could be done through the European innovation partnership proposal to the group to launch an action cluster on standards.

3 Stakeholders and interested parties

3.1 General

The challenge is that this is not simply about taking individual organisations and rating them to decide how well each is doing. Cities will become smart thanks to collaboration between a set of key stakeholders. Among those, the citizen will play a major role. In this chapter, we will categorise relevant stakeholders, and then concentrate more on the citizens' expectations and desires.

The different stakeholder categories, then citizen's perspectives result from the work of the group.

3.2 Typology

Relevant interested parties and stakeholders generally belong to one or more of the following categories:

- **National Governments** and state authorities
- **Regional and local governments** and related public authorities
- **Municipalities** and communities management and associations representing them
- **Public and private** developers, promoters, traders, Investors
- **Industry** and (municipal) service operators
- **Public interest groups**
- **Residents** (as individuals and represented by associations), **trade, consumers** or other types of associations
- **Banks** and International Financial Institutions (IFI)
- **Insurers**
- **Consumers/citizens**
- **Prosumers** i.e. consumers who also produce. In this context, these are citizens who, may produce their own apps to help themselves and their peers benefit from the opening up of data. These are particularly important stakeholders because, by taking the lead, they help the citizen generally to have a much more active role in enabling the city or community to become smarter and more sustainable

3.3 The citizen perspective

In the smart/sustainable-city/community context, the term "consumer" is to be taken broadly, to mean individual citizens and their families.

The smart community offers considerable opportunity not only for citizens to have an improved living environment in which they can benefit from effective services, but also for them to have an additional say in matters affecting their daily lives. At the same time, equal treatment for all citizens needs to be ensured, and account needs to be taken of "big data" risks to their personal information.

Against this background, citizens need:

- transparent information about the public and commercial services being provided in a smart/sustainable-city/community, what is their cost, what are their rights and the redress procedures when they go wrong, etc.;
- mechanisms to ensure their individual voice is heard;
- assurances that the security of their personal information is properly protected and that this data will not be misused for commercial purposes;
- support and education for those unable to take immediate and full advantage of smart community living;
- a physical environment that ensures accessibility for older people and those with disabilities.

4 On-going major European and international initiatives

4.1 A wide range of initiatives

The aim in reviewing existing initiatives is to identify networks and expert organisations that could help identify opportunities for future standardization work that could accelerate and help in moving existing cities to smarter and more sustainable ones.

Initiatives listed in Annex A are sorted by category (structures/documents and means), e.g.:

Structures and documents

- Associations[1]
- Charters[2]
- Best practices, guidelines and tools[3]
- Standardization, advisory and coordination groups[4]

Means

- Funds and supporting programmes[5]
- Indicators, performance assessment, benchmarks and awards[6]
- Certification[7]

It was considered more useful to use this classification for the purpose of the report than classifying by level of jurisdiction, i.e. international, European or national. However some initiatives may link to more than one category.

Initiatives related to smart and sustainable cities and communities have been started in many European Countries, then coordinated at European level to offer a common set of visions, common tools and share common challenges. However, many of these existing initiatives only cover part of the global smart approach and concentrate on certain of the sectors that need to be considered (e.g. mobility, energy, water, waste, buildings, social and societal, …). However, many of these have developed interesting practices, with long term feedbacks from diverse regions and culture, size of the considered communities, climatic conditions and societal environment, with holistic considerations and even methodologies that could help with identifying, planning and implementing smart and sustainable cities and communities' programmes. Those could certainly serve as a basis for standardization work.

Among these more comprehensive existing initiatives, several have been developed with the aim of supporting networking and the sharing of experience. This then offers a benchmark of best practices and expertise, and thus could contribute to supporting future legislative and standardization work. As an illustration, we can pinpoint a few major ones, which have been shared among our CG SSCC work, such as:

- European Energy Award

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[1] C 40, Council of European municipalities and regions, Covenant of mayors / Climate Alliance, EUROCITIES, European Climate Foundation, ICLEI, Metropolis, UCLG

[2] Aalborg Charter (Charter of European cities and towns towards sustainability), Barcelona City Protocol (City Protocol Society), Leipzig Charter on Sustainable European Cities

[3] European Commission Smart Cities Stakeholders Platform, European Initiative on Smart Cities (SETIS : European Strategic Energy Technology Plan), EFCA-FIDIC Project / Programme Sustainability Logbook (PSL), Reference Framework for European Cities (RFSC), United Nations Office for Disaster Reduction's Handbook to make cities more resilient

[4] Advisory and CEN/CENELEC/ETSI coordination groups on Eco design, smart grids, smart meters, e-mobility, accessibility, environment …

Standardization CLC/TC on electrical energy, electronic systems, water supply waste management, facility management, intelligent transports, sustainable purchasing …

[5] European Commission Urb-al III, UNEP Global Initiatives for Resource Efficient Cities, UN Habitat Sustainable Cities Programme, URBACT, Urban Investment Network

[6] City Biodiversity Index (Convention on Biological Diversity), European Green Capital, Global Cities Indicators Facility, ICLEI Eco Management and Audit Scheme (EMAS), Siemens Green City Index, european energy award

[7] BREEAM Communities: HQE Aménagement, LEED for Neighborhoods, European energy award

- Energycities
- INTA-the international sustainable urban development association
- City Protocol
- Covenant of Mayors

Among those, a number of practical tools for helping existing cities to become smarter and more sustainable have been created. They provide a planning and management approach with specific steps, audits, performance indicators (KPIs) and a follow-up process, to help any decision maker utilise a smarter and more strategic process and provide a follow-up methodology to evaluate the outcomes of any decision and action undertaken in such a comprehensive strategy. From our CG SSCC seminars and workshops, we can pinpoint a few successful approaches, with experience and learning gained over a long period, such as:

- the European Energy Award (EEA), created more than 20 years ago and implemented in more than 1200 cities in Europe, as well as adopted by the Covenant of mayors as a "preferred tool" to implement and follow their Strategy Energy Action Plans (SEAP). EEA covers 6 areas, mobility, regional planning and development, communal buildings and facilities, supply and disposal, external communication and cooperation, internal organisation.
- ICLEI, a global cities network more than 1000 cities of any size in 86 countries, created more than 30 years ago. ICLEI also creates tools dedicated to sustainable local change, a broad range of concrete and globally accessible tools to help cities transit to more sustainable urban management, covering the areas of urban design, eco-budgeting, urbanisation, sustainability management and eco-procurement.

Finally, other individual local initiatives, either global or sectorial, have been implemented with very successful outcomes, such as (from our CG SSCC participation and share of experience):

- the City of Stockholm and the SymbiovCity approach
- the City of Lucern based on EEA
- An industry-driven initiative on ride-sharing/car-pooling in the city of Bergen, Norway supported by National Road Authority which aims to reduce congestion and high traffic loads by filling up empty seats in surface transport
- the GRENOBLE "Ecocité"

Annex A gives an overview of the main identified existing initiatives (derived from SSCC-CG seminars and workshops).

It is therefore proposed to review how the topics and issues identified are addressed by each of the initiatives recorded.

The outcome is presented in annexes in a cross reference table highlighting commonalities and gaps. As an example, the table below presented in paragraph 2 objectives of making cities sustainable and smart.

- "Sustainable development in communities, regions and municipalities". It is a management system standard and easy to align with ISO 14001. The standard has been on public enquiry this summer and will be published in the end of 2013/beginning of 2014.
- "Sustainable IT". The standard has been on public enquiry this summer and will be published in the end of 2013/beginning of 2014.
- A new Nordic work to develop a standard for sustainable renovations of existing buildings (energy,)

4.2 European Innovation Partnership on smart cities and communities:

More detailed information is given in Annex B

The **EIP– European Innovation Partnership on Smart Cities and Communities** – is a stakeholder-driven initiative with the EC taking a facilitating role; bringing together cities, industries and citizens to tackle a key societal challenge through an integrated approach, encompassing the areas of energy, transport and ICT. The policy goals are the EU 20/20/20 energy and climate targets.

Launched in July 2012, it was set up by three Directorates of the European Commission (DG MOVE, DG ENERGY and DG CONNECT). The Partnership aims to overcome bottlenecks impeding the changeover to smart cities, to co-fund demonstration projects and to help coordinate existing city initiatives and projects, by pooling their resources together. The

ultimate goal is to establish strategic partnerships between industry and European cities to develop the urban systems and infrastructures of tomorrow. (EIP website: http://www.ec.europa.eu/eip/smartcities).

The CEN-CENELEC-ETSI Coordination Group on Smart and Sustainable Cities and Communities with its Members and Observers answered the EIP Invitation for Commitment. AFNOR, given that it holds the Secretariat of the coordination group is the Lead organisation for this Commitment.

In line with the EIP Operational Implementation Plan, Potential Standards Action 2 "Develop an interoperability framework for smart/sustainable-city/community standards including the identification of relevant existing standards and the gaps and overlaps between them", the CEN-CENELEC-ETSI SSCC-CG has proposed the development of a conceptual interoperability framework.

The aim is that this will enable both smart/sustainable-city/community projects and smart/sustainable-city/community standards to be categorised in order to:

- enable cities to easily find standards and good practice examples that are relevant to them,
- make it easy to describe exactly the requirements for new standards;
- make it easy to compare smart/sustainable-city/community projects in order to gather evidence as to which solutions are best for which circumstances.

It was proposed to undertake this work in partnership with all relevant stakeholders, including Key European City Networks and initiatives such as the Covenant of Mayors, the EEA (European Energy Award), Energy cities, INTA (International Sustainable Urban Development), ICLEI and EUROCITIES involved as much as possible in the information sharing and learning process.

The invitation for commitment of the SSCC-CG (n° 7352) for the development of a conceptual interoperability framework for smart cities, was accepted as eligible under this European Innovation Partnership in August 2014. The activity of the Action Cluster on 'standards' is expected to start in 2015.

The process proposed foresees the use of 'case studies' of smart and sustainable city and community projects with a wide range of sizes and governance models, climatic areas, cultural and societal issues.

It was also stated that this conceptual model should be consistent with the existing concepts (i.e. sustainability as for Bruntland definition, etc..) and international initiatives and ongoing works in the global standards organisations at ISO (ISO/TMB/Smart Cities Advisory Group and ISO/TC 268 'Sustainable development in communities', IEC (IEC SEG 1 Systems Evaluation Group- Smart Cities), ISO/IEC JTC1 Smart Cities Study Group and ITU-T Study Group 5- Focus Group on Smart Sustainable Cities). More generally, it should also be consistent with the European vision of smart cities (Leipzig charter, Toledo declaration, etc.).

R3 - Work towards the alignment of the EIP/OIP with the future activity of the CEN-CENELEC-ETSI SSCC-CG for the development of a common landscape and strategic programme for smart/sustainable-city/community standards.

R4 - In terms of developing a holistic and integrated approach (breaking the 'vertical silos' mentality) for standardization for smart and sustainable cities and communities, not to limit the SSCC-CG range of actions to the three vertical areas of the SIP (*Sustainable Urban Mobility; Sustainable Districts and Built Environment; Integrated Infrastructures and process across Energy, ICT and Transport*) but to widen the focus to 'other aspects' such as for example: integrated care, lifecycle Assessment (water, waste, etc), well-being, citizens' and cities' awareness and engagement in standardization, accessibility, privacy management, etc.

R5 - The three ESOs (CEN, CENELEC and ETSI) to play an active role in the EIP, specifically in relation to the proposed action cluster for 'Standards'.

The SSCC-CG to further develop and test the 'conceptual interoperability framework' as proposed in response to the EIP-Invitation for Commitment, in collaboration with all relevant stakeholders. This will involve the SSCC-CG working in synergy with other selected Invitation for Commitments on Standards and/or other 'Action Clusters' dealing with specific sectorial aspects/issues (such as for example the one on indicators and metrics or on Integrated planning and management or Infrastructure) so as to test, validate and refine the model. This will allow, not only the implementation of the OIP – Potential Action 2, but also interactions with other actions identified in the EIP – OIP such as knowledge sharing, metrics & indicators, open data, policy and regulation, integrated planning, etc.. In this way the model will provide a framework for the codification of best practices and guidelines for smart and sustainable city projects.

R6 - To engage cities and city representatives part of the online Marketplace of the European Innovation Partnership (EIP) on smart cities and Communities (www.eu-smartcities.eu), to get feedback from them on smart/sustainable-city/community projects that they have already undertaken, or are in the process of doing (possibly through the use case template model). As general consideration, to suggest the online Marketplace of the European Innovation Partnership (EIP) on smart cities and Communities (www.eu-smartcities.eu) as member of the SSCC-CG as 'Interested parties platform' for the SSCC-CG (see ToR point 7.3), acting in a purely advisory capacity to the SSCC-CG.

R7 - To take into consideration the HORIZON2020 Call for Proposal (opening 10/12/2014 closing 05/05/2015) SCC 3 – 2015 (Coordination and Support Action) 'Development of system standards for smart cities and communities solution as possible source of funding for ESOs activities in standardization for Smart/sustainable-cities/communities

R8 - A possible collaboration with/participation in the Lighthouse Projects (LHP) to be set up for the identification of relevant and existing standards or development of new standards to deliver innovative smart/sustainable-city/community solutions to be implemented on a large scale.

R9 - To implement as far as possible the potential actions of the priority area (10) "Standards" of the EIP-OIP actions and the SSCC-CG activities together with the international and global standardization organisations (ISO/IEC/ITU-T).

4.3 Standardization activities within European countries

4.3.1 Standardization activities in Poland

Observing national "smart city" initiatives launched to support cities in Poland in developing an eco- and citizen-friendly environment, and being inspired by the joint efforts of the three European Standards Organisations focusing on development of a roadmap of smart sustainable city standardization, it was decided to put forward a proposal to form a group at the Polish Committee for Standardization (PKN) providing recommendations for smart sustainable city standardization in Poland. This proposal gained wide acceptance, and so Task Group 1 (GZ 1) on Smart and Sustainable Development in Cities and Communities was established on December 9, 2013. The Task Group is composed of specialists from various fields of expertise who share a common interest in the field of smart sustainable cities and collateral subjects, and who are willing to take part in the discussions on how standards can support cities and communities in reaching out to identify what is best for them.

Having representatives from various Technical Committees of PKN who joined the group, Task Group 1 provides advice and assistance to the Electrotechnical Sector Council (RS-SET) when it comes to commenting on European and international standardization documents relevant to smart sustainable development of cities or communities. The Task Group, similar to CEN/CLC/ETSI SSCC-CG, is not a standardization body as such, but a coordination group to monitor any relevant national standardization activities, including identifying areas where appropriate standards are missing and making proposals for the allocation of standardization works in PKN, if needed.

Immediately after the kick-off meeting on January 15, 2014, members of the Task Group decided to establish the following two thematic groups (GTs):

GT 1-2 on terminology and Technical Bodies in PKN

Its scope covers a collection of English terms and their Polish equivalents related to smart and sustainable development of cities and communities to allow better communication among various smart city stakeholders. This includes the preparation of the list of Technical Bodies (OT) in PKN involved in standardization activities related to specific aspects of smart and sustainable local development and making proposals concerning the allocation of standardization works to the relevant OT in PKN.

GT 3 for gathering information and the development and implementation of a work programme

Its scope includes identifying stakeholders in Poland, and gathering information on any national "smart city" initiatives having an impact on environment-friendly development, sustainability, and liveability of a city. The group is also tasked with developing a work programme for GZ 1 based on identified priorities for Poland. Finally, its aim is to conduct communication and dissemination of activities to make the results of GZ 1 visible.

The results of the work of both groups are presented and discussed at the plenary meetings of GZ 1. This allows all members of GZ 1 to comment on their ideas, to interact with each other and to evaluate ideas and actions. To date, the Task Group 1 has held four such meetings, during which members of the group could share information on the most promising innovations in metropolitan areas that can be followed in other regions such as, for example, an Urban Energy Audit developed for Lublin and Zielona Góra.

4.3.2 Standardization activities in Germany

4.3.2.1 Structure

In order to respond as efficiently as possible to the universal smart city challenges, DIN and DKE have decided on a common approach with a joint steering body and joint working groups.

This common structure is shown in Figure 2.

The work on the German Standardization Roadmap is strategically controlled by the joint steering body. The nine DIN /DKE joint working groups (GAKs), the content of the Standardization Roadmap, the distribution of the Standardization Roadmap and its continuous revision are all coordinated by this steering body. The joint steering body can elaborate proposals for new standardization projects based on the results of the GAK. It is the national contact for all European and international standardization activities on smart city-related issues. In the future, it will organize the German representation in the strategic activities of the European and international standardization organisations (CEN/CENELEC and ISO/IEC), with the goal of assuming a leading role.

The "Standardization Roadmap" GAK is responsible for drawing up the German Smart City Standardization Roadmap. It also carries out needs-based revision of the Standardization Roadmap.

The other eight joint working groups take care of discussing and documenting all standardization-related information within the topic areas in close collaboration with the national bodies, especially the joint steering body. This information is fed into the content design of the national standardization roadmap. The GAKs consult regularly with each other through joint meetings and the exchange of documents. The demand for standardization in each of the eight joint working groups is not yet clear.

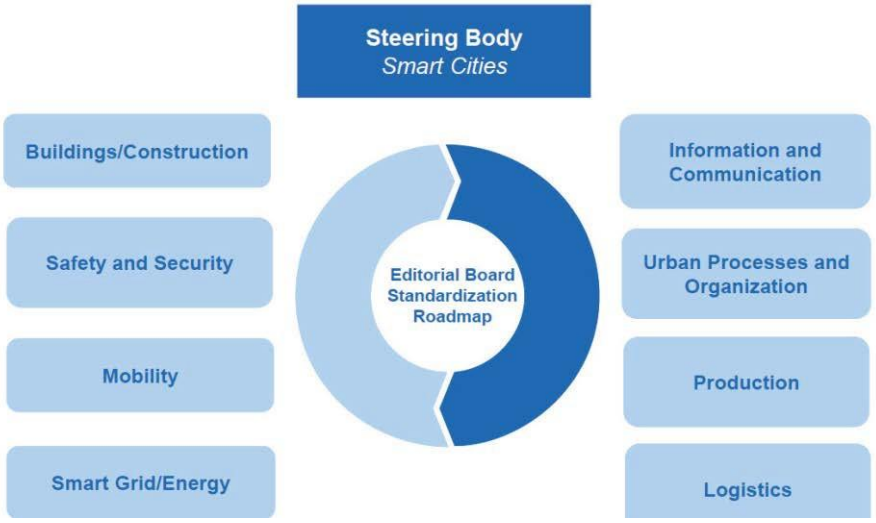


Figure 3 – the structure of DIN/DKE work on smart cities

4.3.3 BSI Smart cities standards work programme 2011-14 and beyond

BSI's Smart Cities Advisory Group has identified a number of issues where barriers to smart city implementation can be reduced and progress accelerated through provision of standards. The benefits of this approach will include sharing of good practice on development and implementation of new service models, identifying common solutions to technical problems, setting out the preconditions for interoperability of data and city systems and describing ways in which risks can be managed and mitigated.

The **current smart cities standards** work will provide a foundation of knowledge to help establish a common vision for smart cities. The first stage of work has focused on establishing a common understanding of the benefits of smart cities and the approaches that can be taken to improve city performance. Specific projects include:

- Providing an overview description of a smart city to provide a basis for communicating the benefits of smart cities to key decision makers (**PD 8100 – to be published December 2014**)
- Establishing common terminology for smart cities, promoting a shared understanding of concepts (**PAS 180 – published and available online for free**)
- Preparing smart city planning guidelines to set out how major new residential, retail and business developments can support the wider plans of that city to become smarter (**PD 8101 – published and available online for free**)
- Setting out principles for economic assessment and funding of smart city initiatives, covering the potential business models and means of procurement (**Report available for free at www.bsigroup.com/smart-cities/smart-cities-economic-assessment-and-funding-initiatives/**)
- Providing a decision-making framework for smart city leaders, setting out how to deliver a smart city project (**PAS 181 – published and available online for free**)
- Developing a smart city data concept model to promote the sharing of data between different agencies within a city (**PAS 182 – published and available online for free**)
- Mapping the current smart city landscape across different standards bodies internationally and sharing best practice (Free report at **www.bsigroup.com/smartcitymapping**)
- Contributing to ISO standards on sustainable community development, global city indicators and infrastructure metrics

Beyond this, BSI is partnering with the future cities catapult and is currently identifying **further issues** that should form the basis of a more detailed standards programme beyond 2014, addressing specific practical issues and risks that will be encountered in roll-out of smart city programmes. This project has been submitted and accepted as part of the EIP commitments – please refer to commitment number 5937.

The UK good practice created through BSI's work will be offered for adoption internationally through CEN/CENELEC, ISO and IEC as deemed appropriate. BSI will take a leading role in European and international standards activities, actively working to align programmes across standards bodies, building on existing knowledge and sharing UK initiatives with other countries to create a global framework for smart cities knowledge. For more details please visit **www.bsigroup.com/smartcities**

4.3.4 Standardization activities in Spain

AENOR published in July 2014 a report that includes the National standardization strategy for smart cities[8]. 13 projects for Technical standards are currently being developed. These standards will promote smart cities in our country. Publication is expected during 2015-2016.

Work programme:

- PNE 178101 Smart Cities. Infrastructures. Metrics for Public Services Networks
- PNE 178102 Smart Cities. Infrastructures. Multiservice local networks
- PNE 178103 Smart Cities. Infrastructures. Convergence of Management and Control Systems in a Smart City
- PNE 178104 Smart Cities. Infrastructures. Comprehensive systems for a Smart City
- PNE 178105 Smart Cities. Infrastructures. Universal access, urban and land use planning
- PNE 178106 Smart Cities. Infrastructures. Specification Guidelines for Public Buildings
- PNE 178201 Smart Cities. Definition, requirements and indicators
- PNE 178301 Smart Cities. Open Data
- PNE 178303 Smat Cities. Management of the city's assets. Specifications

[8] Available in Spanish at
http://www.aenor.es/DescargasWeb/normas/normas_ciudades_inteligentes.pdf

• PNE 178302 Smart Cities. Interoperability of charging stations. Minimum requirements for the interoperability of electric vehicles recharging infrastructures

• PNE 178401 Smart Cities. Street lighting. Telecontrol typology according to zoning

• PNE 178501 Management systems for smart tourist destinations. Requirements

• PNE 178502 Indicators of smart tourist destinations

The Technical Standardization Committee on Smart Cities (AEN/CTN 178) is an initiative of the Secretary of State for Telecommunications and the Information Society in the Ministry of Industry, Energy and Tourism. It was created by AENOR in December 2012 in order to promote, streamline and optimise the implementation of smart cities in Spain.

Detailed information

AEN/CTN 178 National Committee on "Smart Cities": created on December 2012.

Scope: Standardization of requirements, guidance and supporting techniques and tools to help communities becoming smart. The concept of community covers any finite unity of a local entity. Excluded are products and equipment competency of other TCs.

Composition: 369 members

Structure and Composition: 5 Subcommittees:

- SC 1 "Infraestructures"
- SC 2 "Indicators and Semantic".
- SC 3 "Government and Mobility"
- SC 4 "Energy and Environment"
- SC 5 "Touristic Destinations".

SC 5 on Smart Destinations was created later, in October 2013. Standardization works in the field of Smart destinations are the framework of the Integral National Plan on Tourism (Plan Nacional Integral de Turismo (PNIT), within one of the mandates of the Secretary of State on Tourism (Secretaría de Estado de Turismo (SET)) that is the creation of a homogeneous framework to classify the smart touristic destinations.

General figures:

1 plenary, 1 CAG, 252 entities, 688 members, 5 Subcommittees, 22 WGs, 13 projects under development.

4.4 Relevant international work at global level

4.4.1 ISO TC 268 "Sustainable development in communities"

ISO/TC 268 is responsible for standardization in the field of Sustainable Development in Communities which will include requirements, guidance and supporting techniques and tools to help all kind of communities, their related subdivisions and interested and concerned parties to become more resilient and sustainable and to demonstrate achievements in that regard. The proposed series of International Standards will thus encourage the development and implementation of holistic, cross-sector and area-based approaches to sustainable development in communities. As appears in the programme of work, it will include Management System Requirement, Guidance and Related standards.

At the date of this report, ISO/TC 268 is organized as below:

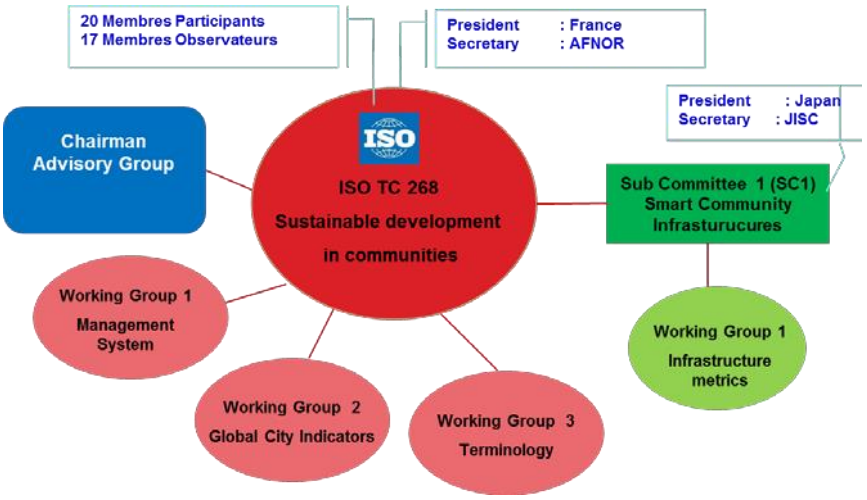


Figure 4 – organisation of the work of ISO TC268

4.4.2 Other international agreements or initiatives that may impact the CEN work on SS CC

4.4.2.1 ISO/TMB/Smart Cities Advisory Group

The ISO Technical Management Board in February 2014 established a Smart Cities Advisory Group[9]. The Chairman is Mr Graham Colclough and the Secretary Mr Francesco Dadaglio (BSI leadership).

The ISO/TMB/Smart Cities Advisory Group aims to:

- propose a clear working definition of smart cities;
- describe the smart cities landscape and identify the aspects of the smart/sustainable-city/community concept that are most relevant to ISO;
- review the existing initiatives and standards activity in ISO;
- develop a gap analysis to identify areas for standards development in ISO and areas for collaboration with other standards bodies, and
- coordinate ISO input, and nominate experts, to the IEC/SEG1.

The ISO AG welcomes the engagement with the leadership of the IEC/SEG1, the ITU-T SG5 Focus Group on Smart Cities, the ISO/IEC JTC1/SG1 on Smart City and CEN-CENELEC-ETSI SSCC-CG, in order to avoid duplication of efforts on international standards activity on smart cities. The kick-off meeting was held in Geneva on 17 June 2014.

4.4.2.2 ISO/IEC JTC1 Smart Cities

Following a growing interest in the area of Smart Cities among a number of standards setting organisations, a Study Group on Smart Cities JTC 1 was established in (December 2013).

The Convenor of the JTC 1 Study Group on Smart Cities is Ms Yuan Yuan of the Chinese National Body and Ms Tangli Liu the Secretary.

Tasks of the ISO/IEC JTC 1 on Smart Cities were:

- To provide a description of key concepts related to Smart Cities, establish the definition of Smart Cities based on the key concepts, and describe relevant terminology;
- To study and document the technological, market and societal requirements for the ICT standardization aspects of Smart Cities;
- To study and document current technologies that are being deployed to enable Smart Cities;

[9] ISO/TMB Resolution 36/2014

- To assess the current state of standardization activities relevant to Smart Cities within JTC 1, in other relevant ISO and IEC TCs, in other SDOs and in consortia;
- To identify and propose how JTC 1 should address the ICT standardization needs of Smart Cities;
- To provide a report with recommendations, and potentially other deliverables, to the 2014 JTC 1 Plenary. Membership

in the SG on Smart Cities was open to JTC 1 National Bodies, JTC 1 Liaisons and approved JTC 1 PAS Submitters;
JTC 1 /SCs, JTC 1/(S) WGs, relevant ISO and IEC TCs; Members of ISO and IEC central offices; and invited standards setting organisations that are engaged in Smart Cities standardization as approved by SG on Smart Cities.

The report of the Study Group was completed in October 2014.

4.4.2.3 IEC SEG 1 Systems Evaluation Group-

This was set up by IEC to evaluate a new potential field of standardization activity in terms of seeing a smart city as a system of systems. The Systems Evaluation Group's (SEG) main objective is the identification of current standardization projects and evaluation of potential future projects both inside and outside IEC and ISO. The group is expected to work out ideas for new standardization work items to be launched in either existing or to be established committees at IEC and ISO. It will evaluate relevant projects and determine the need to establish a Systems Committee (SyC), reporting to IEC/SMB.

The SEG's final report will be submitted to IEC/SMB in May 2015.

Scope of SEG1:

IEC/SEG1 on Smart Cities will evaluate and determine the need to establish a Systems Committee (SyC) with regard to Smart Cities including the SyC's scope, relevant generic use cases, a possible reference architecture model, a standardization roadmap* , a survey and collection of existing and to-be-defined evaluation, metrics and terms & definitions, and a mapping of closely related activities in cooperation with IEC internal technical bodies, ISO and other organisations, fora and consortia.

*including gap identification

SEG1 established the following 8 **Working Groups** that provide input to SEG1 Task Groups, for the preparation of the final report:

WG 1: City Service Continuity

WG 2: Urban planning and simulation system

WG 3: City facilities management (CFM)

WG 4: Use case – Smart Home

WG 5: Use Case – Smart Education

WG 6: Smart Cities Assessment

WG 7: Standards development for smart cities using the City of Johannesburg

WG 8: Mobility and Logistics

In addition,, the following 3 **Task Groups** were established:

TG 1: Inventory of existing standards

TG 2: Inventory of generic use cases and architecture models

TG 3: Inventory of relevant definitions, mapping of related activities and drafting of a roadmap

SEG1 liaises with the following groups:

- IEC/SyC on Smart Energy
- IEC/MSB smart city whitepaper group
- ITU-T/SG 5/FG-SSC
- JTC 1/SG 1 on Smart cities

- ISO/TC 268

4.4.2.4 ITU-T SG 5 Smart Cities

The Focus Group on Smart Sustainable Cities (ITU-T FG SSC) was established at the ITU-T Study Group 5 meeting in Geneva in February 2013 with the aim to assess the **standardization requirements** of cities aiming to boost their social, economic and environmental sustainability through the integration of information and communication technologies (ICTs) in their infrastructures and operations. The FG-SSC acts as an open platform for smart cities stakeholders -municipalities, academic and research institutes; non-governmental organisations (NGOs); ICTs organisations, industry fora and consortia – to exchange knowledge in the interests of identifying the standardized frameworks needed to support the integration of ICT services in smart cities.

Chairman of the ITU-T FG SSC is Mrs Silvia Guzman Araña, Telefónica. The Secretariat is Mrs Cristina Bueti, Adviser, ITU. As Liaison Rapporteur is Mr Paolo Gemma (Huawei), Coordinator of Working Group 2.

The main tasks of the FG-SSC are:

- Defining the role of ICTs in environmentally sustainable smart cities, and identifying the ICT systems necessary to their development;
- Identifying or developing a set of Key Performance Indicators (KPIs) to gauge the success of smart-city ICT deployments;
- Establishing relationships and liaison mechanisms with other bodies engaged in smart-city studies and development;
- Identifying future smart-city standardization projects to be undertaken by its parent group, ITU-T Study Group 5;
- Developing a roadmap for the ICT sector's contribution to Smart Sustainable Cities, providing cohesion to the development and application of technologies and standards.

The outcome of the fourth meeting in Geneva on March 2014 was the agreement on the development a Roadmap for Smart Sustainable Cities and on the following definition:

"A smart sustainable city uses information and communication technologies (ICTs) to provide enhanced quality of life to its citizens, improved efficiency of services and sustainable development. Such a city meets the needs of today without sacrificing the needs of future generations with respect to economic, social and environmental aspects".

A deliverable of the FG-SSC WG3 is a Technical Report on Standardization Activities and Gaps for SSC and suggestions to SG5

4.5 Activities in other parts of the world

4.5.1 China

Facing the increasing urbanization challenges on sustainable and public services' development, China started to focus on smart cities in 2012 with the launch of the 'China Strategic Alliance of Smart City Industrial Technology Innovation' gathering institutes, companies, universities and consulting. One of key problems perceived was the absence of standards in construction for Smart Cities. Priorities have been set for the elaboration of a standardization roadmap in coordination with stakeholders, for the establishment of a standard system based on the analysis of related existent standards and new standards needs and finally for the development of new standards, without entering into conflict with existing standards in vertical sector (transport, smart grids, etc..).

China is looking at the standardization work carried out at International and European level and is active at ISO/IEC/ITU-T level, but it is also active at national level, with specific national strategic planning supported by the Central Government. A national Smart Cities Standardization Coordination Group is coordinating through project groups all related SDOs working at national level. National standards are administrated by Standardization Administration (SAC, NDRC,MOST, MIIT). Supervised by SAC (Standardization Administration of the People's Republic of China), all the SDOs work together and propose the Standard System of Smart Cities, 22 standard items including terminology, reference model, evaluation model, indexes, and guidance on how to use standards.

National standardization projects are about a Smart Cities Evaluation Model and Underlying Metrics System on Information Infrastructure, Information Application and Service and Construction Management and a Smart Cities Application Guidance and Technical Reference model. For the Reference architecture model, China would like to coordinate with the CEN-CENELEC-ETSI SSCC-CG.

The strategy is based upon three principles: 'overall planning'; 'coordination' with governments, SDOs, users, industries and academic and 'application' with local cities participating to the standard development. A draft Smart Cities Reference

Architecture is under development. A Smart Cities Standardization Report was due to be published in September 2014 and more than 20 new national Standards Projects are going to be approved by the end of 2014. In long-term China is expected to establish a Smart Cities Standard System by 2016 to boost standards' development at national level with local pilot and testing on selected cities. At international level, China would like to participate actively to the international standardization work. Promotional and support activities to the standard system are also foreseen including consulting, training, testing and evaluation.

Overview of SDOs working on Smart Cities in China

	Standardization Setting Organizations	**Relative international SDOs**
1	China National Information Technology Standardization TC	ISO/IEC JTC 1
2	（SAC/TC485） China National Communication Technology Standardization TC	ITU-T
3	China City Science Institute	ISO TC268/SC1
4	（SAC/TC426） National TC on Digital Technique of Intelligent Building and Residence Community of Standardization Administration TC	
5	Beihang University	

Overview of China participation at ISO/IEC/ITU-T level

(SDOs)	**(Smart Cities groups)**	**(China's role)**
（ISO）	(TMB AG on Smart Cities) （ISO/TC 268/SC1）	（member） （Vice-chair）
（IEC）	(IEC/SEG on Smart Cities)	（Co-convenor） （Leader of TG1） （Leader of WG2,3,4,5,6）
（ITU-T）	(ITU-T/FG-SSC)	（Vice-chair）
（ISO/IEC JTC1）	(SG on Smart Cities)	（Convenor） （Secretary） （Co-editor）

4.5.2 The American National Standards Institute - ANSI

In May 2014, ANSI, The American National Standards Institute - the official U.S. representative to the International Organisation for Standardization (ISO) and, via the U.S. National Committee, to the International Electrotechnical Commission (IEC)-announced the establishment of the ANSI Network for Smart and Sustainable Cities (ANSSC), a forum for information sharing and coordination on voluntary standards, conformity assessment, and related activities for smart and sustainable cities in the U.S and abroad.

The Network objectives are:

- To get input from cities and local governments, organisations representing them, and organisations involved in urban infrastructure planning and development, on the challenges that cities are facing;
- To enable standards practitioners to describe how standardization can assist cities and local governments in addressing critical issues ;
- To facilitate discussion among U.S. public- and private-sector stakeholders on needed standards and conformity assessment programmes for smart and sustainable cities;
- To promote awareness of standardization initiatives and related activities that support smart and sustainable urban infrastructure planning and development

The ANSI network goal is "to advance standardization as part of a solution set which can help cities to become smarter, more sustainable, and more resilient." The formation of the network came on the heels of an ANSI workshop in November 2013 and a follow-up meeting in April 2014 among key stakeholders (industry, cities and local governments, organisations involved in urban infrastructure and sustainability, standards developing organisations, the federal government, and academia).

The workshop in November 2013 identified a number of priority areas where standardization can contribute to smart and sustainable cities:

- a standardized set of definitions / lexicon for smart cities, applicable across sectors;
- interoperability for systems of systems, including common data formats and communication protocols to enable sharing of data between systems;
- key performance indicators so that measurements are consistent and comparable;
- a baseline guidance document that can be adapted to address the specific needs of sectors;
- best practices;
- resiliency for disaster preparedness and recovery.

ANSI will serve as a neutral facilitator to address national and global priorities in areas as diverse as electric vehicles, energy efficiency, and homeland security, bringing together affected stakeholders from the private and public sectors to discuss standardization needs.

4.5.3 World Council on City Data

This organisation was founded in 2008 in collaboration with the World Bank and nine pilot cities, as the Global City Indicator Facility. GCIF undertook to address the lack of a standardized set of urban indicators and a methodology that would allow cities to compare how they were performing. Since then, the membership has grown to 253 cities across 80 countries. The indicators are focused around themes organised into two broad categories: city services and quality of life.

GCIF worked in close collaboration with ISO/TC 268 'Sustainable development in communities' on city indicators and once the ISO 37120:2014 "Sustainable development of communities -- Indicators for city services and quality of life" was published, set up as the World Council on City Data in order to support the implementation of the standard by cities globally.

4.5.4 The City Protocol Society

City Protocol Society is a global, cross-sector but city-led, NGO that is developing common approaches to tackle city needs.

The City Protocol Society develops agreements, in the form of information and recommendations, developed to address issues agreed by the community of cities. Typical deliverables are:

- Projects and policies tested in cities that can be used as exemplars for other cities, along with Indicators and certifications for those same projects and policies
- Recommendations and technological information.

These are developed by the City Protocol Task Force, which brings together experts from a variety of backgrounds to tackle challenges identified by cities, in an open and transparent way. The aim is to achieve rough consensus around these solutions so that they can gain widespread take up among the members of the City Protocol Society.

All of the Intellectual Property used and generated within this process is managed by the City Protocol Society to ensure that it cannot be misused.

These common solutions, effectively, become the precursor to city standards.

4.5.5 Orgalime

Orgalime, the European engineering industries association, is contributing to the European Innovation Partnership on Smart Cities and Communities and is committed to continue this. One of the key issues identified in the Orgalime position paper "Policy Recommendations on Smart Cities and Communities" is "Interoperability & Standards & Data". Orgalime believes that interoperability, the development and usage of standards and the rightful handling of data are key elements for smart cities and communities. In this position paper, Orgalime supports the SSCC-CG efforts to convince ISO, IEC and ITU to cooperate much closer. The position paper is freely available at http://www.orgalime.org/position/policy-recommendations-smart-cities- and-communities.

R10 - The SSCC-CG recommends that a review should be undertaken of how the topics and issues of a sustainable and smart city, as identified by SSCC-CG, are addressed by each of those initiatives.

5 Added value of standardization

5.1 Introduction

There are four areas where standardization could help to deliver a smarter and more sustainable city or community:

- Developing and managing a smart/sustainable strategy for a city or community. The first aim of European standardization on smart and sustainable cities is to facilitate the development of an effective collaboration between the key players in a city, including the residents and businesses, in order to build a common vision, develop an agreed roadmap to delivery it, manage the process and evaluate progress;
- Managing major Smart/sustainable-city/community Projects. This relates to the implementation of big and complex projects involving many different partners. These would require new and innovative business models and funding packages and new ways of management that cut across the different agencies concerned;
- Doing things smarter. In other words, light touch changes to processes within the city, for instance to support the better collection and sharing of data to enable the city to function better. These are initiatives that are comparatively easy to implement but can be vital ingredients of a smart/sustainable-city/community. Standards on physical and digital environments that ensure accessibility for all citizens;
- Putting in place a solid foundation. This relates to foundational issues that standardization could also contribute to improve: the legal, ethical and inclusivity requirements coming out of the changes that the implementation of smart technology can enable and to ensure that the citizen is kept central, in order to build all the initiatives on firm foundations.

In all of these areas codified good practice and appropriate standards, supporting interoperability and cohesion between city systems, would prove very helpful to cities and communities in their progress towards smartness as for example

Buyers (Governments, developers, operators, etc.) could benefit from: easier planning, easier procurement of infrastructure, support with purchasing decisions, and guidance regarding the management of multiple providers

Providers (Vendors, consultants …) could benefit from better understanding of buyer needs; more efficient and effective global sales; more efficient and effective R&D.

5.2 Developing and managing a smart/sustainable city strategy

5.2.1 Why a strategy?

Smart cities offer opportunities for integrated thinking and planning. The development of an overall smart/sustainable-city/community strategy is attractive for local authorities seeking to make best use of the available technologies. The use of standards is essential to enable a strategy to be drawn up, and to ensure the different city services can operate correctly in line with it. The focus is on the sort of guidance and standards that would help a city in developing and managing its overall smart/sustainable-city/community strategy.

A number of relevant documents are already published at international level. The international standards published by ISO could be adopted in Europe through Vienna Agreement. Usually this is done through adoption without modifications of the document, but specific requirements could be needed if European needs have to be met. Some supplementary work may be

needed to ensure European requirements are covered, for example, BSI PAS181:2014 *"Smart city Framework. Guide to establishing strategies for smart cities and communities"* provides an overview of the strategic aspects or BSI PAS 182:2014 "

5.2.2 Common city concepts

It is important to ensure that there is a common understanding amongst all the stakeholders of what it is that makes the city into a smart one. This then enables a common understanding, and facilitates the adoption of a common concept-setting framework. Within this, there may be several "models" to enable the city to be looked at from different angles; smart/sustainable-cities/communities integrate multiple systems that include infrastructure, processes and of course the citizens, with IT as a common factor.

The most important dedicated contributions that standardisation can make to the development of smart/sustainable-cities/communities relate to this common understanding. The major aspects to which standards can contribute are:

- **Models and modelling techniques:** Standards from ISO-IEC JTC1/SC7 can be used to produce conceptual models, which can be represented in software such as UML, and some individual cities have developed their own "standards". There is also a dedicated specification for modelling of the physical aspects of the city in different contexts - CityGML from the Open Geospatial Consortium;
- **Terminology:** consensus on a common terminology can help considerably to promulgate concepts amongst a wide audience. A first attempt at a common terminology has already been provided through PAS180:2014 *"Smart cities - Vocabulary"* from the BSI.

ISO TC268 is setting up a WG3 that will be looking at terminology for smart and sustainable cities and communities, and ISO TMB's Strategic Advisory Group on Smart Cities is exploring establishing of a common repository, where all the standards organisations can upload all the terms for which they feel definitions are needed, along with any definitions that already exist, and enable conflicts between different definitions to be resolved appropriately. The ESOs should track closely the progress of these initiatives, and seek to ensure they reflect European needs;

- **A roadmap**: to develop and implement a smart/sustainable-city/community strategy, a community's leadership needs to have a systematic way to evaluate priorities and to develop the most appropriate set of actions and timescales needed to help the city become smarter.

BSI PAS181, referred to above, contains some relevant guidance.

5.2.3 Good practice examples

The promulgation of an effective standardized approach can be helped considerably by the use of good practice examples of cities using such elements already. The provision of standardization deliverables as implementation guidelines should also be considered.

5.2.4 Accelerated collaboration and partnerships

A standardized approach is vital to ensure that cities can integrate their different services.

To make a smart/sustainable-city/community work, the key stakeholders within the city need to be able to work seamlessly and effectively together. There may be different public agencies active inside a city, eg from central and local government entities, and many key services may not be managed by city councils but by a range of public, private and community agencies. Bus services, for instance, may be privately run, but still need to be managed in an integrated and coherent way with the wider transport systems within the city and also to support wider city aims. Guidance is needed for cities, on how they can best bring all the key stakeholders together to develop a coherent and common vision and work together effectively to implement it. Similarly, wider communities than a single city - for example a city with its regional hinterland - will need to work together effectively, and standards, not merely to ensure technical interoperability, are a pre-requisite.

5.2.5 Sustainability impact assessment and evaluating Smart/sustainable-city/community Performance

Standards should provide yardsticks to measure how well a city is doing, both against its own planning and in comparison with other cities. ISO TC268 has prepared a first proposal for a comprehensive set of indicators, in the form of International Standard ISO 37120 *"Sustainable development of communities -- Indicators for city services and quality of life".* The SSCC-CG suggests this ISO standard could be adopted as European standard if relevant for Europe. .

ISO 37120 also is relevant to impact assessments, as will be a separate proposed standard ISO 37101 *"Sustainable development and resilience of communities -- Management systems -- General principles and requirements".* The latter is at the Committee Draft stage, with final publication targeted for 2016.

ISO Technical Report 37150:2014 "*Smart community infrastructures - review of existing activities relevant to metrics*" provides a valuable insight into the existing measurement of "smart community infrastructures" by cities across the globe.

5.2.6 Resilience / industrial regeneration

To ensure their citizens have housing and employment, many cities today face some serious restructuring issues, having to deal with a decaying industrial environment, land use problems and so on. A standardized approach will be important: ISO 37101 mentioned above will assist local authorities to manage these processes, but additional standardization may also be required, especially to ensure citizen requirements are correctly factored in.

R11 - CEN members (as members of ISO) to track the relevant work in ISO TC268 and the SSCC-CG to recommend to take up this work if relevant at European level.

5.3 Implementing major new smart/sustainable city projects

5.3.1 Economic Assessment and Funding of Smart/sustainable City Initiatives

Many cities today are facing hard financial constraints both on investment financing as well as on bearing operating costs. Any smart and sustainable city project needs to be justified on socio economic value creation as well as through a good business case for investment.

Urban efficiency gains such as energy savings for example can contribute to significant reduction of operating costs, urban efficiency can also reduce pollution, crime, time lost in travelling and deliver other benefits; these have to be assessed through recognized methodologies and tools.

The financing plan of any project will need to be assessed not only in term of return on investment but also in term of risks and the maturity of planning and implementation. Cities can use a variety of financing instruments, such as fully funding, joint ventures to public private partnerships (PPP), and other similar models. Developing a plan based on integrated solutions is a complex operation which needs to go through technical details of potential solutions.

All above elements illustrate the potential complexity of economic assessment and thus of financing with possibly external investors; Standards can, by referencing good practices and by providing tools to stakeholders, reduce this complexity, lower the perceived risk level and provide the necessary confidence.

5.3.2 Procurement

Systems and services that can enable urban efficiency and sustainable management of urban infrastructure are already commercially available and continuously improving technologies can be adapted and combined in different ways to address multiple situations. The development of smart/sustainable-cities/communities involves both technology providers offering technical solutions and city authorities procuring them. Smart development requires solutions to be adapted to the specific needs of the city and its citizens. The way city authorities organise their activities and procurement systems is a key element for the development of a smart/sustainable-city/community. As such, they need to act as a partner with industry, service providers, financiers and end users, to build the smart/sustainable-city/community. Standards will considerably facilitate the procurement of these tailor-made solutions adapted to different circumstances.

Public contracts and concessions are tools to modernize the public sector and contribute to a more equitable and sustainable model of growth. New rules have been adopted which allow public policymakers to use these tools more effectively, and at the same time make the best use of taxpayers' money. Public contracts can be managed more easily and effectively with savings in terms of time and resources for both public clients and enterprises, in particular SMEs. Social inclusion, the environment and innovation are also recognized as priorities in their own right, allowing public policymakers to opt for the best offer rather than simply the cheapest one. [ISBN 978-92-79-36177-7 doi: 10.2780/45535]

A call for proposal under Horizon 2020, H2020/SCC 4 (2014) aims to establish networks of public procurers in local administrations on smart city solutions. The scope of this action should aim at networking public procurement bodies in order to establish "buyers' groups" for innovative smart city solutions that improve the potential impact of the investment for cities and their citizens, and improve framework conditions for innovation. These networks will help public procurers to increase their capacity to undertake a better coordinated and articulated dialogue with suppliers about future needs by exchanging experience in procurement practices and strategies and by undertaking joint or coordinated actions. The networks must have core set of deliverables:

- identifying procurement around a common need by European cities for which goods and services at the intersection of ICT, energy and transport in urban areas are bought as investment;

- prepare a number of formats/scenarios for possible future joint procurements; assessing the state-of-the art of potentially available solutions by developing different approaches for "market consultations" involving the supply chain (paying special attention to SMEs and locally-based businesses);
- carrying out legal work to ensure that the procurement of innovative solutions complies with European and national law;
- improving procurement capabilities by joint training, workshops and other networking activities

5.3.3 New practices for industry

Smart/sustainable-city/community projects require collaboration with global technology providers, and local organisations best suited for the specific system improvements needed. The smart/sustainable-cities/communities emerging strongest will be those where solution providers collaborate rather than compete to bring the most comprehensive and best solutions together. This means sharing information, breaking down silos and involving global leaders, with world-class capabilities, as well as local providers and stakeholders, who know their cities the best. Incorporating the ideas and thinking of citizens is critical to successfully identifying potential problems. It also helps to win citizens' support and participation in the efficiency initiatives

Due to the economic constraints described previously, new financial models and public private partnership mechanisms to finance and run the new infrastructures and services are necessary

All these new practices will need to be referenced and standards can help a lot in this.

5.3.4 Enabling infrastructure/equipment/platform

The efficient integration of electric grids, gas distribution systems, water distribution systems, public and private transportation systems, commercial buildings, hospitals, homes is essential. These form the backbone of a city's liveability, and sustainability.

While the technologies to develop smart/sustainable-cities/communities are already readily available and improving, it is essential that they are introduced in an integrated way to achieve the necessary efficiency. Without integration of systems there cannot be smart/sustainable-cities/communities. Thus, interoperability in essential to bring on the systems and products that offers the potentially affordable/sustainable solutions. The existence of common standards guarantees that components of different suppliers and groups of technologies can interact seamlessly.

A smart/sustainable-city/community gathers data from smart devices and sensors embedded in its roadways, power grids, buildings and other assets. It shares that data via a smart communications system that is typically a combination of wired and wireless. It then uses smart software to create valuable information and digitally enhanced services.(http://smartcitiescouncil.com/category-vision).

Data will be an essential part of cities' infrastructures and a backbone of their success. They are the glue for smart/sustainable-cities/communities, enabling collaboration and integration across departments, domains and systems, and will allow better decision-making due to the new insights they will provide.

Standards can contribute to drive down investments costs, to facilitate integration and to control operation costs.

5.4 Doing things smarter

Becoming a smarter and more sustainable city or community is not simply about the implementation of large scale complex projects. Just as important is the need to make more subtle changes to existing processes in order to support wider integration; in other words doing things smarter. Here also standards can have a vital role.

5.4.1 Widening out sector specific standards

Many excellent standards have already been developed for specific sectors and for individual organisations. There is therefore no need to develop large numbers of completely new standards in order to help cities and communities become smarter. Rather, the need is to review existing standards and modify them where necessary to ensure that they take into consideration the requirements that relate to the complexities of city/community-wide, and cross-system integration.

In this way, existing best practice in individual organisations and systems can be built on to provide city-wide best practice.

5.4.2 Data sharing

One of the key opportunities to enable a city or community to become smarter comes from the increasing ease with which useful data can not only be generated, but also shared and aggregated.

In order to benefit from this a number of key standards are needed.

5.4.2.1 Concept model

One simple challenge is that when individual city or community agencies collect data, they often use different terms to refer to the same concepts. For instance:

- a health service provider might collect information about patients being treated at different surgeries;
- an education provider might collect information about students being taught in different colleges;
- an advice service might collect information about enquirers being provided with information at different local centres;
- an employment service might collect information about unemployed people being provided with job-seeking support at different offices.

Each of these refers to the same set of concepts but uses different terminology to do so. This makes it much more difficult to share information between databases from different service providers in order, for instance, to gain an overall picture of what sort of services are being provided to the citizen in different areas of the city.

So it would be useful to develop an agreed set of common concepts to which the data from different databases could be mapped, to allow the easy aggregation of the data. BSI is about to publish a standard in this area; PAS 182 *Smart/sustainable-city/community data concept model*, and this could potentially be used as the basis for Europe-wide standards.

5.4.2.2 Technical data standards

Another important piece of standards work would be to make sure that all the agencies within the city use a common set of technical data standards, to allow data to be stored, aggregated, handled and queried in consistent ways. It is possible that there already exist sufficient standards in this area.

However more research is required to understand how far existing standards meet city needs, ensure that any gaps are filled, and to develop guidance documents for city leadership on what they need to do in order to get the full set of standards implemented.

5.4.2.3 Exploiting data effectively

Finally, in order for a city to be able to use data effectively, agreements need to be made about how data generated within individual city/community systems, can be made available to be shared with other agencies, as appropriate, in a way that allows personal privacy and data security to be managed effectively. Here, again, it would be useful to develop some guidance documents and some model agreements to enable cities to benefit from established best practice.

5.4.3 Planning Guidelines

The purpose of standards related to planning guidelines is to provide guidance to ensure that developments and infrastructure projects are designed and built in a way that facilitates the city's progress towards becoming smarter.

Designing smartness into developments and infrastructure projects could provide cities with the clarity they need to think strategically about how smart urban planning and design can help the city as a whole to function better.

It could also provide an opportunity to test new business models and processes comparatively cheaply and easily and use this to demonstrate the viability of replicating them citywide.

Guidance is needed for the following reasons:

- It is easier and cheaper to put in place the foundations for a smart/sustainable-city/community within a development or infrastructure project at the planning and implementation stage;
- Developments and infrastructure projects often provide cost-effective opportunities to test and trial smart/sustainable-city/community products and services, and the business models and processes required to fund and operate them, before rolling them out citywide;

- The smart use of data and digital modelling can not only enable neighbourhoods to be better designed for the people who use them, but can also enable significant savings in the implementation, ongoing management and service delivery stages.
- The impact of a failure to take these opportunities is:
    - the added complexity of having to re-write contracts, and re-define management and funding arrangements in order to support the provision of smart/sustainable-city/community products and services later on;
    - the cost of having to rectify faults in the way a new neighbourhood or area is designed that could have been picked up in the early stages through the use of digital modelling;
    - the cost of having to retrofit vital smart technology; and
    - the missed opportunity for using new urban developments and infrastructure projects to learn important lessons that can inform wider smart/sustainable-city/community strategies.

5.4.4 Urban modelling tools

Many of the challenges that face cities and communities today relate to the rapid changes that are taking place at this present time and the need to anticipate these. These challenges include:

- changes in lifestyles and expectations of citizens;
- the shifts in the way both public and private services, are delivered, often enabled by technology.

Because of this, the whole planning process within towns and communities needs to change. Given that it is becoming increasingly difficult to predict future needs accurately, flexibility is key and a range of scenarios need to be explored in the planning process. In other words, there is a need to take full advantage of urban modelling. Only in this way can developments and infrastructure projects be designed in a cost-effective way that works for today, while supporting likely and beneficial options for the future.

It is true that data has always been used within planning and urban design. For instance, demographic data has been used to identify the sort of housing that is likely to be attractive to local people. Surveys and other methods of collecting travel movement data have been used to understand how to design neighborhoods in order to promote traffic and pedestrian flow.

However, up until recently, research has been expensive and time-consuming, as this has normally involved large-scale surveys involving face-to-face interviews. These are not only expensive, but can be unreliable, in that people do not always report honestly on their behavior.

Now, though, it has become much easier to collect reliable information on people's actual behavior through, for instance, the use of mobile phone data to discover how and when people move through an area and even, by inference, what mode of transport they use. This can be supplemented through a range of other sources, such as data from congestion charging zones, and smart ticketing systems.

However, even though using digital technology to simply gather and visualize the data is valuable, the most important potential benefits that planners or developers want to achieve are likely to be the result of a number of different factors combined. For instance, property developers and planners are interested in increasing land value and this will be based on a combination of a number of different factors, for instance low carbon, low crime, good schools, and convenient transport links.

A model is therefore needed to understand the relative roles of each of these factors and thus to be able to weigh up the pros and cons of various options in delivering the outputs that are important to the planners and developers.

Here guidance document for city/community leaders and planners would be helpful in order to help them understand how best to utilize these new tools and what they need to be requiring of partners and developers. BSI is publishing a guidance document in this area; PD8101 "Smart cities – Guide to the role of the planning and development process", which could provide a start for European-wide guidance.

5.4.5 Skills and Education

Designing a smarter city for the future requires the active involvement of all stakeholders (urban planners, designers, architects, technology providers, governments and city projects' leaders and decision-makers in different city departments

(energy, mobility, ICT, etc..). Those actors quite often have little (if not at all) familiar with standardization and its role as an effective co-regulation tool in providing support to European legislation. Moreover, they tend to confuse standards as voluntary tools facilitating compliance, with regulation with legislation which is mandatory by nature. They tend not to appreciate the added-value of standardization in terms of improved efficiency, reduced costs, spreading of innovative technologies, access new market, quality and safety of products and services.

Building up a conceptual framework/model for smart/sustainable-cities/communities will help the stakeholder to approach standardization not as a 'burden' (too many standards to comply with) but as a 'soft guidance tool' that involves different technologies to transform the Smart/sustainable-city/community perspective into a sustainable and liveable city, by setting strategic priorities. It will help city leaders to innovate across services to meet citizens' expectations.

A cultural shift towards a new collaborative way of working among stakeholders is needed, through the outreach and engagement of public sector stakeholders, partnering with private companies and city leaders, reproducing in the context of a municipality the same level of integration needed in a Smart/sustainable-city/community as 'system of systems'. Sharing experience and best practices among cities in different geographical and social contexts will allow to understand that 'no solution fits for all' but to compare different approaches and patterns towards the same goals of cities' smartness and sustainability.

Several workshops/smart/sustainable-cities/communities' labs have been run by cities with the aim of sharing projects and tools through an integrating approach that involves all city stakeholders in setting strategic priorities towards a process leading to a transformation of a city into a 'smarter city'. An example is the INTAKE workshop organised by the city of Genoa in October 2013 within the FP7 project 'TRANSFORM' (http://urbantransform.eu/)

Smart/sustainable-city/communities are also about an opportunity for capacity building and new competences for education on a broad spectrum of technologies, curriculum design, methodology design experiences, management and planning theories and implementation.

Skills and education are important even critical issue for smart cities development and should be addressed taking into account all the above issues.

5.4.6 Financing projects in a smarter way

Due to the present economic situation many cities today have difficult financial constraints; their budget and revenues must first be allocated to essential operations and staff, so little is very often left for upgrades, retrofits, and other improvement measures.

Furthermore smart cities projects often require significant upfront investment (Capital Expenditure) with the firm expectation that they will create future revenue streams. These might be savings on operational costs (Operational Expenditure) or real revenues provided the services created have a value which can be monetized. So value creation of the projects and financing are strongly linked. Partnerships between private and public sectors can be a way to cope with this.

A way to do this that is already used in a number of countries is the use of energy saving performance contracts (ESPCs), which make the funding of smart city projects possible using the anticipated cost savings. The initial capital investment is provided by a financial institution, while the actual services are delivered by specific purpose companies, or Energy Services Companies (ESCOs). The financier is paid back out of the accrued energy savings, with the ESCO guaranteeing a certain level of savings or performance. If the performance standards are not met, the ESCO is responsible for paying back the loan — not the taxpayer.

Long term concession- based contracts or Public Private Partnerships (PPPs) can also provide attractive propositions for both the private and public sectors, such as a street lighting concession.

Other new business models combining technology and a paradigm change are today already being used or under development, for example:

- demand-response services: dynamic pricing, interruptible load- or dynamic-load capping contracts for industry, commercial businesses and households, participation in balancing markets, services aggregating and optimizing demand for households. These increase system flexibility and reduce the need for generation capacity. They can reward consumers by enabling them to shift part of consumption to cheaper periods;
- Asset sharing: for example electric cars or bicycles – they can be associated with other transportation means (railways, tramways …), in some buildings people share "the friends bedroom";

- Software as a service (SaaS) covering any cloud service where consumers are able to access software applications over the Internet is another interesting model. These applications are hosted in “the cloud” and can be used for a wide range of tasks for both individuals and organisations;
- Crowd funding: A number of crowd funding platforms have emerged to allow ordinary web users to support specific projects. Thanks to crowd funding, Denver raised the final $12 million it needed for a particular project in just one hour. Online orders for what they were calling "mini-bonds", came in so fast that they sold out before the city could stop selling them. It actually had to refund 375 online orders.

The case of the Centre of excellence in the digital education of Planoise (Besançon)

A "digital canteen" will be among the first implementation of this centre of excellence (object of a commitment with the EIP Smart Cities). It will be a friendly place grouping together a cafeteria, co-working spaces, a micro-incubator intended for the young people of the district, a “fablab” as well as place to display the digital implementations (productions) of local companies.

Out of a total investment estimated at 1,080,000 € (premises and equipment), local authorities will only invest approximately 200,000 €, the balance being covered by funds ANRU and FEDER.

The City of Besançon, owner of the equipped premises, will rent it to the various users at a level of rent slightly lower than market prices (which is anyway rather low, given that it is a district undergoing urban renovation). These users will be grouped in an association or EIG (Economic Interest Group) for management of the premises and each of them will pay the EIG the share of expenses in proportion to their own use of the resources.

This arrangement will also allow the users of the places to pay a very reasonable price to use it, while the community will be exempted from any long-term operating expense.

To overcome any initial difficulty in gathering the full amount of funds necessary for the payment of the annual expenses, it was planned to appeal for sponsorship through crowdfunding.

In a more general way, it is intended to appeal widely to “community foundations" and so on for sponsorship; the Department of the Doubs has already implemented this for the Museum Courbet, and more widely, French local authorities begin to open to this practice , following the examples of Lille, Havre, Bordeaux, Rouen, Reims, and Puy de Dôme.

A guide of the financing of smart cities, published in 2012 in this perspective by "Smart Cities Council" (USA), presents further Interesting experiences in this domain: http://smartcitiescouncil.com/resources/smart-cities-financing-guide

This value creation, economic and financial field is with no doubt a critical one. Recognised and documented frameworks can increase the necessary visibility and confidence mandatory for a strong development of these innovative models. Standards may have a role to play there as well.

5.5 Putting in place a solid foundation

5.5.1 Smart cities for all citizen

The European Commission and other initiatives are paying necessary attention to the "smart citizen". Cities in any case need to be more liveable than they are. Problems for individuals to understand or take advantage of new technologies can create barriers such as the "digital divide". Standards can help substantially to overcome such problems; many existing standards programmes such as smart grids, ITS, or those covering energy-related issues however concentrate on the technology aspects. Smart/sustainable-cities/communities standards programmes, necessarily taking an overall approach, can redress the balance and ensure that citizen needs are covered as well.

Through the application of ICT, the use of sensors, communication protocols and access to data, cities are becoming ‘intelligent’ and ‘smarter’. In their evolution nevertheless, buildings and smart services need smarter and active citizens, meaning no longer citizens simply reacting to external inputs, but citizens becoming increasingly involved in the collection and sharing of data and involved in the design of the smart and sustainable city of the future. Smart Citizens could be more motivated to change their daily habits if informed about the improvements those changes could bring to their cities and communities in what it is today referred as ‘sharing economy’ of the future, in which the creation of added-value lies in collaboration, participation and commitment. It should also be noted that IT development fits into a particular cultural and social context and that basic processes therefore require a high degree of flexibility with regard to changes and deployment in different cultural and social contexts.

In addition, citizens need to be able to access the relevant technologies. As noted below, all citizens need to be able to use them, which implies measures to educate, train and demonstrate their use. Aggregate data needs to be properly protected but open for all citizens to access it.

5.5.2 Legal issues and ethics

"Big data" in a smart/sustainable-city/community environment raises issues that badly need to be addressed. The smart/sustainable-city/community of the future will be a place where commercial and public interests alike will be able potentially to access a lot of personal data on individual citizens. Combining data from different sources under the banner of smart/sustainable-cities/communities could reveal more personal information than is warranted, and citizens may not be aware what data is being gathered or used for which purposes or even by whom.

Suitable central legislation - supported by proper standards on the technical implementation of personal data protection and privacy - should help reduce these problems, but additional complementary measures will be needed. For example, a standards-based code of conduct could be provided for local authorities to apply. This would ensure adequate transparency towards citizens, and its observance could become a requirement in local contracts with private-sector service providers.

New forms of communication and data exchange are needed for the integration of all aspects involved in a Smart/sustainable-city/community context. All the information needed for decision-making should be available and accessible at the appropriate time, while taking data protection considerations into account.

In addition to measures for users, standards for industry can offer added value by proactively implementing Privacy by Design for the early stages of technical development as planned in Article 23(4) of the draft Data Protection Regulation. This would enable manufacturers and service providers to seek presumption of conformity, improve public acceptance of smart cities and communities, and ensure a high level of privacy and data protection.

5.5.3 Inclusivity and accessibility

Services in a smart/sustainable-city/community context need to be expressly designed in order to enable all citizens to have equal access to the added-value these services can bring. A 'Smarter City' should be an accessible city 'Designed and Accessible for All' in terms of access to buildings, smart homes, transport systems and mobility, ICT, services, and so on.

Design for All and Accessibility must be at the heart of all aspects of cities that are age-friendly. This is particular relevant in a growing 'silver economy' where demographic changes and the ageing of population are particularly significant. Residents and visitors of all ages in a city require that public spaces, buildings, transport services and information systems are barrier-free. Policy and practices, fully embedded in a city's strategy and supported by its decision-makers, need to promote accessible environments, products and services, enable all people, and especially older persons, to live more independently in their homes and in their cities, and in turn standardization is part of the way to implement that as a strategy.

The European standardization system is already committed to helping every person in society have equal access to products and services and fully participate in society. For ICT, suitable standards, some already existing such as EN 301 549:2014 'Accessibility requirements suitable for public procurement of ICT products and services in Europe' can help to ensure that ICTs in use in smart/sustainable-cities/communities are accessible. This development gives an incentive both for the market and public organisations to take the aspect of accessibility into further consideration, and to foster interoperability and harmonisation at EU level.

Mandate 473 supports the principle of accessibility based on the "Design for All" approach for persons with disabilities and older persons, aimed at integrating this concept in all relevant standardization activities for the design/development of products and services. CEN and CENELEC are preparing a European Standard addressing these principles in priority areas and describing how to consider accessibility for persons with disabilities or older persons. Smart/sustainable-cities/communities can give this work more impetus; ensuring physical accessibility will also imply more use of electronic devices.

In addition, a smart/sustainable-city/community will not function without an accessible and usable infrastructure and building structure included in public areas for all people. The 'barrier-free access' concept should be integrated in the concept of smart/sustainable-cities/communities, and future standards requirements should be put forward in collaboration with local authorities and city planners and designers.

It is relevant to note that, since 2008, CEN and CENELEC have been working on Mandate 420 in support of European accessibility requirements for public procurement in the built environment, and are preparing a new European Standard that contains functional European accessibility requirements, as a complement to standardization at national (eg Germany) or international levels. Smart/sustainable-city/community issues need to be taken into account in this work.

Intelligent homes ("smart houses") are increasingly advocated, and the open communication they embody will be an integral part of the smart/sustainable-city/community. The CENELEC work on a SmartHouse Code of Practice, and on Home and Building Electronic Systems will ensure interoperability between all the elements of the 'smart home' including ICT services and applications, advanced electronic devices, commands and controls, etc.

These issues all need strong and better promotion, and the digital divide in particular addressed through educational measures designed to bring the less able up to speed with the solutions they need. Standardization can and should help considerably with this.

R12 - ESOs through their technical bodies to draw up in the first instance a Technical Report to assess smart citizen-related standards and requirements, including aspects related to accessibility and to data protection/privacy, with reference to existing and planned standardization activities and which would highlight the more general legal/ethical aspects needing further investigation.

6 The sort of standards work needed

6.1 The challenges to be tackled

In considering the work needed to develop standards for smart and sustainable cities and communities, it is important to take two key issues into consideration:

- In addition to CEN/CENELEC/ETSI, a number of other important standards bodies are working to scope out and develop Smart and Sustainable Cities and Communities (SSCC) standards both on a national and on an international level. In addition, there are a number of European City networks and other agencies that have already developed guidelines, metrics and certification schemes in areas of relevance to smart and sustainable cities and communities;
- While there are already a large number of standards in many of the key technology and organisational management areas related to smart and sustainable cities and communities, those standards may not necessarily reflect the complexity of dealing with a smart and sustainable city or community as a system of systems, and the specific challenges that this brings.

These two factors indicate the following challenges that need to be addressed within SSCC standards work:

- The need to ensure interoperability between different city systems;
- The need to take into account the challenges of complex organisational requirements, including interfaces between public sector and commercial organisations;
- The need for the city or community to be able to manage issues such as privacy, security, resilience, data flows on a whole-system basis;
- The need of non-specialist city or community leadership to be able to understand the many, complex and interrelating ICT and other technical issues relating to the move towards a smarter and more sustainable city or community and how to put together the right portfolio of standards requirements to ensure that their projects are able to succeed;
- The need to ensure that standards being developed within Europe in relevant technology areas take into account the requirements of smart and sustainable cities and communities;
- The need to ensure consistency with SSCC standards being developed by national standards bodies within Europe and by international standards bodies and to take on board the lessons that have already been learned by European networks as to useful guidelines and metrics.

6.2 Types of standardization work required

Given the challenges identified above, there are several types of SSCC standards-related work that could potentially be undertaken by CEN/CENELEC/ETSI, or by other European or national standards bodies, that could support cities and communities in becoming smarter and more sustainable:

- Developing standards related to ensuring interoperability and coherence between different city systems and to enable cities to assess progress and benefits from smart/sustainable-city/community initiatives
- Studying SSCC related issues (such as City Security, City Resilience, City Privacy etc.) in partnership with the relevant Standards development organisations within Europe, to:

- identify if there are any gaps in existing standards relating to those issues – so that these can then be tackled by the relevant Standards development organisations;
- develop guides for city leadership on how to bring together the appropriate portfolio of relevant standards in that area that will enable them to tackle that issue.

- Developing guides to the key technologies and trends, in partnership with the relevant European standards development groups, aimed at SSCC practitioners, to help them understand the relevance of these technologies and trends, and the standards underpinning them can have in implementing their smart and sustainable city or community strategies.
- Liaising with relevant European city networks and with other international standards bodies, potentially in partnership with ISO TMB SAG on Smart Cities, to:
  - ensure that standards being developed in technologies relevant to smart and sustainable cities, and within individual city systems, take into account any specificity relating to smart and sustainable cities and communities;
  - identify developing good practice that might be developed into European standards;
  - support co-ordination of international work on SSCC standards to avoid overlaps and ensure greater consistency between the standards developed.

6.3 Linking with the EIP Smart Cities & Communities (EIP-SCC)

R13 - The SSCC-CG suggests any future standardization work to take into consideration the activities of the EIP on smart Cities and Communities and its strategic Implementation Plan highlighting 8 enabling priorities areas (one of them being standards) and the actions described in the EIP-Operational Implementation Plan, priority area 10 "standards".

The following 11 priority areas have been identified:

3 vertical (the three sectors of Energy, Transport and ICT) and the intersections with 8 horizontal areas.

8 Horizontal (which are divided into 3 themes: Insights & Governance: citizen / customer insight & engagement / city governance /local leadership & vision).

The horizontal areas are:

- Citizen focus
- Integrated planning & management
- Knowledge Sharing Funding & Finance: new integrated business models, modernised public procurement, better leveraging of funding instruments
- Procurement & Financing
- Business Models Information & Decisions: accessible public and other data, standards for interoperability, performance indicators, measuring frameworks
- Open data governance
- Standards
- Baselines, Performance Indicators and Metrics

The two key points to note are:

- Standards is the 7th horizontal area and focuses on interoperability, preventing vendor and technology-lock ins, reducing entry barriers, etc. In fact some specific suggestions as to important areas where standards work is needed are contained within the OIP
- Standards work does not have to be limited to the three sectors of Energy, Transport and ICT, given that the EIP specifically mentions that the three areas chosen are only to allow greater initial focus and that they are likely to be broadened out later. The addition of other areas could be considered, such as: Integrated Care, Building Environment, Lifecycle Assessment (water, waste, etc.) should standards needs in those areas be identified.

7 Strategy for standardization

7.1 Management of the standards programme

The implementation of a standards programme for smart and sustainable cities / communities is much more difficult than for any traditional technical standard that simply links consumers, providers of services and manufacturers. A programme of SSCC standards is not just a question of interconnection of technologies and product needs. This exercise has to consider the impacts on the society, the behaviour of the citizen, their position and relationships in that society.

Predicting the future has never been the most exact science. Without proper evaluation of future needs, developing and managing a standards programme will also be challenging.

It is, however, safe to say that some standards will be developed on a national basi; others must be developed under the umbrella of CEN/CENELEC/ETSI, and others yet on international level (ISO, IEC, ITU-T). The continuation of the work initiated by SSCC-CG needs to be both operational and organisational, i.e. overseeing European standardization projects, and coordinating with individual national as well as international activities.

Some key elements could condition a successful implementation of these standards. They have to be checked and improved, for example analysing the conditions of implementing a same type standard, ISO 26000 "Guidance on social responsibility".

7.1.1 Context

Europe is the only region without a megacity. The twenty-two megacities, i.e. cities with more than 10 million citizens, may face vastly different technological challenges than the cities and communities we Europeans call our home. Most European cities follow the architectural urban design of the 19th century which received gradual improvements or "updates" on their infrastructure as the means of transport and the number of vehicles grew.

In 2012 alone China has revealed plans for 10 new cities about to be built from scratch. Announcements for further developments followed earlier this year. It is unlikely that these cities will utilize outdated technology, and construction materials and methods. Also, in any city, hospitals, police stations, fire engines, traffic control, water supply systems, etc. need to be able to communicate with one another not only as part of their daily operations, but also and perhaps especially so, in cases of emergency. Whereas, in Europe, these will typically use incompatible data formats, with all the problems that this entails, this is unlikely to be the case with the new cities in China.

When we talk about cities of the future in Europe we typically are referring to issues such as improvements in Berlin's public transportation, or London's waste disposal, or Barcelona's parking system. However, these still-to-be inaugurated construction sites in China are literally Cities of the Future. And with that, they have different standardization requirements.

Hence, it may be feasible to distinguish between century-old cities in Europe and new construction projects in Asia. And with that, the evaluation of standardization gaps needs to be executed with rather clear boundaries as to what the requirements and needs for standardization in Europe are.

R14 - The recommendation is therefore that, the three ESOs should focus on problems that European cities and communities face, within the framework of international activities on Smart Cities standardization.

Additionally, the general context of Europe in 2014 cannot be ignored. In many countries a resistance has built up to further European regulations supported by standards, and so it will be necessary to promote the advantages of European standardization in the field of smart and sustainable cities and communities and the benefits that this could bring to citizens in terms of increased choice, availability and access services. There is also a large confusion between standards and regulation, as well as regarding the respective roles of partners involved in standardization and in its process.

R15 - The second recommendation would therefore be to launch a campaign that should start before the launch of the standards on smart and sustainable cities, for them to be perceived as “a common language” to face common challenges for climate change for example.

7.2 Obstacles and supporting recommendations

Aside from the sociological challenges that are facing governments and municipal decision makers when discussing the smart and sustainable city, the technological issues at hand contain a vast array of challenges; first and foremost, the issue of interconnectivity. The general concept of the smart/sustainable-city/community is really the interconnected city. Information and Communication Technology (ICT) is seen as the central theme to a well regulated and seamlessly operating community.

ICT is expected to step into the role of a central nervous system, interconnecting devices, services, and managing the individual systems within the system.

However, due to technological improvements within the individual branches of urban development (e.g. buildings, mobility, security, energy, communication, etc.) a variety of technological fields are also in the process of creating new standards related to city development, simply because the living space contains (by definition) all technological areas required for living. In addition, the issue of connecting the old with the new, becomes apparent but also the impacts of these development on the society, its member's behavior, their position and relations in the society.

As a result, a large number of technological branches but also of societal issues need to be involved; and hence, a large number of experts from different domains need to work closely together.

7.2.1 New stakeholders need to be engaged

R16 - Smart/sustainable-city/community standards require standards organisations to bring input from new types of stakeholders such as cities, communities, citizens and small businesses into the standards making process.

Public authorities

Among the different players that may have an impact on the success or failure of a set of standards for smart or sustainable cities, the local authorities have a major role:

- on one hand,
    - their lack of participation in the standardization process;
    - their reluctance in some countries;
    - their insufficient participation in the European programme RFSC (a support to sustainability management in cities) which lead the European commission to cancel its subsidies to that programme.
- but on the other the proliferation of local initiative,
    - to promote a wide diversity of sustainability events;
    - to implement sustainable districts;
    - to impulse sustainable buildings, infrastructure or equipment.

Local authorities, in their role of using or prescribing standards, have a fundamental role for the acceptance, use and development of such standards.

Moreover, the institutional, political and administrative authority's policies at a higher level than the local authority's, are fundamental factors of success for implementing SSCC standards at the local authority level.

Involve the upper level authorities in charge of such policies (…) in the process of selecting the appropriate standards to be developed or reviewed, in view developing a set of standards for the implementation of their policies.

Business stakeholders

Many systems are being developed and implemented by providers of products, services, equipment and operators of different nature, sometimes with commercial incentives for the use of their systems. These systems can be an obstacle or a support to a standardization policy for SSCC.

Favour frameworks standards (on definition, methodology ..) instead of too specific and technical ones, in order to support an open system

Involve these providers in the selection of standards to be developed, revised or transposed.

The citizen stakeholders

Their attitude and behaviour conditions, at minimum will measure the success of the standardization policies on SSCC, through the good practices the citizens will adopt or decline to.

Therefore, the practices that such standards will encourage must clearly provide some clear and unquestionable advantage.

Capacity building is, in the same line, an important component of such policies that should involve all companies having a role developing them, and other parties like associations or research centres that might promote adequate good practices.

The challenge of involving SMEs and micro businesses

industry perspectives tend to be dominated by large (multinational) companies, which is why it is often difficult to capture the needs but also ideas of small and micro businesses in technical standards. One of the key opportunities of smart/sustainable-cities/communities relying on technical standards is that open interfaces to data sets enable a vast array of new applications. As with tangible goods, standards also allow smooth, easy and inexpensive interconnectivity of devices to ensure proper data flow. In this particular field of ICT it is likely that the greatest innovation is to come from small technology businesses. However, SMEs and start-ups are the very ones that find it difficult to engage with the standards process, due to their lack of staff.

One solution to this might be to engage with agencies such as Citymart (http://www.citymart.com) who act as brokers between cities and developers and who aim to enable applications developed for one city be easily portable to others.

As a general recommendation attention should be paid to bring together city councils, urban planners, engineers (water, waste, electrical, energy, ICT, etc.). Since their establishment, CEN and CENELEC (along with ISO and IEC) have tended to organise standardization committees in vertical silos. As practical as this may have been in the past, this approach is no longer timely but evolving to build up new relationship, involving and engaging new stakeholders.

7.2.2 Standards suffer from a negative image

Important obstacles are linked to the additional cost and administrative burden perceived by the use of standards as well as a negative image towards standard in relation to the proliferation of systems, for which performance is difficult to analyse.

- *Smart/sustainable-city/community* technologies are developing rapidly, so there is a need for a much faster method of developing standards than standards bodies are used to.

→ **Creating horizontal standards for the urban space may be an opportunity to rethink the standardization process with its time-consuming commenting phase. By actively involving every stakeholder (municipalities, builders, engineers, etc.) the "customer" will already be involved from the outset; not only as professionals but also as citizens. Close collaboration with existing city networks could promote benchmarking, which may be a blessing in disguise, because as controversial as this topic has become in some European countries, it may be a useful tool to learn about good practice examples. This in turn could provide very useful starting points for new standards or the improvement of existing ones, which would speed up the entire process and make the technology available for markets outside of Europe.**

- Cities and communities tend to be suspicious of standards. The term "standardized living" or "standardized city" is regularly being demonized regardless of the geographical region.

→ **Knowledge on standardization and Technical Standards is still very shallow. This becomes evident when technical committees (at CEN/CENELEC) receive comments from the general public outside of the committee participants. Obviously, technical standards never intend to "standardize living" per se. While the European Commission and CEN/CENELEC/ETSI has led many initiatives to bringing standardization closer to SMEs, start-ups and the general public, the topic of smart/sustainable-cities/communities may require further efforts to keep scepticism at bay.**

- Financing the standardization activities: while many technophile cities and communities are interested in modernizing their infrastructure and improving the quality of life for their citizens, many communities may also scramble to finance their ideas.

→ **Most businesses benefit from participation in standards work; there can be cost advantages, benefits of greater knowledge, and advantages from influencing the content of the standard. While the companies involved in the standardization process derive direct advantages from setting standards, cities may need to receive a financial incentive to participate. This would also help cities to see more easily the value of standards and make it easier for cities to get involved in the process. This could be a virtuous cycle: if cities get involved, it would make it easier to get companies from different domains to work together; if cities learn that companies are interested in setting standards with the help of cities, the diversity of companies (small-medium-large) might increase. The key here, however, is the financial incentive for cities and communities, because they are the customers.**

R17 - A communication policy including contacts with the media should be drawn up to promote the value of standards.
R18 - Ways should be explored to reduce the costs of participation and the time to develop standards for SSCC while ensuring that all relevant stakeholders are included in the process and their requirements are met.

R19 - The proliferation of systems dedicated to SSCC imposes some upper global concepts for a common understanding worldly recognized that could not be questioned, for example some definition extracted from ISO TC 268 "Sustainable development in communities" or other international institutions works, like the definition of smartness proposed in the draft ISO 37101 "Sustainable development and resilience of communities – Management systems – General principles and requirements" that creates a link between smartness and sustainability, avoiding opposing their approaches.

7.3 Standardization Roadmap

A "roadmap" is needed to provide a clear and public summary of what is required and how to achieve it. It should contain a list of actions/activities, milestones and deliverables about European standardization on SSCC.

The publication of a comprehensive European standardization roadmap in this domain is an important step. This would involve:

- Identifying the key areas where standards would be helpful for European cities and communities;
- Prioritising these;
- Gaining agreement about which standards bodies should lead in which should be involved in support – taking into account national, European and International standards bodies;
- Gaining the involvement of the key stakeholders, in particular the cities, in this process.

Such a roadmap will have several impacts:

- The complexity of the situation will become clearer;
- The diversity of the stakeholders and participants will become clearer;
- The potential work packages awaiting CEN/CENELEC/ETSI and the European community, including policy makers, citizens, and professionals will become transparent;
- The potential work packages for SDOs interested in leading this work will become clear;
- All the facets of smart/sustainable-city/community development will be laid out; that is, a comprehensive description of what the proclaimed "smartness" might be all about.

R20 - Cities, communities and other relevant stakeholders should be encouraged to participate in the development of a Smart Cities standardization roadmap".

While the Olympian ideal may not be sufficient motivation to provide input, participants would certainly gain from sharing their knowledge and experience with other stakeholders.

Although cities and communities are not necessarily competition-driven, they are nevertheless interested in improving themselves, their appearance, reputation and infrastructure.

On the other hand, technological innovation alone does not guarantee competitiveness, but also requires efficient diffusion of innovation. According to recent studies, standardization plays a key role in the diffusion of inventions. The planned roadmap is a first step towards standardization. It will help raise attention for the tasks ahead and allow interested parties to acquire more information on the topic and ways to participate.

Companies can even reduce their R&D costs by participating in standardization work, not only through funding programmes, but particularly in the coming years where Horizon2020 represents an excellent opportunity for cities, companies, and researchers alike to receive funding and make their research results available to standardization bodies.

Technical standards, especially in the construction sector, greatly simplify contractual agreements. Standards have also been known to lower trade barriers; technology invented in Europe will therefore be available for export, increase trade and competitiveness oversees.

Publishing a roadmap on smart/sustainable-cities/communities will also help to build focus, cohesion and attract a critical mass of interested parties.

R21 - SSCC-CG would be prepared to take a leading role in the development of a Smart Cities standardization roadmap if this was felt to be appropriate by the ESOs

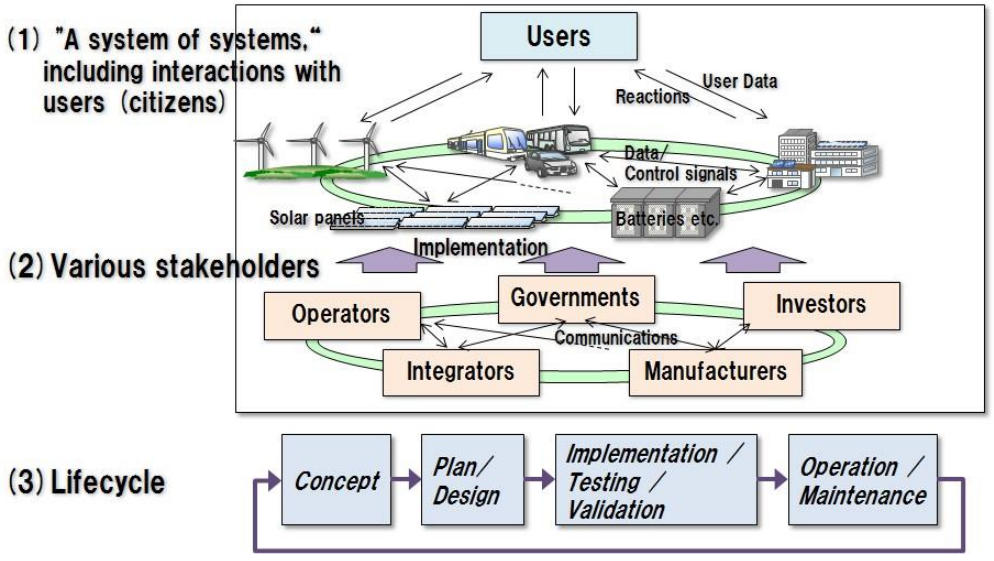
7.4 Communication Strategy

7.4.1 Who needs to be communicated to and why?

- Representatives from cities and communities; that is, decision makers in municipalities as well as engineers working for the cities/communities (water, waste, emergency workers, ICT). They need to provide technical input regarding the technical and architectural infrastructure, information regarding volatilities in their communities, special needs, historical issues, and communicate the public's concern.
- Companies already working with cities and communities (contractual enterprises), because they are familiar with community projects, past and present.
- High-Tech companies interested in working with cities and promoting their product; they are interested in marketing and selling their innovations. It is feasible to connect with both local and international organisations because of the market-opening properties standards tend to have. In order to avoid unintended monopolization of the "smart/sustainable-city/community Tech-market", companies of various sizes should be included in the standardization process: start-ups, SMEs, large corporations.
- Research organisations due to their sometimes close proximity to the corporate world and innovative yet financially challenged ideas. Standardization provides a great vessel to introduce innovative ideas to the market.
- Emergency Services, First Responders, Police. They need to ensure communication between each service provider. Technological updates might bring challenges to the way communication and data exchange is being dealt with today. Emergency services must join the round table to look at every issue from the perspective of increasing the city's resilience.
- EIP on Smart Cities and Communities. The European Innovation Partnership on Smart Cities and Communities (EIP-SCC) has already helped bringing together cities, industry and citizens to improve urban life through more sustainable integrated solutions. EIP-SCC looks to establish strategic partnerships between industry and European cities. The role of standardization in the EIP activities should be recalled and emphasized where needed.

7.4.2 What needs to be communicated?

Below, the system "city" as described in the draft document ISO/TS 37151 *Smart Community Infrastructures.* The city is "a system of systems". Just as communication needs to be verified amongst the various entities in a city and all its service providers, standard setting committees need to ensure communication at the round table of standardization.



Every aspect the individual stakeholders deems important to share in their individual professional field, needs to be shared with every participant. The unprecedented complexity standardizers will be facing in this endeavor makes the seamless exchange of information between the different SDOs working on different aspects of SSCC standards crucial.

As mentioned before, new technologies allow the interaction of several traditional technological branches that have not been connected to each other in the past. In order to avoid interconnectivity problems amongst newly interconnected (traditional) technological, the means and types of interconnection will have to be tested, validated and perhaps benchmarked prior to their permanent installation.

In terms of **initiating the standardization** process, communication between the ESOs and their members and the EIP-SCC, as well as the European Commission needs to be established, prior to getting outside stakeholders on board. The close collaboration SSCC-CG established with EIP-SCC also helped to propose the creation of a future Action Cluster on standards.

The questionnaire on smart/sustainable-city/community projects that was sent out by SSCC-CG and was completed by 16 city representatives will also help with gaining a better understanding of the technological challenges ahead. Although the questionnaire was a one-directional communique, it has nevertheless built a bridge between SSCC-CG, cities and the organisations cities are working with. SSCC-CG is looking to build on this exchange and is seeking active involvement of these and other cities. Building on this city network, establishing relationships with interested companies, research organisations, and the respective emergency services of participating cities is only going to be a minor challenge.

Aside from the technological challenges, cities need to communicate regarding their organisational, financial, and public issues. Citizens might resent drastic changes in their environment, especially in combination with financial responsibilities. Clearly, the communication needs to be multi-directional, as the citizens are the ultimate decision makers.

7.4.3 What methods and channels are best to communicate between stakeholders?

As the EIP-SCC has done before, the public needs to be involved and must be given the opportunity to voice their concerns. There are a number of recent examples in Europe where public interest was underrated and ignored; this must not be the case in a large scale project involving numerous countries and spanning a several years.

Although all documents involving European legislation and standardization projects are publically available online, it may be feasible to get citizens involved through workshops and public discussions on *smart/sustainable-cities/communities*. Buzzwords (like *smart/sustainable-cities/communities*) often develop a negative connotation that is difficult to extinguish. Representatives of cities and communities might be interested in learning more about the technological opportunities ahead, funding programmes, and the improvement in their citizens' quality of life.

Additionally, initiatives like the European Commission's funding programme Horizon2020 might create the incentive necessary to get cities and stakeholders organisations involved in the process of making their environment *smarter*. Opposition to change is often connected to financial burdens. Offering the right incentive will create opportunity for cities and communities to improve themselves attract people, enterprises, tourists and further investments.

7.4.4 Gaining the active involvement of cities

Working with key city networks is of paramount importance, i.e. SSCC-CG, or its successor group, should seek involvement of the Covenant of Mayors, European Energy Awards, etc. and figure out ways to work with them to identify what guidance they may have already developed that could be developed into (technical) standards.

It would also be helpful to identify wherever large numbers of cities have set a common set of objectives for themselves, for instance those based on the European Energy awards, and investigate the potential of working with them to develop smart/sustainable-city/community standards that would help them achieve those objectives.

Organizing collaboration between CEN/CENELEC/ETSI and these European organisations could be triggered by a one day workshop, with a clear set of material to go through (city projects, standard development), and invite political representatives from a range of city networks. Due to the already existing credibility these networks have established with their city members, they may have done work on standardized approaches, which could provide a basis for these to be developed into technical standards. SSCC-CG could assist this process and have their work developed into standards, which would also establish a more permanent relationship with them.

Because developing standards for the smart/sustainable-city/community environment is not a short term process, it is highly recommended to encourage these in participating in the development process permanently. This would also create financial incentives to get individual cities to participate in standards work which would of course drive the process in a self-sustaining manner.

7.5 Conclusion and other general recommendations:

As a conclusion, it is important to know what to do, and how to use success factors and avoid obstacles.

Care should be taken to:

- **avoid any overlap with the field of competence of elected local authorities**
- **limit, as much as possible, any costs involved in implementing the standards and provide some support for their use (ie develop Guidance Documents)**
- **Build strong links with existing networks and city organisations; the number and range of existing city award schemes and benchmarking initiatives would make it difficult to gather supporters of standardization activities if this was undertaken as a separate initiative.**

The SSCC-CG successor body will have to make sure that companies providing the technology and communities interested in implementing that technology can come to agreement regarding how best to handle the technical and organisational issues involved, so that standards developed work for both. CEN/CENELEC/ETSI should be available to provide the "roundtable" for sorting out the organisational process; bringing the right people together and explaining the benefits of standardization in the context of urban development.

R22 - The SSCC-CG should continue its work by:
- draw up a clear roadmap for future standardization activities in Europe and promote it amongst affected stakeholders;
- analyse and recommend standards for development, adaptation, or revision by CEN, CENELEC, ETSI;
- monitor a dedicated communication policy;
- develop adequate partnerships.

ANNEX A

EUROPEAN AND INTERNATIONAL INITIATIVES LINKED TO SSCC

A.1 The international institutional background for sustainable development

A.1.1 The Brundtland definition of sustainability

The Brundtland definition of United Nations. 1987.'Report of the World Commission on Environment and Development.' General Assembly Resolution 42/187, 11 December 1987. Retrieved:2007-04-12.

The Report of the Brundtland Commission, *Our Common Future*, was published by Oxford University Press in 1987. The Report was welcomed by the UN General Assembly in its resolution 42/187. The report deals with sustainable development and the change of politics needed for achieving that. The definition of this term in the report is now well known and often cited:

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organisation on the environment's ability to meet present and future needs."

This report also discusses concerns about the accelerating deterioration of the human environment and natural resources, as well as the social and economic consequences of that deterioration. A sustainable society, it argues, depends on a balance between environmental, social and economic development.

A.1.2 UNEP SBCI and GI-REC

The International Federation of Consulting Engineers (FIDIC) has been collaborating for years with UNEP-DTIE in its Sustainable Building and Climate Initiative (SBCI) as one of the founding members and is now part of its new Global Initiative for Resource Efficient Cities (GI-REC) steering committee.

In order to respond to the needs of an increasingly urbanising world, UNEP supports cities in emphasising interventions that have both local and global benefits. Built environment activities promote resource-efficiency at city level within the context of sustainable development and poverty alleviation. Furthermore, they provide a global platform for the building sector stakeholders to discuss and develop the role of sustainable buildings in combating climate change, drawing on UNEP's unique capacity to facilitate collective action.

Extensive work in the sector has led UNEP to the conclusion that resource efficiency is key for cities to contribute to local and global sustainability and offer at the same time high potential for financial savings.

For this reason, UNEP launched the Global Initiative for Resource Efficient Cities (GI-REC) last June 2012 at Rio+20. Activities under the Initiative encourage cities to combine greater productivity and innovation with lower costs and reduced environmental impacts.

The GI-REC aims at working with local and national governments, the private sector, civil society groups and the academia to promote energy efficient buildings, efficient water use, sustainable waste management and other activities. It is a platform for consultation and for sharing best practices among city practitioners.

It develops common metrics for sustainable cities — e.g., for greenhouse gas emissions, city environmental performance assessments, Common Carbon Metric in the building sector, etc. It also promotes a holistic approach to resource use and consumption in cities.

The Initiative has already been backed by a broad range of international institutions, such as UN-Habitat, the World Bank, United Cities and Local Governments (UCLG), Local Governments for Sustainability (ICLEI), Cities Alliance, International Federation of Consulting Engineers (FIDIC), Veolia Environment Institute, Bioregional, Urban Environmental Accords Members Alliance, Sustainable Cities International (SCI), and International Institute for Environment and Development (IIED).

On-going activities of the GI-REC include

- a review of existing methodologies for assessing resource efficiency, their applicability at city level, and how to use this to inform the development of practical tools and policy recommendations to promote efficiency improvements in cities around the world;
- a global survey targeting more than 100 cities around the world to gather city's initiatives on resource efficiency and their needs; and
- a mapping exercise of stakeholder organisations on resource efficient cities.

In summary the GI-REC will assist city practitioners in:

- Accessing an extensive network of technical expertise, knowledge and information on effective approaches to resource efficiency across sectors.
- Accessing support to build the capacity of cities to integrate resource efficiency at the local level.

This includes potential assistance to pilot strategic activities that will promote resource efficiency in cities.

- Participating in and benefiting from research on resource efficiency. The GI-REC is committed to supporting its partners in translating research products into practical tools that will allow decision makers to promote and integrate resource efficiency at the city level.

A.1.3 UN Habitat and COP 18

In its Resolution 24/3 of 19 April 2013 the Governing Council requested UN-Habitat, in consultation with the Committee of Permanent Representatives, to initiate the elaboration of International Guidelines on Urban and Territorial Planning and to present the Draft Guidelines to the Governing Council at its 25th session for approval.

The International Guidelines on Urban and Territorial Planning (UTP) intend to constitute a global framework for improving policies, plans and designs for more compact, socially inclusive, better integrated and connected cities and territories that foster sustainable urban development and are resilient to climate change.

The intention behind the development of these Guidelines can be summarized in a few goals:

- Develop a universally applicable reference framework for national urban policy reforms;
- Capture universal principles from national experiences that could support the development of a diversity of planning approaches adapted to different contexts and scales;
- Complement and link other international guidelines aiming at fostering urban development;
- Raise the urban and territorial dimensions in the development agendas of national, provincial and local governments.

The International Guidelines on UTP should be seen as a complement and an operationalization of two sets of guidelines previously adopted by the Governing Council of UN-Habitat. The Guidelines on Decentralisation (2007) have been designed as a catalyst for policy and institutional development and reforms at national level to empower local authorities and improve urban governance. They are policy-oriented and have been used as a reference in a number of countries.

The Guidelines on Access to Basic Services for All (2009) have been designed to provide an enabling framework for improved partnerships in the delivery of basic services at city level. They are process-oriented and have been adapted to the national conditions of various countries. The present Guidelines on UTP have also been designed as a universal framework, a reference document integrating the three dimensions of urban policy principles (why to plan?), management processes (how to plan?) and technical products (which urban and territorial plans?). By doing so, they would facilitate the application of the two previous sets of international guidelines.

A.2 From sustainable development to sustainable cities

A.2.1 Urban Programme

The European Commission has no specific competence with regard to urban planning, but the EU has long been traditionally active in the field of urban development ie the URBAN programme in 1994, expanded in 2002 by URBACT: a European 'Acquis Urbain'.

A.2.1.1 URBACT

URBACT is a European exchange and learning programme promoting sustainable urban development. It enables CITIES to work together to develop solutions to major urban challenges, reaffirming the key role they play in facing increasingly complex societal changes.

It helps cites to develop pragmatic solutions that are new and sustainable, and that integrate economic, social and environmental dimensions.

It enables cities to share good practices and lessons learned with all professionals involved in urban policy throughout Europe.

URBACT is jointly financed by the European Union (European Regional Development Fund) and the Member States.

URBACT III will be a European Territorial Cooperation programme jointly financed by the European Union (through the European Regional Development Fund) and Member States and will be delivered across the 2014-2020 programming period.

It is proposed that URBACT III will act as a European exchange and learning programme promoting sustainable urban development. It will enable European cities to work together to develop solutions to urban challenges and share good practices, lessons and solutions with all stakeholders involved in urban policy throughout Europe.

The programme will cover all of the 28 Member States of the European Union as well as the two partner countries of Norway and Switzerland.

It is therefore proposed that URBACT III will facilitate the sharing of knowledge and good practice between cities and other levels of government in order to promote integrated sustainable development and improve the effectiveness of regional and cohesion policy. In doing this URBACT III will contribute to the Europe 2020 goals by providing a mechanism for stakeholders involved in developing and implementing urban policy to develop their knowledge and skills. The new knowledge and skills acquired from participation in the URBACT III programme will contribute to stronger and more vibrant European cities and help tackle a range of emerging urban issues linked to smart, sustainable and inclusive growth (the three Europe 2020 priorities).

A.2.1.2 The European Urban Charter

The 2013 Barcelona General Assembly of ECTP-CEU approved in April 2013 “The Charter of European Planning”. This combines the Istanbul Addendum with the 2003 New Charter of Athens into a single document.

It retains the core Vision in the 2003 NCA document but made clearer, less time-dated and stronger. It also promotes a more pro-active role for planners in shaping public debate, (e.g. in dealing with the economic role of planning).

It updates the 2003 Charter so that it continues to be relevant to the current and future issues Europe faces which need to be greater weight than they were given in the 2003 Charter (e.g. climate change, regional planning and ecosystems).

This now allows the ECTP-CEU to develop an Action Plan over the next two years in order to implement the Charter. This will be targeted at groups of stakeholders such as our members, the European Union and our national governments, for example, in terms of its implications for metropolitan planning areas or for planning schools.

This *Charter of European Planning* is a Call for Action at all levels of civil society including government, business, educationalists, NGOs, community interest groups and especially individual citizens. Effective Spatial Planning is essential to the future of Europe which has balanced economic development, increased social justice and vital ecosystems. Spatial Planning considerations must be embedded in policies at all levels of government.

A.2.2 A European vision[10] shared by many European states

The Leipzig charter 24 of May 2007[11] on sustainable European cities.

The Leipzig Charter on Sustainable European Cities was adopted in Leipzig by the European ministers responsible for urban policy on 24 May 2007. To achieve the objective of sustainable cities, an integral approach to urban issues must be chosen. In addition, the European structural funds should be made *available for local projects that embrace this integral approach.*

The Marseille declaration of November 2008

It provides for a new field of cooperation in Urban Development, with the involvement of regional authorities to define appropriate planning.

The Paris Summit of the 'Barcelona Process: Union for the Mediterranean' (Paris, 13 July 2008) injected a renewed political momentum into Euro–Mediterranean relations. In Paris, the Heads of State and Government agreed to build on and reinforce the successful elements of the Barcelona Process by upgrading their relations, incorporating more co-ownership in their multilateral cooperation framework and delivering concrete benefits for the citizens of the region.

This first Summit marked an important step forward for the Euro-Mediterranean Partnership while also highlighting the EU and Mediterranean partners' unwavering commitment and common political will to make the goals of the Barcelona Declaration – the creation of an area of peace, stability, security and shared prosperity, as well as full respect of democratic principles, human rights and fundamental freedoms and promotion of understanding between cultures and civilizations in the Euro-Mediterranean region – a reality. It was decided to launch and/or to reinforce a number of key initiatives: De-pollution of the Mediterranean, Maritime and Land Highways, Civil Protection, Alternative Energies: Mediterranean Solar Plan, Higher Education and Research, Euro-Mediterranean University and the Mediterranean Business Development Initiative.

Sustainable Metropolitan and Urban Development are at the heart of the major issues of the Mediterranean. Population growth and uncontrolled urban sprawl, concentrated mainly on the coasts, are significant and have a negative impact on the Mediterranean region's development. Sustainable Urban Development implies that governments, developers and financiers to better anticipate future urban growth, need to better meet the basic needs of populations (housing, transportation, access to water, electricity and telecommunications) and integrate environmental constraints. This challenge implies the involvement of regional authorities to define appropriate planning through an integrated approach.

The Toledo declaration in 2010*:*

The Ministers of Urban Development of the European Union formalised a commitment to apply a Spanish proposal for integrated urban regeneration, in a declaration bearing the name of the meeting-city, TheToledo declaration in 2010. The Spanish Minister of Housing, Beatriz Corredor, stated that the Toledo Declaration 'sets out the European Union's political commitment to defining and applying integrated urban regeneration as one of the key tools of the 2020 Strategy'.

A.2.3 A European vision[12] shared by many European cities,

The Aalborg commitments of 1994

Aalborg Charter is an adoption in 1994 of the sustainability embodied in the Charter of European Cities & Towns towards Sustainability principles of shared commitments to be jointly implemented by local governments across Europe.

Since its adoption by the local government representatives, the Aalborg Charter has been signed by more than 2700 local authorities. Today it is still one of the most visionary and forward-looking documents on local sustainability, and has managed to win the support of thousands of cities from across Europe and the world.

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[10] **A consensus on the basic principles of urban and regional development in Europe**: growth balanced and polycentric structure / major metropolitan areas and secondary service centers / compact urban structure / quality of the environment.

[11] It founded the RFSC programme supported by European Commission, an intergovernmental programme for **a frame work reference for sustainable cities in Europe, implementing Leipzig charter**

[12] A consensus on the basic principles of urban and regional development in Europe: growth balanced and polycentric structure / major metropolitan areas and secondary service centers / compact urban structure / quality of the environment

European Sustainable Cities and Towns Campaign: 1994 – 2013 (7 conferences)

Launched in 1994 in Aalborg and with more than 2700 participants today, the European Sustainable Cities & Towns Campaign remains the biggest bottom-up movement that had emerged following the Local Agenda 21 mandate from Rio. The mission of the Campaign was to support the exchange of experience between cities, collect information on the activities undertaken at the local level and serve as interface between the European Union and the local sustainability movement. The Campaign has played a key role in defining what a sustainable European city should look like and in setting out a process for making this vision a reality, by producing the Aalborg Charter and the Aalborg Commitments respectively.

The Local agenda 21

Agenda 21 is a non-binding, voluntarily implemented action plan of the United Nations with regard to sustainable development. It is a product of the UN Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, in 1992. It is an action agenda for the UN, other multilateral organisations, and individual governments around the world that can be executed at local, national, and global levels. The "21" in Agenda 21 refers to the 21st Century. It has been affirmed and modified at subsequent UN conferences.

In 1994, the European Commission, in partnership with ICLEI (International council for local environmental initiatives) and networks of cities, has launched the Sustainable Cities to strengthen the anchoring of Agenda 21 in Europe. This was launched with the Aalborg Charter, which invites the community to support the Rio Agenda 21 and to develop comprehensive action plans in the medium and long terms.

RFSC reference framework for European sustainable cities

RFSC is an online toolkit designed to help cities promote and enhance their work on integrated sustainable urban development. It was born after the Leipzig Charter on Sustainable European Cities which outlined an ideal model for the European Sustainable City and laid the foundations for an integrated urban policy and the Marseille declaration in 2008 where the Ministers decided to have a tool created that would translate into practice the common sustainability goals and the Leipzig Charter objectives.

European covenant of mayors

The Covenant of Mayors is the mainstream European movement involving local and regional authorities, voluntarily committing to increasing energy efficiency and use of renewable energy sources on their territories. By their commitment, Covenant signatories aim to meet and exceed the European Union 20% CO_2 reduction objective by 2020. After the adoption, in 2008, of the EU Climate and Energy Package, the European Commission launched the Covenant of Mayors to endorse and support the efforts deployed by local authorities in the implementation of sustainable energy policies. Indeed, local governments play a crucial role in mitigating the effects of climate change, all the more so when considering that 80% of energy consumption and CO_2 emissions is associated with urban activity.

STEP 1: Signature of the Covenant of Mayors

- Creation of adequate administrative structures
- Baseline Emission Inventory & SEAP (sustainable energy action plan) development

STEP 2 : Sustainable Energy Action Plan submission

- Implementation of your Sustainable Energy Action Plan
- Monitoring progress

STEP 3 : Regular submission of implementation reports

European green capital award

The European Green Capital Award (EGCA) recognises and rewards local efforts to improve the environment, the economy and the quality of life in cities. The EGCA is given each year to a city, which is leading the way in environmentally friendly urban living and which can thus act as a role-model to inspire other cities. Cities differ enormously and sharing concrete examples of what a European Green Capital can look like is essential if further progress is to be made.

In addition to the EGCA there are a range of European Environmental Action Plans and Policy Instruments in place across Europe which support European cities and communities in becoming more sustainable. This includes:

- 7th Environment Action Programme (EAP)
- Reference Framework for Sustainable European Cities (RFSC)
- Roadmap for a resource-efficient Europe
- Thematic Strategy on Urban Environment
- EU Sustainable Development Strategy
- Green thinking and Best Practice Guides and Reports
- Europe 2020 Strategy (Resource efficiency)
- Funding for Green Initiatives

The European Sustainable Cities Platform

Launched at the 7th European Conference on Sustainable Cities & Towns in Geneva (Switzerland) 2013, the European Sustainable Cities Platform is an information hub for local governments, organisations and interested individuals. Recognising the variety and diversity of schemes, awards and activities organised for local governments by a multitude of organisations, the Platform aims to bring together all relevant partners working on issues around sustainable cities, and offers a one-stop shop for any local community trying to find the right entry door for engaging in sustainability action.

The European Sustainable Cities Platform is an initiative by ICLEI and the City of Aalborg, emerging from the European Sustainable Cities & Towns Campaign, and carrying its heritage further into the future. The Platform is open to partnerships with, and contributions from other organisations.

The Global Network of Age-Friendly Cities (http://www.who.int/ageing/age_friendly_cities_network/en/)

The Global Network of Age-Friendly Cities aims to promote active aging by optimizing participation, improving health conditions and increasing the safety of environments in order to improve the quality of life of the elderly.

EEA – The European Energy Award®

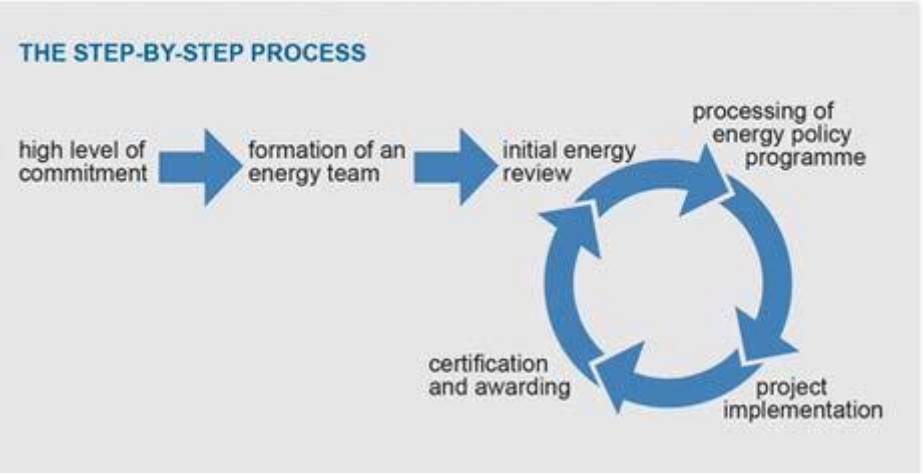
The European Energy Award® supports municipalities willing to contribute to sustainable energy policy and urban development through the rational use of energy and increased use of renewable energies. European Energy Award exists for about 30 years. There are 1500 municipalities participating today.

The European Energy Award®

- Implements successfully municipal energy and climate protection activities.
- Monitors and communicates successes of the communal energy and climate protection policy

Process

Like quality management systems from business and industry, the European Energy Award® is also based on a process of continuous improvement, which ensures that EEA municipalities continually increase their energy efficiency, the use of renewable energies and the sustainability of approaches to mobility.



Quality management system and certification system

The European Energy Award® (EEA) is a quality management and certification system for municipalities committed to sustainable municipal energy, climate and transport policies. From space planning to energy supply, from mobility to communication and cooperation – the EEA comprises all proven energy and climate protection measures municipalities can take. The EEA is therefore a most comprehensive quality management system for municipalities in the field of energy efficiency.

6 Areas of activity

A municipality's scope of action regarding energy and climate protection policy covers the areas shown below. The EEA process ensures that all activities in each of these areas are systematically determined, planned and assessed, continually checked, co- ordinated and precisely implemented. The process follows a Plan-Do-Check-Act (PDCA) approach, with permanent improvement process.

- Mobility (Public Transport, Reduced Speed Zones, Management of Car Parks, Footpath and Bicycle Lane Network ...)
- Supply and Disposal Electricity, District Heating, Renewable Energy Sources, Water Supply, Sewage, Waste
- Communal Buildings & Facilities Inventory & Analysis, Maintenance, Renovation, Energy & Water Efficiency
- Regional Planning & Development Model, Energy & Traffic Planning, Construction Approval & Supervision
- Internal Organisation Continuing Training, Performance Agreements, Planning & Controlling
- External Communication & Cooperation Information, Events, Local Cooperation and Support

Energy Team formation

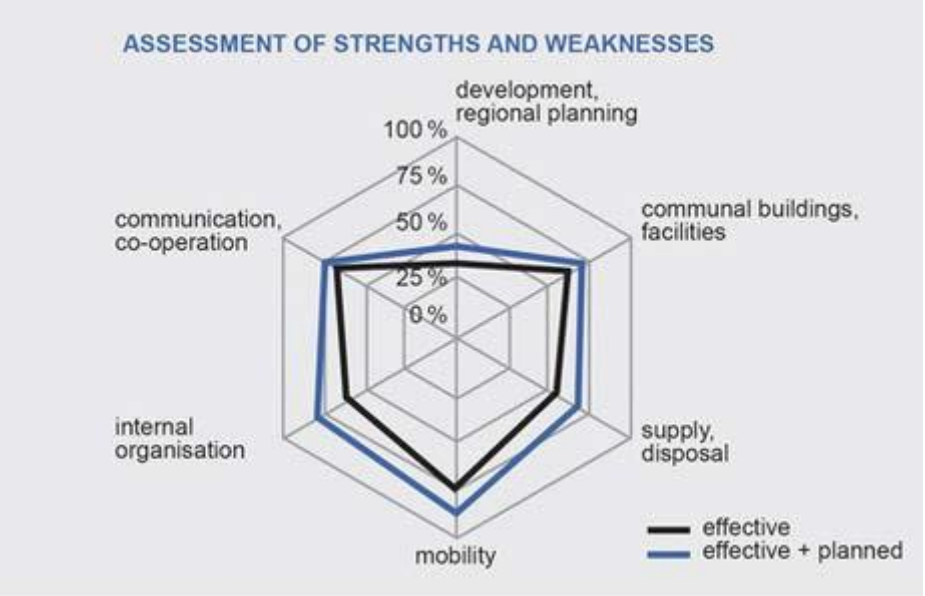
The municipality creates a working group responsible for implementing the EEA programme. This Energy Team comprises all of the municipality's key players in energy and climate protection, i.e. various administrative and policy departments, possibly also committed residents, stakeholders etc.

The national/regional EEA organisation refers the municipality to an accredited EEA advisor, who provides technical and organisational support to the municipality throughout the entire EEA process.

Initial energy review

It follows a SWOT analysis (strengths - weaknesses - opportunities - threats):

Using the EEA-Management-Tool (EMT), the Energy Team and EEA advisor review which measures within the municipality's scope of action have already been implemented and identify areas that still provide potential for improvement. From this initial energy review a report is created that sets out the municipality's individual profile of strengths and weaknesses.



Energy policy programme

Based on the results of the initial energy review, the Energy Team prepares an energy policy programme, which defines a binding programme of activities for subsequent years and sets out responsibilities and deadlines.

This programme of activities helps maintain a clear overview of all energy and climate protection policy activities.

ENERGY POLICY PLAN 2013

	what?			who?	when?		costs?	
No.	measure	description of activity	additional eea-points	realisation lead	termination	priority	single costs	annual costs (internal/ external)
Development, Regional planning								
1.1 Concepts, Strategy								
1.1.1	Climate strategy at municipality level, energy perspectives							
1.1.2	Balance, indicator systems							
1.1.3	Climate protection and energy concepts							
1.1.4	Evaluation of the effects of climate change, assessment of the impacts of climate change							

Project implementation

The activities defined in the energy policy programme are implemented by policymakers, the administration and private individuals.

Monitoring and auditing

- Annual, internal audit

The Energy Team and the EEA advisor conduct an annual, internal audit in order to review the implementation of activities and establish whether goals have been reached.

- External audit (every four years)

If the internal audit shows that a municipality actively utilises at least 50% of the scope of its energy and climate protection policy, it is referred to an external audit, which must be completed every four years.

Certification and award

Once both the EEA auditor and the national EEA committee have confirmed the municipality's exemplary energy and climate protection policy and implementation, based on the results of the external audit, the municipality is certified either under the European Energy Award® (implementation of 50% of the scope of action) or the European Energy Award® Gold (implementation of 75% of the scope of action).

Tools

EEA-Management-Tool (EMT)

The EEA-Management-Tool (EMT) is the core instrument of the European Energy Award®. This online catalogue comprises 79 energy and climate policy measures grouped into six municipal areas of activity, namely Development and Spatial Planning; Municipal Buildings and Facilities; Supply and Disposal; Mobility; Internal Organisation; Communication and Cooperation.

Each measure is allocated a maximum number of potential points, which can be adjusted depending on the municipality's scope of action, which in turn is determined by its size, structure and competencies.

Benefits

The EMT offers EEA municipalities the following benefits:

- Overview of all of the municipality's past, current and planned energy and climate policy activities
- Ideas for future energy and climate policy activities
- Monitoring of ongoing performance improvements
    - Automatic generation of progress reports
    - Automatic generation of diagrams illustrating the municipality's strengths and weaknesses and development
- Central management of all relevant documentation
- Concurrent processing by internal staff and external advisors

Indicators

The European Energy Award® Management Tool is also used to collect information on energy and climate policy indicators, for example a municipality's CO2 emissions and total energy consumption, as well as less aggregated indicators such as the number of registered cars and the portion of green power in the total power consumption.

Benefits

The collection of indicators within the EMT offers EEA municipalities the following benefits:

- Overview of all of the municipality's key energy and climate policy indicators
- Automatic generation of diagrams on the development of these indicators
- International comparability of indicators (as the same set of indicators is used internationally)

The EEA processes and tools have proven successful in 25 years of implementation in the various member states. A bottom-up approach, in which national/regional EEA offices submit proposed changes to the Forum European Energy Award e.V., is applied in order to ensure that these processes and tools are continually improved.

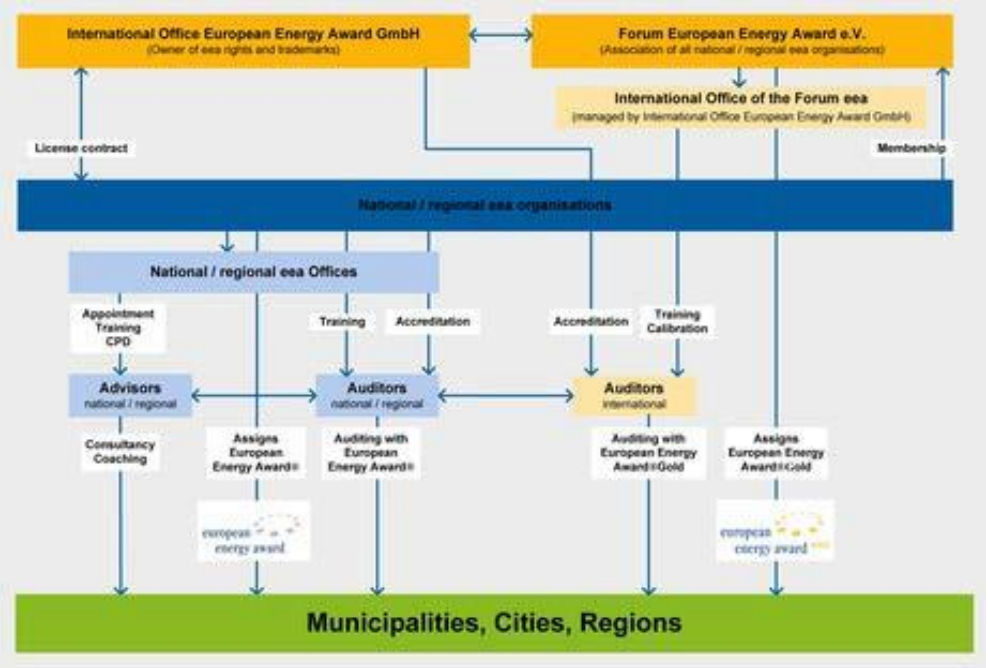
Takes individuality into account

The European Energy Award® takes particularities of individual countries and regions into account, yet provides for benchmarks to be established between municipalities at a European level.

The EEA process can be carried out as an independent programme, but it is recommended that municipalities and regions make it part of a broader energy and climate protection programme. It can also be used as a tool for implementing the Covenant of Mayors, and it allows the integration of Smart City projects.

Organisation

The European Energy Award® is organised on three different levels: International level, national level, municipal level.

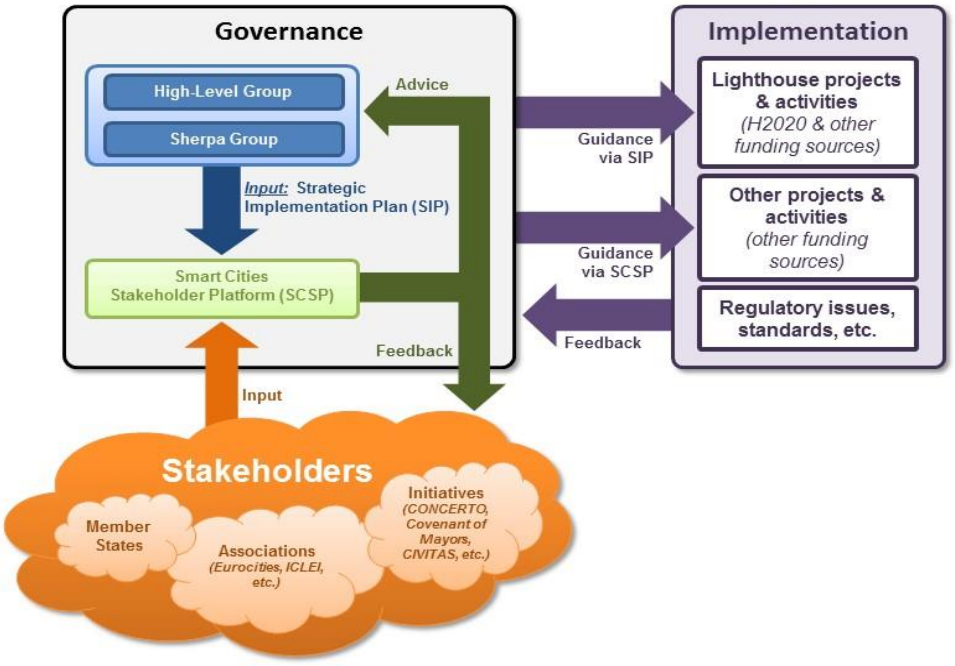


website : www.european-energy-award.org

ANNEX B

European innovation Partnership on smart cities and communities (EIP) Smart Cities brings together governance bodies, public bodies and institutions, companies and industries of all kind, market actions and public actions, citizens and associations, bringing together a broad range of services, systems and technologies into a new paradigm.

B.1 The EIP governance



The European Innovation Partnership for Smart Cities and Communities consists of the **High Level Group** (supported by its **Sherpa Group**) and the **Smart Cities Stakeholder Platform**.

The **High Level Group (HLG)** is made of high representatives from industry - CEOs/CTOs from leading European ICT companies - high level representatives of European cities (such as mayors and deputy mayors), research and other stakeholders such as the European Smart Cities Stakeholder Group. The HLG is supported by the members of a **Sherpa Group.**

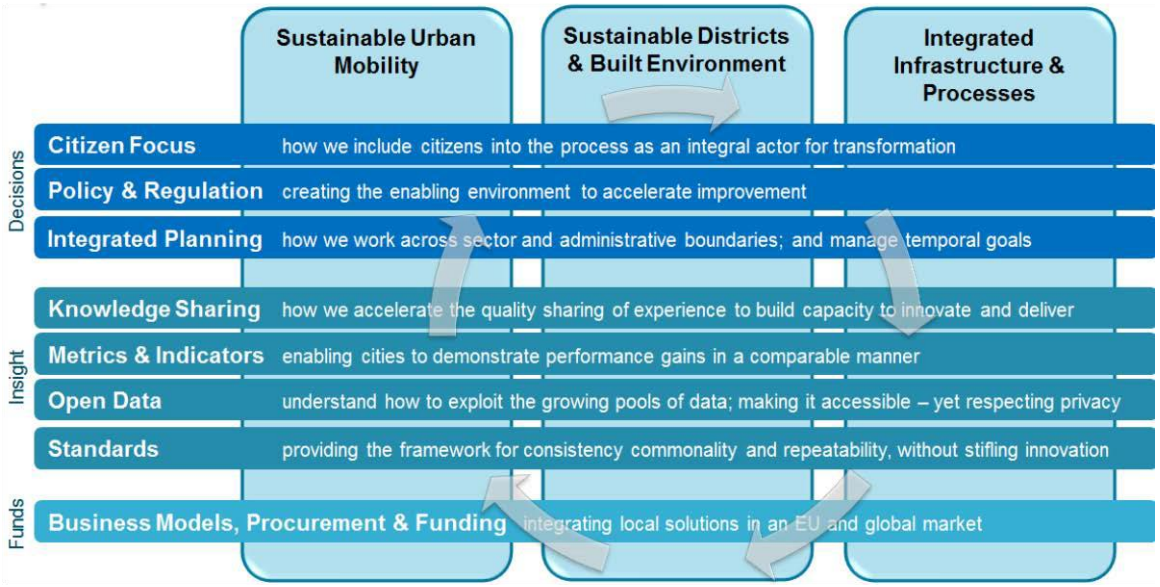
Together and with the support of the **EC Stakeholder Platform**, they have been in charge of elaborating a **Strategic Implementation Plan (SIP)**, which helps define how the concepts promoting Smart Cities are put into practice.

In particular the Sherpas' Group representative for CEN and CENELEC, Mr Ashok Ganesh, CCMC Director Innovation, together with the ETSI Board representative, Mr Keith Dickerson, also Action Leader of the 'Standards Priority Area', have worked to identify 'standardization' as one of the flagship actions to be included in the SIP and to recognize the key role of standards to support smart cities.

On 14 October 2013, the HLG (High Level Group) has agreed upon the **SIP (Strategic Implementation Plan)**. The SIP highlights the actions needed to create the right framework conditions to make cities better place to live and to do business in, to reduce energy use, carbon emissions and congestion.

Structured into three 'vertical domains' and eight horizontal (enabling) priority areas - one of them being '***Standards*** *providing the framework for consistency, commonality and repeatability without stifling innovation'*- (see figure below), the

SIP describes for each area the context and challenges, the drivers and which potential actions can help result in game-changing outcomes.



The EIP-SIP provides also a definition of Smart Cities as the following:

"Smart Cities should be regarded as systems of people interacting with and using flows of energy, materials, services and financing to catalyse sustainable economic, development, resilience and high quality of life; these flows and interactions become smart through making strategic use of information and communication infrastructures and services in a process of transparent urban planning and management that is responsive to the social and economic needs of society".

The Sherpa Group then developed an **OIP** (**Operational Implementation Plan)** which was launched in its first public draft version on **28 February 2014.**

While the SIP laid out the general directions and the overall goals for the Partnership, the OIP takes the SIP framework with its eleven priority areas as starting point and develops it in detail. In Priority Area 10 'Standards', in particular Section 10.2, the OIP recognize standards as enablers for the integration of city systems, functions, applications and services and for the technologies and communication infrastructures underpinning these. There they are indicated 14 potential actions that could help create a standardized and replicable framework for smart cities. The OIP, being a living document, is probably being updated in **June 2014.**

B.2 Invitation for Commitments

In parallel with the updating of the OIP, an **Invitation for Commitments** was issued by the EIP to all stakeholders to jointly support, share ideas and carry out plans for actions agreed in the OIP. The deadline for responses was set on **15 June 2014**. The Invitation for Commitment is independent of any Calls for proposal within HORIZON 2020 and is not linked to any funding instrument, but is primarily about learning, exchange and synergy creation between new partners.

A commitment is an intention to provide a measurable and concrete engagement in support of one or more focus areas over the next year or a longer period of time, with particular focus on energy, transport and ICT in the urban context.

The European Commission recently clarified in occasion of the Sherpa meeting on 2014-05-27 that **submitting a commitment was a 'light procedure' to enhance the visibility and promote engagement with other partners**. They invited the three ESOs to respond to the Invitation for Commitment and they informed that successful applicants are likely to be invited to become part of '**Action clusters'** so to facilitate close operational cooperation and exchange across sectors and between the supply and demand side-leading up to joint work plans on a voluntary basis. The SSCC-CG reference number of the IfC 7352 and either refer to the BT specific message and/or include the text of the invitation for commitment BT N9627 rev/CENELEC BT 18/DG9490/INF/REV. The invitation for commitment of the SSCC-CG for the development of a conceptual interoperability framework for smart cities was accepted as eligible under this European Innovation Partnership in august 2014.

The Smart Cities and Communities Stakeholder Platform

The Smart Cities and Communities Stakeholder Platform (www.eu-smartcities.eu) was set up on behalf of the European Commission (DG Energy) as part of the Smart Cities and Communities initiative initiated by the European Commission with the dual aim of i) identifying and spreading relevant information on technology solutions and needs required by practitioners and ii) providing information for policy support to the High Level Group and the European Commission. It is both a web-based and physical Platform open to anyone who wants to register on it. Backbone is the contributions by stakeholders in a bottom-up way, owned by the stakeholders.

The Stakeholder Platform (SP) is one of the two governance bodies of the Smart Cities and Communities European Innovation Partnership (EIP). As collaborative, networking and knowledge-sharing tool, the Stakeholder Platform collects and analyse inputs from all stakeholders to give advice to the HLG. The CEN-CENELEC-ETSI SSCC-CG activities were presented to the Stakeholder Platform on 7 May 2014 in a meeting with the European Commission and the SP Management Team (Zabala Innovation Consulting) in Brussels.

The role of the SP was described as market place for Smart/sustainable-city/community solutions; a knowledge hub and a centre for collaboration focused on the implementation, feasibility and replicability of smart cities' solutions. They will also support the SIP implementation in the form of action clusters. As follow-up of the meeting, it emerged the possibility to present the work of the SSCC-CG on definition of a 'model' for smart cities as SSCC-CG 'Commitment' in the framework of the upcoming EIP Invitation for Commitment. The concept 'model' was defined as a 'tool' helpful to '*categorise city issues, and smart/sustainable city/community solutions to those issues, in a way that will make it easy for cities to easily find examples of good practice, guidance, and standards that are relevant to them, and easy for standards bodies to scope out exactly what new standards might be needed'* .

The stakeholder platform has changed the name in online marketplace of the EIP on Smart Cities and Communities in October 2014.

B.3 HORIZON 2020

HORIZON 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market (focus more on innovation and market exploitation than previous FP7). Horizon 2020 is complementary to the EIP on Smart Cities (in its related smart city part under Energy WP) and inspired by the focus areas of the EIPs.

HORIZON 2020 is working through bi-annual Work Programmes (on specific sectors) defining the priorities and related opportunities of funding through calls for proposals (submissions of project proposals). The Work Programme 2014-2015 '*Secure, clean and efficient energy*' highlights as one of the focus areas: **Smart Cities and Communities**. The European Commission co-funding in 2014-2015 is available for best project proposals (see figure below) selected through calls for proposals that might possibly have common goals with the SIP of the EIP (topics of the calls aligned with the SIP).

The challenge of deploying solutions related to the energy, transport and ICT sectors, including those which are at the intersection of these three sectors, in an urban environment is to overcome the local specificities and the importance of standards..

Therefore, EU action for Smart Cities and Communities, with inputs from the Strategic Implementation Plan of the European Innovation Partnership Smart Cities and Communities focus on providing support to partnerships created between municipalities and industries which propose solutions and standard requirements answering to the complexity of projects in the intersection of the three sectors and which take actions for large scale deployment of those solutions in other cities across Europe.

Proposed solutions need to be driven by demand side actors, while the generic technological platforms e.g. for smart lighting, the Internet of Things and cyber-security are being developed with strong industry drive in LEIT part of the programme.

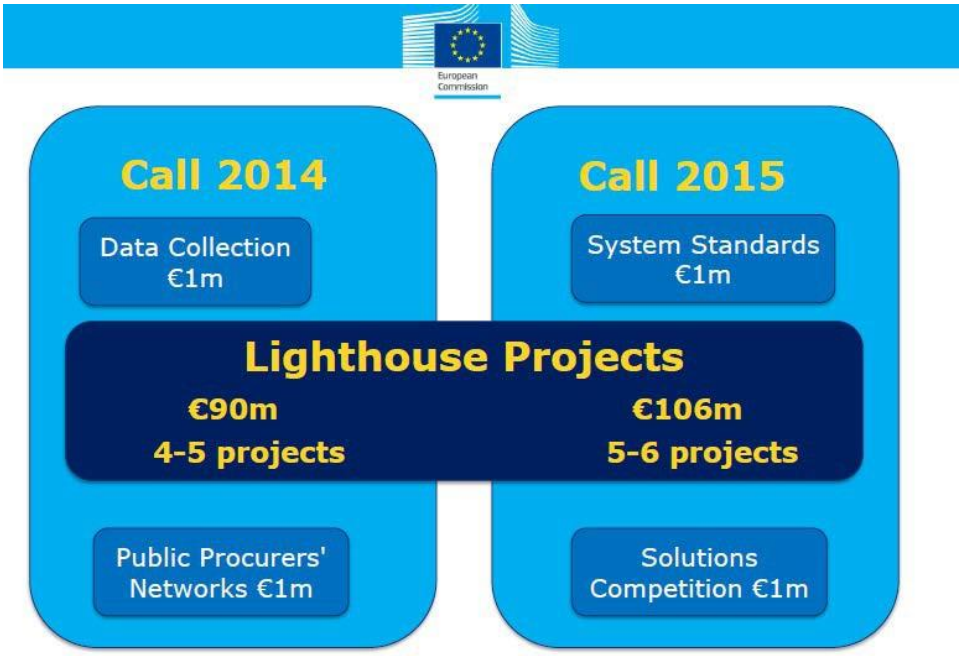
The projects funded under the call "Smart Cities and Communities" of the Work Programme 2014-15 will participate in the Pilot on Open Research Data in Horizon 2020 in line with the Commission's Open Access to research data policy for facilitating access, re-use and preservation of research data. Projects have the possibility to opt out of the Pilot. A related new element in Horizon 2020 is the use of Data Management Plans (DMPs) detailing what data the project will generate, whether and how it will be exploited or made accessible for verification and re-use, and how it will be curated and preserved, which might set requirements for developing new standards.

The 2014 H2020 projects on smart cities and communities should address the following main areas:

- (Nearly zero) or low energy districts: through the integration and management of: i) the supply of energy with predominant exploitation of local resources (e.g. waste heat, renewables, storage) and the active participation of consumers (e.g. use of aggregators); ii) the cost-effective refurbishment of existing buildings without significant disruption for tenants (use of sustainable materials) with a special focus on residential buildings iii) the cross-cutting ICT solutions for the design and overall management of energy/ transport systems
- Integrated Infrastructures: through the integration of physical infrastructures such as core networks, street scenes, lighting, industrial sites etc to create new forms of value through re-use and repurposing. This should lead to quantifiable benefits such as reduction of capital /operational expenditure as well as reduced carbon / energy footprints. This might also imply exploitation of synergies between requirements for smart grids, broadband infrastructures and in general poly networks (eg district heating and cooling).
- Sustainable urban mobility: through the integration of energy/ fuelling infrastructure with vehicle fleets powered by alternative energy carriers for public and private transport, including logistics and freight-distribution. Implications on energy management, and in the case of electromobility, the impact on the electricity grid, of the deployment of high numbers of vehicles and/or the alternative fuel blends performance must be assessed.

The proposed proposals should address in addition to the main areas presented above a strategy that addresses appropriate enabler actions to support the commercial exploitation of the proposal. This includes (indicative list): commitment of authorities (even if changes of politicians/ majority, in the course of the project); citizens' engagement and empowerment; optimising policy and regulatory frameworks; open, consistent data and performance measurements; dissemination and unlocking the market potentials worldwide.

According to the Communication on Smart Cities and Communities [C(2012) 4701 final] the light house projects should look for creating partnerships between industries, academics and cities, empower citizens and ensure the replicability of the solutions, ensure the funding from various sources.



In particular it has to be highlighted for **2015**, the Call for Proposal SCC-03-2015: Development of system standards for smart cities and communities solutions (a Coordination and Support Action with deadline 2015-05-05).

This Call is asking for a system approach for the development of integrated solutions of Smart Cities and Communities and it is highlighting standardisation as a relevant tool to implement the solutions identified by smart cities and communities with costs reductions. The Call quotes " It *is expected that this work is carried out by the industries cities and communities contributing to the Smart Cities and Communities European Innovation Partnership in cooperation with the European Standardisation Organisations (CEN, CENELEC, ETSI) as well as other Standard Developing Organisations (SDOs) responsible for technical specifications in the area of Smart Cities*.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 to 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

The **Call for Proposal SCC-03-2015** is also mentioned in the EIP-OIP (page 78) as relevant action under Horizon 2020, to be taken into account to implement OIP action.

Lighthouse projects in HORIZON 2020

The **Lighthouse projects (LHPs)** are large- scale projects, which come from policy recommendations in the Strategic Implementation Plan and can be financed through a number of different channels, including Horizon 2020 and structural funds. Key features of those type of projects are 'impact' and 'replicability'. Projects should be realised in 2-3 ''lead cities or communities ("lighthouses") and 2-3 follower cities, expected to significantly contribute to the requirements engineering stage of solution development embedded in urban plan. Standardization in LHP could support 'replicability' of solutions. The HORIZON 2020 Call for Proposal SCC-01-2014: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects is open also in 2015 (deadline 2015-05-05).

H2020/SCC 1 – 2014/2015: Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects with the scope to identify, develop and deploy replicable, balanced and integrated solutions in the energy, transport, and ICT actions through partnerships between municipalities and industries has funded 3 lighthouse projects targeting primarily large scale demonstration of replicable SCC concepts in city context where existing technologies or very near to market technologies;

1) GrowSmarter with 3 lead cities (Stockholm, Cologne and Barcelona) and 5 follower cities (Valetta, Suceava, Porto, Cork and Graz) having 12 ambitious, integrated solutions covering energy, transport and intelligent infrastructure. Within the project an additional 20 cities will be engaged.

2) Remourban with 3 lead cities (Valladolid, Nottingham and Tepebasi/Eskisehir) and 2 follower cities (Seraing, Miskolc) focusing on mid-size cities of about 300.000 inhabitants. A central element of the project will be the elaboration of urban renovation strategies focused on the citizens

Triangulum with 3 lead cities (Manchester, Eindhoven and Stavanger) and 3 follower cities (Prague, Leipzig and Sabadell) with Chinese city of Tianjin as observer. Project is focusing on development and implementation of a joint ICT reference architecture requiring the need for new standard.

ANNEX C

Modelling Sustainable and Smart Cities and Communities

C.1 Modelling Sustainable and Smart Cities and Communities

In order to understand the role of standards in helping a city or community become smarter and more sustainable it is important to develop a model that indicates how such a city or community works.

A city or community can be understood as a system of systems, with a unique history and set in a specific environmental and societal context. In order for it to flourish, all the key city/community actors need to work together, utilising all of their resources, to overcome the challenges and grasp the opportunities that the city or community faces.

It is quite clear that, while every city and community is unique, in general, they work in similar ways and there is therefore a great deal that they can learn from each other and many solutions to city and community problems that could be widely used and therefore standardised.

The SSCC-Co-ordinating group has developed a way of mapping out how a city or community works which indicates what are the common elements and what are specific to an individual city or community.

	City/Community history and characteristics What is the city or community story, its "brand" and values? Is it a stand-alone city, a hub city or satellite city, or is it a network of rural towns and villages? What is the size of population? Is it growing, stable or shrinking? What is its demographic mix?	
Environmental context How flat or hilly On what kind of rock it is built If it is by the sea or inland Climate	**City/Community actors** Local authority, Health trusts, service providers, electricity and gas suppliers, police, bus and tram companies, voluntary groups, businesses, banks, investors, and, most important of all, the citizen. **Activities** Planning, managing, purchasing, regulating, building and repairing, providing services, generating profit, gaining finance … **Community facilities and buildings** Homes, hospitals, schools, electricity substations, sports facilities, cinemas, water treatment plants, district heating plants, factories, offices, shops … **Infrastructures** Gas, electricity, water, sewerage, telecoms, roads and rail, district heating systems … **Soft Infrastructures** Business / Science / Community / Innovation networks and collaboration structures **Technical systems** Traffic light management, ticketing, billing and payment, automatic number plate recognition … **City/Community functions or service areas** Employment, Housing, Education, Health, Security, Mobility, Energy, Water, Waste Management, Food Supply chain, Consumer Goods Supply Chain .. **Scale** Citizen, building, block, neighbourhood or village, district or town, city, metropolis …	**Societal context** Laws & regulations Division of power between national and city/community governments Division of power between agencies within the city or community Cultural norms Economic structures and situation Political context
	City/Community Governance The task of City and Community Governance is to ensure that all of the functions of the city or community are delivered effectively at all levels of scale, and are properly co-ordinated to best deliver on the purposes the city or community has set itself. **City/Community Purposes** The key challenges facing the city or community that need to be tackled and the opportunities that need to be grasped. Social, Economic, Environmental …	

Figure 1: A city model

C.2 The city or community story

Every city and community is unique. It has its own unique history that explains how it has arrived to where it is today. Every city and community also has its own "brand" in other words a set of images and ideas that are evoked when people think about it. Effectively, the city and community story highlights the characteristics about which its citizens are most proud.

Clearly there are other characteristics of a city or community that will affect the relevance of particular solutions to the challenges it faces. For instance, it might be a metropolis, or a medium or small city, its population may be growing, stable or shrinking, it may be a stand-alone city, a satellite city of a larger city or a large city working with a number of smaller satellite towns and cities, or it may be a network of rural towns and villages.

Potentially each of these characteristics needs to be taken into account when evaluating the effectiveness of any solution for a particular city or community.

C.3 The city context

The ability of a city or community to decide its own future is constrained by two things outside its own control – its environmental and its societal contexts.

The **environmental context** includes factors such as its climate, how level or hilly it is, whether it is by the sea or is inland, and so on. Certain solutions that work for a city or community in a cold climate would not work for one in the tropics. Cities or communities on the coast might be vulnerable to tsunamis or sea level rise. Cities or communities which are largely flat might be more suitable for shared cycle schemes than those which are largely hilly. Cities or communities built on islands or peninsulas or in valleys may be comparatively constrained in terms of how they can grow in size. Another example is the fact that, for instance, the reason why Manhattan has many high rise buildings is because of the exceptionally deep and hard rock foundation underpinning it.

The **societal context** takes into account that any city or community is part of a larger nation, and its ability to direct its own future will be constrained by the legal and regulatory systems set in place by the national government and by the extent of the powers that have been devolved to it. It also includes cultural issues, such as the attitude of the general population to issues such as cycling and green issues, the relative roles of men and women in society and so on.

A city or community, therefore, needs to review potential common city solutions and standards to see how well they fit in with its environmental and societal context.

C.4 The city or community systems and how they work together

The centre box depicts the key players and infrastructures in the city or community and their relationships with each other.

Each of the **functions** of the city or community will be delivered by a range of different **actors** undertaking a range of different **activities** and using a variety of different **community facilities** and **infrastructures** at different **scales**. In many cases the citizen themselves will play a key role in the delivery of the city or community functions. All of the agencies that work together to deliver a city or community function, along with all of the community facilities and infrastructures at each of the different levels of scale, form a **city system**.

C.5 City Governance and city purposes

The role of **City Governance** is to ensure that all of the functions of the city are delivered effectively and are properly co-ordinated to best deliver on the city purposes. City Governance is not purely the role of the City council, although it will be the key facilitator of this.

The city purposes are the key aims set by the city to tackle the major challenges and to benefit from the major opportunities that the city faces. They will be based to a certain extent on the city's story and its own strengths and weaknesses. The city purposes will probably be adopted as such by the city council but are best developed through widespread participation of all key stakeholders, specifically the citizen. All the city purposes will be focused on the key needs of the residents, businesses and visitors to the city.

For instance city purposes might be to reduce the carbon footprint of the city, to bring more of a particular kind of employment into the city, to improve the health of the citizens and so on

The process of identifying these will often involve a wide range of stakeholders. Once they have been agreed, the city leadership will develop a strategy to address these challenges and opportunities, and this strategy will involve city systems being required to able to work together seamlessly to achieve that purpose. The precise way that this needs to be done will depend on the specific purposes adopted by the city.

For instance, if the city purpose is to improve the health of the citizen, that will, of course involve the health system. However it may also involve supporting the citizen in getting involved in more healthy leisure activities, in encouraging more journeys to be taken by bicycle, in improving the air quality by tackling pollution and so on.

In other words, while it is important that each of the individual city systems themselves work effectively, city governance is about ensuring that these systems can also work together in a seamless and effective way to deliver the key city purposes.

C.6 What is common and what is unique

The items and the relationships in the central box describe what are common to all cities and communities and are the basis for the development of common approaches and standards.

The environmental and societal contexts help define which solutions, from among the common solutions and standards, are practical for any particular city or community.

The purposes that the city or community has chosen to focus on, will determine the priority actions for any individual city or community – i.e. which common solutions should be implement first.

The City History and Characteristics define the values of that city or community and the factors that make it unique, and the city or community leadership would aim to choose those solutions that are most consistent with these.

C.7 The Smartness of a city or community and its relationship with sustainability

The "smartness" of a city or community describes its ability to bring together all its resources, to effectively and seamlessly achieve the goals and fulfil the purposes it has set itself.

In other words, it describes how well all the different city systems, and the people, organisations, finances, facilities and infrastructures involved in each of them, are:

- individually working efficiently; and
- acting in an integrated way and coherent way, to enable potential synergies to be exploited and the city to function holistically to best achieve its aims.

Clearly sustainability is a foundational purpose of almost all cities and communities.

However, while sustainability is basic to the life of any city or community, smartness is just as important, since it represents how effectively a city or community will be able to move towards achieving sustainability.

C.8 Smart/sustainable-city/community and community standards

There are many important areas of standards relating to ensuring that individual city systems are working well and they are all important to the life of the city or community.

However, the specific role of smart/sustainable-city/community and community standards is focused on enabling the integration. interoperability and cohesion of the systems serving the city or community in order to provide value, both to the city or community as a whole, and to the individual citizen.

C.9 Levels of Integration

Because these standards relate to the integration of city and community systems, they need to address those systems at a whole range of different levels.

There is no value, for instance, in working to solve all of the technology problems relating to the integration of city systems if the organisational structures and processes within the city make it difficult, if not impossible, to acquire and manage the products that these standards would enable. It is equally true that the value of the integration of business processes and strategies within the city towards achieving common goals will be greatly enhanced when the technical issues of interoperability and integration are also solved.

This means, for example, that the focus and priorities regarding the development of smart/sustainable-city/community and community technical standards and products need to be tailored to ensure that they are supporting city priorities and fitting in with city organisational structures.

Standards work has to, therefore, cover the whole range of issues from basic technology through to business processes and city strategies. It also has to be focused on involving and supporting the work of city and community leadership and the citizens, as well as the businesses that are developing smart/sustainable-city/community products and services. And, most importantly, it has to be aimed at underpinning the sustainability and enrichment of city and community life.

C.10 The next steps in developing the model

The model shown above, by listing the many different entities and relationships in the city, points to boundaries across which interoperability, integration and coherence are needed.

In order to make this model more useful for standards work it needs to be developed in two ways.

There is a need to

- map which of these boundaries provide particular challenges around integration at the moment; and
- identify which specific types of integration across which boundaries are needed in order to deliver on which city purposes, in order to help city and community leaders identify where they need to focus their work of integration
- The next stage of the work of developing the model therefore needs to be done in partnership with cities and communities, particularly those who are already implementing strategies to become smarter and more sustainable.

The recommendation is that this is done jointly with existing city networks within Europe and specifically utilising the standards and indicators action cluster being set up by the European Innovation Partnership for Smart Cities and Communities.

ANNEX D
European standardization structures

D.1 European standardization structures potentially interested and/or concerned by SSCC

Here below the list of CEN and CENELEC Technical Committees, CEN-CENELEC Joint Working Groups, CEN/CENELEC/ETSI Strategic Advisory Groups and Coordination Groups potentially interested and/or concerned with the topic of smart and sustainable cities and communities

D.1.1 CEN Technical Committees

- **CEN/TC 107** (GA)' Prefabricated district heating pipe systems '
- **CEN/TC 164** 'Water supply'
- **CEN/TC 183** 'Waste management'
- **CEN/ TC 230 '**Water efficiency/quality (Water analysis)'
- **CEN/TC 247** ' Building automation'
- **CEN/TC 256** 'Railway applications'
- **CEN/TC 264** 'Air quality'
- **CEN/TC 278** 'Intelligent Transport Systems'
- **CEN/TC 286 '**Liquefied Petroleum Gas Equipment and Accessories'
- **CEN/ TC 292 '**Characterization of waste'
- **CEN/TC 301** 'Road vehicles'
- **CEN/TC 308 '**Characterization of sludge'
- **CEN/TC 310** 'Advanced automation technologies'
- **CEN/TC 312** 'Thermal solar systems and components'
- **CEN/TC 325** 'Crime prevention, through building, facility and area design'
- **CEN/ TC 345 '**Characterization of soils'
- **CEN/TC 346** (GA/DC) 'Conservation of cultural heritage'
- **CEN/TC 348** 'Facility management'
- **CEN/TC 350** 'Sustainability of construction works'
- **CEN/TC 353 '**Information and Communication technologies for Learning, Education and Training'
- **CEN/TC 371 '**Energy Performance of Buildings'
- **CEN/TC 391 '**Societal and Citizen security'

D.1.2 CENELEC Technical Committees

CLC/TC 8X 'System aspects of electrical energy supply'
CLC/TC 9X 'Electrical and electronic applications for railways'
CLC/TC 13 'Equipment for electrical energy measurement and load control'
CLC/TC 17A 'High-voltage switchgear and control gear'
CLC/TC 205 'Home and Building Electronic Systems (HBES)'
CLC/TC 21X 'Secondary cells and batteries'
CLC/TC 57 'Power systems management and associated information exchange'
CLC/TC 65 X 'Industrial-process measurement, control and automation'
CLC/TC 69X 'Electrical systems for electric road vehicles'
CLC/TC 79 'Alarm systems'
CLC/TC 111X 'Environment'
CLC/ TC 82 'Solar photovoltaic energy systems'
CLC TC 88 'Wind turbines' (in urban areas)
CLC/59 X/61 'Performance of household and similar electrical appliances'
CLC /TC 215 'Electrotechnical aspects of telecommunication equipment' **CLC/SR 35 '**Primary cells and batteries'
CENELEC/TC 23BX 'Switches, boxes and enclosures for household and similar purposes, plugs and socket outlets for d.c. and for the charging of electrical vehicles including their connectors'

CENELEC/TC 64 'Electrical installations and protection against electric shock'
CENELEC 121A 'Low-voltage switchgear and controlgear'
CENELEC 120 'Electrical Energy Storage (EES) Systems'

D.1.3 CENELEC and CENELEC Joint Working Groups

CEN/CLC JWG 1 'Energy audits'
CEN/CLC JWG 4 'Energy efficiency and saving calculation'
CEN/CLC JWG 6 'Accessibility in the built environment'
CEN/CLC JWG 5 'Design for All'
CEN-CLC JWG 8 'Privacy management in products and services' (IT security technologies and services- starting in 2015)

D.1.4 CEN/CENELEC/ETSI Strategic Advisory Groups

- **CEN/BT/WG 213** '**Strategic Advisory Group on Accessibility'** –(SAGA)
- **CEN/CENELEC Sector Forum Energy Management** (SFEM)
- **CEN/CENELEC/ETSI Sector Forum Rail**
- **CEN/BT/WG 215** on **Building Information Modelling**
- **CEN Strategic Advisory Body on Environment** (SABE)

D.1.5 CEN/CENELEC/ETSI Coordination Groups

- **CEN-CLC-ETSI Smart Grid** Coordination Group **(M/490)**
- **CEN-CLC-ETSI Smart Meters** Coordination Group **(M/441)**
- **CEN-CENELEC eMobility** Coordination Group **(M/468)**
- **CEN-CENELEC Ecodesign** Coordination Group (Eco-CG)
- **CEN-CLC-ETSI** Coordination Group on **Green Data Centres**
- **CEN-CLC-ETSI Cybersecurity Coordination Group**

Proposed Actions and Objectives for SSCC-CG next steps

Smart and Sustainable Cities and Communities Coordination Group

January 2015

afnor NORMALISATION

GENERAL OBJECTIVE - A successful implementation of European policies on smart and sustainable cities and communities (SSCC) supported by coordinated standardization policies.

GENERAL RECOMMANDATIONS

The SSCC-CG members, taking into account the outcome of the work of its members and the recommendations for further actions to be undertaken in support of European standardization activities for smart and sustainable cities and communities, are asking to CEN and CENELEC (Technical Boards) and ETSI Board for an extension of the duration of the SSCC-CG lifetime of 2 years.

A potential transformation of this Coordination Group as a technical body might be examined at the end of this period.

The SSCC-CG is also requesting CCMC to provide support/coordination in response to the Horizon HORIZON2020 Call for Proposal SCC 3 – 2015 (Coordination and Support Action) '*Development of system standards for smart cities and communities solutions'* (opening 10/12/2014 closing 05/05/2015)

The ToRs have to be revised by CEN-CENELEC-ETSI boards according to the new scope and work program for 2015-2016

OBJECTIVES FOR NEXT YEAR AND CORRESPONDING ACTIONS

OBJECTIVE A – PROMOTE AN ENABLING FRAMEWORK FOR THE EMERGENCE OF SSCC

ACTION 1: the SSCC-CG to go on working on modeling for smart and sustainable cities and communities, starting from the elaborated city model (presented in the report, page 9).

ACTION 2: The SSCC-CG to further develop and test the 'conceptual interoperability framework' as proposed in answer to the EIP-Invitation for Commitment (Commitment n° 7352), in collaboration with all relevant stakeholders, part of the SSCC-CG. This will include the SSCC-CG to work in synergy with other selected invitation for commitments on standards and/or other 'Action Clusters' dealing with specific sectorial aspects/issues.

ACTION 3: the SSCC-CG to work towards an agreement on a common set of concepts, with international standardization organizations (ISO, IEC, ITU …) but also with others (world bank, …).

- Proposal of common meetings with ISO/IEC/ITU and other major international institutions involved in the elaboration of SSCC referential, to be organized in 2015 (see BT 9715, BT149/DG9621/DC).

OBJECTIVE B – PROMOTE STAKEHODLER INVOLVEMENT AND ENGAGEMENT INVOLVED IN STANDARDIZATION POLICY ON SSCC , STAKEHOLDERS THAT ARE USUALLY NOT VERY FAMILIAR WITH STANDARDIZATION (ex : Cities, city network, states, consumers, research centers and academics, …..)

ACTION 4: to promote a general campaign on SSCC with the support of European major partners involved in the implementation of smart and sustainable cities policies. (This should start before the launch of the standards on smart and sustainable cities, for them to be perceived not as "standards" but as "a common language" to face common challenges, climate change for example).

→Pilot a general campaign with mobilization of the networks, starting from national level to the European one;

→Organize workshops/roundtable targeted to involve existing city networks and reinforce the collaboration/promote their engagement in standardization;

→Elaborate material dedicated to attract new partners in the standardization process (with the purpose of 'explain main objective of standardization, the process, getting stakeholders more familiar with standardization);

→Promote skills and education to stakeholders not familiar with standardization or SSCC, mainly cities representatives through for example sessions supported by platform to present case studies.

OBJECTIVE C – STANDARDIZATION (implementation of specific inter-silos standardization processes in Europe for SSCC and a key set of standards

ACTION 5: The SSCC acting as a catalyst/filter for the identification of existing standards under development and/or specific standards to be developed for smart and sustainable cities and communities.

→ Coordination of the existing CEN-CENELEC and ETSI Technical Committees and or Advisory Groups/Coordination Groups working on smart and sustainable city related standards (example, IT security, ITS, building, etc.);

→ Recommend standards for development, adaptation, or revision by CEN, CENELEC, ETSI, and as an evaluating group for the applicability of international standards to the European market (make EU specific needs to emerge);

→ To work towards the alignment of the EIP activities and future activities of the SSCC-CG. (This includes all the potential actions referred in the OIP- Priority area 'Standards').

ACTION 6: To coordinate relevant identified initiatives on SSCC, at international level as well as in Europe with adequate process and tools – like the architectural framework to be developed - and advice the relevant authorities for standards to be developed, transposed or adapted, especially a key set of strategic standards.

ACTION 7: Encourage the development of guidance (ex: to assess smart citizen-related standards requirements, including aspects related to the legal/ethical and accessibility issues)

OBJECTIVE D – COMMUNICATION AND PROMOTION OF SSCC STANDARDS, STARTING WITH A KEY SET OF STANDARDS

ACTION 8: Communication via Medias and modern tools as well as via a network of existing initiatives and partners to identify and mobilize

→Define guidelines for a communication action plan on SSCC

→Monitor and coordinate a communication policy on SSCC