



Smart Cities Marketplace



CLIMATE-NEUTRAL & SMART CITY GUIDANCE PACKAGE - A SUMMARY

FAST-TRACKING FINANCIALLY
VIALE PROJECTS IN AN
INTEGRATED AND INCLUSIVE WAY

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Launched with support from the European Commission, the Smart Cities Marketplace is a support hub for all that are interested in and challenged by promoting and financing smart city solutions. The Smart Cities Marketplace is a new platform which was created by merging the Marketplace of the European Innovation Partnership on Smart Cities and Communities (EIP-SCC) and the Smart Cities Information System (SCIS).

INTRODUCTION	4
CHAPTER 1: HOW TO START?	8
CHAPTER 2: THE VISION MADE CONCRETE	14
CHAPTER 3: PREPARE THE PLAN(S)	20
CHAPTER 4: REALISING THE PLAN(S)	29
CHAPTER 5: FOLLOWING PROGRESS	33
CHAPTER 6: MAKING AMENDMENTS	35
CHAPTER 7: INCREASING THE IMPACT BEYOND THE PROJECT	38
NEXT STEPS	41
REFERENCES	42
COLOPHON & ACKNOWLEDGEMENTS	43

Introduction

WHAT IS IT?

This document aims to help fast-tracking financially viable smart climate-neutral urban projects in an integrated and inclusive way. It provides a roadmap for this purpose, which summarises the different stages of developing a coherent process and the different steps at each stage in the form of a checklist. It also advises on planning various accelerating actions that can help to achieve more impact locally through replication and scaling up of the smart climate-neutral city solutions later. This document does not discuss so much technological solutions themselves, but the preconditions and pro-

cesses that need to be organised for the successful planning and implementation of feasible and financially viable projects, while adopting a holistic perspective. Its main purpose is to accelerate the preparation and execution of projects applying climate-neutral and smart solutions in cities by making city administrations and key stakeholders fully aware of what is needed to be successful, and do this in an effective and efficient way. It is based on the original self-help tool [Smart City Guidance Package](#) (SCGP) and elaborates the financial aspects of different stages and steps in more detail.

WHY?

The need to accelerate the transition to smart, sustainable and climate-neutral cities is widely acknowledged, and a truly integrated and inclusive approach is vital for this. However, these trajectories are repeatedly quite complex, while time-pressured staff of city administrations are often too busy to explore best practices and common repositories as the [Smart Cities Marketplace \(SCM\)](#). As a result, it is often difficult to translate this holistic and inclusive approach into concrete actions. The roadmap presented here is an easily accessible introduction into integrated planning and implementation. Key features of the holistic approach facilitated by the SCGP are: 1) integration of a long-term perspective when deciding upon short-term actions; 2) integration of different domains and disciplines; 3) integration of multiple technologies in one territory; 4) integration of different stakeholders and commitments; 5) integration of financial aspects and co-benefits. The lack of access to financial resources and viable business models is the barrier for the uptake of clima-

te-neutral and smart solutions in cities most frequently mentioned by city administrations and practitioners. Too many projects are delayed or cancelled due to difficulties in securing finance or funding. At the same time, investors might be hesitant to invest in climate-neutral and smart solutions due to lack of insight into complexities and accompanying risks of such solutions. Therefore, this summary advises on how to elaborate financial aspects of planning and implementation at an early stage of the process within the advocated integrated and inclusive approach. This makes sense as actual and perceived risks are often linked to specific aspects of projects as buy-in of key stakeholders, changes in political priorities or regulatory frameworks, etc., which can be avoided or mitigated when using a truly integrated and inclusive approach from the start. This will stimulate the realisation of more climate-neutral and smart city projects, resulting in better public services, better use of resources and less impact on the environment for more and more citizens and businesses across Europe.

FOR WHOM?

This summary is primarily meant for city administrations, local politicians (Mayors, Vice-Mayors, Councillors and their staff), directors of unit, smart city project managers and other local authorities, e.g. public transport, housing, utilities or waste management. However, it can also be very useful to all partners in the cities' ecosystem, such as businesses (energy network and transport operators, real estate developers and facility managers, solution providers), financial institutions such as banks, pension funds or private investment funds, and civil society, e.g. housing associations, citizens and local

companies, Non-Governmental Organisations (NGOs). The method presented here informs about what can be expected in such trajectories from planning to implementation, helps to engage and better understand the different positions of partners, and advises on co-design, co-creation and joint decision-making. This helps to build supported, robust and resilient projects.



HOW DOES IT WORK?

This summary booklet is mainly meant as an introductory self-help guide to developing smart cities strategies and projects from the vision stage until replication and upscaling. The process recommended here is based on various sources of information, such as experiences of climate-neutral and smart city project coordinators and partners, publications of research and innovation projects, interviews, the [european energy award](#) (eea), [JPI Urban Europe](#)-funded smart city projects and ISO standards. You can use this description to set up a process in your organisation which takes an integrated and inclusive approach at heart, yet pays enough attention to financial details. For each stage and step, we kindly invite you to fill in the actions you would like to take as an organisation. We give you suggestions for

HOW CAN I USE IT?

If your city has an overall long-term strategy or vision, you can use this summary booklet to concretise this strategy in the planning and implementation of smart city projects. Likewise, you can use it to realise a Sustainable Energy and Climate Action Plan (SECAP) or substantiate the UN Sustainable Development Goals (SDGs). If such

HOW HAS IT BEEN DEVELOPED?

This summary is largely based on the [SCGP](#) (Borsboom-van Beurden et al., 2019). The [Action Cluster on Integrated Planning, Policy and Regulation of the Smart Cities Marketplace](#), decided to bundle best practices for an integrated approach to smart city and climate-neutral projects in the form of a “cookbook”. The eventual roadmap has been composed by integrating information from a series of SCM workshops, reviewing hundreds of smart city projects, conducting 29 interviews, harvesting feedback from cities and city networks, and organising

GET CRACKING

The Smart City Guidance Package works with seven consecutive stages. These stages are based upon the Plan-Do-Check-Act concept, which is extended with a couple of stages which are deemed relevant for smart climate-neutral city plans: VISION to develop or adjust the long-term strategy, DECIDE & COMMIT to explicitly consent to preparing the plan, and REPLICATE & SCALE UP to plan already for replication from the start. The order and description of the content of each stage are based on common experiences of cities participating in the [european energy award](#), lessons learned in the [CON-CERTO Programme](#), and material from interviews with managers of Framework Programme 7 and Horizon 2020 smart city projects. Finally, the stages consider

actions, tools and standards which might be useful for you in doing so. By following the recommended steps, you can develop your climate-neutral and smart city strategy and project(s) and present your project(s) to financiers and funding organisations, or use the [matchmaking facility](#) of the [Smart Cities Marketplace](#). If you need more in-depth information, you can use the references included in this document. You are also very welcome to use the complete version of the [SCGP](#), which explains in more detail why we advocate for specific actions, provides examples from other projects and gives more information on barriers and opportunities. In the near future, also a web-based version of it can be found on the [Smart Cities Marketplace](#) website.

a long-term strategy or vision is missing, you can use this method to develop it, so your climate-neutral and smart city project is properly anchored in your city's or company's long-term vision. Lastly, you can also use it to develop your project from scratch.

five validation workshops in Santa Cruz de Tenerife, Sofia, Vaasa, Brno and Parma. Valuable advice on replication and upscaling of demonstrated projects was provided by Smart City projects funded by [JPI Urban Europe](#). Compared to the original SCGP, additional information has been added on finance. More attention is been devoted in this summary to arranging suitable finance for smart city projects and finding private finance, next to arranging and structuring public-private collaboration.

that the UN SDGs have been adopted by the European Commission (EC) and are therefore relevant to European smart city roadmaps as well. With the term “cities”, city councils and city administrations are meant in this context. The term key stakeholders refers to those stakeholders crucial for integrated planning and implementation of the smart city roadmap, such as citizens, transport and energy operators, and other businesses such as ICT companies, start-ups, local highly specialised SMEs, etc. Throughout the process, attention to keeping the engagement of all stakeholders and citizens must be ensured, through communication and in-depth participation, co-creation and co-realisation.

QUALITY MANAGEMENT SYSTEM APPROACH



Figure 1 Stages from vision to implementation and permanent improvement loop. Source: Borsboom-van Beurden et al., 2019

Chapter 1: How to start?

TOOLS:

- direct consultations
- SWOT-analysis
- peer review
- round tables
- focus groups
- broad public hearings
- World Café
- benchmarks
- scenario planning
- foresight studies
- mind-maps
- innovative brainstorming methods (i.e. tree of knowledge)
- Espresso Maturity analysis
- NESTA method
- Logical Model

STANDARDS:

- ISO 18901 Diagnostic of city's readiness level/maturity level for setting a long term vision
- ISO 37101 Quality Management Systems approach
- national standards if applicable

STAGE 1: VISION

QUESTION:

How do we see the city we are living in in 20, 30, 50 years from now?

✓ TO DO 1: DEFINE THE OPPORTUNITIES AND CHALLENGES

by making more precise which ambitions you want to realise or which problems we want to address with climate-neutral and smart city project(s)

✓ TO DO 2: TAKE STOCK OF WHAT YOU ALREADY HAVE AND WHAT YOU WOULD NEED

by becoming aware of financial and organisational aspects and of stakeholders who should be engaged, and define financial principles

✓ TO DO 3: START ORGANISING THE LOCAL ECOSYSTEM

by identifying, engaging and informally consulting key stakeholders and clarifying their roles and responsibilities

✓ TO DO 4: BRAINSTORM

by discussing different aspects of the opportunities and challenges with key stakeholders

✓ TO DO 5: CREATE SHARED KNOWLEDGE BASE

by exploring possible solutions for the problem(s) and issue(s) at stake together with key stakeholders

✓ TO DO 6: EXPLORE LEGISLATION AND COMMITMENTS

by charting the preconditions and binding national and EU obligations following from these, which may influence the design of your solutions

✓ TO DO 7: CAPTURE THE VISION

through a set of compelling key messages

OUTPUT:

Priority in long-term objectives for smart sustainable development laid down in vision.

If an overall long-term city vision is not in place, this first stage creates a vision that is shared with and supported by other internal and external stakeholders. Otherwise, an overall long-term city vision or specific plans such as SE(C)APs, might need to be attuned to smart city developments. Its output describes the long-term objectives for the climate-neutral and smart city plan(s).

TO DO 1: DEFINE THE OPPORTUNITIES AND CHALLENGES

The first TO DO at the stage of vision development, is to make more specific which ambitions the city wants to realise, which opportunities should be seized, or which challenges and issue(s) the city actually wants to address with one or more smart city projects. As these ambitions or challenges are usually interlinked, they should be addressed in an integrated way. Issues are mostly in the field of adaptation to or mitigation of climate change, energy efficiency and security, energy affordability, pollution, liveability, congestion, outdated infrastructures and provision of utilities, obsolete buildings and (re)development of areas, economic competitiveness, underperforming digital infrastructures, lack of social cohesion, etc. Most of them are closely linked to the UN SDGs, in particular SDG 11 ("Make cities and human settlements inclusive, safe, resilient and sustainable."), to which many cities have committed themselves. Strong political leadership is crucial at this stage, not coming from one of the sectors due to the inherent cross-sectoral nature of the issues to be addressed,

but from the city's top leadership. Long-term objectives related to prioritised opportunities or challenges, can also be adopted from an existing overall plan or vision. Focus should be then on selecting the main opportunities or challenges where programmes or projects need to be better aligned. In case an overall city vision or urban strategy, SE(C)AP or Sustainable Urban Mobility Plan (SUMP) is in place, it is probably not necessary to identify which problems the city wants to address from scratch. If not, do consider the use of tools that help assess the problem. Some resources can be found [here](#). Using the tools recommended by the Global Covenant of Mayors facilitates downstream reporting and disclosure requirements. The scale considered in this step is usually the entire city, not the individual districts. A comparison of (energy-focussed) tools which is helpful to select a problem assessment tool can be found in Huwiler (2017). Note however, that tools can only be supportive of building a vision: they will not generate a vision by themselves.

TO DO 2: TAKE STOCK OF WHAT YOU ALREADY HAVE AND WHAT YOU WOULD NEED

The next TO DO is about becoming aware and taking stock of what and who is needed in general to seize the opportunities or solve the problems identified before in terms of finance, internal collaboration, and stakeholders. Through explorative public hearings, informal consultation, and assignments to staff or consultants, information can be collected for a rough outline of the main financial and organisational aspects of the problem(s), and to find out who in the city is essential to have around the table in order to solve it. A preliminary list of people and organisations to contact, such as citizens, contractors, users or organisations representing them, agencies, finance providers, research bodies, and

consultants, and their coordinates, must be drawn up. It is commendable to premeditate already an approach and set of principles on how the city seeks to finance its ambitions, that can act as guidance for later (procuring and) financing of projects. The approach and principles may address the way the city wants to cooperate with public and private finance providers, requirements around sustainable finance, bundling of projects with fellow cities or embracing innovative solutions through advanced procurement practices. The scale level of this step is usually the whole city, not just a particular district.

Figure 2 Checklist of the VISION stage.
Amended from: Borsboom-van Beurden et al., 2019



LOCAL GOVERNMENT

City administration and staff



STRATEGIC ALLIES, CO-INITIATORS

- Real estate developers
- Grassroot initiatives
- Owners of buildings, land and infrastructure
- Energy network operators
- Transport operators
- Citizens, tenants, end-users
- Local businesses



ENABLERS

- Knowledge institutes, universities
- Utilities
- Investors, private equity
- Banks, financial institutions
- Asset and facilities management
- NGOs
- Consultants, engineers
- Architects, spacial planners
- Technical solution providers
- Construction industry
- Energy suppliers
- Other local authorities
- Regional authorities
- National authorities

TO DO 3: START ORGANISING THE LOCAL ECOSYSTEM

As a consequence, in the next TO DO, the local ecosystem has to be organised, in case it is not yet sufficiently built up or developed, to ensure smooth collaboration on problems identified earlier. Nearly all successful climate-neutral and smart city projects are founded upon mutual collaboration between local administrations, research institutes, industry, and citizens, local businesses and other local actors. Due to the complexity of these projects, many different stakeholders must be engaged, and diverging interests must be aligned. Figure 2 depicts the most common stakeholders in cross-domain climate-neutral and smart city projects. Three main groups can be distinguished: city administrations and their

staff, strategic allies and additional initiators of plans, who are indispensable for preparing and realising the project, and parties enabling a successful planning and implementation in their capacity of advisor, financier or consultant. The identification of key stakeholders implies the following actions for TO DO 3: charting internal and external stakeholders, engagement and consultation of the most relevant ones (i.e. citizen focus groups), and identification of specific roles, of critical relations and interdependencies, and of legal responsibilities within the prospective stakeholder group. At this stage, the overview of stakeholders will not yet be exhaustive.

TO DO 4: BRAINSTORM

In the following, different aspects of the targeted opportunities and challenges must be explored with the stakeholders identified so far, to hear their opinions and understand their interests. Usually, this implies organising one or more brainstorm sessions on different aspects of the opportunity or challenge at hand with the stakeholders, or comparable methods for discussion and dialogue. Apart from direct consultations, many other different formats for informing and engaging stakeholders have been developed over the years, which can be used

here, all with their specific advantages and disadvantages. To name a few: world cafés, round tables, focus groups, public hearings, canvassing, workshops, drawing of mind maps, citizens panels, serious games, meetings at “pop-up” temporary physical meeting spaces, or neighbourhood festivals. In addition, internal collaboration within the city administration needs to be organised. Siloed municipal organisations are a problem that occurs often, discussed more in-depth in the following DECIDE & COMMIT stage.

TO DO 5: CREATE A SHARED KNOWLEDGE BASE

After brainstorming with stakeholders for the previous TO DO, where different aspects and consequences of the opportunity or challenge were discussed, the next TO DO entails that the city administration investigates directions for possible actions and solutions with the same stakeholders, with the aim of determining their feasibility and viability. At this step, it is also important

to clarify what type of impacts the stakeholders want to achieve and set preliminary targets for them. The Logic Model approach (Funnel and Rogers, 2011) can help to define these preliminary desired impacts and the needed inputs. This step is necessary to prepare a collective agreement on the approach in the future.

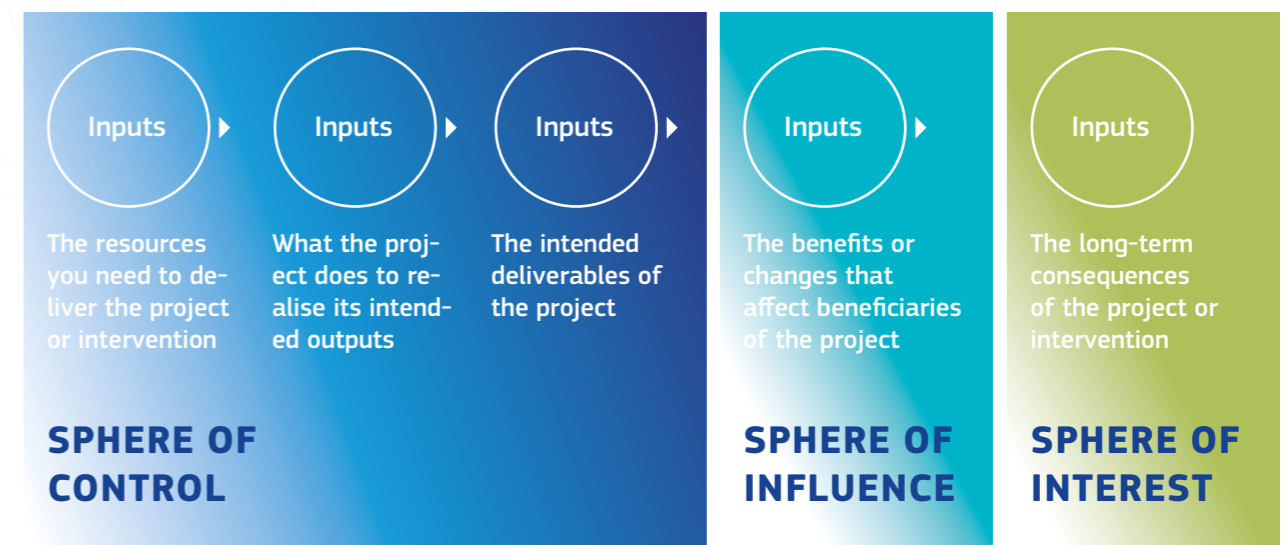


Figure 3 Various stakeholders in smart city ecosystems Source: Borsboom-van Beurden et al, 2018.

Figure 4 Logic Model Approach to create an overview of how inputs are transformed by activities in outputs, which in turn generate desired outcomes that eventually may lead to impacts. Inputs, activities and outputs are well within control of the project. However, outcomes can only be influenced by the project and impacts are even less predictable.

TO DO 6: EXPLORE LEGISLATION AND COMMITMENTS

This TO DO implies that conditions following from current legislative frameworks and ongoing obligations from binding commitments must be investigated, as these determine what can be done and what the city administration is allowed to do, or what the city administration has to do anyway. This defines the degrees of freedom in carving out new plans and activities under specific mandates or legal responsibilities. The resulting room for manoeuvre may lead to different choices in the approach by the city administration and stakeholders when it comes to making the vision concrete. This TO DO is also important because projects are planned within a specific legislative and political context that might change. These changes can result in new issues emerging, such as the need for new negotiations, reassessment of expectations, and adjustment of the intended project. Depending on the severity of the changes and their impact to the project, these can result in delays, impact on the bankability, postponement of implementation, or failure

of the project. Therefore, any smart and/or climate-neutral city project plan should involve the city administration as the main stakeholder and co-creator in the planning process, responsible for safeguarding the vision at long term and for connecting to other related policy and decision-making processes. Both the process and the final project plan should be transparent and unambiguous about the scope and timeline, and any deviations from the original plan in the future should be collaborative, approved by all stakeholders, and integrated into the project plan. Original and amended project plans must incorporate the political timeline into their possible risks, but these risks should be mitigated as much as possible by having a transparent, unambiguous, and consistent plan with approvals in place. In addition, the responsibility for smart city plans can be allocated to structures or organisations less vulnerable for political cycles. Finally, contracts and collaboration agreements can allow a time horizon longer than that of the political cycle.

TO DO 7: CAPTURE THE VISION

Lastly, the city's vision on its smart, sustainable and climate-neutral future must be captured in a document, website, video or other medium. A set of compelling key messages and communication material that can be used to communicate consistently with urban stakeholders, must be created and be part of this captured vision. The translation of this captured vision into a set of key performance outcomes that the city wishes to

achieve later will enable the city administration and its partners to use the vision as a tool for a reality-check on all activities performed to conceptualise, specify and implement smart city projects under the umbrella of the vision. The vision should be used to regularly ask yourself: 'is what we are doing or planning to do consistent with and contributing to realising the vision?'





STAGE 2: DECIDE & COMMIT

QUESTION:

How are we going to meet these long-term objectives by working out this vision in a smart city strategy or policy per objective?

Chapter 2: The vision made concrete



TOOLS:

- SEAP and SECAP
- European Energy Award method to define a portfolio of projects
- open sources
- self-assessment tools
- dashboards
- CONCERTO method for co-design
- SINFONIA method for charting co-benefits
- CIVITAS model process for SUMP
- ESPRESSO maturity check
- traditional project management tools as CEM
- PRINCE
- workshops
- direct consultations
- maps and 3D visualisation
- assignments to consultants and researchers
- study visits
- Business Model Canvas
- Logical Model



STANDARDS:

- ISO 37106 Multisectoral Strategies for Cities
- ISO 3712X Targets with Indicators
- ISO 3715X Infrastructure
- ISO 37101 Quality Management Systems Approach,
- CityKeys KPI framework
- ISO 37104 Sustainable Cities and Communities

- ✓ **TO DO 1: SET MILESTONES AND TARGETS**
and agree on responsibilities, who does what
- ✓ **TO DO 2: EXPLORE STATE-OF-THE-ART OF RELEVANT AND APPLICABLE METHODS AND TECHNOLOGIES**
internal and external
- ✓ **TO DO 3: RECONNECT TO STAKEHOLDERS**
communication and consultation on envisaged actions
- ✓ **TO DO 4: VISUALISE LOCAL CHALLENGES AND POTENTIAL IMPACT**
of prospective methods and technologies in neighbourhoods
- ✓ **TO DO 5: DRAFT A LIST OF RELEVANT ON-GOING AND POSSIBLE NEW PROJECTS**
with stakeholders
- ✓ **TO DO 6: ELABORATE COSTS AND RISK MITIGATION, CHOOSE FINANCIAL SCHEMES AND SOURCES**
by financial readiness checks and financial model(s)
- ✓ **TO DO 7: RANK AND SHORT-LIST PROJECTS**
according to their viability and select the best projects' terms of preconditions and possibilities and prepare due diligence
- ✓ **TO DO 8: START RISK ASSESSMENT**
of project(s)
- ✓ **TO DO 9: PREPARE THE MONITORING PROCESS**
by considering KPI's for targets and co-benefits
- ✓ **TO DO 10: PREPARE IMPLEMENTATION**
through contracting own finance and funding, public procurement and PPP's

OUTPUT:

validated, ranked and operationalised action plans, and topics for subcontracting

From such a consensual vision, capturing long-term expectations for the city, a political commitment/decision of the city and the stakeholders is needed to start preparations, which work out the vision in a strategy and proposed actions. This commitment/decision also ensures a coherent alignment of priorities, through a holistic approach.

TO DO 1: TRANSLATE THE GENERIC VISION

The first TO DO is that the generic vision or comparable long-term plan has to be translated into a strategy and/or policies and a timeframe per objective. This indicates roughly the direction to go and which solutions could be contemplated. For example, if the objective of the vision is to reduce local air pollution levels by a smart city project, it is evident that this objective can be achieved in different ways. Healthier transport modes such as walking and cycling might be encouraged by closing roads for car traffic, e-buses could be made mandatory in concessions for public transport, intelligent transport systems can use sensor data to lower the speed of traffic resulting in lower emissions, and travel by personal car can be made much more expensive by introducing road pricing or toll systems. Per objective, a preliminary strategy and/or policy must be established, accompanied by a defined timeframe, for discussion with key stakeholders later in this DECIDE & COMMIT stage. This is usually done in interdepartmental meetings, workshops, and brainstorming sessions, supported by assignments to consultants or collaboration with local research partners. Field trips and site visits can help to gain an overview of solid approaches and good examples. Also, here, support by high-level leadership is

crucial. A committed person or group within the city administration, such as the (Deputy-)Mayor, a Councillor or Director of Unit, must champion the cause and facilitate the process from planning to implementation. This commitment of municipal support helps to reduce the perception of risk, to attract investors and partners, and to engage the public. An important pre-condition for high-level leadership for smart city projects is to fit within the overall city strategy or vision, as developed or adjusted during the VISION stage. This requires timely engagement and buy-in at the highest political levels through sharing of information and education, next to explicit approval in the city council of official policy documents such as a smart climate-neutral city or low energy district strategy, complementary to support at the level of practitioners. Therefore, the narrative of the envisaged project should highlight positive effects that relate to the overall goals of the current political landscape (e.g. economics, jobs, tourism). In addition, indirect benefits and co-benefits which can be expected from the contemplated directions, such as less air pollution, lower operational costs of infrastructures, or less congestion, can help to make the case.

TO DO 2: DETAIL THE ROLES OF STAKEHOLDERS

Following, the next TO DO focuses on bringing more detail in the respective roles of all key stakeholders. The city administration must identify these roles more precisely and consult in depth with stakeholders about the strategy and/or policies proposed in the previous TO DO and their implications for day-to-day operations, living environment, finances, etc. of the stakeholders. Further, during this stage it is important to reach an agreement

on the responsibilities of all key stakeholders for the preparatory phase of the project. Possibly, more formal forms of collaboration can already be explored, for instance by starting to prepare Public-Private Partnerships. Besides, recruitment of ambassadors and local heroes who are willing to endorse the overall vision, strategies and policies, will help to create public support for them.

TO DO 3: RE-ALIGN SMART CITY GOALS, AMBITIONS AND POLICIES

In the VISION stage, the legislative framework and binding national and European commitments have already been explored. Now the strategies and/or policies have been defined in more detail per objective, and their timeframe is better known, it is now time to ensure again that these strategies and policies are properly (re-)aligned with other local targets and local plans, such as the Sustainable Energy (and Climate) Action Plans (SE(C)APs) developed under the [Global Covenant](#)

[of Mayors for Climate and Energy](#), and regional, national, EU and UN targets, such as the SDGs. Exchange and communication with the regional level and with metropolitan areas (in case the city collaborates formally at agglomeration level) on the intended strategies and policies are essential for this TO DO. Often investments in smart operations of urban infrastructures and public transport, or decisions on smart (re)development of urban areas, are taken or approved at this level.

TO DO 4: JOINTLY PRIORITISE ROUTES WITHIN EACH STRATEGY AND POLICY

After the specific roles and responsibilities of city administration and key stakeholders have been agreed upon and public-private collaboration loosely organised earlier at the stage of DECIDE & COMMIT, the time has come to make the strategies and/or policies more concrete by bringing all different stakeholders together toward one or more common goals, shared understanding and collective agreement on the routes or pathways to follow. This can be done by organising a couple of repeating cycles, where each time the same steps are made to arrive at a list of prioritised “routes” within each strategy or policy, agreed upon by the key stakeholders. The main criteria for this first selection and ordering of these “routes” are usually the current situation, expected impact, financial aspects, and maturity and expected feasibility of the proposed route(s). It might occur that the lack of incentives or the existence of disincentives for specific sectors of city administration or for key stakeholders, hamper this process of achieving collective agreement. In many cases a smart city project is attempting to tackle a problem which is for the public good, but it may go against the self-interests or profitability of stakeholders, for example existing service providers. The proposed strategy and

policies can change current value chains of businesses, and can pose threats or opportunities.

At this time, it is good to start thinking how the business model(s) might work: how will value (monetary and non-monetary) be captured, against what deployment of human, technological and financial resource? A tool that has become popular to sketch and test business models and the assumptions behind them is the Business Model Canvas. This tool has been contextualised for use by cities, e.g. by the IRIS smart city project (see [for a template and some examples of application](#)). By giving a voice to key stakeholders, and engaging them in co-designing and co-producing the eventual solutions from the viewpoint of their own interests, the city administration ensures public support for the actions per strategy or policy ultimately proposed. Different solutions can help to provide better monetary and non-monetary incentives for different stakeholders, such as adjustment of existing business models through diversification for energy network operators, lower costs for mobility through e-car sharing, or upgrading of public space and less air pollution for inhabitants.

TO DO 5: ALLOCATE RESOURCES FOR THE PREPARATION OF PLANS

The next TO DO entails allocation of resources by the city administration and each key stakeholder for further development and elaboration of plans: at this stage mostly capacity. To be able to draft the plan, it must be clear what resources can be committed, not only by the

city administration, but in particular by the stakeholders involved. It is not yet about finances for the implementation itself, but for thorough preparation of the plan. Often, but not exclusively, this is done in the form of a Public-Private Partnership

TO DO 6: FORM INTERNAL AND EXTERNAL TEAMS

This step focuses on setting up the team(s) which will prepare the plans for climate-neutral and smart city projects. Usually each key stakeholder puts together a small team which has a specific mandate for the preparatory phase (external teams). The city administration commonly plays a major part as main orchestrator of the distributed efforts of all stakeholders (see Borsboom-van Beurden and Costa, 2020, for an example on this by the City of Florence.) To that end, the city administration will often set up a larger team consisting of staff from different departments (internal team). Citizens and local businesses can participate individually, send representatives or organise themselves in a more formal structure, for example by establishing a neighbourhood or user association, or a business communi-

ty. Common activities at this step are engaging different departments, formalising interdepartmental collaboration to breach the siloes, and create an institutional framework and vehicle for capacity building in public-private partnerships. The latter can be done by creation with stakeholders of a joint smart city “brand”, a specific, connective approach to climate-neutral and smart cities, geared to the city needs, and often in the form of a Public-Private Partnership. During this step, one repeatedly encounters the problem of siloes, not only in governments, but also in businesses. Projects on smart city and low energy districts are often managed by vertically structured departments (silos) in the local government or similarly, sectors in businesses. Other project stakeholders, including local businesses, solution providers,

and universities, are frequently siloed as well. Since no single department or sector has the full mandate (or ability) to implement a holistically designed project, this can lead to long negotiations, and delays or postponement of implementation of the project. Within the city administration or company, internal collaboration issues can be prevented by the clear definition of a person or

entity (a system integrator) in charge of horizontal coordination with sufficient responsibilities and mandate. Successful co-ordination requires the establishment of truly multi-disciplinary or multi-sectorial teams. Some approaches to overcoming siloes initiated by cities but also applicable to business include:

- Installing cross-sector departments
- Creating “special staff units” reporting directly to the politicians
- Installing informal interdepartmental working groups
- Outsourcing this task to semi-independent project management companies

Another approach is to collect and aggregate the different city infrastructure data streams and control operations in a single structure – an operations centre. Co-located services and employees from different departments, working together, may act as a “nerve centre” to facilitate co-ordination and communication, breaking down some of the walls of administrative silos. For instance, in the Horizon 2020 Lighthouse project [REPLICATE](#) the City of Florence developed the Smart City Control Room in their lighthouse project, which enables collaboration and synergies between different bodies and utilities (Bellini et al., 2018). The problem of siloed organisations can be aggravated by differences in workplace culture and organisational structures, especially with the ad hoc sort of organisation developed speci-

fically to bring together a wide range of partners for a temporary project. Such incompatibilities in workplace culture differences can be handled by setting ground rules regarding expectations and defining the project work culture, including risk management, contingency planning and rules for escalation. Further, staff training in the field of climate-neutral and smart cities, next to the development of a common language and thinking, e.g. by a glossary, can help establish a level playing field within a project team, especially when project members come from highly diverse disciplines. Lastly, social activities, in combination with educational, training and work activities, physically located in the plan area, can contribute considerably to overcoming siloes.

TO DO 7: EXPLORE DIFFERENT FINANCIAL SCHEMES

This TO DO entails a first exploration of financing options, with the aim of having a realistic understanding of the viability of the plan in terms of finance. To build an understanding of the options towards the bankability of the project, it is recommendable to undertake a number of activities:

- Early phase exploration of financial aspects of the plan;
- Risk assessment and feedback on financial feasibility during the preparation phase;
- Advice on financial models, and securing finance, when concretising the plan;
- Assess options for procurement, contracting, establishment of Public-Private Partnerships or other collaboration forms, which enable implementation;
- Monitoring of financial performance of the plan during implementation;
- Evaluation of financial performance after implementation;
- Recommendations on finance and possible adjustment of the chosen financial model. It is key that the city understands the various funding and finance options and deal structuring open to them. There are some excellent resources available that can help build this understanding, including:
- A high-level overview of the funding and finance options for smart city projects is provided by the [Smart Cities Marketplace](#). It highlights the difference between public funding and private finance and explains which options are typically used, depending on project size
- The [Covenant of Mayors funding guide](#) provides a good overview of (supranational) public funding opportunities for cities
- The [Circular City Funding guide](#)
- The [EIB European Public Private Partnership Expertise Centre](#)
- [Webinar series](#) of the European Smart Cities Marketplace.

The economic viability of climate-neutral and smart city plans can be improved in several ways (EIP-SCC, 2013, 2014; eeef, 2017). Foremost, demand should be bundled in order to create more attractive business cases. However, this scale up is closely related to standardisation of smart city solutions. Standardised solutions provide better business cases as the potential markets are larger. Subsequently, novel business models, mixed funding and crowd funding can help to tap into previously unused sources of finance, in particular when firmly rooted in the local ecosystem of smart city partners, including local businesses, citizens and NGOs. Investments in smart assets can be used for lowering operational expenditures and other costs for partners, and investments from different stakeholders can be combined. Sometimes this requires the adjustment of the regulatory and legislative framework. Public-Private Partnerships can provide the structure for such mixed financing investments (Placidi et al., 2016). Further, more innovative and faster procurement procedures with fewer uncertainties makes investments more attractive. And lastly, possible investors and funding resources should be involved from the concept phase of any smart city plan and project. Requirements need to be addressed together with the project scope and before structuring any

call for tender and concession documentation, with respect to the minimum investment size, blending options, and the financial maturity function of implemented measures (eeef, 2017).

Further, many residents may be unaware of financing options or opportunities which may exist to help them with the financial costs of implementation of smart solutions or measures to save energy and use more renewable sources of energy. Therefore, promoting awareness of financial opportunities should be one of the first activities covered during project scoping. Opportunities for external help with private financing should be one of the mandatory activities in project planning. The project team should collect and evaluate those specific opportunities that apply to the project and target market. The project group should bundle, simplify, streamline, and support the application process for the target market. In addition, several portals and digital catalogues need to inform about financing opportunities for cities at European level, see for example the financial guides of the Global Covenant of Mayors for Climate and Energy and the Smart Cities Marketplace Action Cluster Business models mentioned above. Most regions and countries have helpdesks which provide information about loans and grants, for example the Managing Authorities for

European Structural and Innovation Funds. At local level, more and more cities have implemented the one-stop shop concept for information on energy saving measu-

res and clean energy production and offers for implementation. The Chambers of Commerce can play a role in advising local businesses on these matters.

TO DO 8: START RISK ASSESSMENT OF PROJECT(S)

A sound risk assessment of your project(s) will be essential for investors, be they private or public: any investor will want to undertake a due diligence process to create a risk profile of the project and having the right information available facilitates this process. A due diligence is a comprehensive appraisal of a venture, business or project to help put a value to the future returns of an investment and to identify potential risks and mitigating measures. A due diligence helps an investor to identify

any show-stoppers and 'red flags' early on.

In a due diligence process, an investor will want to know, mostly through hired-in assistance (that is multidisciplinary and may consist of several firms undertaking the work) of a third party, where risks are in the following categories. Some examples of where the focus might be directed are provided by means of illustration:

- Accounting/financial: analysis of books, historical statements and existing financial arrangements;
- Tax: compliance with tax laws, opportunities for tax reduction;
- Legal: ownership and exposure to liabilities, (potential) litigations;
- Regulatory: risks, regime, revenue regulations;
- Commercial/market: assessment of demand (future, historic), existing contracts, forecasts, product/service portfolio;
- Technical/environmental: workforce quality, contractors, compliance with technical standards, environmental impact, asset condition, maintenance policies, capex/opex plan.

PROJECT INITIALLY NEEDS INCREASING AMOUNTS OF CASH

CASH FLOW

PROJECT STARTS TO GENERATE CASH



DUE DILIGENCE PROCESS: TECHNICAL AND FINANCIAL CHECKS ►

To learn about how due diligence takes place, you are invited to review the [Smart Cities Marketplace webinar on due diligence](#). Furthermore, the LAUNCH Risk Assessment Protocol created for risk profiling projects delivering sustainable energy assets is a prime example of what risk types (17 in the case of LAUNCH) should be considered. You can learn more about the protocol [here](#).

Figure 6 Where the due diligence process fits into project development.

Chapter 3: Prepare the plan(s)



STAGE 3: PLAN

QUESTION:

What are appropriate action plans or projects for implementing the strategies and policies agreed upon in the previous stage?

- ✓ **TO DO 1: SET MILESTONES AND TARGETS**
and agree on responsibilities, who does what
- ✓ **TO DO 2: EXPLORE STATE-OF-THE-ART OF RELEVANT AND APPLICABLE METHODS AND TECHNOLOGIES**
internal and external
- ✓ **TO DO 3: RECONNECT TO STAKEHOLDERS**
communication and consultation on envisaged actions
- ✓ **TO DO 4: VISUALISE LOCAL CHALLENGES AND POTENTIAL IMPACT**
of prospective methods and technologies in neighbourhoods
- ✓ **TO DO 5: DRAFT A LIST OF RELEVANT ON-GOING AND POSSIBLE NEW PROJECTS**
with stakeholders
- ✓ **TO DO 6: IDENTIFY FUNDING AND FINANCING OPTIONS**
for projects in portfolio
- ✓ **TO DO 7: INVESTIGATE CONDITIONS OF FINANCIAL SCHEMES** in detail
- ✓ **TO DO 8: RANK AND SHORT-LIST PROJECTS**
according to their viability and select the best projects
- ✓ **TO DO 9: ENSURE APPROVAL AND COMMITMENT**
for selected projects by city administration and stakeholders
- ✓ **TO DO 10: PREPARE THE MONITORING PROCESS**
by considering KPI's for targets and co-benefits
- ✓ **TO DO 11: PREPARE IMPLEMENTATION**
through contracting own finance and funding, public procurement and PPP's



TOOLS:

- SEAP and SECAP
- European Energy Award method to define a portfolio of projects
- open sources
- self-assessment tools
- dashboards
- CONCERTO method for co-design
- SINFONIA method for charting co-benefits
- CIVITAS model process for SUMP's
- ESPRESSO maturity check
- traditional project management tools as CEM
- PRINCE
- workshops
- direct consultations
- maps and 3D visualisation
- assignments to consultants and researchers
- study visits



STANDARDS:

- ISO 37106 Multisectoral Strategies for Cities
- ISO 3712X Targets with Indicators
- ISO 3715X Infrastructure
- ISO 37101 Quality Management Systems Approach,
- CityKeys KPI framework

OUTPUT:

validated, ranked and operationalised action plans, and topics for subcontracting

By prioritising actions, operationalising them and defining them more narrowly, by setting precise targets and milestones, allocating responsibilities, and selecting a portfolio of projects, one or more plan(s) are drafted. This stage also establishes an urban platform with the aim of facilitating information and knowledge exchange, both internally and externally.

TO DO 1: SET MILESTONES AND TARGETS

The first TO DO is to define milestones and concrete, effective targets for the strategy and/or policies per objective from the DECIDE & COMMIT stage. Subsequently, within the city's administration and key stakeholder's organisations, a division or roles has to be arranged,

making specific departments, sections or staff positions responsible for achieving particular milestones and targets ("Who does what?"). This is usually done by internal meetings and workshops, and informal consultation with stakeholders.

TO DO 2: EXPLORE STATE-OF-THE-ART OF RELEVANT AND APPLICABLE METHODS AND TECHNOLOGIES

The second TO DO is to explore, make overviews of, and study the state-of-the-art in relevant methods and technologies, which might be contemplated for the action plan. These methods and technologies must be assessed on their appropriateness for the local situation in terms of densities, building or infrastructure characteristics, mobility patterns, legislative context, etc. Spe-

cific preconditions for contemplated solutions need to be checked as well, for example with respect to rules for privacy of personal data. This can be done by the city administration itself, if competences are present, by internal and external consultation of experts, engineers, consultants, research organisations on technologies and methods the city wants to deploy.

TO DO 3: RECONNECT TO STAKEHOLDERS

Normally stakeholders have already been engaged for specific TO DO's in earlier stages, however, as the "routes" prioritised earlier become more narrowly defined and are worked out in more detail into actions, it is of utmost importance to keep the stakeholders engaged and (re)connect with them on a regular basis. A mistake made often, is to engage stakeholders at the start of the

preparation of plans, but not anymore at a later stage, what might lead to a less positive attitude towards the plan. City administrations should consult all local stakeholders, including not only citizens and local businesses, but also other users of services, infrastructures, buildings and public space as visitors or shoppers, in a proper way by keeping in mind that:

- *Stakeholders might not be aware* of specific issues deemed important by the city administration and its partners in local ecosystems, or might have other priorities. Clean mobility and logistics, energy efficiency and smart interoperable infrastructures might not be the main concern of stakeholders and users of buildings and urban infrastructure, however, expected monetary savings are often an important motivation for agreement to plans for smart climate-neutral city projects. Buy-in of stakeholders is also highly for later use of the refurbished buildings and infrastructures, or new services. If end users are not willing or able to use the climate-neutral and smart technologies properly, this will lead to their underperformance and to rebound effects. Therefore, communication, raising awareness and the training of the tenants or other users might be the most important factors to success (Yoldi, 2017). Many stakeholders find it difficult to grasp rather abstract concepts as smart climate-neutral cities, and visualisation of the challenges, or the options might help to understand the ins and outs of climate-neutral and smart solutions, thus raising awareness. Realising that stakeholders might have different priorities means also that city administrations should reach out to and develop specific approaches for those who are
- negatively affected by the plan, e.g. citizens suffering from energy poverty or companies less accessible by reduced car mobility.

Figure 7 Checklist of the PLAN stage. Amended from: Borsboom-van Beurden et al., 2019



- Win-win situations must be created by *including other benefits from the envisaged actions than savings and reduction of greenhouse gas emissions in the plan*, such as less air pollution, or enlarging the scope of the envisaged actions, such as better quality of the public space or more social cohesion. For instance, the narrative of energy efficiency investments should include compelling arguments on those attributes that the homeowner is likely to value, and be tailored in order to emphasise the direct co-benefits of the measures – including a higher living standard, increased comfort, improved aesthetics, enhanced lighting quality, healthier ventilation, and better acoustics, among others (City-zen, 2016; Ferreira et al., 2015). The city administration needs to explain: “What’s in it for you?” Communicating the broad range of expected co-benefits creates a positive attitude and makes it possible to include the wishes and hopes of many stakeholders, including those who are sceptical about climate-energy issues (Bisello and Vettorato, 2018).
- Some *flexibility must be allowed to adjust the potential solutions and envisaged actions*: as stakeholders might have different preferences, there should be sufficient room for adjustment of the plan to stakeholders’ preferences and promote the co-benefits relevant to them.
- *Joint ownership of the plan has to be brought about*, for example by explaining to citizens and other stakeholders that it is not about technology gadgets, but how a smart climate-neutral city can be useful to them in supporting their quality of life.

TO DO 4: VISUALISE LOCAL CHALLENGES AND POTENTIAL IMPACT

After consultation with the stakeholders, the next TO DO is to include more spatial details in the envisaged actions in terms of neighbourhoods or building blocks, by making a geographical refinement of the specific challenges identified in the VISION stage. What is more, the potential impact of actions must be shown with the help of dashboards, urban platforms, etc. These tools, for example based on Building Information Models (BIM) or Geographical Information Systems (GIS) and using

map tables, can visualise specific local challenges and the potential impact at neighbourhood level. Information about the impact of contemplated solutions, might influence the choices to be made in the next TO DO. ICT tools showing the state of the current built environment with its energy and transport infrastructures, and analysing the suitability of various smart city solutions for specific areas, can help to develop a “common operational picture” and prepare for collective agreement later.

TO DO 5: DRAFT A LIST OF RELEVANT ON-GOING AND POSSIBLE NEW PROJECTS

With more information what can be done where, the next TO DO is to create a comprehensive list of relevant on-going and possible new projects in transport, energy efficiency and RES, infrastructures and ICT, for instance, as included in the Sustainable Energy and Climate Actions Plans developed under the Global Covenant of Mayors

for Climate and Energy. This is done together with the stakeholders. Plans are becoming rather concrete at this stage. The technical feasibility of projects can be researched using feasibility screening tools such as [RETScreenExpert](#). The screening outcomes are input to ranking projects in terms of feasibility and impact in TO DO 8.

TO DO 6: IDENTIFY FUNDING AND FINANCING OPTIONS

In the DECIDE & COMMIT stage, exploration of the possibilities and conditions of different financial schemes have already taken place. Now, this TO DO focuses on making final choices for the financial models for the projects in portfolio during implementation of the plan. Different groups of activities are part of this. Firstly, a detailed elaboration of costs and yields needs to be created for the projects on the list resulting from the previous TO DO. This means calculating key financial parameters such as capital expenditures (CAPEX), operational expenditures (OPEX), return on investment (ROI), profitability, etc. A useful template to build an understanding of the financial parameters involved in each project can be obtained from the [EU City Facility](#). By using this template,

a city builds a profile for each project that can be understood by investors and financial institutions and thus facilitates access to funding.

Many solutions for climate-neutral and smart cities have high initial costs and generate insufficient cash flows. Cities’ and investors’ initial perceptions of prohibitively high costs, whether upfront costs, initial costs, or overall costs, are a common issue facing projects at different stages of development and implementation. Factors affecting this perception include the methodologies for determining return on investment, including internal and external rate of return, as well as assumptions about interest and discount rates. Different ways to deal with high costs are:

- Public-Private partnerships can often help overcome other challenges facing smart climate-neutral city projects, including lack of initial funding, lack of staff capacity, lack of technical capacity to develop and manage innovative projects. The Public-Private Partnership may transfer to the private sector a large share of the responsibility for developing, managing, and completing the project. But the private sector may only be willing to engage in a Public-Private Partnership if a competitive rate of return is assured, which they could get from alternative projects bearing similar risks (Stacey et al., 2016);





- Bundling highly profitable project investments with less profitable or unprofitable elements can be a method for expanding the project while retaining overall profitability, e.g. by selling part of the building stock;
- Mixed financing from various sources and types of investors, and innovative business models where operational cost savings finance higher investments, or a longer time horizon for return on investment is accepted because of other advantages;
- Revolving funds, green bonds, crowd funding, pre-financing and subsidies;
- Sustainable procurement including environmental externalities. By monetarising environmental disadvantages of fossil energy use, sustainable projects are higher valued.

However, also citizens may have a perception of prohibitively high investment costs and prohibitively long payback times as a common issue facing projects where citizens co-finance the needed investments, e.g. in smart, energy-efficient houses. This perception is often related to their socio-economic status and access to capital, motivation, problems organising collective agreement and action, and lack of awareness of financing opportunities. Apart from stressing the direct co-benefits of the plan (Ferreira et al., 2015), the timing of investments can also provide an opportunity for less costly investments with shorter payback times, for example by integrating smarter technologies when buildings or infrastructures are upgraded or refurbished anyway.

Subsequently, the detailed elaboration of costs and yields is used to assess the suitability of possible financial schemes, resulting in a proposal for sources of finance and funding. A wide range of possibilities from within financial and funding schemes exists, see [here](#) for a useful overview.

Split incentives are a commonly encountered issue in smart climate-neutral city projects, when the actors financing the project, e.g. a real estate developer, owner of a building or infrastructure, and the actors benefiting from the project, e.g. tenants or passengers, are different. For these reasons, a fair division of costs and benefits must be part of the plan. It can be achieved by users contributing to the costs of the investment, energy service companies (ESCOs), mixed financing business cases, sharing of profits according to investment, or energy-neutral rents (consisting of rent and energy costs together, where energy savings finance the refurbishment of the buildings).

As indicated in the previous step, finance and funding organisations will ask for more information about the real and perceived risks associated with the projects on the list to confirm any finance to a project. Conventional solutions are often preferred by stakeholders in order to avoid unknown problems with innovative solutions, such as flaws in construction work or inadequate maintenance (HERON, 2016). New or innovative solutions are

considered to carry with them a higher implicit risk, and this leads to apprehension from many stakeholders, including public entities, private enterprise, the public, and financial lenders. Small-scale projects can provide a low-risk way for public entities to support testbeds for innovation, raise familiarity and skill levels by involving local partners in the project, reduce apprehension by verifying and validating the project claims, and alleviate unfamiliarity through public exposure and participation. Other ways to deal with innovative solutions perceived as too risky, are organising a better exchange of knowledge,

and a better integration of technological and financial economic knowledge e.g. investors and solutions providers. Ideally, possible risks should be roughly identified before negotiations with the preferred sources of finance and funding can start. Risk mitigation, contingency planning, and guarantees on performance of smart climate-neutral solutions help to make the envisaged solutions less risky. This TO DO results in a preferred choice for a financial model, i.e. a revolving fund, loan, grant, or mixed financing, and a (sub)plan for mitigating risks.

TO DO 7: INVESTIGATE CONDITIONS OF FINANCE IN DETAIL

Before possible projects are ranked and short-listed, this TO DO gives the city administration and its key stakeholders some homework to become aware of which conditions might apply to specific sources and models of finance. Several subtasks need to be taken care of:

- **Check which sustainability requirements your investors need to meet to be able to consider investment in your projects**

Increasingly, investors are looking to invest in projects that meet their so-called Environmental, Social and Governance (ESG) standards: factors such as energy consumption, impact on climate, health, safety and human livelihoods which may be included in investment criteria. In Europe, considerable effort has been undertaken to create a compendium of economic activities that are environmentally sustainable and that can help investors, issuers, project promoters and policy makers to understand whether a project is meeting robust environmental standards. This compendium, called the [EU Taxonomy for Sustainable Activities](#), is a key tool for cities to develop and design projects that align with the standard, and once finance is attracted, it enables investors to be transparent and report in alignment with the EU taxonomy. There will be increasing amounts of capital looking for projects that align with the EU taxonomy. It is important to note that sustainability is more than addressing climate change. Impact of investments on e.g. the health of natural habitats, water resource, access to food, access to basic services, etc. will become additional areas of activity in scope of the taxonomy on sustainable finance.

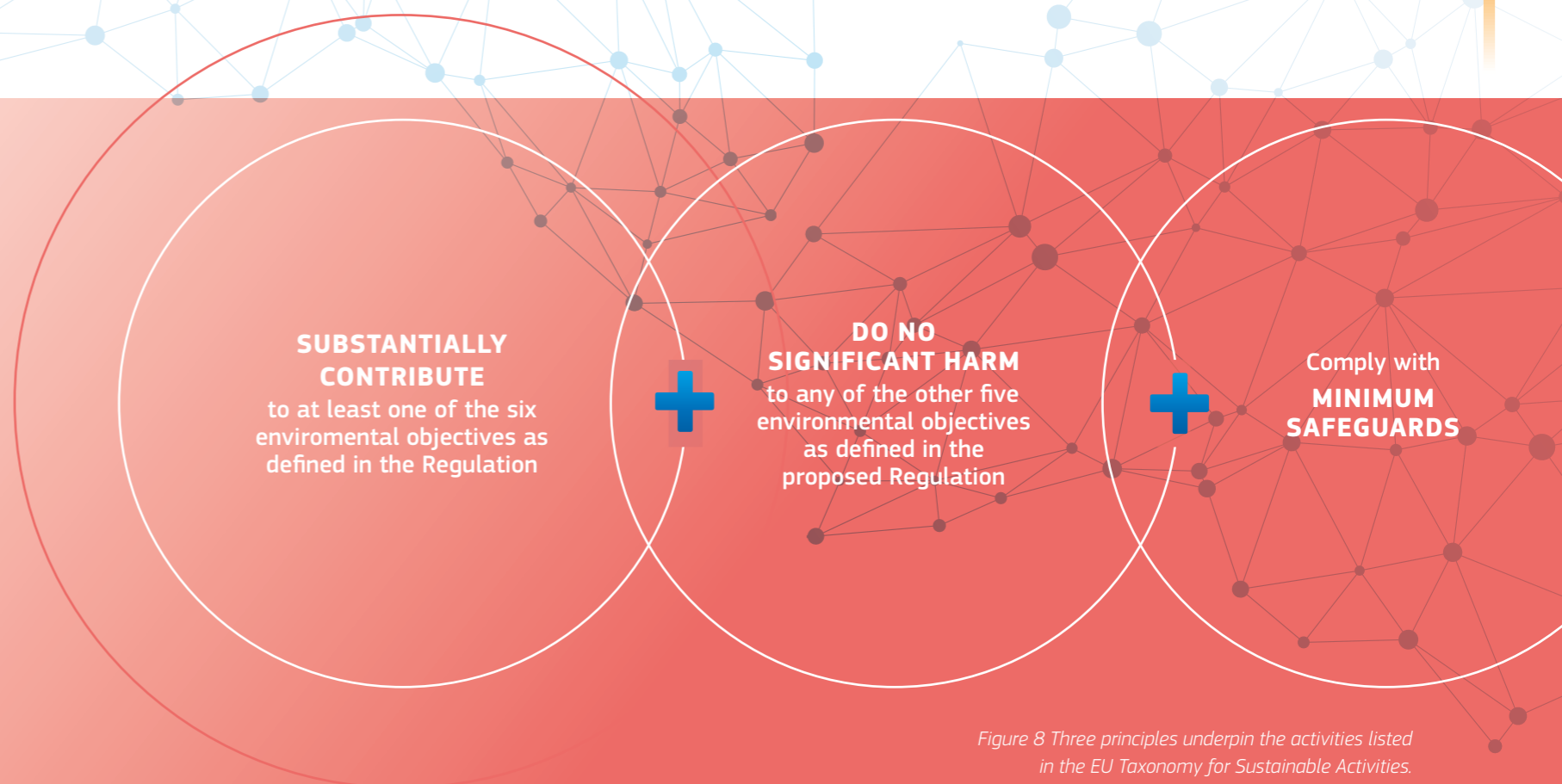


Figure 8 Three principles underpin the activities listed in the EU Taxonomy for Sustainable Activities.



- **Understand why the private sector is interested in working with cities that are on a climate-neutral, smart mission**

The private finance sector is seeking to fulfil their ESG objectives and are looking to invest in projects that really create impact, going beyond the minimum standards. However, the private (finance) sector cannot deliver the outcomes alone. There are market failures that only the public sector can address and create a private sector investable position in the years to come. The private sector can bring innovation to a partnership, both from a technological as well as a financial perspective. With a partnership with the private sector, public money can go further and deliver the desired outcomes and policy objectives. The private sector can help organise the stakeholders, structure the deal and supply chain to deliver the project.

What to think about when you consider a public-private partnership is that from a private finance perspective, one needs to understand there are different risk appetites: funds that invest in physical infrastructure will want to see long-dated, steady cashflows, whereas venture capital type investors are willing to invest in the supply chain directly with equity. It is important that early on, the public sector needs to have a view of what it is looking for to deliver the desired outcomes. Also, the private sector will want to understand how governance is arranged in a partnership: is it completely outsourced or is there more direct involvement by the city? In general, a good partnership has a well-defined division of responsibilities. As the technologies involved to deliver climate-neutral and smart cities develop so rapidly, the private sector will want to have public procurement processes to be as flexible as possible. Then, the business case is essential: what is it that the public sector desired from a partnership with the private sector: is it pure financial returns, or (also) other types of impacts, such as lowered emissions or job creation. It is not always a given that the public sector will get both financial returns combined with all the other desired results. In practice, it is a process of give and take within a successful public-private collaboration. Finally, the sustainability credentials of an investment are, as said, becoming increasingly more important for the private (finance) sector. Having the right credentials, through alignment with standards such as the EU taxonomy for sustainable finance or similar, will result in lower cost of finance and thus be attractive to project developers and operators.

- **Explore what a collaboration with private investors might look like**

A typical set-up of a collaboration between a city and the private (finance) sector is organised around a so-called Special Purpose Vehicle (SPV), a fenced-off organisation with the specific purpose to provide finance to a (larger) project, without transferring all the risk to the parent company or organisation.

The SPV would oversee the operations of the project. The project itself would engage the supply chain and design and implement the concept that the city has set the objectives for. Returns from the project flow back to the SPV and through that, to the city and investor(s). You can learn more about these structures by listening to the [Smart Cities Marketplace webinars on finance](#).

Another example, of a different scale and magnitude, is to have a public-private fund that solicit projects to invest in. One such example is the Mayor of London's Energy Efficiency Fund, that brings together finance from the London Greater Authority as well as commercial lenders to provide debt or equity to realise energy efficiency, renewable assets, e-mobility and decentralised energy solutions. More information about this public-private partnership can be found [here](#). Amber Infrastructure is one of the members of the Smart Cities Marketplace's Investor Network, all of whose members are looking forward to receiving project proposals to review for funding opportunities.

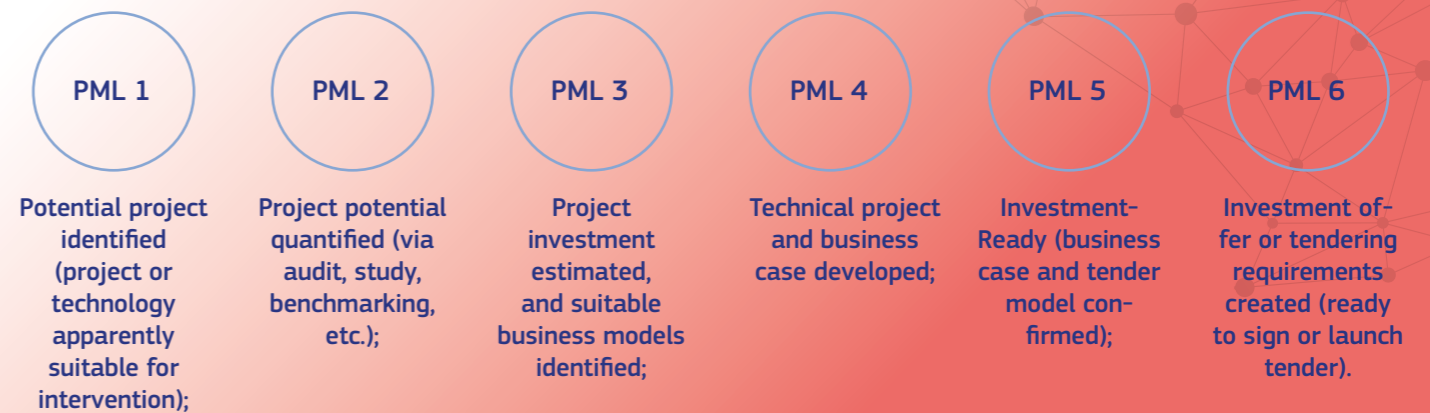
- **Understanding the revenue model is essential for private investors**

There are essentially a number of ways that a project can generate a revenue. First of all, the city can pay for the service obtained through the project (e.g. through energy efficiencies achieved). Secondly, the users can pay for the service, either directly, or indirectly (e.g. through on-bill finance). Thirdly, other, third parties may generate income as an indirect result of the project (e.g. renting out space created through the project or advertising) and finally, there may be benefits following governmental support such as minimum project income guarantees. Cities may value non-financial benefits of the project, which in turn could be relevant for private investors. In any case, it is essential to understand what the revenue streams for your project are, how they may evolve and where co-benefits might be that could be interesting to both city as well as private investor.

TO DO 8: RANK AND SHORT-LIST PROJECTS

Now the overall financial model for the project portfolio is clear, each project will be assessed and prioritised. Therefore, the next TO DO is to reach agreement with the key stakeholders about which projects should be short-listed. In meetings and workshops with stakeholders, proposed projects on the list drafted for TO DO 5 have to be ranked according to their viability. Comparable to the DECIDE & COMMIT stage, where "routes" to solve the problems where prioritised, this is done by taking into account factors such as maturity of the proposed project, financial feasibility, financial and non-financial risks, direct and indirect impacts, and consistency with the targets set in the general, overall city plan or VISION developed earlier.

A useful way to manage a portfolio of possible projects is to use the Smart Cities Marketplace Project Maturity Level (PML) model. This model under development, with its six levels, helps smart city programme managers to assess which parts of their portfolio are investment-ready and which projects need further development. These steps overlap to some extent with the checklists and TO DOs proposed here, however focus more specifically on portfolio management and can thus be a valuable extra tool in the future.



Depending on the risk appetite and level of engagement of the investors the city is in contact with, conversations with investors will normally only be worthwhile for projects with PML 4 or higher. Venture capital firms could be interested in lower level PMLs, if there is an investable vehicle that equity can be obtained from. In any case, it is pivotal to consider the investor requirements right from the business models identification.

Documenting these factors will be essential for investors to help them undertake due diligence activities to rate projects according to their own risk appetite. After the ranking, the most viable projects must be selected. Usually, a couple of iterations is needed to come to an agreement about which proposed projects should be selected. Co-design of the content of plans with other stakeholders, often in a couple of iterations, contributes to establishing the basis for collective agreement.

TO DO 9: ENSURE APPROVAL AND COMMITMENT

After the best and most promising project proposals have been selected, this choice must be approved by the politicians in the city administration, while key stakeholders should support this selection as well. They must approve the proposed projects and commit themselves to their realisation in the future. This buy-in of the city administration and the key stakeholders helps to secure budgets and human resources for preparing and executing the project. A common situation in the field of smart climate-neutral cities is fragmentation among a large number of different actors and ill-coordinated collaboration between different stakeholders and their interests (Rivada et al., 2016). This is a problem not only because usually from a legal perspective approval of the stakeholders is mandatory, but also

because stakeholders often feel the impact of the proposed project(s) most and many times have to bear a part of the financial burden. This collective agreement is often not easy to achieve and needs time and attention. For instance, when planning energy-efficient retrofitting of multi-ownership residences, a collective decision to agree on such a plan within the owners' association, condominium agreement, or housing cooperative responsible for common building maintenance and utilities, can be rather complicated to reach (LEAF, 2016). Sometimes professional property management companies can also help to achieve this collective agreement with the owners by acting as an organisational and financial vehicle for energy-related retrofitting (EFFESUS, 2017).

TO DO 10: PREPARE THE MONITORING PROCESS

Now the most viable project proposals have been selected, preparation of the monitoring process can start. Usually this happens at interdepartmental city level with the help of sectorial experts. Monitoring is a necessary step for project management and permanent improvement. In the case of smart and sustainable cities and communities' projects with a holistic approach, monitoring helps in achieving a consistent and systematic evaluation process:

- It clarifies programme objectives;
- It links activities and their resources to objectives;
- It translates objectives into performance indicators and sets values for targets;
- It routinely collects data on these indicators;
- It compares actual results with targets;
- It reports progress to managers, authorities and citizen;
- It alerts them to problems.

Translating objectives into performance requires an appropriate set of indicators, known as key performance indicators (KPIs). These KPIs are characteristic indexes to be measured. They can vary enormously: from number of people using public transportation, temperature in buildings, number of public consultations, number of green areas and total surface, num-

ber of kWh produced by renewables, annual weight of residual waste per inhabitant, share of the population with internet access, annual greenhouse gas emissions emission, number of e-vehicles in self-service, to air quality, noise levels, etc. KPIs can be either quantitative or qualitative. At this stage, KPIs are considered which reflect progress on the targets as defined early during the PLAN stage, but which also capture co-benefits other than reduced fossil fuel consumption or less greenhouse gas emissions emission. These additional benefits can be relevant for citizens and other stakeholders (e.g. improved public spaces, less congestion), but also for the city administration itself (e.g. lower operational expenditures, smoother inter-departmental collaboration). The gathering of data for monitoring of smart climate-neutral city projects can easily lead to issues in the field of data privacy, as projects often deploy large amounts of urban data to track activities, measure consumption, learn about usage patterns, and optimise solutions. Maintaining the trust of public and private entities with regards to privacy is of paramount importance in order to further these concepts. Therefore, the project should be fully transparent about its data collection and use policy. Besides, technical measures like encrypting and improved security of for instance smart meters can be applied. Hackathons might test the security of planned or deployed technology for ensuing improvement.

TO DO 11: PREPARE IMPLEMENTATION

The last TO DO for this stage is to start preparing contracts, public procurement, and public-private partnerships. Cities often have in place existing practices for procurement (the public purchase of work, goods or services from companies), but these are often incompatible with innovative solutions. They are based on an existing model of provision, and therefore support the business-as-usual situations better. One approach to promote innovative solutions is to tender calls for

solutions instead of specific products or services – in this manner the solution provider is allowed a wide range of options to meet the guidelines of the tender, and may develop new solutions outside the expectations of the tender (Stacey, 2016). Another approach is to include criteria for sustainability as energy efficiency, re-use and clean energy production in public procurement.



TOOLS:

- risk management, living labs
- testbeds
- experimentation zones
- trial and error
- [Smart City Information System](#)
- traditional project management such as regular progress meetings and reporting



STANDARDS:

- ISO 37104
- ISO 3715X Identify Infrastructure Issues
- ISO 3715X Identify Multisectoral Issues
- ISO 37101 Management System
- ISO 3712X Set Indicators for Progress, Follow-up and Reporting, to help implementing the action plan
- ISO 37101 Quality Management Systems Approach

Chapter 4: Realising the plan(s)

STAGE 4: DO

QUESTION:

How to implement the action plans for smart and sustainable cities in order to achieve their targets?

- ✓ **TO DO 1: COMPOSE A SKILLED LOCAL TEAM**
with representatives of the city administration and stakeholders with roles and responsibilities
- ✓ **TO DO 2: ALLOCATE RESOURCES**
to the team(s) such as budget, capacity etc.
- ✓ **TO DO 3: DRAFT A DETAILED ACTION AND/OR PROJECT PLAN**
by defining actions in dialogue with the stakeholders
- ✓ **TO DO 4: ORGANISE THE KICK-OFF**
of the action plans and/or projects
- ✓ **TO DO 5: SET UP THE MONITORING PROCESS**
by defining the baseline information, monitoring methods and protocols in detail, choose KPI's
- ✓ **TO DO 6: START ORGANISING ACCESS TO AND SHARING OF RELEVANT DATA AND PROJECT INFORMATION**
through an urban platform
- ✓ **TO DO 7: EXECUTE THE PROJECT(S)**
and management of progress

OUTPUT:

achieved goals of action plans, progress towards KPIs

Figure 9 Checklist of the DO stage. Amended from: Borsboom-van Beurden et al., 2019

Actual implementation of plans and projects takes place in the DO stage. With a culture of achieving results, this usually involves many amendments and changes, and a feedback loop with the subsequent stages CHECK and ACT is established at this stage, in line with the Quality Management Systems approach (ISO 37101). This enables an iterative cycle of improvement to achieve the set targets and agreed strategic objectives, in order to meet the VISION collectively set up and agreed upon earlier.

TO DO 1: COMPOSE A SKILLED LOCAL TEAM

The execution of the action plan or project might require different competences and capacities than its preparation. Therefore, for the second time a skilled local team must be composed. This team should have representatives of the city administration and key stakeholders on board, with roles and responsibilities in the assigned action plan and/or project are agreed upon and clearly described. It can be the same team as the team that worked on the preparation phase of the plan, but not necessarily so as other competences and skills, or other roles and mandates, might be needed for implementation of the plan. The responsibilities and mandates of the team members must be clearly related to the structures (organograms) of their respective organisations. Staff competency and capacity are crucial for successful implementation of action plans or projects. Therefore, the

chosen team must not only have the technical and organisational competences and skills to realise the plan, but this must also be in sufficient quantities. Additional training or hiring of staff might be necessary to meet the requirement, possibly leading to a revision of the budget. Especially technical or interdisciplinary competences in the city administration to deal with such cross-domain and multiple-technologies projects might fall short of what is needed. This might be solved by offering (post-graduate) training by establishing courses or academies with local research institutes such as universities or Research and Technology Organisations (RTOs). Also, the exchange of personnel in collaboration with (local) businesses, beside traineeships and internships, can help to raise the technical competences of the staff.

TO DO 2: ALLOCATE RESOURCES

The next TO DO is that resources, such as budget, capacity, workplace, etc., must be allocated to the team(s). There can be more teams working in parallel on different parts of the action plans and/or projects at the same time. These resources can be made available by the city administration, but also by stakeholders, investors and other financial parties, or regional and national government. The budget will most probably include expenses for acquiring specific technologies or for contracting construction or refurbishment works. Often the costs of implementation of smart climate-neutral

city projects are underestimated, so a provision for additional finance might be needed. Public-Private Partnerships can make specific arrangements among their partners for allocating capacity and budget to the plan. A part of the resources might be covered by subsidies, research funding or pre-commercial procurement. Further, by relating the action plan or project to smart specialisation strategies, it might receive regional economic incentives. Many climate-neutral and smart city plans combine different forms of finance and funding to develop a solid business case.

TO DO 3: DRAFT A DETAILED ACTION AND/OR PROJECT PLAN

Subsequently, a detailed action and/or project plan has to be drafted with the help of standard project management tools for the next TO DO. This detailed action and/or project plan explains comprehensively what has to be done in what way, in a specific timeframe. Besides, it clarifies the tasks and responsibilities during the implementation phase. Further, it makes it possible to track the progress of the project with the help of monitoring.

It is advised to work with a project management method that fits the type of project and the level of outsourcing of the project. A construction project is different from an IT project and in-house development introduces more project management effort compared to positioning yourself as an 'intelligent customer' by specifying and selecting delivery organisations and overseeing portfolio of outsourced project implementations.

TO DO 4: ORGANISE THE KICK-OFF

After this, a plenary meeting of the city administration with preferably all stakeholders must be organised, for an official kick-off or start of the action plan and/or project. This could also be in the form of public meetings or hearings, if possible, on the site of the climate-neutral and smart city plan. This meeting has several purposes. It marks the official launch of the action plan and/or project. Also, participants get a shared understanding of the project's ambitions, in case they might not yet have been fully up to date on this, and the selected actions

being used to achieve these ambitions. Participants can relate the proposed actions to their own responsibilities and competences, to further prepare for their role in the action plan or project. A proper kick-off meeting can contribute much to teambuilding, especially when team members meet their fellow team members for the first time. From a communication viewpoint, it increases the external visibility of the action plan or project and enhances the climate-neutral and smart city brand of the city and community.

TO DO 5: SET UP THE MONITORING PROCESS

Successively, the earlier preparations of the monitoring process during the PLAN stage must be elaborated in more detail. A very important part of this TO DO is that a "snapshot" of the current situation should be taken, the so-called baseline, for comparison of KPIs during the CHECK stage. In addition, qualitative and quantitative KPIs, including financial and performance indicators, must be finally chosen after being explored and considered at the PLAN stage. Advanced Horizon 2020 Lighthouse projects advocate the inclusion of some KPIs and value capture techniques for process learning as well, as this appears to be less often highlighted, but a major positive outcome of Lighthouse projects (Evans, 2019). Once the KPIs are known, the methods and protocols for monitoring should be defined in detail. Data collection for the baseline can start after it is clear which methods and protocols should be used.

Key Performance Indicators (KPIs) are relevant indicators that have been selected for ensuring the agreement of stakeholders on targets, on evaluation and on monitoring. The quantitative or qualitative values of indicators must be assessed following standardised methods, as this facilitates comparisons between different action plans or projects. This feeds a benchmark of best practices, and helps in defining targets for action plans or projects about to start, based on validated success stories. Several management systems and initiatives for a smart and sustainable development of cities and communities have been implemented in Europe and even worldwide, in particular the Global Covenant of Mayors for Climate and Energy, the European Energy Award management system, Horizon 2020 [CITYkeys](#), and Horizon 2020 project [ESPRESSO](#). These management systems, projects and initiatives have been engaged as active partners within the Smart Cities Marketplace and collaborated intensively in workshops and meetings to define basic sets of KPIs for smart, sustainable and energy efficient cities. While there are many different types of European cities and communities in terms of size, mandates, development, culture, historical context and local specificities, the overall picture is that specific sets of KPIs can be proposed and serve as a point of departure for all other city administrations, while being flexible enough for different situations and conditions. KPIs can be used for four different purposes, each with a different scope:

1. Programme evaluation and management (more overall view)
2. Project evaluation and management (rather sectorial approaches)
3. Reporting and communication (internal and external, including to citizens)
4. Benchmarking related issues (feeding a benchmark of best practices and success stories)

For each of these purposes, five main categories of KPIs have been defined, common to all programmes, projects and action plans:

- Category 1 PEOPLE: health, safety, access to services, education, social cohesion, mobility, noise and silver economy;
- Category 2 PLANET: energy, climate resilience, water, waste, pollution and ecosystem;
- Category 3 PROSPERITY: employment, equity, green economy, economic performance, innovation, attractiveness and competitiveness;
- Category 4 GOVERNANCE: organisation, community involvement, training, procurement, multi-level governance, development and spatial planning;
- Category 5 REPLICATION/SCALING-UP: scalability, replicability, local co-operation and cross-cities/communities co-operation.

It is advocated to take these KPI (sub)sets as a point of departure when the monitoring process is set up in the DO stage, and KPIs have to be chosen.

TO DO 6: START ORGANISING ACCESS TO AND SHARING OF RELEVANT DATA AND PROJECT INFORMATION

The next TO DO is that the team must start with organising access to, and sharing of, relevant data and project information through an urban platform.

Frequently, the limited interoperability of different data streams, platforms, and protocols, is a hindrance to fulfilling the full potential of many smart city projects, and to a lesser extent of low energy district projects. Data availability, modes for sharing, and interoperability while working with different vendors, are key elements to address during the implementation of smart climate-neutral city plans. It goes without saying that access to data is of paramount importance in all smart city projects and in most low energy district projects. However, collecting and processing data, promoting interoperability, and providing access to these data, while maintaining privacy, can raise several issues in smart city and low energy district projects. Sometimes projects noted problems with maintaining data availability and interoperability with private contractors – which might result in being locked into a proprietary platform or protocol provided by the outside vendor (Veronelli, 2016). Often regulations at best only partially define data measurements and control while normalisation for ICT systems is lacking. For instance regarding smart buildings, the lack of standardisation makes the process of integrating

different ICT solutions often more difficult, so additional work needs to be done to ensure the correct integration of all solutions and a satisfactory performance of the building as a whole (Mörn et al., 2016).

There are several ways municipalities can work to improve data availability and interoperability, and enable the sharing of data to facilitate innovation. The development of a standardised protocol for data interoperability between localities could solve many of the issues of different cities and organisations adopting different protocols (Stacey et al., 2016a). The statistical office of the country could be tasked with providing access to the data, maintaining its quality, structure, and interoperability (Di Nucci, et al., 2010). A standardised approach involving built-in interoperability for creating and maintaining open data services in house, would be less burdensome for municipalities often lacking the staff or technical capacity for this (Rivada et al., 2016). For instance, the FIWARE open source initiative defines a universal set of standards for context data management, which facilitates the development of Smart Solutions for different domains, e.g. Smart Cities, Smart Industry and Smart Energy (FIWARE, 2019). FIWARE standards are applied in several Horizon 2020 Lighthouse projects.

TO DO 7: EXECUTE THE PROJECT(S)

Finally, the last TO DO at this stage is execution of the action plan or project, and management of the progress. Quite often smart climate-neutral city projects have to make significant amendments and adjustments along the way, due to reasons varying from underperforming solutions to changed priorities of stakeholders that play a key role in implementation. Many times, the actual implementation of the action plan or project is hindered by several challenges related to regulations and legislative frameworks. The main issues are regulations that conflict with the project goals and lock-in, subsidies, and regulations that favour specific technologies (including competing solutions) or business-as-usual.

Another issue is the complexity and possible conflict of regulations at different governmental and regulatory levels (e.g. local, regional, state, country, EU), for instance European rules on competition (Vandevyvere,

2018). City managers need to direct the city's policies and regulations to incorporate a more flexible approach – one that is more welcoming to innovation. This can start with allowing pilots and public procurement processes to permit temporary exceptions to regulations, to allow time for innovative, experimental, or disruptive approaches to test the market and see if there is a public demand for their services (e.g. regulatory sandbox). By allowing these innovative approaches to test the field within a living lab, the city can set the ground rules for the demonstration site, as well as the parameters required for future expansion or approval of the project approach. Other solutions are to scan the regulatory and legislative framework during the planning and preparation to prevent an impact on the plan. Finally, a smart city plan or project should be encouraged to make proposals for adjustment of the regulatory framework, if needed.



TOOLS:

- software
- GIS
- databases
- protocols
- traditional project management tools



STANDARDS:

- ISO 37104
- ISO 3712X Measure Progress towards Planned Targets
- ISO 37101 Quality Management Systems Approach
- U4cities of ITU
- CityKeys

Chapter 5: Following progress



STAGE 5: CHECK

QUESTION:

Are we following the right track to meet the targets agreed upon during the implementation of the project?

- ✓ **TO DO 1: CHOOSE A PLATFORM FOR MONITORING** of KPI's
- ✓ **TO DO 2: ALIGN WITH OTHER CURRENT REPORTING OBLIGATIONS** to prevent double work
- ✓ **TO DO 3: ESTABLISH THE BASELINE AND START COLLECTING** monitoring information
- ✓ **TO DO 4: ORGANISE FREQUENT MEETINGS FOR ANALYSIS AND INTERPRETATION** of the information from the team and from the monitoring system, to identify possible problems early
- ✓ **TO DO 5: EXPLORE HOW TO SOLVE POSSIBLE PROBLEMS AND IDENTIFY ADJUSTMENTS NEEDED** in order to improve the project. Discuss these with internal and external stakeholders in the quadruple helix

OUTPUT:

comparison of progress against agreed targets, suggestions for improvement(s) and amendment(s)

Figure 10 Checklist of the CHECK stage. Amended from: Borsboom-van Beurden et al., 2019

This stage centres on measurement of progress and evaluation against the targets as represented by the KPIs during the CHECK stage, after establishing a baseline. This enables continuous assessment of progress of the project, and provides clues for improvement in the ACT stage where needed.

TO DO 1: CHOOSE A PLATFORM FOR MONITORING

The first TO DO for the CHECK stage is to choose a platform for monitoring of KPIs. There are multiple existing, user-friendly monitoring tools for collecting and storing data with specific information about date and time. For this reason, cities are encouraged to list current platforms and check which platforms are appropriate for their smart and sustainable development, before looking for a new platform. Most of the time, city adminis-

trations already have comparable tools in different sectors or departments, but in this case, it is important to centralise these data in one (virtual) single platform. For this TO DO, the team should identify the tools that are essential for an efficient and successful management of the projects, and investigate in detail the interfaces issued to avoid barriers between the different tools

TO DO 2: ALIGN WITH OTHER CURRENT REPORTING OBLIGATIONS

After that, it is important to ensure alignment with other on-going reporting obligations, to make an efficient use of the resources of the city administration and stakeholders for monitoring activities. It is very well possible that monitoring activities of this action plan or project can be aligned with other reporting obligations, for instance for SE(C)AP, SUMP, European Energy Award quality management related or ISO 37101 and ISO 37104 related.

Be aware that your investors will need verifiable information on your projects' performance, in order to fulfil their disclosure requirements on ESG-related elements of their investments, very much like many cities in the world have committed to disclose information on their sustainability journey, e.g. via affiliation with the [Global Covenant of Mayors](#), [Carbon Disclosure Project](#) or [C40 reporting frameworks](#).

TO DO 3: ESTABLISH THE BASELINE AND START COLLECTING

After choosing the platform and aligning with all other current obligations, the actual monitoring activities for the earlier chosen KPIs, which reflect the targets of the action plan or project, should start. To be able to make comparisons later with the values of KPIs when the project started, it is important to establish a baseline or

"snapshot". This baseline reflects the current situation: the values of all KPIs before any actions were implemented. Several methods exist to define such a baseline. Very well known is the [Baseline Emission Inventory of the Global Covenant of Mayors for Climate and Energy](#) which is part of drafting a SE(C)AP.

TO DO 4: ORGANISE FREQUENT MEETING FOR ANALYSIS AND INTERPRETATION

The next TO DO during the CHECK stage is to organise frequent meetings for analysis and interpretation of the monitoring information, provided by the team and by the monitoring system. Potential or expected problems must be identified as soon as possible (are there any red flags?). An efficient follow-up of progress needs regular and frequent analysis of the monitored data. The

project team needs to consider the monitoring platform as a frequently used tool, which is not only used when the end of the project is nearing. Dependent upon which specific indicator(s) it concerns, this might entail daily, weekly or monthly checks. For example, air pollution will be measured more frequently than the share in the total housing stock of refurbished dwellings.

TO DO 5: EXPLORE HOW TO SOLVE POSSIBLE PROBLEMS AND IDENTIFY ADJUSTMENTS NEEDED

The last TO DO for the CHECK stage is to explore how observed or foreseen problems might be solved. The team must identify which adjustments are needed to improve the project. Successively, these possible adjustments should be widely discussed with all internal and external stakeholders within the local ecosystem. Such a communication and dialogues with all stakeholders concerned with the project, while staying focused on the agreed targets, provide the best approach to finding the best and most efficient corrective action(s) while maintaining the engagement of all stakeholders.

If you are working with private finance, you should expect that you will need to update information on the business model and finances annually to fulfil your obligations towards your investors, e.g. by financial reporting.



TOOLS:

- traditional project management tools, such as contingency plans for risks



STANDARDS:

- ISO 37101 Quality Management Systems Approach
- ISO 37104 series

Chapter 6: Making amendments



STAGE 6: ACT



QUESTION:

How to adjust the action plan and/or projects in order to meet its eventual targets?

- ✓ **TO DO 1: RELATE SUGGESTIONS FOR IMPROVEMENTS AND AMENDMENTS TO THE GOALS AND AMBITIONS** of the city administration and other relevant stakeholders in the quadruple helix
- ✓ **TO DO 2: SELECT AND AGREE UPON THE MOST SUITABLE IMPROVEMENTS AND AMENDMENTS** based on the recommendations of the implementation team, in consultation with the quadruple helix
- ✓ **TO DO 3: IMPLEMENT PROPOSED CHANGES** by city administration and relevant stakeholders
- ✓ **TO DO 4: REPORT FREQUENTLY** as project team
- ✓ **TO DO 5: IDENTIFY CRITICAL SUCCESS FACTORS** for the project related to the context of the project
- ✓ **TO DO 6: ADAPT AND FINE-TUNE** of specific operations based on evaluation in permanent improvement loop

OUTPUT:

amendments and improvements realised, lessons learned

Figure 11 Checklist of the ACT stage. Amended from: Borsboom-van Beurden et al., 2019

This stage entails improvement by reaching on proposed changes and amendments with all relevant partners and stakeholders in the quadruple helix. Subsequently, the actual changes are made where needed during project implementation, to ensure that the milestones and targets set in the PLAN stage are achieved.



TO DO 1: RELATE SUGGESTIONS FOR IMPROVEMENTS AND AMENDMENTS TO THE GOALS AND AMBITIONS

The last TO DO of the CHECK stage explored potential solutions to the problem, or non-conformity, observed. Here, these suggestions for solving the problem are interpreted, and related to the final objectives as laid down in the vision and overall ambitions of the city administration and other relevant stakeholders in the quadruple helix. Suggestions the project team has in mind, might

have consequences for chosen methods or technologies, role and task divisions, mandates and responsibilities, and these should be realised and dealt with. This means that the impact of proposed changes on other projects must be taken into account. Basically, there are three ways to improve:

- To change the actions or measures when the targets are not met;
- To adjust the targets because they were not realistic;
- In case the “design” of the action plan or project contained some flaws, it is recommended to go back to the PLAN stage and redesign parts of the action plan or project.

Many climate-neutral and smart city projects and action plans need to make amendments or work with a plan B due to their high ambitions, the complex urban setting and their sometimes rather experimental character.

When these experiences and lessons learned are shared, for example on a platform as the Smart Cities Marketplace, a solid learning environment is created which benefits other cities.

TO DO 2: SELECT AND AGREE UPON THE MOST SUITABLE IMPROVEMENTS AND AMENDMENTS

One of the key messages in a recent OECD report on smart cities is: *“Smart cities need smart governance. Business and contractual models need to adapt to rapidly changing urban environments and encompass a more holistic approach, sometimes re-regulate rather than simply de-regulate, and leverage public procurement, including at the pre-procurement stage”* (OECD, 2020). This smart governance is particularly important when the most appropriate and effective suggestions for improvements, adjustments and amendments, must

be selected and agreed upon to ensure that the adjustments are properly implemented. Usually, this selection is based on short-listed recommendations of the implementation team, in consultation with all relevant partners and other stakeholders in the quadruple helix. However, before making a selection, the extent and seriousness of the problem must be clear. For this reason, the implementation team must check the cause(s) of the non-conformity, in order that it does not reoccur or resurface elsewhere, for example in other projects.

This should be done by reviewing the non-conformity, determining its cause(s), and check if similar non-conformities exist, or could potentially occur.

If and when regulations or requirements change that impact the project’s financial/business model (for instance affecting cash flows or the number of activities

developed by the project) the city administration will need to discuss with its financiers to assess the impact on the financial arrangement. This discussion could take place within the governance structure of a Public-Private Partnership.

TO DO 3: IMPLEMENT PROPOSED CHANGES

Evidently, the next TO DO is to implement the action(s) needed, as seems fit. The city administration or the respective stakeholder responsible for this ensures the mitigating or corrective measure is taken. Parts of the DO stage might be applicable here as well, as this TO

DO is basically a “mini” implementation. For example, changes in the team or role division, altered mandates and responsibilities, re-allocation of resources, adjustment of the monitoring process, and knowledge sharing through the platform.

TO DO 4: REPORT FREQUENTLY

Subsequently, the effectiveness of any corrective action taken must be reviewed on a regular basis. For that reason, the next TO DO is that the project or action plan implementation team reports regularly to the city management team about this, and if needed, to the most relevant other stakeholders. To do this properly, the team must keep documented information as evidence of the nature of the non-conformities and any subsequent actions taken, and the results of any corrective

action. This documentation should provide information on topics such as information on conformity, details of the non-conformity, corrective and preventive measures taken, and consequences for targets and indicator values. Frequent reporting on finance is also included in this TO DO. However, depending upon the type of finance secured, requirements on such reporting to financiers will vary greatly.

TO DO 5: IDENTIFY CRITICAL SUCCESS FACTORS

To prepare for further replication and scaling up of successfully implemented actions in the future, for example, within the cities’ territory, the next TO DO is to identify the critical success factors for the project or action plan related to its local situation and context. Based on this information, changes can be made to the original action plan or project for smart sustainable development in communities in future, if necessary.

TO DO 6: ADAPT AND FINE-TUNE

The last TO DO at the ACT stage is the continuous adaptation and fine-tuning of specific operations based on evaluation. This permanent improvement loop ensures that the implemented actions stay tuned towards new political, societal or technological developments.





STAGE 7: REPLICATE & SCALE UP

QUESTION:

Which organisational and financial models sustain the project's upscaling, and which parts of the project can be replicated in other places?

Chapter 7: Increasing the impact beyond the project



TOOLS:

- Tools for drafting business model plans
- regular financial evaluation tools (CAPEX, OPEX, ROI, etc.)
- collection of case studies from smart city and low energy district projects
- tailored workshops
- networking
- peer-to-peer meetings
- involvement of city networks
- industry platforms and branche organisations
- repositories as Smart City Information System

✓ TO DO 1: COMMUNICATE AND EDUCATE

by sharing results through repositories and city networks, and by capacity building

✓ TO DO 2: DEFINE THE BUSINESS MODEL

in terms of sustainability and maintenance in the future, and financial resources for scaling up

✓ TO DO 3: DEVELOP A PLAN FOR WIDER COLLABORATION

with industry, ICT companies, solution providers, citizens, local businesses and research after the demonstration or implementation

✓ TO DO 4: PERFORM A VIABILITY ASSESSMENT

of applied methods and solutions for other projects and contexts, and do a risk assessment of key success factors

✓ TO DO 5: ADJUST APPLIED METHODS AND TECHNOLOGIES

towards the local situation and conditions, and to foreseeable changes in the future

✓ TO DO 6: CONSOLIDATE A PIPELINE OF NEW PROJECTS

in other cities with other contexts and local specificities

OUTPUT:

right preconditions for further market uptake created, a learning environment for cities in place, an accelerating market for smart city and low energy district solutions

The stage of REPLICATE & SCALE UP organises the preconditions and support for repeating the project(s) at other locations, both within and outside the city's territory and jurisdiction, and for bundling of demand in the market. Sharing of experiences and best practices is key to further market uptake and acceleration of smart city solutions, as success stories build trust and help to move from consultation to agreement. It should be noted that for attracting finance to replicate solutions, standardisation of solutions is advisable, as that contributes to de-risking the activity for investors and financiers.

TO DO 1: COMMUNICATE AND EDUCATE

Foremost, communication and dissemination of the experiences, not only of successes but also of barriers and failures are essential for creating the learning environment that allows a wider community to benefit from the outcomes of the demonstration or pilot. Therefore, the sharing of results is an important TO DO that cannot be underestimated. Based on these outcomes, other cities and stakeholders can set up new projects, adapted to their local situations and contexts. The city hosting the original demonstration or pilot can support such a process by peer-to-peer collaboration with the other city, while city networks as [Eurocities](#) and [ICLEI](#) can help to disseminate the results in a wider group of cities.

TO DO 2: DEFINE THE BUSINESS MODEL

Within the city that hosted the project, usually successful implementation is followed up by creating the right preconditions for repeating the project within the city administrations' jurisdiction. Therefore, the next TO DO entails that the business model in terms of durability and resilience must be defined, and financial resources for expansion, scaling up or replication ensured.

TO DO 3: DEVELOP A PLAN FOR WIDER COLLABORATION

The next TO DO for this stage, is that a plan needs to be developed which consolidates wider collaboration of the city with industry, ICT companies, citizens and local businesses after the demonstration is finished. This could be for example with representative organisations of specific stakeholders, such as housing associations and grassroots initiatives, branch organisations of professionals, or associations of local government.

TO DO 4: PERFORM A VIABILITY ASSESSMENT

Probably, the successful implementation of the demonstration or pilot will draw the attention of other parties interested in repeating the demonstrated solutions in other places and in other situations. However, as solutions cannot be simply copy-and-pasted, for the next TO DO their applicability and viability in other contexts should be assessed, and key success factors must be compared with the new situation before the plan is prepared. It should be noted that private investors are particularly interested in projects at scale (for deal preparation and oversight effort/return reasons) and thus would welcome, when feasible, bundling and aggregation of the project, either within a city or in a group of cities.

TO DO 5: ADJUST APPLIED METHODS AND TECHNOLOGIES

Subsequently, the next TO DO is that the original plan and project features must be made replication and future-proof, by adjusting it to other local situations and conditions, and to expected changes in future.

TO DO 6: CONSOLIDATE A PIPELINE OF NEW PROJECTS

In the same or other cities, with possibly different local situations and contexts, the best practices of the project can be replicated. This can be done by identifying similar opportunities for making cities smarter and more climate-neutral. For example, the city of Vienna is upscaling the approach towards deep refurbishment and e-car sharing it developed in the Lighthouse project [Smarter Together](#) to other multi-owner buildings (Smarter Together, 2020).

Figure 12 Checklist of REPLICATION & SCALE UP stage.
Amended from: Borsboom-van Beurden et al., 2019



Next steps

For more detailed information on fast-tracking financially viable smart city projects in an integrated and inclusive way, the reader is cordially invited to check out the website of the [Smart Cities Marketplace!](#)

Furthermore, the full version of the SCGP, which provides more background and examples from other projects on all seven stages and each to do, can be downloaded [here](#). This full version provides a complete roadmap, not only for city administrations, but also for key partners in the local ecosystem, such as companies, research, citizens and NGOs. It advises on the process for preparing and realising a smart climate-neutral city strategy and subsequent projects. It contains the same information on stages of and steps in planning and implementation of a smart city strategy and project(s), but gives also numerous examples of and references to best practices in the field of smart climate-neutral cities, and highlights the background in more detail.

City administrations and other organisations are also most welcome to develop their project concepts further towards financially viable, bankable projects with the Smart Cities Marketplace Team. In a [matchmaking process](#), you can submit your project concept, which will be discussed with the investors in our network once sufficiently mature. To get you up to speed, the Smart Cities Marketplace frequently organises webinars and trainings on how to prepare the financial aspects of your smart city plan in the best way.

Lastly, experts in the Smart Cities Marketplace work in six [Action Clusters](#), focussing on topics ranging from the energy performance of buildings and districts, sustainable mobility, integrated infrastructures, innovative business models and finance, and engagement of citizens to integrated planning. Please feel invited to check out each Action Cluster and submit a request to become a member!

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