EIP-SCC
European Innovation Partnership
on Smart Cities and Communities

European
Commission

Marketplace of the European Innovation Partnership
On Smart Cities and Communities

TOWARDS A JOINT INVESTMENT PROGRAMME FOR EUROPEAN SMART CITIES

A Consultation Paper to Stimulate Action

FOREWORD

Digitisation has undeniably delivered profound change in many sectors, and is fast emerging as a major opportunity for cities across Europe. Smart city technologies offer a brighter future for European municipalities grappling with issues such as air pollution, traffic congestion and climate change.

Urban environments face complex and interdependent challenges. They are where the vast majority (76%) of Europeans live. Although cities should not be our singular focus, they certainly offer one that will deliver scale advantage more swiftly.

The smart cities market has been technology-led and industry-driven for too long. The market must shift to a city-needs-led and demand-driven model. This must involve greater collaboration between cities and industry partners.

The opportunity for investors to fuel the growing smart cities market is very real and very large, and with tightening public budgets much more needed. Creating the scale that the market and investors will benefit from requires new business models and aggregation of effort. The multi-lateral institutions and the private sector are intrigued, however there is a need for them to speed up their interest and contribute to the leadership of new funds and financial instruments.

There are now a growing number of European smart city pilots and demonstrators in place, supported by market stimulation from the EU and national public investments. These projects offer packaged, proven and market-ready solutions.

It is now time to move from pilots to mainstream application and deliver the advantages on offer to tackle head-on the societal challenges we face. Investments at scale are required. This must be our priority focus – to make the European smart cities market more fluid and productive. To do so requires the attraction of investments far beyond what the public purse alone can provide.

These packaged solutions present export potential for EU industry. Many large nations beyond Europe are increasingly active in developing smart city programmes – both in developed countries such as the US and Australia and emerging markets like India and Nigeria. These nations will now look to Europe for inspiration.

We must act swiftly to deliver the benefits on offer to European cities and society, and to capture the larger international market opportunity to grow European industry.

Smart cities have enormous transformative potential. To realise this vision, municipalities must collaborate to develop new business models and find fresh sources of finance. Realising the promise of a joint investment programme will be central to achieving this in the future.

Foreword by Professor Greg Clark, Global Advisor for Cities

EXECUTIVE SUMMARY

The extent and the scale of opportunity that smart city technologies offer to municipalities across Europe is potentially game-changing. Realising this potential will see cities **radically enhance quality of life, stimulate economic growth** and **create new value** for taxpayers and investors. Smart technologies are key to ensuring that cities are ready to grow and thrive in the context of rapidly-changing global patterns of trade, urbanisation, and consumption.

Pan-European programmes have made solid progress in stimulating activity in a bid to accelerate growth of the smart cities market across the continent, but there remain significant barriers to the mainstream application of innovative technologies at scale. The smart cities market has yet to attract the flood of (private) capital that is required to accelerate scale-up. Hampered by private investors' risk-averse approach, smart cities programmes have increasingly relied on finite sources of public sector finance. The public purse alone is not sufficient to deliver the transition from small-scale pilots to mainstream application.

Now it's clear that smart cities urgently require new sources of capital investment, both private and public, if they are to rise to the challenges that the future will present. Mainstream scale-up of smart city technologies in European municipalities requires a comprehensive programme of long-term investment.

Key to realising this vision of the future will be collaboration at every levels. Smart cities must adopt an inclusive approach, thriving on the contribution of **cities of all sizes**; industry – large and small; investors – existing and new. Close cooperation is required to make smart cities a more attractive investment, from devising **innovative new business models** to aggregating demand to access economies of scale and pooling risk.

Embodying the spirit of collaboration, a joint investment programme for European cities will empower cities to work together to attract long-term finance. This will only become a reality however if the EC, member states and industry work together to make it so. In a bid to stimulate wide-ranging discussion, this paper proposes tactics that could be deployed on the road to a joint investment programme.

The EC has a critical role to play in ensuring that Europe's cities can begin their journey towards a joint investment programme. Maximising the impact of the SCC01 Lighthouse Programmes is a good first step. The EC must ensure that the programmes can collaborate around common open integrated solutions that will demonstrate that smart city technologies are all set to deliver returns for investors on a large scale. European Commissioners are also ideally placed to help realise the cities of the future via the use of structural funds to stimulate the smart cities market.

European smart cities are currently hampered by an EC financial instrument regime that is too opaque and complex. A lack of clarity is making it extremely difficult for cities with limited resources to compete at the top table with larger European cities. Many European smart cities are, as a result, failing to unlock the public finance that is necessary to stimulate subsequent private investment. With excessive complexity stifling the development of the smart cities market, it is clear that the EC should bring a new sense of clarity in this field. This would send a strong message to the investor community that would help liberate market finance.

Member states also have an important part to play in Europe's journey towards a joint investment regime. Some countries have already run grant-financed competitions to stimulate market action. These should be replicated going forward with a view to ensuring genuinely pioneering smart city projects access to the finance required to accelerate the delivery of pilot schemes.

Investors themselves are an integral part of the pathway to a joint investment programme, and it's vital that they are put at the heart of the process by member states, cities and the EC. Europe's large investment banks have already blazed a trail on this, with smart city funds granting cities access to the capital required for expansion and scale-up. Going forward, a pan-European smart city infrastructure fund will both stimulate growth in the smart cities market and generate long-term returns for the investors who commit capital to delivering the smart cities of the future.

This agenda for change embraces a host of diverse stakeholders. Much has been done already, and much is in process. However, there is a great deal more to do. We have tabled 21 suggested actions in Part 2, with sector leadership from the Commission, other public/MS, and Investors.

Our success will be defined by continued persistence, passion, and unfaltering commitment. And very importantly, it must be a journey that involves collaboration.

KEY MESSAGES

- Society, and thus cities, face a huge and complex set of challenges.
  The challenge is too big to face alone.
- No sector or individual escapes change – public, industry, investors, and everyone in urban communities.
- Disruptive technologies and digitisation offer new innovative ways of tackling these challenges.
- However, the scale of change is greater than the public purse can withstand; so new sources of finance, and new business models must be found.
- Packaged, component-based solutions are needed that cities can trust, are interoperable, and can be tailored to local needs.
- This is a single-generation opportunity to stimulate profound change. Decision makers and influencers in place now must make a choice to act responsibly and sustainably to make a difference.
- Irrespective of which sector you come from, and what level of knowledge you bring about this very diverse and fast-moving smart cities market, this paper offers views and suggests actions that present opportunities for you.

PART 1 is about aligning readers on the key considerations and rationale for collaborative transformation.

PART 2 is about the move to Actions, and what specifically could be done.

IF YOU ARE...

INVESTOR

Please do read Part 1 to orient on the market context and the emerging opportunities for scale investment.

Part 2 gets to specific actions you may wish to engage in.

What and where do you want to help?

CITY

You experience the market forces daily, however often struggle to break free and influence forward plans to benefit the communities you serve.

Part 2 suggests collaborative actions that will help.

We need to know if these fit your needs, and what is missing.

INDUSTRY

You may well be familiar with the market context, however a change in approach is perhaps needed. And significant opportunities can emerge as a result.

What needs to start, and to stop or change?

EUROPEAN COMMISSION

The market must own, respond to, and pick up the pace, however as the principal policy setter, you can help good ideas be more visible, stimulate common solutions and scale, and bring investor confidence.

Are the actions and the balance right?

SMALL AND MEDIUM-SIZED ENTERPRISES

How to ensure a fair market platform that encourages scale-up of SMEs? A move to scale common solutions coupled with adoption of guidelines and standards will foster innovation and growth.

Is there enough suggested by way of action that gives you confidence?

GOVERNMENT AGENCY

National Governments can play a crucial role in stimulating market action, however it requires positive convening action and deterministic steps to foster cross-government alignment.

Is your government doing enough?

INTRODUCTION

Towards a joint investment programme for European (smart) cities

- WHY TOWARDS? We must agree bold targets[1], set expectations of what can be done, act with agility, and recognise that this change will take time. It is a journey that requires commitment and ongoing support.
- WHY JOINT? Engagement within individual sectors is a challenge in itself, while engagement of all three (cities, industry, investor) is a huge task. However, collaboration is the only way that this will work.
- WHY INVESTMENT? Because we have spent too long talking technical only, and not enough time exploring different business models, and engaging in innovative financing discussions that will support Europe's jobs, growth, and €300 billion investment ambitions[2].
- WHY SMART? A common misconception is that digitisation still has a long way to run to both impact cities and the financial sector. Smart approaches help us exploit and multi-purpose existing city assets, work across service silos, introduce new services based on data and disruptive Information Communication Technologies, and engage society far better; and that can help transform outcomes.
- WHY PROGRAMME? To date we have been tactical and opportunistic. We need a more strategic, programmatic approach to deliver success at pace. This requires many parties coming together around a clear, dynamic and flexible programme of activities that all point towards better long-term sustainability.

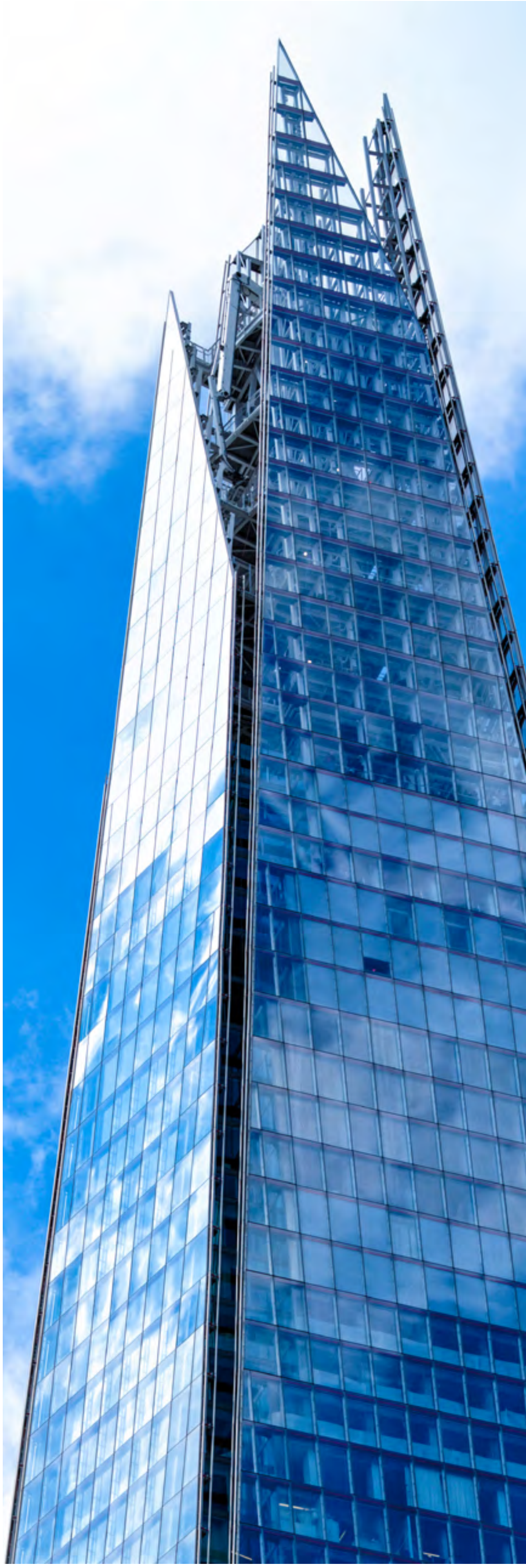
This paper sets the course to join up the various aspects of the much-needed push for investment which will speed-up the adoption of smart city solutions in Europe and make that international growth opportunity a reality. It refreshes the intentions of the **Strategic Implementation Plan (SIP)**[3] that was the founding paper for the EIP-SCC. It is intended to stimulate constructive dialogue that will help build investor and broader market confidence, and also support the development of tools and capabilities to accelerate and sustain EU smart cities.

THE PAPER IS PRESENTED IN TWO PARTS:

PART 1: sets out the transformation agenda; looks at three pan-EU smart city platforms for action; explores the key gaps in the market; explains how financing sources are changing; looks at future spending patterns; and the resulting opportunities that emerge; discusses how to engage the investment community, and finally introduces the emerging forward plan. This part seeks to bring a diverse group of readers to see a common context.

PART 2: 'A Roadmap to Stimulate a Joint Smart Cities Investment Programme' sets out 21 pragmatic lines of action that sector leaders can take to make concrete coordinated progress.

This should be considered as the updated strategic context and practical roadmap beyond the initial EIP-SCC Strategic and Operational Implementation Plans.



1 - As example, the EIP-SCC Market Place has set a target of €1 billion smart investment and 300 cities engaged
2 - https://ec.europa.eu/commission/commissioners/2014-2019/katainen_en
3 - http://ec.europa.eu/eip/smartcities/files/sip_final_en.pdf

PART 1: A TRANSFORMATIONAL AGENDA

Cities across the world are evolving at a phenomenal rate. Unprecedented population growth is fuelling rapid urbanisation, with citizens rushing to capitalise on the economic opportunities that cities provide. Profound demographic change will put increasing pressure on city authorities already struggling to maintain comprehensive public service provision, clean air, and free-flowing roads.

The European smart cities agenda is critical to ensuring that Europe's cities can meet the challenges of the future. Smart city technologies will help urban areas find innovative new ways of improving air quality, reducing congestion and removing barriers to economic growth.

Understanding the complex demographic dynamics that will affect European cities in the future is key to making sense of why the transformative potential of smart cities must be realised.

PROFOUND DEMOGRAPHIC CHANGE: Two complementary and compelling views can be taken. That of the city move – 'bottom-up'. And that of the bigger global picture – 'top-down'. Both of course interconnect. The long-term outlook clearly calls for transformation. However, it is our actions in the next decade that will define our chance of success.

The global picture that steers the agenda is driven by the unprecedented worldwide population[3] rise. Over the course of a single lifetime, the world's population is set to triple. This results in multiple societal and environmental challenges.

A ONCE-IN-A-LIFE-TIME AGENDA FOR ALL

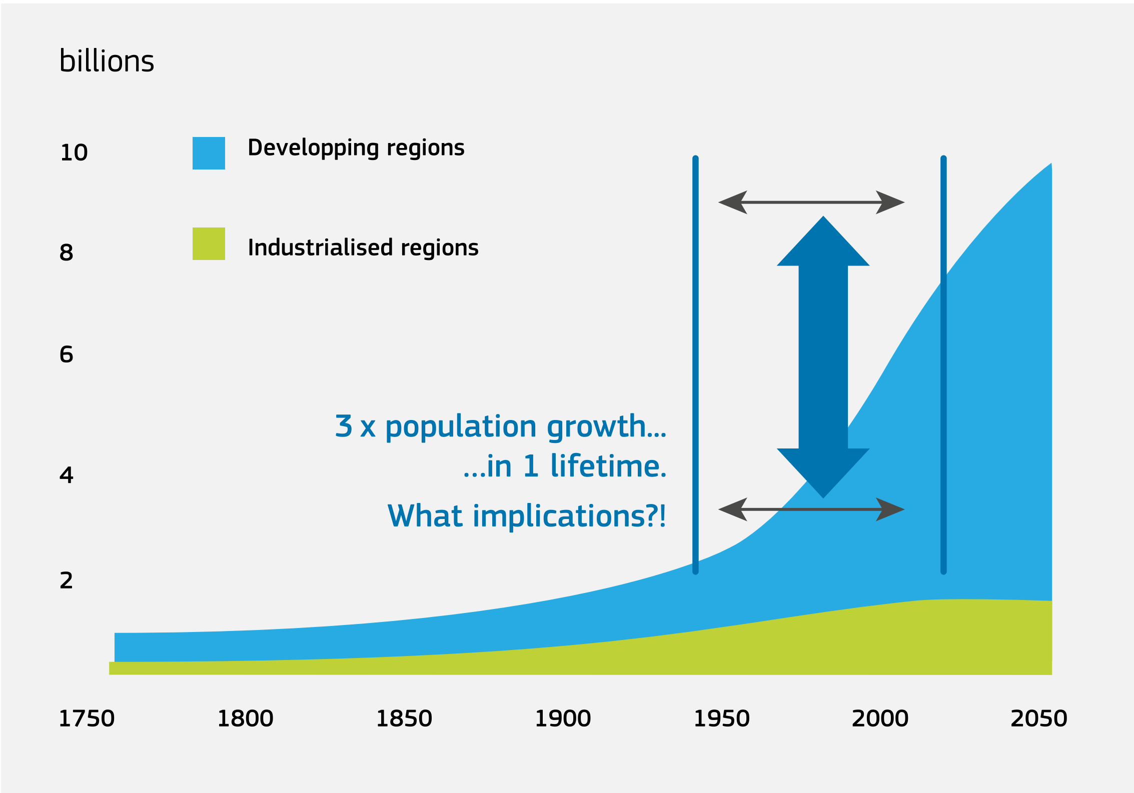


Figure 1 Global Population Growth between 1750 and 2050

3 - UN Population Forecast

Population growth also shifts the axis of global power if one considers *where* the growth of urbanisation will occur[4]. The contrast (figures below) of the 2010 top 20 cities by population and the 2100 top 20 provides a stark demonstration of this. The 2100 forecast shows that the world's top 20 cities will all be in the 'global south' rather than the 'global north' where most of them are today.

Though that might suggest the challenges don't lie in Europe. Wrong! They are for everyone to tackle.

Top 20 cities by population

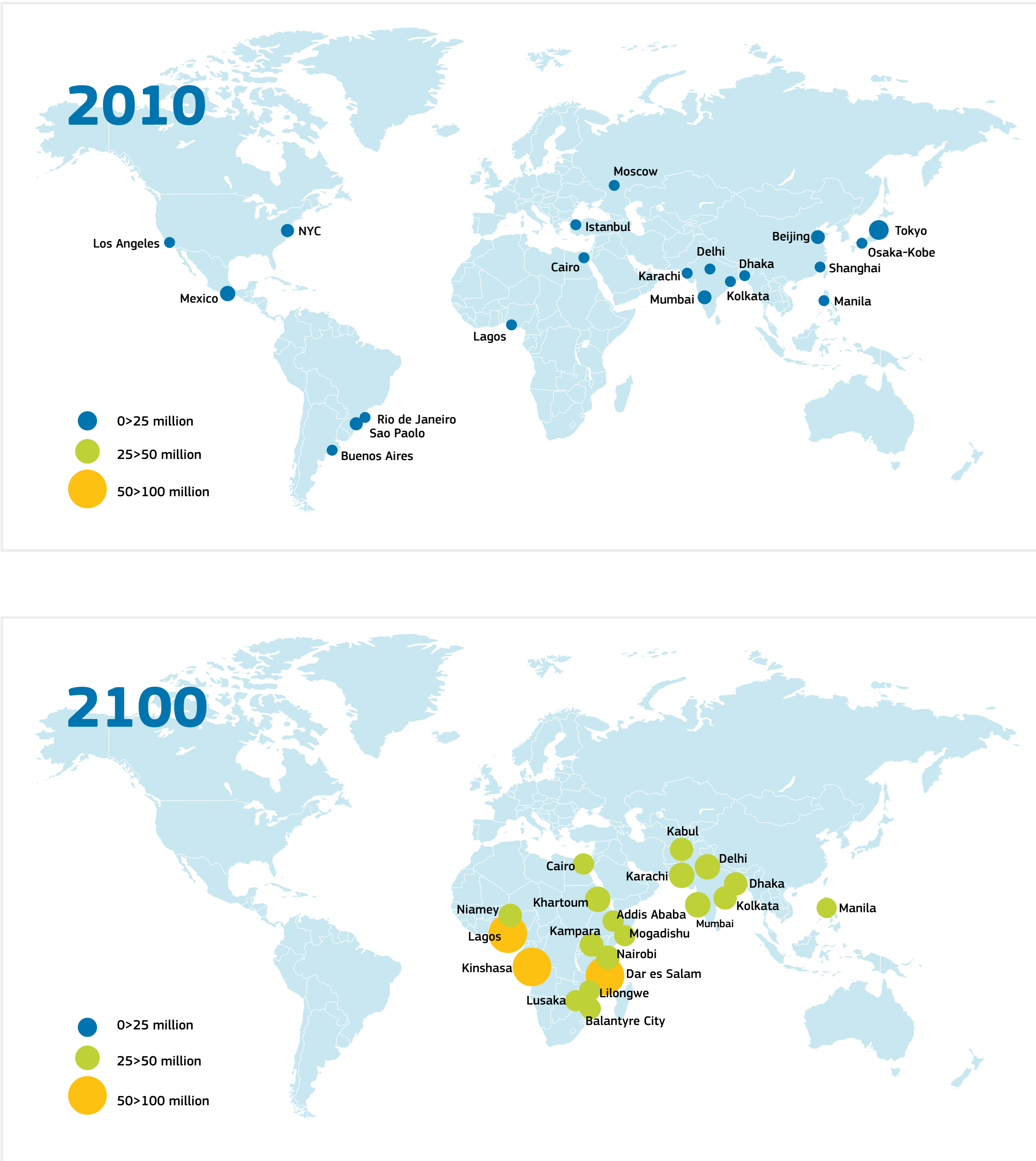


Figure 2 Top 20 Cities by Population 2010 and 2100

A major shift in large urban settlements to the 'global south and east' is set to occur. What might that mean for aging urban infrastructures in the north? What opportunities might this create in the south?

4 - Hoornweg, D. and K. Pope. Population Predictions of the 101 Largest Cities in the 21st Century. Environment and Urbanization, 2016.

RESOURCE CONSUMPTION: If one maps energy use in major *developed* economies, and reflects on the ambitions of people in the *developing* world to mirror the consumption habits of people in developed, it is difficult to see how our natural environment will be able to cope. Take energy for example (figure 3).

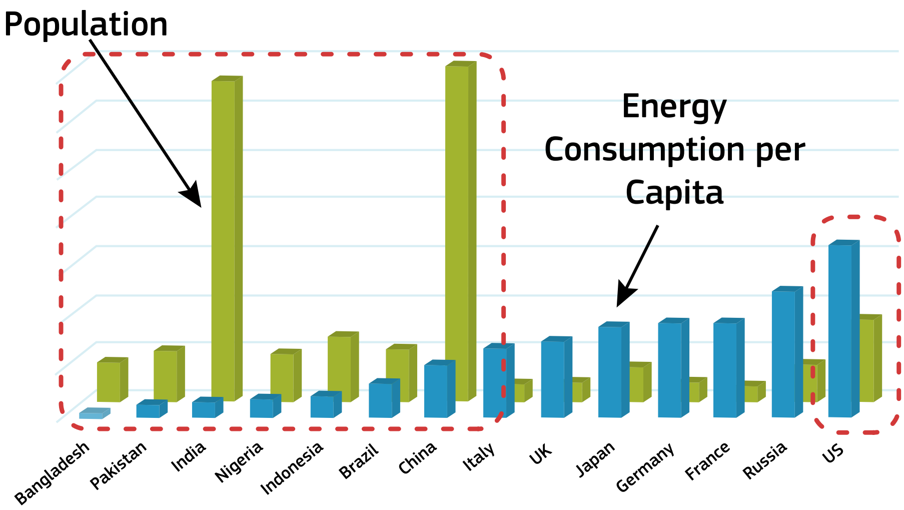


Figure 3 Population and Energy Consumption

US consumption habits x Indian or Chinese population ≠ a sustainable future!

Such patterns emerge for many more key resources, as more and more people in cities seek to adopt the models of the West. These forecasts suggest futures that are in many ways unattainable.

POPULATION RISE HAS A PROFOUND IMPACT ON ALL RESOURCES

Global and dramatic shifts are happening in our lifetime. Without doubt, the only option we have is rapid global-scale transformation. We no longer have the luxury to ponder. We must think and act in fundamentally different and much swifter ways.

Transformation will not occur as a top-down initiative only. It will only happen with the commitment and responsible actions of all in society. And cities play a vital role in convening society – residents; the business community, and visitors.

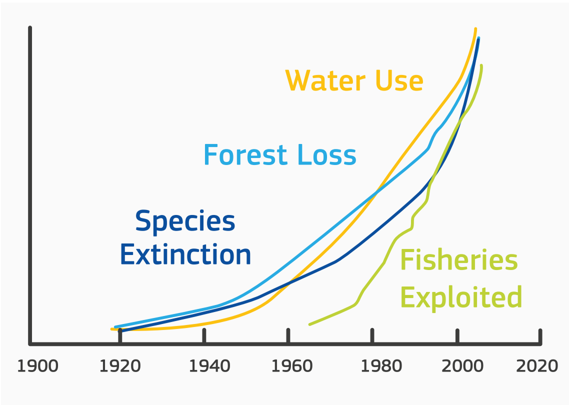


Figure 4 Natural Resource Depletion 1900-2000

We envisage more and more cities stepping up to the challenge and setting targets with a level of commitment and pace that exceeds national governments.

These include transformative ambitions for some of the most costly and important basic services, better health and wellbeing, sustainability, conservation of energy and water, transport, and waste management. The C40 Cities Climate Leadership Group offers an example of this connecting 90 of the world's greatest cities. They also include actions that exploit disruptive technologies and introduce innovative new business models. An example of this is Citymapper the transport app.These goals require concerted action on the part of every individual and collaboration across all levels to cause rapid step-change. **The role of city halls to stimulate, steer and convene transformation at all levels, will become increasingly important in the future**.

3 - Energy statistics
4 - Chris Masterson's Crash Course

KEY PAN-EUROPEAN SMART CITY INITIATIVES

Solid progress has already been made by multiple European smart city initiatives in piloting innovative new technologies in cities. These initiatives have proven to be a genuine catalyst for change in municipalities across Europe. Thus far they have largely relied on the public purse to finance their activities, and it's now clear that they must find new sources of investment to deliver mainstream application of smart city solutions.

The European market is large and very relevant globally as regards to smart cities. The convening role of the EC to stimulate and shape the market is significant and vitally important. Five key initiatives are presently in place to do so, supported by a variety of additional complementary financed projects.

EUROPEAN INNOVATION PARTNERSHIP FOR SMART CITIES & COMMUNITIES (EIP-SCC) – A STIMULANT TO THE MARKET: EXPLORE, SHAPE, DEAL

The EIP-SCC is one of five EIP vehicles to establish a pan-EU market. Its focus is on energy, mobility and integrated infrastructures. It engages all sectors; of all sizes, including small cities and SMEs, to help ensure an inclusive market with opportunities for all. The EIP-SCC has been in place for four years as a non-publicly-funded vehicle for change. It seeks to bring together multiple actors from across Europe to collaborate to bring common integrated solutions to the market that will deliver step-change outcomes, at scale and pace. The EIP-SCC has established foundations, and now needs an impetus to take it to scale action. However, many of the initiatives across the six Action Clusters sit at the emergent side of the adoption gap. New ways of working must be incentivised right across the market, as well as in some cases stimulus funds, to nurture and accelerate these ideas – for which there are several; and scale funds must be accessed to exploit the resulting common value-adding tools and solutions.

EU SMART CITIES INFORMATION SYSTEM (SCIS)

The Smart Cities Information System (SCIS) brings together project developers, cities, research institutions, industry, experts and citizens from across Europe to collaborate on the creation of smart cities. SCIS is primarily a knowledge platform, launched with support from the European Commission, that encompasses data, experience and know-how collected from Smart Cities and Building Energy Efficiency projects co-funded by the European Commission under FP7 and Horizon 2020, that focus on energy, mobility and ICT. SCIS aims to foster replication and therefore analyses project results and experiences to: establish best practices, identify barriers, capture lessons learned, and provide policy recommendations.

SMART CITIES "LIGHTHOUSE" PROGRAMMES (SCC01s) – BUILDING A COMMUNITY IMPLEMENTING COMMON SOLUTIONS

There are presently a dozen EU-financed consortia representing 36 'demonstrator' cities, 42 replication cities, representing a collective total EU investment of €500 million within the 2020 programming period. All cities are working on a common agenda – energy reduction and sustainability through energy efficiency measures in buildings, local renewable energy, electric mobility, integrated infrastructures, societal engagement, and various data-enabled solutions. Unlike many other EU-financed projects, this investment must be considered as stimulus only, and a means to influence greater collaboration; finance innovation; design, demonstrate and share value-adding common solutions; and create scale. Scale, not through the modest EU-financed activities within each individual city; but through stimulating greater levels of adoption of solutions within a city, and more importantly through replication and demand aggregation between cities. Like most grants, this stimulus should have multiplier targets. The Cross-SCC01 Collaboration Agreement demonstrates a clear commitment to develop joint replicable business models and solutions.

COVENANT OF MAYORS.

The Covenant of Mayors is a voluntary bottom-up movement, launched and supported by the European Commission, that gathers local authorities committed to meet and exceed the EU climate and energy objectives. These political commitments translate into concrete actions and projects developed and implemented under the local Sustainable Energy and Climate Action Plans (SECAPs) prepared by the signatory cities. Such plans help encourage investments and enable investors and SMEs to identify opportunities and better engage in local projects. SECAPs (or their equivalents) are currently a prerequisite for receiving funding under the Horizon2020 Smart City Lighthouse project calls. The Covenant of Mayors is working with the EIP Marketplace to establish a process for the realisation of local projects. With its dedicated office the Covenant of Mayors serves also as a city platform to facilitate exchange of best practices and transfer of knowledge, helping to encourage collaboration between cities on climate and energy and to replicate concrete solutions.

URBAN AGENDA – A MAJOR SHIFT IN STRUCTURAL FINANCING TO SUPPORT INTEGRATED INCLUSIVE URBAN DEVELOPMENTS

The Urban Agenda for Europe is the 'umbrella' urban policy initiative. The aim is to establish a more effective integrated approach to EU and national policies and legislation with a clear and balanced impact on urban areas. The approach involves innovative multi-level cooperation involving EU institutions, member state ministries, regions, cities and their stakeholders to create ownership and improve quality of outputs.

Twelve partnerships have been established, focusing on the EU 2020 strategy for smart, sustainable and inclusive growth, all of which can benefit from 'smart' approaches; and includes partnerships on energy, mobility, and cross-cutting digital transition. These groups are formed with multi-stakeholder participation of a workable size. Cutting across most are considerations of urban-rural synergies, small and medium-sized cities, diverse contexts, and good urban planning. These partnerships are tasked with developing action plans that overcome blockers and provide concrete recommendations. The overall goal is to help shift action to an integrated approach to urban development that moves from sectorial to integrated planning and policy-making.

A GAP IN THE MARKET – WITH PLENTY OF SCOPE FOR IMPROVEMENT

The burgeoning smart cities market provides a massive growth opportunity for investors. Municipalities across Europe have struggled to engage in a meaningful way with investors in a bid to secure long-term private investment. If smart cities are to make a durable transition from small-scale pilot projects to mainstream application, city leaders will have to make a compelling case to investors. Investor-city collaboration is a prerequisite of market growth.

The smart cities market has been technology-led and industry-driven for too long – a 'push' market. A city-needs-led and demand-driven 'pull' market is very different to what we have experienced to date. This will lead to greater productivity and efficiency. In making this shift all sectors need to change, as illustrated below.

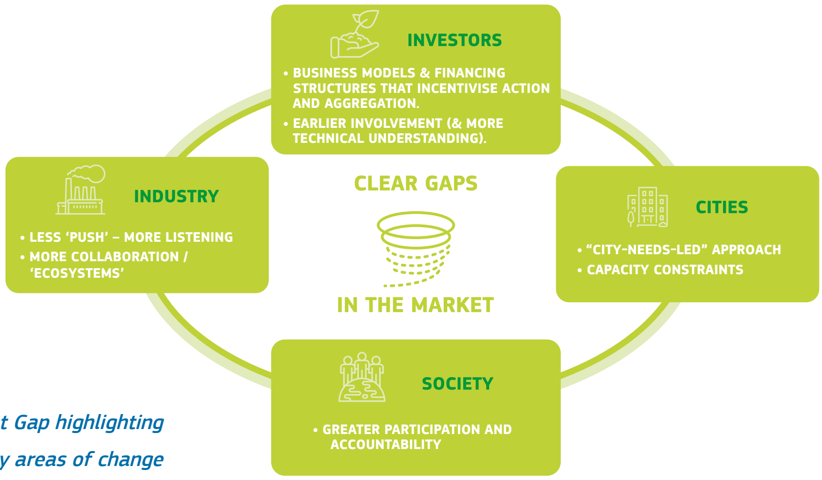


Figure 5 Smart Cities Market Gap highlighting each sector's key areas of change

This transition will require considerable collaboration – from all quarters – resulting in a more productive market. The picture painted below is a somewhat polarised view, to emphasise the change that is required to stimulate the market into a new and more functional form. What is clear is that the market is riddled with challenges and perceptions – some true, some less so. And as a result, opportunities.

Table 1: Necessary Market Shift

THE CURRENT STATE...	A BETTER WAY...
CITIES:	
• Individualistic / bespoke solutions • Capacity constrained • Risk averse • Asset rich, resource / finance poor • Pilot obsessed, not market oriented	• Greater ambition for innovation and agility • Collaborate to influence the market and deliver better value • Outcome focused; stimulating the market to find the means
INDUSTRY:	
• 'Push' solutions • Sector-silo solutions • Short term, financially driven	• Active listening to city needs • Building cross-segment industry ecosystems • Respect of public setting, public value, and public constraints
INVESTORS:	
• View cities as "too small, too slow, and too risky" • Involvement too late in the deal cycle • Act once the ideal low-risk investment-ready project emerges	• Involvement earlier in deal shaping • Active role to incentivise common solutions and demand aggregation • Blended financing (including capital and revenue) • Financial intermediary to create and operate innovate business models
SOCIETY:	
• "Done to..." mindset • Assumption that public services are 'free' and a right	• Engage, participate, and actively take responsibility • Collaborate • Build trust – society / public sector

CITY FINANCING SOURCES ARE CHANGING

The evolving nature of city financing further highlights the need for smart cities to diversify their sources of finance and create innovative new incentivised business models. With member states operating in a challenging fiscal environment, the ability of the public sector to finance mainstream scale-up is limited. European smart cities must work together to find diverse sources of long-term finance if they are to grow and thrive.

Local Government (as distinct from cities) expenditure across Europe represents a significant portion of overall national public expenditure (figure 6), increasing from the mid-1990s to a current plateau level around 24%. It also represents a major portion of overall government investment, dropping from a pre-crisis level near 50% to currently 43% of total public investment .

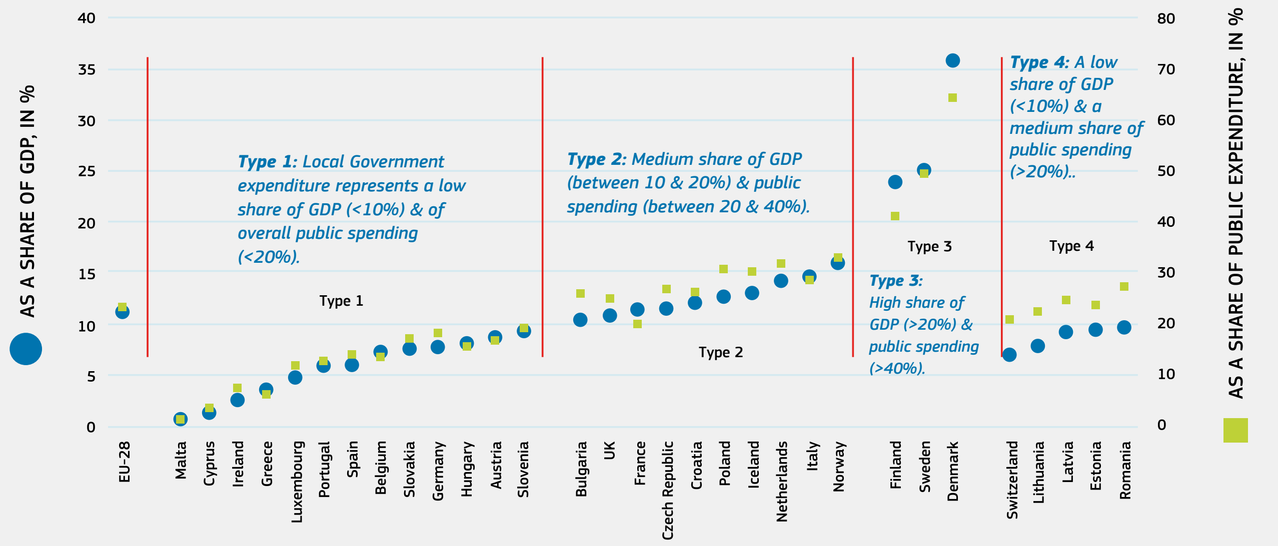


Figure 6 European Local Government Expenditure, in comparison with Nation Expenditure (Eurostat 2015 data)

Much of major infrastructural investment in cities has come from grants: national (or regional) government, or EU structural funds. These involved considerable capital investment. However, these sources are finite, and the required expenditure to support rapid transformation is much greater.

Cities have relied heavily on central government for direction and financing in many countries. However, in several member states, the trend is towards more local accountability for action. And in most cases, this also involves greater powers to control and raise finances. That presents both opportunities and capability challenges. **A move towards local accountability makes much sense, as transformative change sustains best when it is stimulated and owned at grassroots level – within and by the local community**.

There is an observed trend to continue externalisation of what was in the past considered 'public' services: utilities, transport, health and waste. As a result, **cities shift from investor/operator to outcomes commissioner, the accountabilities between sectors change, and the lines between capital and operating costs blur**. Such services are now managed more on a performance-based model where savings or revenue must be factored in alongside capital investment decisions. **A more nuanced and blended approach to investment decisions is thus required**. This is also supported by new business models.

Smart city solutions typically involve cross-functional (and often cross-sector) interdependencies, and these introduce complexities. Delivered value – hard and soft – accrues to different parties over different timescales. Those involved in investment decisions may well differ from those that benefit, within and across sectors, which introduces the need for greater transparency and collaboration. Present budgeting processes and benefit-tracking mechanisms do not cater well for this. So, being able to **evidence early examples of step-change value improvements through smart approaches is vital to build confidence and support decision making**. And if these decision makers involve investors outside of traditional financing channels, the need for evidence is that much greater.

EXPECTED FUTURE SPENDING PATTERNS: WHERE THE MONEY WILL GO

The expenditure focus for European cities will be dominated by maintaining, extending the life of, maximising the yield from, or replacing ageing physical assets and infrastructures. Cities will also be seeking efficiencies in budget lines including social services. A small percentage is expected for greenfield developments.

WHERE WILL CITY BUDGETS GO?

How much will be spent on urban infrastructure over the next 10/25/50 years, and how could we spend that money more wisely? Both questions require complex answers.

The first results in an eye-wateringly large number yet we do not know it in sufficient detail to manage it. Where it is known it is in the databases of advisers, not openly available in the hands of cities. There is certainly scope to manage city budgets more wisely – to spend less and gain more. Yet, the acceptance of and evidence of how is illusive.

The focus should not only be on physical infrastructure. The "Barnet Graph of Doom" [8] highlighted that with aging population and stressed public budgets, by as soon as 2025 all of that London Borough's public expenditure would go to care services for children and the elderly.

8- https://www.theguardian.com/society/2012/may/15/graph-doom-social-care-services-barnet

There is presently a clear focus on energy efficiency and transition (notably buildings and transport) in terms of investment in 'smart' solutions (figure 7). This is the pattern in Europe and beyond. It is also the predominant focus of the €500 million SCC01 'Lighthouse' smart cities budget investment.

However, there is likely to be an increase in human services spend (public safety, health and wellbeing, inclusion) as the potential from ICTs proves itself in these service areas that represent the predominant portion of a city's budget.

Smart city forecasts are highly variable. The boundaries between what is considered as 'smart' differ. Typically, estimates reflect technology expenditure, not the full infrastructure or service costs. The latter is important to consider however, as the **implementation of smart solutions** – sensors, data analytics, social technologies, and the like – **within traditional budget lines can reduce overall costs and increase value**. For instance, the benefits of peer-to-peer sharing technologies to improve urban mobility; the installation of leak detection technologies in water systems; level monitoring technologies in waste bins; strain gauges in bridges and other urban infrastructures. These digital 'add-ons' are typically what are reflected in the forecasts, though they are less-than-significant in overall cost terms, yet can be disproportionately beneficial in value terms. Value can be derived through automation, through new technologies in the physical asset design, and through changed human behaviour – and indeed it is crafting that best combination that is truly 'smart'.

The European smart cities market tracks at a similar scale presently to the North American and Asia Pacific markets, although looking forward the Asia Pacific market is forecast to continue to grow as the latter two remain relatively stable.

Analysts are converging on a smart city global (supply) market forecast of around $1.2 trillion by 2020, at a CAGR ~22%. Transport, buildings, and energy are most significant.

The 'smart city' forecast is however dwarfed by the amount that cities will spend on urban infrastructure. Urban infrastructure forecasts vary widely: $36-40 trillion over 20 years (OECD/ABB); $65 trl over 15 years (UN), to $350 trl over 30 years (WWF).

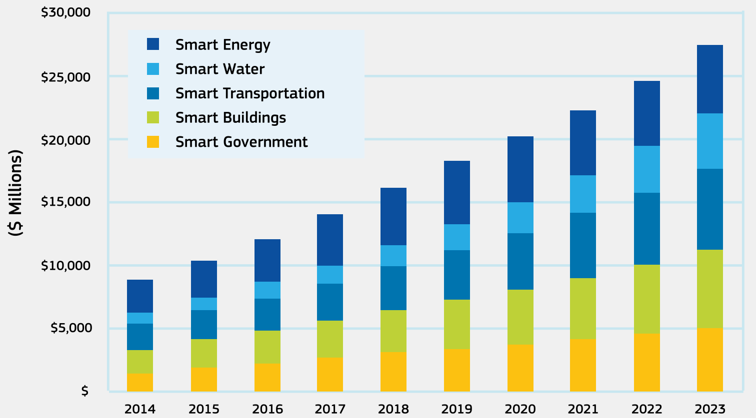


Figure 7 Smart City Market Forecast

Source: Navigant Research

OPPORTUNITIES EMERGE IF WE CREATE THE RIGHT CONDITIONS

The pressing need for collaboration between smart city platforms, industry and investors to secure long-term finance solutions for the smart cities market is clear. Establishing the right enabling conditions is vital. Creating the right environment will support market scale, accelerate action and deliver better outcomes for both society and investors. The following five key areas of focus are integral to establishing the foundations for an active and investable smart cities market.

1. Accelerating the emergence of new business models

A number of themes disrupt current city business models: (i) the **scarcity of public** funds to cater for the scale of investment; (ii) the externalisation of services; (iii) the **role of society** in realising value; and (iv) the increasing **involvement of society in financing** (e.g. **crowdfunding; digital social market**). These present significant opportunities to innovate and design new approaches to the management of investment and return for infrastructure and services. Such change affects all stakeholders. A common prerequisite is the need to evidence value, as the basis to justify commitment of resource, and ensure new business models are viable.

Of note, for EU Regions that rely on structural funds that are deployed against capital investment, there are opportunities to use these moneys to attract and 'blend' investment and stimulate business model innovation.

2. Changing perceptions of cities from "*too small, too slow, and too risky*" - to attractive investment targets

Many investors hold this view. It has elements of truth to it. **Cities are complex organisms that provide a huge variety of services to a broad group of stakeholders**. They hold statutory obligations, and balance political and professional goals. They must make choices about service operating models (provider / commissioner) and budget deployment to these services and city-wide infrastructures, work across Governmental tiers and with local public/private collaborators, and also manage the complexity of 'public value' which is considerably more challenging than single organisation financial optimisation as seen in the private sector.

Yet the **'cities market' is also, in aggregate, one of the largest markets worldwide**. And there is no need to excuse the complexity. It is the reality, and should be understood. **Engaging the investment community early** and working through these perceptions rationally together is the route to successful and fruitful investments.

Risk is reduced for investors, most importantly through confidence in return (funding) streams in order to be able to offer attractive terms. This will be aided by the early involvement of the investor community in structuring deals, and the natural transfer of thinking and skills that results. It must also come through positive action in building innovative commercial capabilities and processes in cities. This latter point requires a **systemic approach** to address this city-market-wide need.

3. Variety control – the application of standards

There is an ongoing challenge to balance the desire or (perceived) need for bespoke solutions against the other extreme of 'one-size-fits-all'. This introduces the role that guidance and standards play to make and shape the market that helps to lead to interoperability and commonality. For **smaller cities in particular** this can be advantageous. There is considerable scope here. It can lead to **cheaper**, **faster** and **better** services. For the investor, it can bring confidence in solutions. And investors can play an important role in conditioning the market to select common interoperable solutions. Achieving the best economies of scope and scale (Figure 8) is thus a challenge, and a considerable opportunity – the result of which can be a very much enlarged investment market.

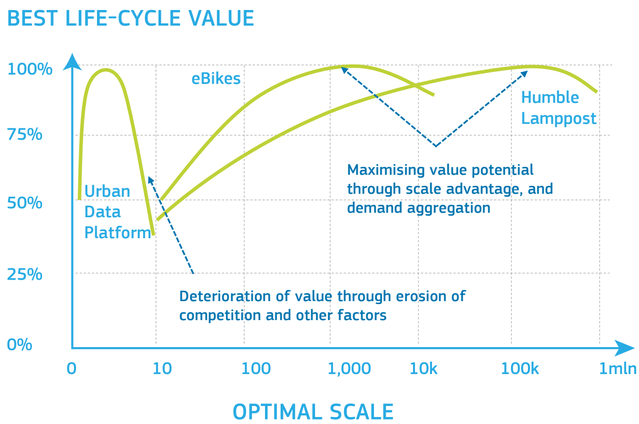


Figure 8 Economies of scale are enabled through interoperable standards (Sharing Cities 'Lighthouse' expert opinion)

4. Ensuring an inclusive market

As the fad of 'smart city' matures, it is natural that some cities benefit more than others. There is a relatively small group of progressive cities that come to mind when 'smart city' is mentioned. These tend to gain the attention of grant fund decision makers, of industry research and sales resource, and of investors. Scale is achieved by attracting cities well beyond this to **ensure there are no cities that are left behind**. Many of these smaller and less developed cities are eager to learn about and capture the opportunities at hand, so are predisposed to collaborate with others. Smaller cities are often more agile and swifter to act.

Again, the **result of which can be a very much enlarged investment market**.

5. Ensuring cities develop real societal insight, means to engage, and cause societal participation

This is perhaps one of the most vital means to provide investor confidence, yet it is a set of actions that investors would perhaps not see a direct connection with. Most transformations of city outcomes require (substantial) people-driven change to deliver financial, social and environmental gains. Cities must be excellent at understanding, influencing and actively engaging society. This is a city action, and one that is perhaps not visible to most of the investment community. However, it is vital. The EIP is actively developing a toolkit to support cities in this endeavour.

HOW CAN 'SMART' TRANSFORM CITIES?

Energy: around 200 million Europeans live in mid-20th century large tenement blocks. These are notoriously energy-inefficient. Deep retrofit of the buildings: shell, building energy system, grid integration, inclusion of renewables, and monitoring can save 50% of the energy load.

Transport & Mobility: peer-to-peer car sharing enabled by vehicle tracking, apps and other digital solutions holds potential to substantially reduce the need for more tarmac, and will reduce congestion. Add to that the shift to more reliable digitally-tracked and monitored public transport, greater adoption of electric vehicles, a longer-term shift to assisted and automated driving, and it becomes clear that digital solutions will transform not only the technical solution, but also the business models and demand response/incentive mechanisms.

Smart Lampposts: for every half a dozen residents in a city there's a lamppost. And changing from old to LED lighting can save 50-70% energy costs, and 50% maintenance costs. Not only that, these 'mesh' networks of powered assets present considerable opportunity to offer improved safety, connectivity for people (and devices), access points for eVehicle charging, locations to monitor the environment (e.g. air quality, water levels), and the opportunity to extract additional value from captured data. Costs are modest, and it's a valuable quick win.

Pan-City Data Platforms: the spectacular growth in city data offers an enormous opportunity to take a wholly different approach to how cities shift from reactive to proactive -indeed predictive-infrastructure planning and service management.

'Smart City' is an oft mal-used and misunderstood term. Technology can support these transformations, but to be effective 'smart cities' must be viewed as a more holistic term that addresses leadership, societal engagement, all infrastructures and core city services, and how we manage the flow of information and finances through these interdependent systems.

ENGAGING INVESTORS – WHICH ONES, WHY, AND HOW?

Smart city programmes must meaningfully engage with investors early if they are to source new models of finance and devise new ways of doing business. Rather like the diversity in where the finances go, there is a wide variety of potential investors for cities, and a range of different financial instruments and business model options to apply. Investors span institutions that have a tradition of financing urban developments, to established investors that are new entrants in the market, and increasingly to society itself – through modest sized participatory schemes.

Public finances are limited, and are increasingly under pressure and scrutiny. They are, however, vitally important as they bring with them an obligation to deliver public good: social outcomes, inclusion, diversity, and ecological and environmental improvements over the longer term. The observed shift towards cities being able to raise revenue introduces new opportunities for cities and other public bodies. **However, given the finite nature of public finances, their focused use to stimulate and steer becomes more important**. Public bodies can bring confidence to other investors, and through phasing and blending of investment, they can attract far greater volumes of market finance.

'Smart' introduces new opportunities in terms of exploiting value from city data. The **contemporary challenge concerns the valuation and monetisation of data** (Figure 9). Given that much of the data is from people, this opportunity is arguably best addressed from a 'public value' perspective. Implemented with due care, this enables new funding and revenue streams to emerge, and city hall steerage can ensure that value is appropriately attributed, and managed in a way that provides fair value, also respecting data security and privacy. The table below offers a perspective of the motive and method by which various investors can be engaged..

Figure 9: Progressive data challenges

Table 2 Investor Engagement – types, motives and methods

INVESTOR TYPE	WHY (PURPOSE & MOTIVE)	HOW (INSTRUMENTS)
Government and Institutional Investors	Steer towards desired policy outcomes Stimulate market action Convene demand / incentivise common solutions and demand aggregation (scale)	Grants & Competitions Stimulate 'blending' of investments; & scale Regulatory and legislative conditions Revolving funds, stimulating replication
City Hall	Deliver public good obligations Deliver city-specific vision and goals	Match-funded innovations SME Instruments Marketing
National Public Banks	Outcomes-focused	'Blending' with complementary investors Infrastructure bonds stimulate aggregation
Global Commercial Banks	Return on Investment (ROI)	Scale investment complementing public policy goals / investment
National / Mid-Sized Banks	ROI Local business stimulation and support	Investment supporting public policy goals City-specific economic development
Sovereign / Impact Investors	Sustainable outcomes 'Acceptable' returns	Social impact bonds Green bonds
Philanthropic Investors	Promote 'greater good' outcomes	Support to innovative initiatives that will stimulate new growth potential
Pension Funds	Stability for investors Often local / sector goals	Backing for social outcomes
Insurance Companies	Manage risk	Investment in impact bonds Support data analytics innovations
Industry	Market access	Research budgets Collaborative challenge grants
Society / Communities	Incentivise engagement and participation Generate a sense of accountability	Crowdfunding & Participatory budgeting Digital social market (incentive schemes)

PART 1 CONCLUSION – THE EMERGING FORWARD PLAN

The immense potential of the European smart cities market to deliver a transformative programme of change is well-documented. Cities and investors that embrace the spirit of collaboration will be richly rewarded in the long-term. Cities that engage meaningfully with the investment community will both stimulate long-term economic growth and improve quality of life for people who live and work in cities. Cities that inspire action on the part of investors will liberate finance that can be used to help foster a more sustainable future for European municipalities.

Conversely, cities that fail to capture the imagination of investors will continue to be hampered by inefficient resource consumption and debilitating environmental pollution. **With global economies jostling for market share in an increasingly competitive international trading environment, Europe can ill-afford to fall behind in the race to deliver the smart cities of the future**.

The journey that is needed is one of transformation. At real scale, and at pace. Involving cities of all sizes; industry – large and small; investors – existing and new. A journey that will involve and deliver for society, the economy, and our environment. A journey that can bring broader benefits for EU industry, and for other continents.

Much has been done already, and much is in process. However, there is a great deal more to do. It will involve continued persistence, passion, and unfaltering commitment. And very importantly, it must be a journey that involves collaboration. Like any transformational journey involving multiple disparate stakeholders, the end needs to be clear, compelling and in sight. **The means to get there should be agile and flexible, and developed together**.

Part 2 of this document elaborates a set of practical steps that the various stakeholder groups can engage in. These are offered for consultation. They are neither complete nor perfect. However, in the spirit of pragmatism they can provide a basis to move forward, enrich and improve. This roadmap clearly deserves broader stakeholder discussion to generate the level of understanding, innovation and commitment that is necessary. The consultation process importantly will also help liberate the essential finances to make it come to pass.

A summary of the potential actions in shown in the table below, and a high-level overview of the roadmap logic and 2018 outline plan included in the graphic overleaf.

Table 3 Summary of Potential Roadmap Actions

A EC-LED ACTIONS

1. Maximise the impact of the SCC01 Lighthouses
2. Identify and drive ‘quick wins’ through to visible market value
3. Use Structural Funds as a stimulus to attract further scale investment
4. Deliver greater alignment of EC financing sources
5. Incentivise demand aggregation
6. Mandate Open Standards as a pre-requisite in EC calls
7. Stimulate and condition industries
8. Co-create an Open Framework for Urban Infrastructure Expenditure Forecast
9. Introduce EIP-SCC Initiative Champions
10. Support Seed Financing of Select EIP-SCC Initiatives

B OTHER PUBLIC / MEMBER STATE-LED ACTIONS

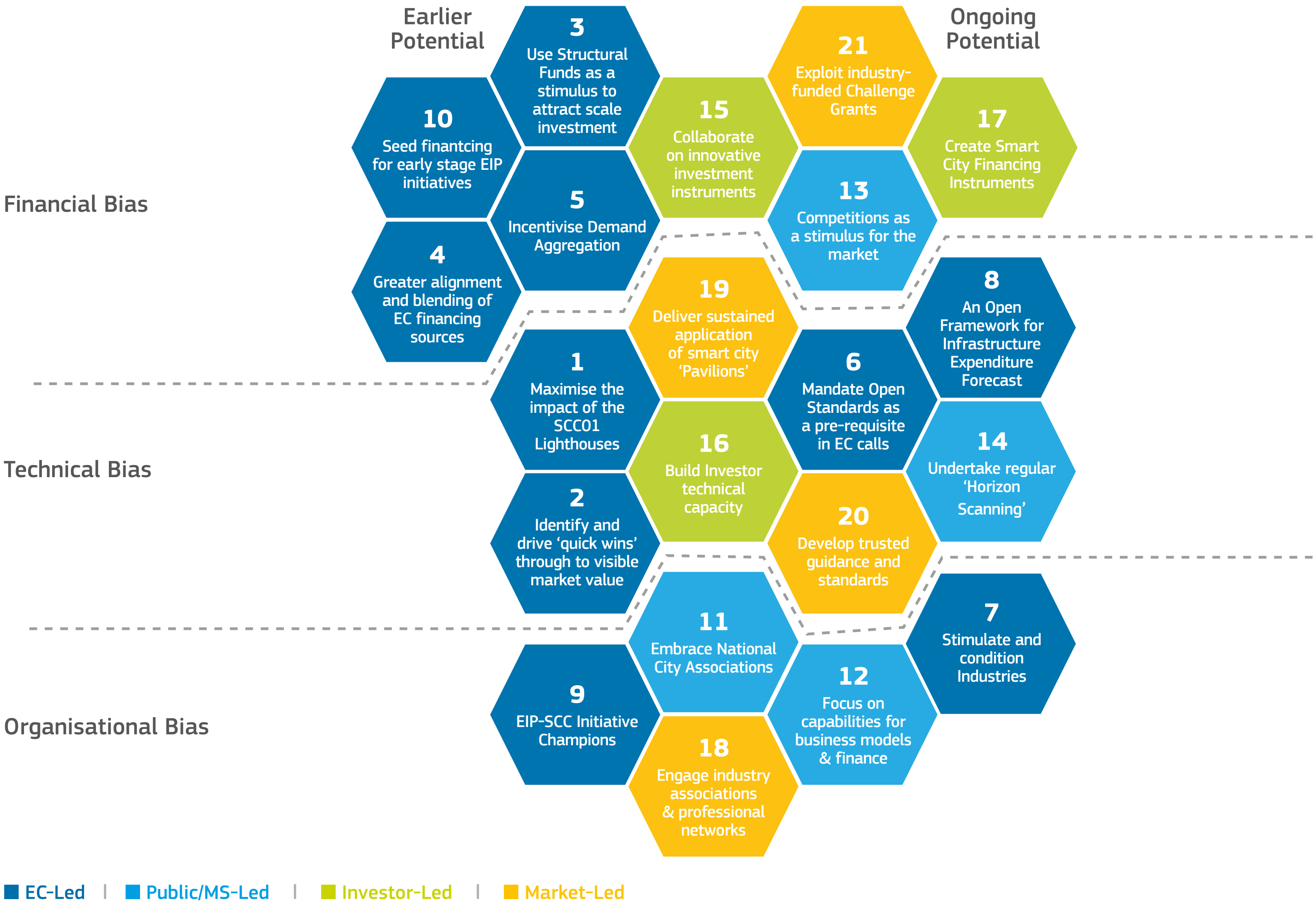
11. Embrace National City Associations
12. Focus on capabilities for business models & finance
13. Use competitions as a stimulus for the market
14. Undertake regular 'horizon scanning'

C INVESTOR-LED ACTIONS

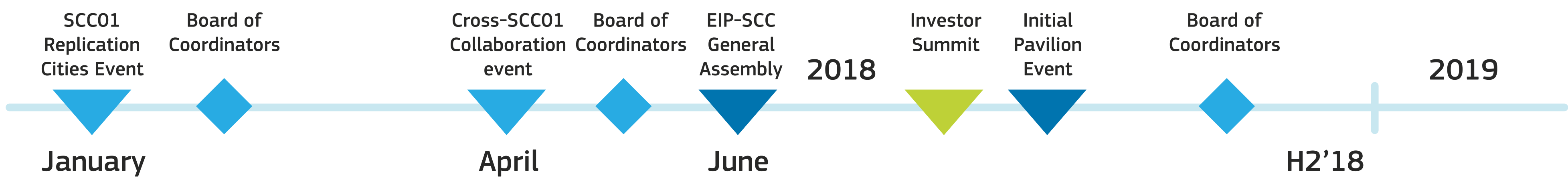
15. Collaborate on innovative investment instruments
16. Build investor technical capacity
17. Create Smart City Financing Instruments

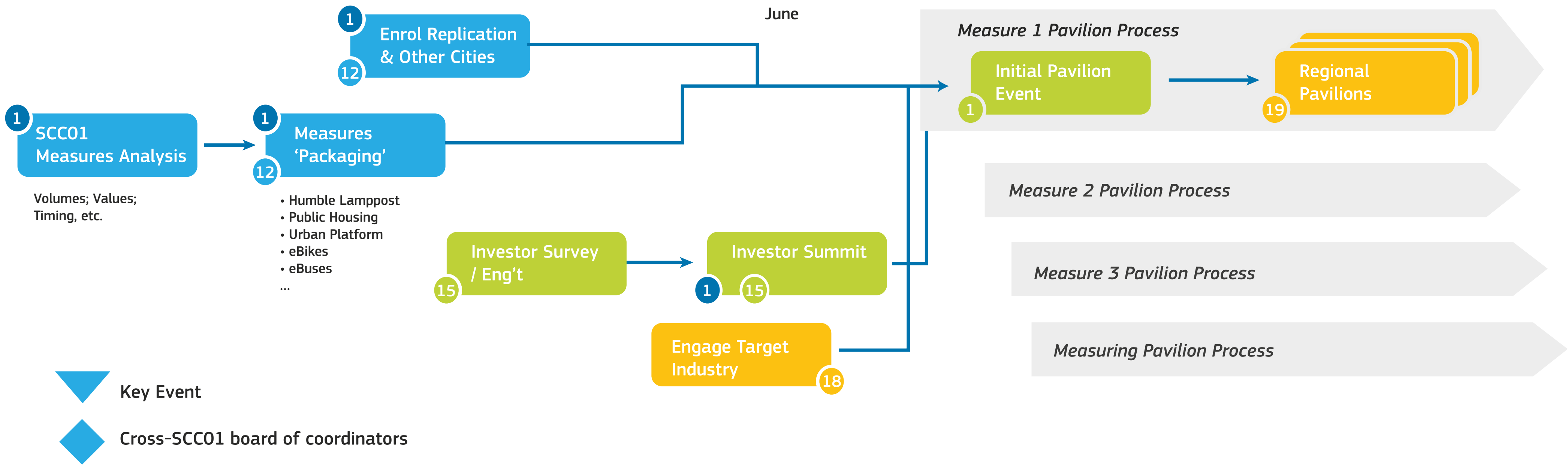
D MARKET-LED ACTIONS

18. Engage industry associations and professional networks
19. Deliver sustained application of smart city “Pavilions”
20. Develop trusted guidance and standards
21. Exploit industry-funded challenge grants


Earlier Potential
Ongoing Potential
Financial Bias
Technical Bias
Organisational Bias
3 Use Structural Funds as a stimulus to attract scale investment
10 Seed finantcing for early stage EIP initiatives
5 Incentivise Demand Aggregation
4 Greater alignment and blending of EC financing sources
15 Collaborate on innovative investment instruments
21 Exploit industry-funded Challenge Grants
13 Competitions as a stimulus for the market
17 Create Smart City Financing Instruments
8 An Open Framework for Infrastructure Expenditure Forecast
19 Deliver sustained application of smart city 'Pavilions'
1 Maximise the impact of the SCC01 Lighthouses
6 Mandate Open Standards as a pre-requisite in EC calls
16 Build Investor technical capacity
14 Undertake regular 'Horizon Scanning'
2 Identify and drive 'quick wins' through to visible market value
20 Develop trusted guidance and standards
11 Embrace National City Associations
7 Stimulate and condition Industries
9 EIP-SCC Initiative Champions
12 Focus on capabilities for business models & finance
18 Engage industry associations & professional networks
EC-Led | Public/MS-Led | Investor-Led | Market-Led

Outline 2018 Action Plan





PART 2 A ROADMAP TO STIMULATE A JOINT SMART CITIES INVESTMENT PROGRAMME

The need for intensive collaboration to further the European smart cities agenda is clear. Central to realising this vision of the future will be joint-working at every level. Smart cities must adopt an inclusive approach, and put investor engagement at the heart of everything they do. Close cooperation is required to make smart cities a more attractive investment. Delivering a joint investment programme will be key to ensuring that smart cities can move away from a sole reliance on finite public sector funds. This section outlines a roadmap to stimulate a joint smart cities programme. It proposes 21 actions that could be taken in the short to medium term to make the vision of a joint investment programme a reality. To accelerate the pace of positive change, the EC, member states and investors must work together at every opportunity.

The package of actions below is not a comprehensive roadmap towards a joint investment programme. Rather it is designed to prompt a pan-European conversation amongst those stakeholders contributing to the smart cities movement. This is a conversation that stakeholders must be prepared to have if smart cities are to move forward.

A EC-LED ACTIONS

1.Maximise the impact of the SCC01 Lighthouse Programmes

These now twelve programmes tackle a similar scope. The €500 million EC provision is significant enough to influence consortia partner activities, and the overall programme is visible enough to exert political influence, even though a city's share of the €500m is modest when put in context with their overall expenditure. It must therefore be considered and communicated as 'stimulus' funds, and expectations clearly managed as such.

More should be done to set expectations of the recipients for greater collaboration to increase value from the investment. There is considerable potential for learning, and presently value is at risk of being left on the table.

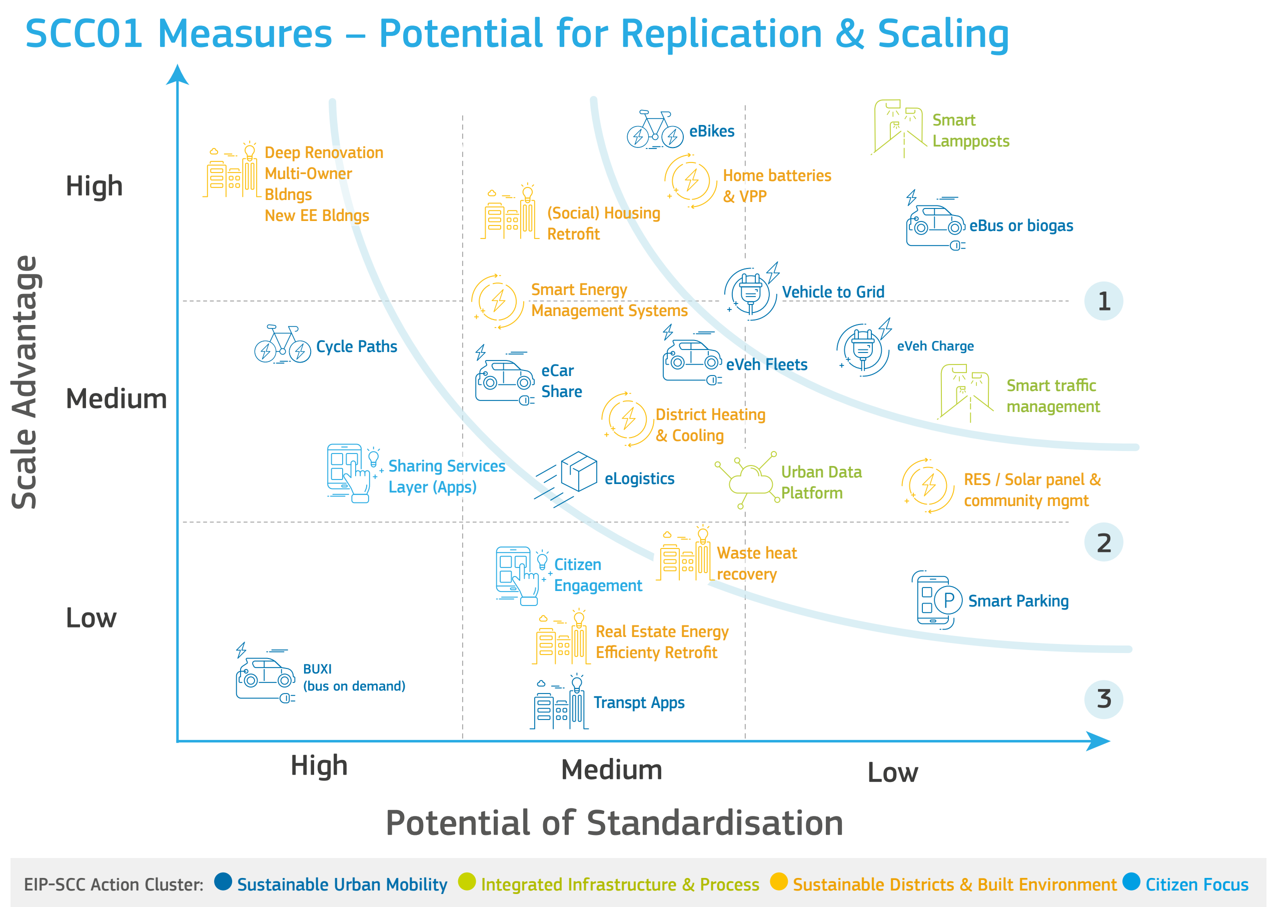


Figure 10 SCC01 Measures Mapping (source: Cross-SCC01 Business Models & Finance Task Group analysis)

The €500m should trigger a multiplier effect, and targets should be set and monitored accordingly. The target should be in € billions to gain political attention and support. One programme alone has an ambition to trigger €500m investment in smart city solutions through replication activities.

The portfolio of SCC01 measures is shown in Figure 10. It maps these against two axes: 'potential for standardisation' and opportunities for 'scale advantage'. The solutions in the upper right would seem to offer potential 'quick win' opportunities, delivered by any of:

- increased collaboration around pre-procurement activities
- common functional requirements, and technical specification
- framework procurement
- demand aggregation locally/regionally
- cross border scale procurement

Initial analysis of five of the measures provides indicative investment figures that suggest investment potential from planned or expected projects. Looking across the analysed measures and cities (as shown in Figure 11), in aggregate, the EC stimulus investment (€31m) results in more than a 10x multiplier (€411m) of committed funds within the demonstrator cities. This should trigger considerably more investment than the €163m presently indicated, however this does not reflect the potential subsequent city investments, which will be considerable.

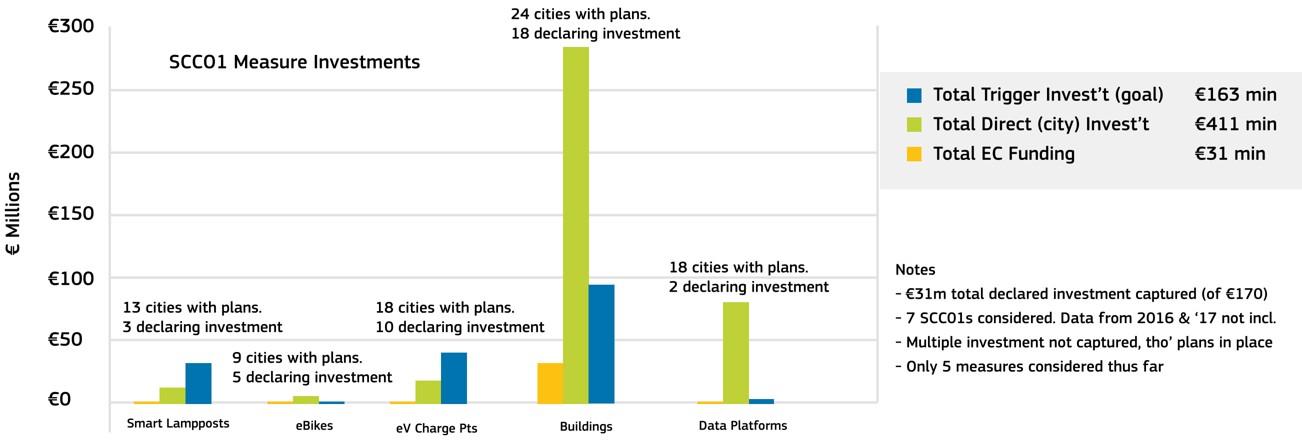


Figure 11 SCC01 Sample Measures Expenditure Forecast (Source: Cross-SCC01 Business Models & Finance Task Group analysis)

If the demonstrator 'Lighthouse' cities can collaborate around common open integrated and packaged solutions, that show a marked positive impact, this will give confidence to the market, and thus attract the finance from various investors that is needed to stimulate real scale action.

2. Identify and drive 'quick wins' through to visible market value

The above analysis suggests several measures where there is scope for early wins. Working collaboratively between the three EC smart city platforms (SCC01s, EIP-SCC Marketplace, Urban Agenda) there is real potential to stimulate and open up opportunities more broadly.

The concept of 'Pavilion' events has been tabled. These focus on specific solutions, and bring together various 'conditioned' parties to accelerate project activities in the market:

- Cities with clear intent to purchase, and that have undertaken pre-procurement activities (hopefully applying a more common set of tools and specifications) – i.e. 'conditioned' demand.
- Industry ecosystems – manufacturers and service providers that understand where they can complement other companies in supporting an overall smart solution.
- Investors – appropriate to the geographical area in consideration, and the nature of the investment project (i.e. smart solution).
- EC and member state government actors that are required to ensure the enabling conditions are set for success.

3. Use Structural Funds as a stimulus to attract further scale investment

This requires **a new approach to the treatment of capital and operating budgets**, and requires far more activity to stimulate **blending of financing sources**. This offers scope for collaboration between the Urban Agenda working groups, and specific project activities such as the EIB RICE smart cities finance project. This can have a very significant impact in the eastern EU Member States and other areas where there is risk of a two-speed Europe between cities that 'have', and those that do not.

4. Deliver greater alignment of EC financing sources

For most cities, the current set of EC financial instruments is too opaque and complex, and larger cities that have learned how to manoeuvre around this landscape are unlikely to share how to do so with others. This risks that the smaller or less active cities will lose out, creating an unhelpful gap in the market. Communicating where, why, and how finance sources can be blended to increase access to scale financing for cities would help the market move forward faster. This involves blending of public and private; and of capital and operating. This would also provide a clear message to the investor market that would help liberate market finance. The EIB Advisory Hub is an important step towards providing capacity and support for promoters to strengthen their proposals and manoeuvre through finance sources.

5. Incentivise demand aggregation

EC calls could be written to favour collaborative approaches that involve demand aggregation from joint design, common templates, framework procurements, joint commissioning to operational synergies. However, the notion of demand aggregation will help deliver more-common solutions, at scale and pace. The extent to which all bidders to EC calls, including unsuccessful ones that reach threshold levels, could be **incentivised to come together to implement common solutions** also warrants further investigation, and the EIP Marketplace could play a facilitative role in this process.

6. Mandate Open Standards as a pre-requisite in EC calls

Increasingly, as more guidance and standards emerge in the market, calls should be more stringent about adoption of and compliance with emerging and published open standards. Standards help **prevent 'vendor lock-in' and help level the playing field** in terms of providing **equal opportunity for the SME community**. They can also significantly help the adoption of solutions at scale.

7. Stimulate and condition industries

A number of potential actions led by the EC are offered as a means to positively stimulate and condition the market:

- Proactive steps through EU-level standardisation bodies to strengthen and focus MS-level smart cities standards actions and strengthen and focus collaboration with international standards bodies. The SCC01s can play an important role in developing and proving guidance and standards. Such steps will be welcomed by the three international SDOs (ISO/IEC/ITU).
- Focused actions to stimulate EU SMEs to succeed in the smart cities market. This could be through technical assistance financing; capability building, regional 'pavilions', and other actions.
- Competitions and awards, that can attract industry investment..

8. Co-create an Open Framework for Urban Infrastructure Expenditure Forecast

Presently there is no consistent method to estimate future urban expenditures. Forecasts are presently typically conducted at a city-specific level, applying different methods. This does not result in a sustainable model (typically delivered as specific advisor-commissioned studies). They are also typically done by domain, so tend not to look to smart solutions that address multi-purposing of assets, or where digital disruption can reduce demand or expenditure. **Capturing forecast expenditure in a common open and consistent model** with direct involvement from city halls and local universities could lead to **lower costs**, an **enhanced information** base and **improved comparability** between cities. The current providers of expenditure forecasts are not incentivised to develop such a model.

9. Introduce EIP-SCC Initiative Champions

Leadership attention tends to bring with it the application of resource, and frequently therefore delivers success. The EIP initiatives often lack that overt support of leadership, and as a result suffer the burden of being bottom-up or middle-out initiatives, with the unavoidable need to convince many more people of their worthiness. As pro-bono investments from (often entrepreneurs in) the field this introduces additional hurdles to their success. A mechanism to identify those that warrant stimulus and support, and motivate the adoption of these initiatives by respected high-level champions would enable their early advancement.

10. Support Seed Financing of Select EIP-SCC Initiatives

Several viable EIP-SCC initiatives are stuck on the wrong side of the 'adoption curve'. Accelerating their route to market could offer considerable value to cities and the smart cities market. These are both initiatives that can enable market action, as well as early stage service or infrastructure initiatives. Support to identify and facilitate dialogue with potential investment sources will enable these valuable initiatives to reach fruition earlier.

B OTHER PUBLIC / MEMBER STATE-LED ACTIONS

11. Embrace National City Associations

National City Associations are often not prominent enough in the smart cities discussion. Member states should do more to incentivise these bodies into productive market-making action. The EC could also implement some form of comparison and support mechanism to stimulate competitiveness and thus improve effectiveness. **National city networks are particularly important for the smaller or under-capacity cities (that represent the largest market)**.

12. Build capacity for business models and financing

As the demand to transform city services outstrips the availability of public budgets to cater for this and cities turn to alternative finance sources and business models, there is an accompanying need to ensure the appropriate skills and experience are in place within the buyer/commissioner community to perform the role of an 'intelligent client'.

13. Use competitions as a stimulus for the market

Some member states have run grant-financed competitions to stimulate market action. The EIP-SCC 6-Nations Smart Cities Forum initiative clearly indicated that these were a growing component of member states' efforts to condition the market. However, it has also indicated that **the 'winner takes all' approach does little to sustain the enthusiasm** that was generated within the competition process. Competitions can play a powerful role in convening the market and bringing key stakeholders together. This includes local SMEs that are an important local engine to economic growth in cities.

Active follow-up to competitions by using their momentum to bring together cities around common solutions and investors to incentivise demand aggregation, can help sustain and expand the impact that competitions have. The winner gets the grant, while the others have the opportunity to join together and access more attractive loan terms. In addition, for some unsuccessful yet promising EC H2020 call responses, the 'seal of excellence' can help legitimise quality proposals that achieved above threshold levels, such that accessing alternative financing is made easier.

14. Undertake regular 'horizon scanning'

Technology cycles are shortening, often radically. The ability to identify potential disruptive developments, and ensure that the demand side is adequately and collectively advised on the implications of what might be coming next, and the likely time horizon, is an increasingly important need. Doing this at a city level requires considerable resource, and a managed process. Many cities have this in place formally or informally, however many of the smaller cities do not, or cannot.

Satellite, digital ledger technologies, assisted intelligence, battery, nano-technology and automation are all examples of recent technologies that can offer cities disruptive step-change outcomes at an affordable price. Providing a 'horizon scanning' capability to strengthen cities' understanding of opportunities and risks is something that several actors can support, and frequently this could best be provided or convened at national level and built into innovation programmes.

C INVESTOR-LED ACTIONS

15. Collaborate on innovative investment instruments

There are clear benefits to be had through involving the investment community early, to help explore business model and financing options. This is already seen in the example of the EIB Technical Assistance Hub which seeks to support and ready early stage city project promoters for more successful implementation. Such models, if adopted by other investors, could significantly help move the market forward.

16. Build investor technical capacity

Complementing the need for cities to understand more about business models and finance is the **need for investors to understand more about the technical nature of the solutions** being implemented by cities. For some investors that are less familiar with the cities market, this could also include an increased understanding of how cities operate and make decisions. The specific actions to support this are various and in many aspects the choice of the investment community, however the need and the benefits are real.

17. Create Smart City Financing Instruments

The decision of EIB and Belfius to create a €400m smart city fund is an example of a successful investor-led joint action. This model could be mirrored in other geographies at (inter)national, as well as city/metro level. The creation of, for instance, a smart cities infrastructure fund could provide access to finance for smaller and riskier cities by aggregating demand and mitigating fund risks. Different member states and different cities have different contexts, so clearly understanding these and developing a means to support the development of conditions that are more conducive to the different types of investors will help create a more fluid and productive market.

D MARKET-LED ACTIONS

18. Engage industry associations and professional networks

These can play an important role in helping to shape the market. There are multiple international, national and regional examples across a range of functions. These include groups covering planning, energy, construction, developers, utilities, transport, lighting, connectivity and digital. These can provide a more independent and objective interface between the cities market and suppliers, which addresses cities' nervousness about vendor lock-in and procurement probity. There is scope for further discussion on how these bodies can best be engaged. They can also convene and mobilise joint financing for worthy smart city investment causes.

19. Deliver sustained application of smart city "Pavilions"

The Pavilion approach should not remain a top-down initiative. It should only be stimulated to show commitment and prove the concept. The market more generally should continue to bring together demand, supply, and investors in focused and structured pre-procurement workshops to build greater understanding of common needs and solutions, explore opportunities, and shape projects.

20. Develop trusted guidance and standards

Guidance and standards are fundamental for a fluid, functioning market. Currently cities are not accustomed users of guidance and standards. **Standards tend to be developed and used by industry, with little input from cities**. As a result they risk missing the mark in terms of servicing a well-defined need. Because of a lack of city involvement, these standards are not trusted or complied with. There are a few exceptions, where national governments have taken positive action to engage cities in the process. More such models will add value to the quality of the materials and their acceptance and use.

In addition, Standards Development Organisations (SDOs) typically publish the more detailed technical specifications that suppliers build to. There is now **a recognised gap to develop trusted guidance that is written to and relevant for city leaders and city service managers**. These '**Leadership Guides**' – short sharp key issue documents; and '**Management Frameworks**' are aimed at reducing pre-procurement times and strengthen the quality of demand-side decision making. Dialogue with executives in international SDOs and national standards bodies (NSBs) is progressing to address this.

21. Exploit industry-funded challenge grants

Many large industry players have smart cities business units. They struggle to engage the market, and are too often received dubiously by the cities market. The gap between these solution providers and realities of city operations is often too large for industry to fully understand operational needs and optimise their solutions in the field. There is thus value left on the table. The deeper understanding of city systems, contextual constraints, and realities of operations is a prerequisite.

PART 2 CONCLUSION – TACTICS FOR CHANGE

This paper has sought to **stimulate wide-ranging discussion** on the future of European smart cities. Recognising the realities of the smart cities market, it's clear that devising new ways of sourcing finance and doing business will be crucial going forward. Innovative new business models that inspire investors and engage citizens are central to this vision. The public purse alone is not sufficient to enable smart cities' transition from small-scale pilots to mainstream scale-up.

A joint investment programme for European cities will open up **a world of opportunity for municipalities yet to realise smart cities' transformative potential**. A joint financing regime is the goal – but how cities get to that point is up for discussion. In a bid to stimulate debate, this paper has proposed more than 20 tactics that could be deployed on the journey to a radically-strengthened investment system for European smart cities.

The EC is perfectly placed to blaze a trail towards a more sustainable financial future for smart cities. When the EC leads, Europe follows. **The EC can make an immediate impact by working to maximise the effectiveness of the SCC01 Lighthouse programmes**, using structural funds as a stimulus to attract further scale investment, and supporting seed financing of select EIP-SCC initiatives.

Brussels must **work closely with member states to drive the smart cities agenda forward**. Member states can make a real difference by embracing national city associations, focusing on capabilities for business models and finance, and using competitions as a stimulus for the smart cities market.

A roadmap to a joint investment programme will achieve little unless **investors are placed at the heart of the process** from the outset and throughout. Bringing investment banks such as the European Investment Bank and National Public Banks onside will be key to this. Market-led actions are also central to this agenda, with a more pronounced role for industry associations and professional networks a must going forward. Better use of industry-funded challenger grants will also help to drive a radical transformation in the smart cities investment environment.

It's now incumbent on smart city stakeholders from across Europe to engage in a wide-ranging dialogue on how municipalities can move forward on their journey to smart-city-led transformation. The tactics set out in this paper offer a glimpse of what the journey to a joint investment programme could look like. It's now time for Europe's stakeholders to rise to the challenge of forging a better future for its smart city market.

SHORT-TERM ACTIONS

The EIP-SCC invites smart city stakeholders to take an active role in creating a codified roadmap to a joint investment programme in Europe.

There are multiple opportunities for engagement:

- EIP-SCC invites comments on the tactics discussed in this report. Evidence can be submitted via the EIP-SCC website.
- EIP-SCC will be hosting a series of webinars in which the tactics set out in the report will be reviewed extensively.
- EIP-SCC invites stakeholders to participate in dialogue on a roadmap to a joint investment programme at events such as the marketplace's series of action cluster meetings and General Assembly.
- SSC01 lighthouse meetings also provide an excellent opportunity for stakeholders to share their analysis of the road ahead for European smart cities.
- Meetings held in city Membership and Industry Association forums also offer an appropriate forum for discussion on a joint investment programme for European smart cities.

A FINAL THOUGHT
10 CHARACTERISTICS OF SMART FINANCING IN SMART CITIES

There is much more to the topic of smart cities financing than first meets the eye. Cities need innovative new approaches to business models and new sources of financing. However, change is not limited to these aspects of city management alone, neither is it limited to cities. Digital transformation has occurred in all industries, though it has still some miles to travel in the financial sector.

There has been much written and discussed in connection with smart cities, however within that dialogue there is little of substance regarding smart financing. There has been a focus on the physical (smart infrastructures), human (smart services), and more recently digital (connectivity), yet the disciplines surrounding money remain somewhat traditional. Why is that? What might be considered an emerging vision of 'smart financing for smart cities'? Here are ten characteristics that seek to answer this:

INTERNAL-FACING

- **Pan-City Data that enables Real Time Budgeting** – including both city hall and other key public agencies. This moves the dial from a backward-looking accounting perspective, to a more agile department and service-focused rolling / real-time / predictive budget management position.
- **Outcomes-Focused Financial Management** – the competencies and systems in place to look not only at internal departmental accounts, more so also looking at the desired 'for public good' outcomes (energy, environment, wellbeing, growth). Also supported by a clear pragmatic balanced scorecard approach to managing input/process/output/outcomes from a performance indicators and financial perspective.
- **Financial Data Streams & Data Science** – money is seen to be a strategic flow throughout the city from a data management perspective and the city seeks to manage financial streams in a similar fashion to for instance best practice operational traffic flows.

EXTERNAL-FACING

- **Societal Involvement in City Financing** – through financial transparency and clarity of communications of public budgets, effective participatory budgeting, crowdsourcing of community/public good initiatives with public co-funding and financial incentive mechanisms that help affect positive behaviours to deliver sustainability goals.
- **Greater Convening of, and Support to Local Economic Prosperity** – by ensuring the appropriate information is collected, governed, and exploited by 'city hall' and/or (public) agencies to steer economic development activities and the broader industry market – and by ensuring city hall is visible in its actions as a pro-active 'convener' of economic prosperity.
- **Attraction of International Investment** – the city is outward-facing in recognising that to flourish it must actively seek to be competitive and attract external funds, people and business into the city. For smaller cities this is something that can only realistically be done in collaboration with neighbouring cities/region.
- **Collaboration with Financing Ecosystems to Stimulate Prosperity** – 'city hall' develops a position of trust with city-based and other financial service actors (investors, insurance companies, pension funds) to underpin joint actions.
- **Externalisation for Betterment of Service Delivery** – appropriate business models are established that retain appropriate influence on outcomes and longer-term impact, whilst providing attractive investment conditions for the market (communities, local business, major Industry, investors) to invest in services where service delivery quality or accelerated service improvements can be achieved better, faster, cheaper through engaging beyond the public purse.
- **Exploiting Trusted Digital Ledger Technology** – trust is critical in financial management, and at an increasing deficit over recent years. City hall can take an active position to positively re-build the trust of society around financial and transaction probity particularly for some of the basic human needs that supports inclusive society (e.g. energy poverty, resource recovery, and the circular economy). The exploitation of distributed ledger technology (DLT) to support trusted and federated financial data management is an example of measures in this regard.
- **Managing Data as a Valued Asset** – many cities are presently challenged with addressing availability, quality, and governance of pan-city data in relation to infrastructure and services. That data, by its very existence, influences outcomes – thus value (including financial). The contemporary challenges that cities presently wrestle with are about the valuation and monetisation of this data. This is an underpinning and profoundly difficult thing for cities to resolve.

These characteristics consider 'smart city' in a broader context, not just focused on technology or data, and all the above are positively supported by innovative digital means. From a 'city hall' perspective it is worth considering what smart financing for smart cities means in the local context, and what steps can be taken within the pan-city financing community to complement the delivery of smart service and infrastructure plans.