SUMP-PLUS

Developing Transition Pathways towards Sustainable Mobility in European cities

Conceptual framework and practical guidance

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Abstract

SUMP-PLUS D1.2 includes a review of the state-of-the-art in academic and practitioner evidence regarding the development of longer-term Transition Pathways for urban mobility, and sets out some key concepts for addressing this issue. It identifies some major implementation barriers to sustainable mobility policies in European cities, and proposes a new planning approach to overcome the 'implementation gap' and enable sustainable mobility transitions. The final two chapters develop two sets of practical guidance supporting cities to develop: (i) longer-term Transition Pathways towards carbon-neutral mobility and liveable cities by 2050, and (ii) a series of shorter-term Implementation Strategies that detail how measure packages will be implemented in practice, and how organisational and political issues can be managed. These are designed to complement existing guidance on developing Sustainable Urban Mobility Plans (SUMP).

List of beneficiaries

No	Name	Short name	Country
1	STAD ANTWERPEN	ANT	Belgium
2	MUNICIPALITY OF ALBA IULIA	ALBA IULIA	Romania
3	KLAIPEDOS MIESTO SAVIVALDYBES ADMINISTRACIJA	KLAIPEDA	Lithuania
4	COMUNE DI LUCCA	COMUNE DI LUCCA	Italy
5	DIMOS PLATANIAS	PLATANIAS CRETE	Greece
6	TRANSPORT FOR GREATER MANCHESTER	TR G MANCHESTER	United Kingdom
7	FONDATION NATIONALE DES SCIENCES POLITIQUE	Science Po	France
8	POLYTECHNEIO KRITIS	TECH UNIV CRETE	Greece
9	UNIVERSITY COLLEGE LONDON	UCL	United Kingdom
10	EUROPEAN INTEGRATED PROJECT	EIP	Romania
11	FORSCHUNGSGESELLSCHAFT MOBILITÄT – Austrian Mobility Research FGM-AMOR gGmbH	FGM-AMOR	Austria
12	MEMEX SRL	MEMEX	Italy
13	SPACE SYNTAX LIMITED	SPACE SYNTAX	United Kingdom
14	VECTOS LIMITED	VECTOS	Germany
15	ICLEI EUROPEAN SECRETARIAT GMBH	ICLEI EURO	Germany
16	UNION INTERNATIONALE DES TRANSPORTS PUBLICS	UITP	Belgium

Table of Contents

List of Figures

List of Tables

1 Executive Summary

To achieve a climate-neutral Europe and liveable cities by 2050, transitions towards sustainable urban mobility need to be accelerated. To date, transitions have been uneven across European cities, and particularly smaller cities outside Western and Northern Europe face challenges with implementation of sustainable mobility measures. In order to ensure that climate targets are met and urban mobility works for rather than against citizens in the future, cities need a clear long-term vision and strategic pathway of how to get to it – as well as practical skills in relation to implementation in shorter-term.

This deliverable addresses the PATHWAYS component of the SUMP-PLUS project (Task 1.2), aimed at producing 'a conceptual framework… to develop context-sensitive transition pathways to sustainable mobility and liveable cities'. This report provides an evidence-based conceptual framework for Transition Pathways and linked Implementation Strategies, and provides two sets of practical guidance to support European cities in developing these.

Chapter 2 of this report discusses the policy context outlined above, and Chapter 3 discusses the complementarity of the SUMP-PLUS framework to existing guidance. To avoid replication of existing approaches, Chapter 3 considers in detail what the starting points of the SUMP-PLUS Transition Pathways concept should be, including lessons from the CREATE project that serve as a foundation. Chapter 4 delivers on the Sub-Task regarding consolidation of existing knowledge regarding pathways, presenting a review of the state-of-the-art in academic and practitioner evidence regarding the development of Transition Pathways for sustainable urban mobility, including policy-making and implementation approaches that have been proven successful.

At the core of the Transition Pathways conceptual framework is the idea of backcasting or 'Vision and Validate': rather than a 'Predict and Provide' approach with a focus on forecasting current trends in travel demand into the future, the SUMP-PLUS approach turns transport planning 'on its head' and emphasises the importance of starting with a vision of the desired urban future, and tracing a pathway backwards from there to the present. Development of a pathway thus involves asking: where do we want to be, and what do we have to do – by when – to get there?

The specific added value of SUMP-PLUS is in providing in-depth guidance on the development of both: (i) longer-term visions and strategic policy approaches, in the form of a Transition Pathway that covers a 20 to 30-year time horizon (e.g. up until 2050), in contrast to the focus of existing SUMP guidance on the next 10 years; and (ii) detailed Implementation Strategies for how measure packages will be developed in practice over a 5 to 10-yeat time frame, with a particular focus on measure sequencing (order of measures), building an implementation timeline (with distinct phases) and spatial clustering of measures. Guidance regarding Transition Pathways is presented in Chapter 5, and guidance regarding

Implementation Strategies in Chapter 6. European cities can use these approaches separately or together, in close integration with SUMPs or as a free-standing approach.

2 Introduction

2.1 Aim of the deliverable

SUMP-PLUS is a project focused on bringing Sustainable Urban Mobility Plans (SUMPs) forward into successful implementation, with the PATHWAYS component (Task 1.2) aiming to produce '*a conceptual framework and supporting analytical tools to develop context-sensitive transition pathways to sustainable mobility and liveable cities'.* This deliverable D1.2 completes the two first Sub-Tasks 1.2.1 (Consolidate existing 'pathway' implementation knowledge) and 1.2.2 (Conceptual framework for developing successful transition pathways to implementation), whereas analytical tools are developed separately (Sub-Task 1.2.3).

2.2 The needs addressed by the SUMP-PLUS framework

In this section, we cite an overview of the EU policy context developed in an academic publication by Smeds and Cavoli (2021), drawing partly on the SUMP-PLUS project. This publication also suggests a number of policy recommendations for European Commission, regarding how the development Transition Pathways in European cities could be supported.

The SUMP Guidelines were first launched alongside the European Commission's 2013 Urban Mobility Package, which provided more funding for this policy area of around €13 billion. While the development of the European policy community on urban mobility has been a tremendous achievement, and many European cities have benefited from producing Sustainable Urban Mobility Plans (SUMPs), cities continue to face great challenges in implementing sustainable mobility policies. A recent report by the European Court of Auditors (2020, p.4), evaluating the 2013 Urban Mobility Package, concluded that "six years after the Commission called for a step-change, there is no clear indication that cities are fundamentally changing their [policy] approaches". We note that six years is a short time after which to assess the impact of an EU policy package at the local level.

2.2.1 The unevenness of sustainable mobility transitions across European cities

Rather than stating that little progress has been made, we observe that transitions towards sustainable urban mobility have been highly *uneven* across Europe.

Private car use has decreased since the 2000s in large Western European capital cities such as Vienna, Copenhagen, Paris, Berlin, London (Wittwer and Gerike 2016), Oslo, Zurich, Stockholm, Geneva, Milan (Teoh et al. 2020) and in mid-sized cities such as Bristol, Cardiff,

Bordeaux and Toulouse (Cavoli 2015). However, in many cities, we can also observe the opposite. Reviewing trends between 2007-2017 in 13 large European cities, the European Court of Auditors (2020) found that there had been a significant shift away from private car use only in two cities, while car use had actually increased in five cities. Statistics at the national level shows that car use grew across the EU28 between 1995 and 2009, with only some countries exhibiting a 'peak car' plateauing from 2009, and continued growth in large parts of Eastern Europe (Focas and Christidis 2017).

2.2.2 Accelerating transitions to achieve a climate-neutral Europe by 2050

In December 2019, the European Commission launched the European Green Deal, oriented around achieving a 'climate-neutral' European Union by 2050 (EC 2019). 'Accelerating the shift to sustainable and smart mobility' is identified as one of eight thematic priorities. The transport sector accounts for a quarter of the EU's greenhouse gas emissions, and meeting the 2050 target will require a 90% reduction in emissions from the transport sector. Decarbonising urban mobility will be critical to achieving this target, since urban areas are estimated to account for 23% of CO_2 emissions from transport in the EU (EEA 2019a).

To date, the transport sector has not seen the same gradual decline in GHG emissions as the energy, agriculture, industrial or service sectors in the EU: emissions only started to decrease in 2007[1] and remained 28% higher in 2017 compared to 1990.[2] There is no large-scale dataset for GHG emissions attributable to urban areas across the EU, and thus we cannot draw definite conclusions regarding the decarbonisation trend for urban mobility. However, when considered alongside other evidence, the available data suggests that the trend is not on track to achieve the 2050 target. The COVID pandemic has introduced a significant degree of uncertainty regarding progress towards climate goals: on the one hand, accelerating the uptake of teleworking, but on the other hand, undermining public transport use and encouraging greater reliance on private car use. It is unclear how these sudden shifts in urban mobility patterns will develop in the medium- to long-term.

The Green Deal fundamentally transforms the policy context for urban mobility in Europe. DG MOVE is currently developing an 'EU Strategy for Sustainable and Smart Mobility' that is to set out how the 2050 target can be met. The roadmap published for consultation states that the Strategy will "set a **pathway** for the [transport] sector to master the twin green and digital **transitions**" (DG MOVE 2020, p.1). The roadmap also includes an objective of "revamping the European agenda for sustainable urban and regional mobility, including cycling, intermodal transport and transport-on-demand" (p.3). With this deliverable, we hope to contribute to the agenda that will be launched by the Strategy, offering a conceptual

[1] See: https://ec.europa.eu/clima/policies/transport_en.

[2] See: https://www.eea.europa.eu/themes/transport/term/term-briefing-2018.

framework and practical guidance that can support European cities in developing Transition Pathways towards the 2030 and 2050 climate targets.

2.2.3 The need for additional EU guidance supporting urban mobility transitions

It is clear that the capacities of European municipalities for planning and implementation of sustainable mobility policies need to be strengthened. The recently launched 2nd edition of the SUMP Guidelines (Rupprecht Consult 2019) will certainly contribute to achieving this. It now seems likely future EU co-funding will be made conditional on cities having an adopted SUMP in place, as recommended by the European Court of Auditors (2020).

In this deliverable, we suggest that additional EU guidance is necessary to support European cities in accelerating transitions to sustainable mobility, as a complement to the SUMP Guidelines. This is based on two arguments, described in greater detail in section 3.2 below:

1. **The need to think longer-term and 'bigger picture'.** The SUMP Guidelines advise cities on how to produce medium-term strategic plans, with a typical timeframe of 5-10 years. In this deliverable, we propose a conceptual framework and practical guidance for how European cities can develop Transition Pathways, focusing a longer-term 20-30 year vision and strategic timeline leading up to 2050. We hope this can feed into future iterations of the SUMP Guidelines.

2. **The need to develop smart approaches to close the 'implementation gap'.** It is well-known that having a policy strategy in place does not guarantee successful policy implementation. Municipalities thus need to have the capacity to implement the measure packages included in the SUMP, yet implementation receives relatively little attention in existing SUMP Guidelines. To address this, we propose practical guidance that cities can use to develop an Implementation Strategy for measures defined in SUMPs, covering a 5-10 year time period. We hope this could form the basis of a new SUMP Topic Guide on Implementation.

2.3 Structure of the deliverable

Chapter 3 discusses the starting points for the SUMP-PLUS Transition Pathways component, to arrive at an appropriate specification of what new type of conceptual framework is needed. The first section reviews evidence on the implementation gap for sustainable mobility, while section 3.2 then discusses the focus of existing SUMP guidance, and the remaining gaps that SUMP-PLUS and this deliverable aims to fill, giving an overview of how the Transition Pathways framework relates to and complements the (second edition) SUMP Guidelines. Section 3.3 and 3.4 introduce a second important dimension of Transition Pathways as defined in Task 1.2: a conceptual framework that will allow European cities to

develop *context-sensitive* transition pathways, and discusses lessons from the CREATE project and SUMP-PLUS D1.1 (City Typology) in this regard.

Chapter 4 reviews the state-of-the art in academic and practitioner knowledge, summarising the evidence base on successful mobility transitions and associated pathways, and sets forth a set of policy principles that can be derived from this existing knowledge.

Based on these principles, we present the conceptual framework on Transition Pathways in Chapter 5, along with a recommended process for developing such pathways, and detailed guidance on how cities can develop Implementation Strategies in Chapter 6.

3 Starting points: what kind of new concept is needed?

3.1 The implementation gap for sustainable mobility

In section 2.2.3, we pointed to the implementation gap in the realisation of sustainable mobility policies. Here, we summarise evidence that identifies the specific challenges that European cities face in working towards sustainable mobility transitions.

3.1.1 Sustainable mobility measures: what to implement?

In the 1990s and early 2000s, when the principles of sustainable mobility as a planning approach were still being developed, the efforts of researchers and practitioner networks were focused on developing a better understanding of the full range of possible policy measures and their potential impacts. The emphasis on building better knowledge about 'what to implement', i.e. generating evidence and guidance regarding effective sustainable mobility measures.

In line with this, European projects have focused on developing sophisticated decision-support tools for cities focused on measure selection, option generation, measure appraisal and evaluation. CIVITAS SATELLITE conducted a review of available tools developed within CIVITAS projects and other European initiatives and city networks,[3] which in collaboration with the SUMPs-Up project have been made available in an Urban Mobility Tool Inventory on the CIVITAS and Eltis websites. Currently, this features over 200 tools and methods,[4] including 199 guidance documents and manuals, 20 tools for option generation and 22 indicator sets for appraisal and evaluation.

The recent CIVITAS SUMPs-Up (2017) project conducted a survey regarding European cities' experiences with sustainable mobility planning, obtaining responses from 328 cities. The finding was that cities expressed demand for enhanced EU support in relation to *measure selection*, with respect to less established measures (e.g. shared and low-emission mobility), but – we think, crucially – also in relation to *measure implementation*, with respect to established measures (non-motorised mobility, public transport; parking and road safety).

[3] See CIVITAS SATELITTE Deliverable D4.9.

[4] https://civitas.eu/tool-inventory. Including tools and methods developed by non-EC-affiliated private sector and third sector organisations, which SATELLITE and SUMPs-Up teams have decided to include.

In other words, even where the degree of knowledge regarding the effectiveness of a particular measure is good, cities still support to implement it.

These findings suggest there is clearly some scope for decision-support tools and guidance to integrate new measures, as future mobility technologies and approaches continue to evolve rapidly at the global scale. Furthermore, our analysis of SUMPs-Up data (see section 2.4.1) suggests that the level of experience of European cities with sustainable urban transport planning differs widely across cities of different size and cities located in different regions of Europe. The extensive number of guidance manuals and tools on measure selection, option generation, and appraisal are likely to meet most of the existing needs of European cities in those specific areas.

However, we argue that in order to address the 'implementation gap' and the clear need of cities for support in this respect, there is a need to target more complex barriers: 'how' to implement, rather than 'what'.

3.1.2 Institutional, financial and political barriers: how to implement?

Despite the growth of knowledge regarding available measures, transitions towards sustainable mobility have been slow in the context of most urban areas. Why is there an implementation gap? Over the past 20 years, research evidence has again and again demonstrated that the most significant barriers to effective implementation are institutional, financial and political. Indeed, the SUMPs-Up survey found that European cities cited the most significant 'roadblocks' slowing SUMP implementation as:

- Differing priorities between levels of governance (local, regional, national)
- Different priorities across municipal departments
- Lack of data and a weak monitoring culture
- Technological 'tsunami' – the rapid pace of technological innovation poses challenges for cities to keep up with forming and updating relevant policy frameworks and regulations

Table 3.1 below summarises significant pan-European research studies, which have reviewed implementation barriers and recommended actions to address them. All of the studies discuss the following types of barriers affecting local transport decision-making:

- Unconducive institutional frameworks across different levels of government, including governance structures, legal powers and requirements
- Lack of organisational competences, e.g. for enforcement

- Lack of financial resources
- A range of factors grouped together under 'politics', such as public acceptability and resistance, local electoral politics and special interest group lobbying
- Availability of appropriate, mature technologies[5]

Source	Identified implementation barriers	Recommended actions to overcome barriers
Banister (2008) – building on DANTE and other projects	Public acceptability of sustainable mobility policy measures	Promoting acceptability by: 1 Information, targeted communications, selling the benefits of sustainable mobility policies 2 Stakeholder involvement 3 Packaging of push and pull measures 4 Adopting controversial policies in stages, providing practical demonstration of benefits
OPTIC (2011)	- Cultural conditions: lack of public/stakeholder acceptance - Political conditions: unfavourable leadership or political coalitions - Legal and regulatory conditions: necessary legal basis to adopt measure is not in place - Organisational conditions: lack of conducive institutional framework, unclear roles and responsibilities - Knowledge and information: evidence available for policy-making - Fiscal/financial conditions:	- Combining carrots and sticks - Expanding the policy scope and developing flexibility in negotiations - Implementation through temporary trials, as a way of creating legitimacy and acceptance - Communicating benefits clearly - Using good examples - Preparing for windows of opportunity - Organisational responsibility and set-up - Applying national government funding to instigate municipal

[5] Barriers relating to the availability of mature technology is cited as a smaller concern for European cities, although this may have increased in recent years.

	resource availability - Technological conditions: mature technology to deliver desired policy outcomes not available	investments - Selection of established technical solutions
ECMT (2002)	Survey of 160 European cities: - Lack of a national policy framework for sustainable urban travel - Poor policy integration of transport, land-use and environmental policies - Inefficient or counterproductive institutional framework: too little or too much national government involvement, absence of an integrated local planning framework - Public, lobby and press resistance to policies - Unsupportive legal framework, e.g. involvement of private entities in public transport services, vehicle standards - Balancing public transport financing needs: user, public and private sources - Poor data quality and quantity - Wavering political commitment	Recommendations for national government: establishing more conducive institutional, legal and financial frameworks for local policy implementation and innovation
KonSULT (University of Leeds 2016)	Based on survey of European cities in the PROSPECTS project: - City authority lacking legal powers to implement an instrument, most significant for land-use, road-building and pricing measures - Financial barriers - Political acceptability - Practical and technological	Dealing with barriers in the short-term: - Measure packages combining policies that: reinforce each other's benefits; generate revenue with measures involving costly expenditure; provide new services while also restraining car use; compensating losers - Effective participation to mitigate institutional and

	barriers, e.g. enforcement, technology availability, lack of key skills and expertise	political barriers: stakeholders and citizens - Effective approaches to implementation: considering barriers in the design of the implementation approach; sequencing measure implementation through introducing most essential elements first, in a gradual fashion, followed by more costly measures later Dealing with barriers in the longer-term: - Identifying ways to overcome legal, institutional and technological barriers as a key element of long-term strategy - New legislation - New governance structures - Adjustment of financial rules

Table 3.1: Research evidence on barriers to implementing sustainable mobility policies and recommended actions to overcome them.

The SUMPs-Up survey findings are thus broadly in agreement with the existing literature, although SUMPs-Up highlights the very rapid pace of technological change, as we enter the 2020s, as a particular challenge. We can thus summarise the key challenges for implementation as:

- Institutional and organisational
- Financial
- Political
- Technological

3.2 Existing SUMP guidance and gaps addressed by SUMP-PLUS

This section expands on section 2.2.3 regarding the gaps that the SUMP-PLUS Transition Pathways framework seeks to address, and considers to what extent existing SUMP guidance addresses the key implementation barriers discussed in the previous section 3.1.2.

3.2.1 The focus of existing SUMP guidance: strategic plans covering a 5 to 10-year period

The launch of the SUMP Guidelines by the European Commission constitutes a major milestone within the development of EU urban mobility policy, in setting out a concept and a set of principles for a new kind of European transport planning, focused on people rather than traffic engineering. We wholeheartedly subscribe to the eight principles of the SUMP approach.[6]

In the second edition SUMP Guidelines (Rupprecht Consult 2019), a Sustainable Urban Mobility Plan is defined as a 'strategic plan', which the Guidelines recommend should be developed through a 12-step cycle (Figure 3.1 below).

The recommendation is that the SUMP is updated every 5-10 years. Cities are advised to focus on the next 2-3 years in detailed planning of measures, but also to complete a 'rough' planning for the next 10 years and to 'be aware' of long-term measures for which implementation will continue beyond this 10-year period. The recommendation is that the *measures* defined in the SUMP are updated 'at least' every second year.[7] Thus, it appears that the recommendation is to treat the SUMP as a 'living document' that is regularly updated, but guided by a longer-term vision.

In addition to the SUMP Guidelines, the CIVITAS SUMPs-Up project has published a document called *Standards for Developing a SUMP Action Plan* (Matsson and Wennberg 2018), which states that *Phase 3: Elaborating the Plan* (steps 7-9) in the first edition SUMP Guidelines was 'not very developed'. The document thus presents guidance, aimed primarily at cities with very limited experience with sustainable urban mobility planning, on how to develop a SUMP Action Plan, covering a period of less than 5 years. This is defined as a description of the measures and measure packages within the SUMP, including the responsibilities of different actors, impact assessment and identified relations between measures. In addition, the recommendation is to develop an 'Implementation plan' with *detailed* descriptions of measures and tasks to be implemented in the next year. While the

[6] As laid out in Figure 1, p.10 of the second edition SUMP Guidelines (Rupprecht Consult 2019).
[7] See Activity 2.3: Agree timeline and work plan.

SUMP Guidelines have become adopted by cities across Europe, the impact or official status of this SUMP Action Plan concept is still unclear.[8]

Figure 3.1: Cycle of 12 steps to produce a Sustainable Urban Mobility Plan, as per the Second Edition of the SUMP Guidelines. © Rupprecht Consult 2019.

In summary, it appears that the planning framework suggested by existing SUMP guidance is:

- *Strategic plans,* with a vision, objectives, targets and measure packages specified for 5-10 years, including an update of measures every 2 years.[9]
- Potential *SUMP Action Plans* 'nested' under the SUMP, which describe measure packages and implementation process in greater detail, over a 1-5 year period.

[8] This document is not included on the Eltis (Urban Mobility Observatory) website's list of SUMP Topic Guides, for example. https://www.eltis.org/mobility-plans/topic-guides

[9] Activity 5.1 of the SUMP Guidelines, which focuses on development of an urban mobility *vision* to guide SUMP development, states that such a vision "usually has a long-term horizon – that can go even beyond the timeframe of the SUMP, envisioning situations in 20-30 years" (p.88). However, in practice, the planning framework recommended by the Guidelines stretches over a 10-year time horizon.

The SUMP Guidelines have proven popular among European cities – and countries, as reflected in the formulation of National SUMP frameworks in a number of member states (Plevnik et al. 2018). The second edition Guidelines will be particularly helpful to cities in countries without an existing national SUMP framework, and cities that currently mainly undertake traditional traffic engineering and do not have a sustainable mobility vision or strategy in place.

3.2.2 Gaps in existing SUMP guidance

However, the focus of the SUMP approach is primarily on the planning of measures – *what* to implement, in line with a city's vision, objectives and targets. The SUMP Guidelines have less to say about *how* to implement and overcome implementation barriers. The development of SUMPs, as strategic planning documents, is not enough in itself to close the 'implementation gap' with respect to sustainable urban mobility. This is because of the well-known fact, highlighted by the European Conference of Ministers of Transport (ECMT 2002), that having a well-considered strategy in place does not guarantee it will be implemented.

We identify three important gaps in the existing SUMP guidance:

1. **Framework conditions for planning and long-term barriers to implementation**

Adopting a strategic plan like the SUMP does not address the longer-term institutional, financial and political barriers to implementation, discussed in Section 3.1 above. To enable actual transitions towards sustainable urban mobility, we need to consider how all these barriers can be overcome. The SUMP Guidelines largely outline a process for cities to produce a strategic plan *within* the existing *framework conditions* faced by the municipal government, i.e. in line with existing financial resources and organisational capacities. This makes sense when thinking of the next 5-10 years. However, in the longer-term, achieving sustainable urban mobility in Europe by 2050 is likely to require large-scale changes to governance structures, funding and financing, and public acceptability of measures.[10]

In other cases, the SUMP Guidelines presuppose quite a strong degree of pre-existing institutional capacity. For example, planning for sustainable mobility across the entire

[10] Quite a few Topic Guides have been produced on process-related issues, they discuss participation, governance, and funding in relation to SUMP development, rather than with reference to the city's broader context. The CH4LLENGE Manuals on Institutional Cooperation and Participation focus on engagement and coordination between different actors for the purposes of developing a SUMP, but again do not discuss wider institutional or political issues. In the end, there are many other plans and policy/planning processes going on in European cities, beyond the SUMP.

functional urban area is the first key principle of the SUMP approach,[11] yet it is well known that many European municipalities are not part of metropolitan or city-regional governance structures that would allow such planning; in fact, inter-municipal cooperation is often cited as a major challenge. Working towards new governance approaches is thus in many cities likely to be a crucial supporting element for successful transition pathways.

While these long-term barriers may seem high-level, overcoming them is very important for successful transitions, as also identified by KonSULT.[12] Many of these barriers are not within direct local power to change, but require municipalities to work towards change at regional, national or European scales.

2. **Detailed guidance on practical implementation approaches**

There is another gap in relation to addressing practical implementation issues in the shorter term. The SUMP Guidelines provide relatively little advice on implementation processes. Step 10 of the SUMP cycle – 'Manage Implementation' – briefly outlines two activities: 'coordinate implementation actions' and 'procure goods and services'. It does not discuss: (i) how the spatial and temporal dimensions of implementation can be planned, such as the sequencing and phasing adopted to introduce measures, (ii) how measures might be clustered spatially at different scales within the city, nor (iii) detailed guidance regarding how to deal with challenges that might arise during the course of implementation.

The Measure Selection Kit developed within the CH4LLENGE project describes how measure options can be generated and packaged using the KonSULT tool, but without explicit attention to how measures should be implemented in space and time. The SUMP Topic Guide on 'Standards for Developing a SUMP Action Plan' only briefly discusses implementation planning.[13] The SUMPs-Up project Manuals on SUMP Measure Selection have advanced available guidance by also discussing *implementation approache*s, particularly the Manual for Advanced Cities.[14] However, overall, there is a need for further guidance on the actual process of implementing measures, beyond their selection.

3. **EU 2030 and 2050 targets for climate change mitigation**

[11] See second edition SUMP guidelines, p.11.
[12] See 'How can we overcome barriers in the longer term?' within Decision Makers' Guidebook (University of Leeds 2016).
[13] It recommends to set up "... a concrete implementation plan of the exact activities to perform over the coming year" (p.11). More generally it states that (p.12): "Estimate when the measure should be implemented. Without being too concrete, an approximate start and end of the measure should be given. This is useful as well to relate the measure to other measures or to important changes in the city. For example, a new bike path into the city centre should be completed before its promotion."
[14] See SUMPs-Up project website: https://sumps-up.eu/publications-and-reports/.

The SUMP Guidelines do not emphasise climate change mitigation. The Guidelines do mention the potential of integrating SUMP development in harmony with Sustainable Energy and Climate Action Plans defined by some European cities as part of the Covenant of Mayors.[15] However, there is no reference within the SUMP Guidelines to the EU 2030 and 2050 climate targets that are (or will soon be) legally binding vis-à-vis all member states, and thus also necessitating GHG emission reductions from urban areas. Emission reduction is discussed alongside other objectives of sustainable urban mobility planning, in relation to visioning, targets and measure appraisal (steps 5-7 in the SUMP cycle). Of course, mobility planning will always be driven by multiple objectives, including air quality, road safety, accessibility, social inclusion, efficiency, etc.

Yet, there is no sense or mention of the urgency of decarbonisation within the SUMP Guidelines. Reductions in GHG emissions must be delivered *alongside* other objectives. We all know that the 2030 and 2050 climate targets must not be missed; indeed, they have been endorsed by the whole European community. To meet the 2030 target, detailed planning of how sustainable mobility policies will be implemented needs to start in 2021, and meeting the 2050 target requires a long-term strategic approach. Planning with a 20-30 year time horizon also allows benefits of 'thinking outside the box' and beyond immediate 'firefighting' to reimagine mobility in future European cities.

3.2.3 Focus of the SUMP-PLUS Transition Pathways framework

The SUMP-PLUS approach set out in this deliverable seeks to provide complementary guidance to that in the SUMP Guidelines, to support European cities in achieving climate-neutral mobility and liveable cities by 2050. The Transition Pathways framework focuses on the *how* of implementation – both in terms of the 'big picture' and overcoming longer-term barriers, and the 'detailed picture' of how to plan and manage practical implementation in the short- to medium-term. Our proposed conceptual framework includes two different planning approaches, as depicted in Figure 3.2 below:

- the development of a **Transition Pathway** over a 30-year time period leading up to 2050, including a long-term vision, high-level policy mix and strategic timeline
- the development of **Implementation Strategies**, which lay out plans for implementation in greater detail over a 5-10 year time period, drawing on measures already defined in the SUMP or other plans.

[15] There is a special Topic Guide published on this SUMP-SECAP harmonisation exercise.

Figure 3.2: Timeframes of the Transition Pathway and Implementation Strategy approaches, taking a city from current mobility conditions to achievement of the desired future vision.

Figure 3.3 below provides an overview of both concepts and the material in this document, in relation to the SUMP cycle. Chapter 5 presents the conceptual framework for Transition Pathways, but also guidance on a recommended process for European cities to develop a Transition Pathway in practice. This approach is related to Steps 4-8 of the SUMP cycle, where a SUMP or other existing strategy can be taken as a starting point for extending visions, objectives, targets, scenarios and measure planning further into the future. Chapter 6 provides practical guidance on developing an Implementation Strategy, covering a 5 to 10-year time horizon, which can complement a SUMP by laying out implementation processes in more detail. The Implementation Strategy focuses on Steps 7-10 of the SUMP cycle, beginning with refinement and more detailed specification of measure packages, and extending to the operational stage of implementation.

Figure 3.3: Relation of D1.2 contents to the SUMP cycle and complementarity to the second edition SUMP Guidelines.

3.3 Transitions past, present and future: adapting lessons from CREATE

Much of the SUMP-PLUS methodology set out in the original proposal is based on concepts from the CREATE project (Jones et al. 2018).

CREATE studied how transport policies in five Western European capital cities (Berlin, Copenhagen, London, Paris and Vienna) had evolved from the 1960s to 2010s, which it broadly characterised as a three-stage transition - from 'Stage 1' to 'Stage 3'. This transition involved an initial increase and subsequent decline in private car mode share, associated with an accompanying shift in the predominant policy perspective, from Stage 1 (Car-oriented) to Stage 2 (sustainable Mobility-oriented) to Stage 3 (Place and public space-oriented) – see Figure 3.4.

Each 'Stage' comes with its own set of policy priorities and policy measures, as shown in Figure 3.5.

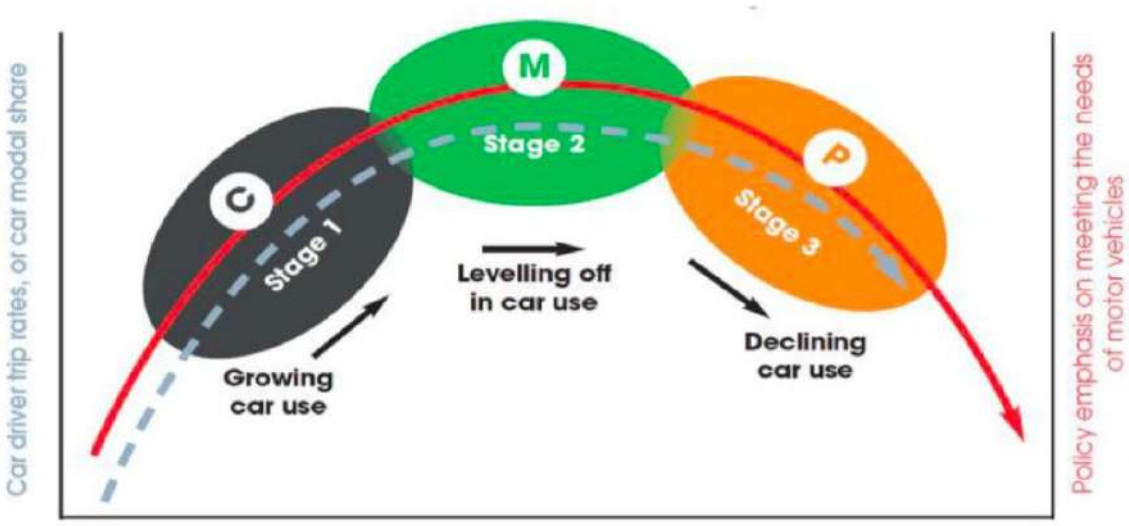


Figure 3.4: The CREATE Stage model as a general characterisation of urban mobility transitions. Source: Jones et al. (2018). Image © CREATE.

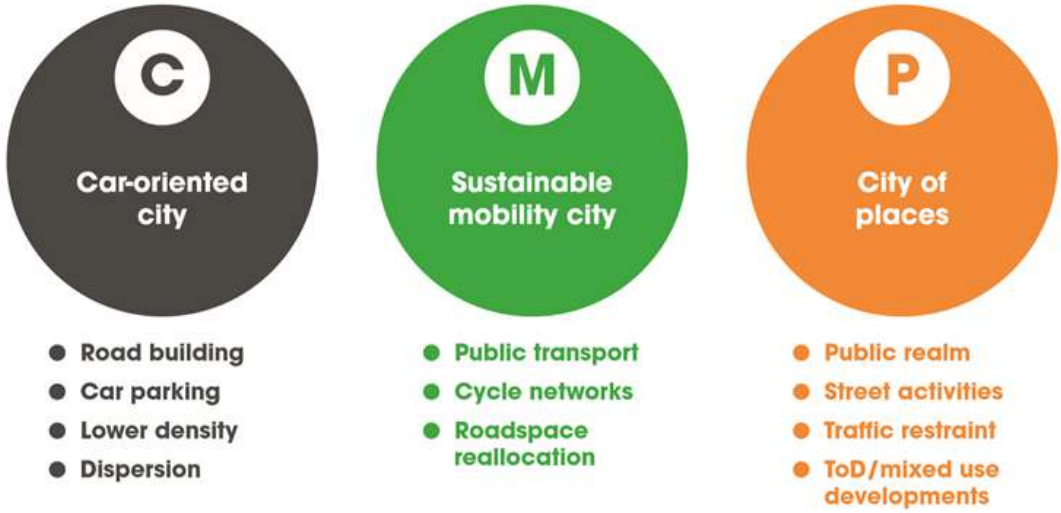


Figure 3.5: Policy perspectives and policy measures associated with each CREATE stage. Source: Jones et al. (2018). Image © CREATE.

CREATE also posited the emergence of a 'Stage 4' (see Figure 3.6 below), which it characterised as being associated with increasing integration, both across the mobility sector – through initiatives such as MaaS (Mobility as a Service) – and across sectors, as is being promoted through the notion of the 'smart city'. The cross-sectoral aspect is explored within the LINKS component of SUMP-PLUS (see D1.4).

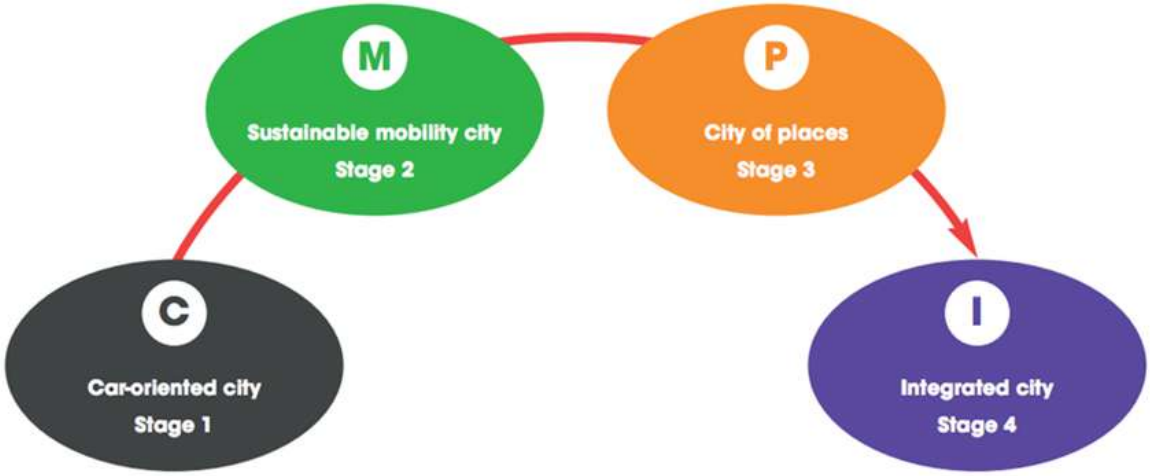


Figure 3.6: A possible CREATE 'Stage 4' focusing on the 'integrated city', drawing on smart city principles. Source: Jones et al. (2018). Image © CREATE.

One of the core findings of CREATE was that many large Western European cities – and larger cities in other parts of the world with established high levels of car ownership – took half a century to transition from a car-enabled to a car-constrained policy framing, and in the process built many highway structures (from elevated motorways to elaborate one-way

systems) that have subsequently been removed, at considerable cost. Today, there is a need to greatly accelerate the transition to sustainable and liveable cities, with the question of how to speed up and short-circuit this process (see Figure 3.7) being a primary focus of SUMP-PLUS.

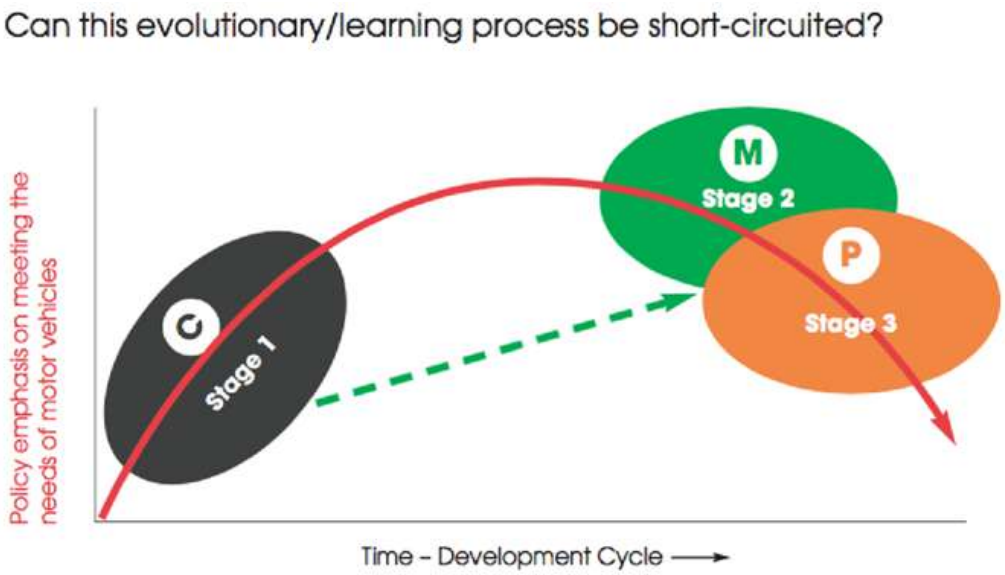


Figure 3.7: Possibility of short-circuiting the policy transition from car-dominated mobility to sustainability and liveability. Source: Jones et al. (2018). Image © CREATE.

The aim of SUMP-PLUS Task 1.2 is to develop a framework for 'Transition Pathways' for general application in European cities, by learning from the transitions in the CREATE cities, but adapting these for a wider range of differing urban contexts across Europe. The foundational assumption of SUMP-PLUS was that Pathways in these cities will be different from the historical ones in the CREATE cities that transitioned to Stage 3, pointing to differences in context relating to:

- **City size.** All 'Stage 3' CREATE cities were capital cities, and so were generally larger in size than the cities involved in the SUMP-PLUS project, and many had different political pressures and governance arrangements by virtue of being capital cities. The CREATE project did not have the opportunity to consider transition processes in smaller or more peripheral cities.
- **Urban conditions beyond Western and Northern Europe.** All Stage 3 cities analysed within CREATE are located in Western and Northern Europe, and transitions were thus shaped by similar historical path-dependencies and macro-scale trends with respect to socio-economic development, the onset of mass motorisation and car-oriented planning, and changes in politics and values that led to an eventual paradigm shift towards sustainable mobility policy. SUMP-PLUS is based on the recognition that these trends will differ significantly in other contexts, e.g. Central and Eastern Europe.

These two points are picked up in section 3.4 below.

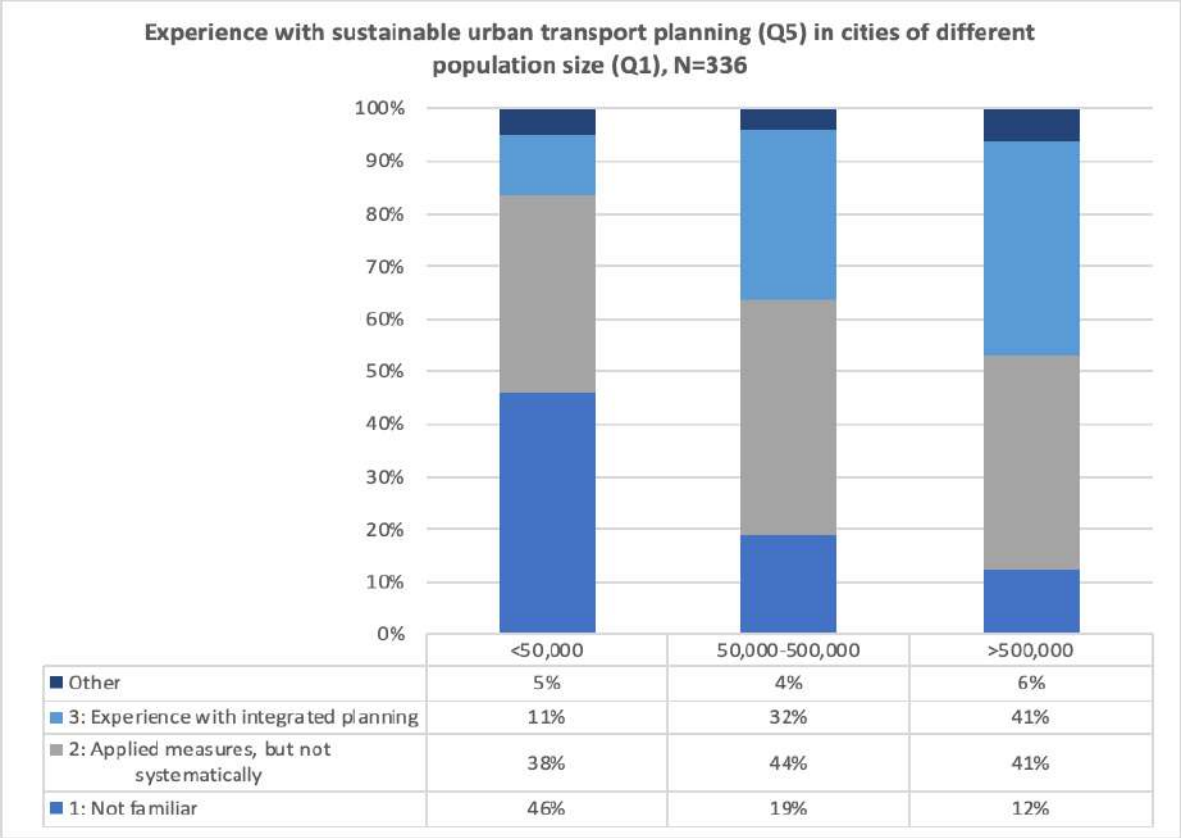
3.4 A context-sensitive approach to Transition Pathways

SUMP-PLUS Task 1.2 emphasis the development of a *context-sensitive* conceptual framework for developing transition pathways in different types of European cities, that allow for successful implementation of sustainable mobility policies in different contexts.

To create an evidence base that Task 1.2 could draw on to develop a context-sensitive approach, SUMP-PLUS Task 1.1 set out to create a novel typology of European cities with respect to sustainable mobility. This was achieved through further analysis of (raw) survey data (N=336) from the SUMPs-Up project, which is reported in detail within D1.1.[16] The key findings of the analysis were:

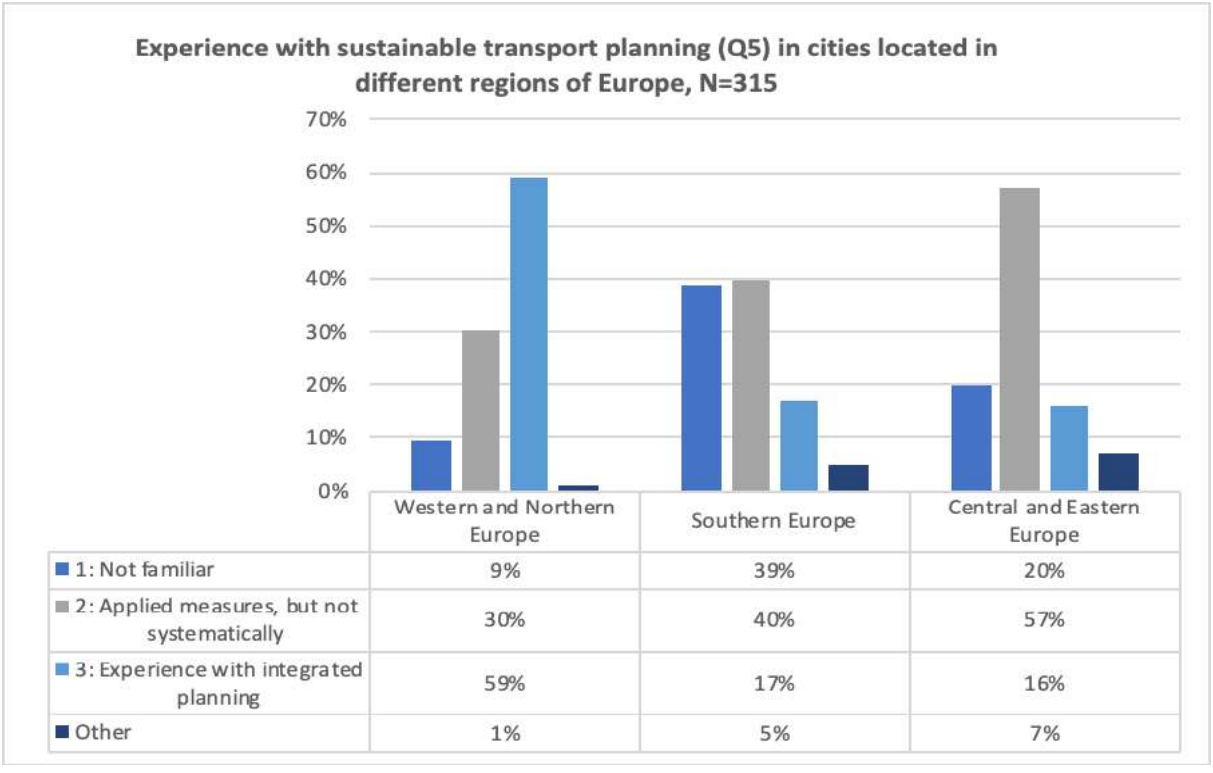
- **City size is confirmed as a significant contextual factor.** The findings confirmed the foundational assumption of SUMP-PLUS that smaller cities have less experience with sustainable urban transport planning and greater challenges with SUMP development, and would thus benefit from a simplified SUMP process and context-specific transition pathways; it identified additional challenges faced by very small municipalities (population <50,000). See Figure 3.8.
- **The geography of Europe matters for sustainable urban mobility transitions.** The findings supported the foundational assumption of the SUMP-PLUS project concerning the different contexts and challenges faced by cities in Central and Eastern Europe, but also highlighted the challenges faced by Southern European urban areas with respect to sustainable transport planning (especially small and mid-sized cities). See Figure 3.9.
- **Larger cities are in a stronger position also in terms of city population trend and spatial centrality.** Very small municipalities (<50,000 population) were more likely to have a shrinking population, whereas large cities (>500,000) were significantly more likely to have a growing population. Almost all large European cities who responded to the survey were the largest cities within their respective commuting zones. However, very small municipalities were not predominately rural, but rather located near larger cities, suggesting they might be part of a suburban belt or larger city-region. In other words, large cities enjoy advantages just beyond their (current) population size. The findings highlight the well-established fact that, within the context of economic agglomeration, large and 'core' cities have strong institutional capacity compared to smaller, spatially peripheral cities – which also affect their ability to conduct and implement sustainable urban mobility planning. The population trend and relative location of a city should thus be considered when developing context-specific transition pathways.

[16] ICLEI and UCL (2018). *City Typology for context-sensitive frameworks and tools development*. SUMP-PLUS project D1.1. ICLEI Europe and University College London. Available online at: https://sump-plus.eu/resource?t=SUMP-PLUS%20City%20Typology.



	<50,000	50,000-500,000	>500,000
Other	5%	4%	6%
3: Experience with integrated planning	11%	32%	41%
2: Applied measures, but not systematically	38%	44%	41%
1: Not familiar	46%	19%	12%

Figure 3.8 Variance in the degree of experience with sustainable urban transport planning among European cities of different population size. Source: SUMP-PLUS D1.1.



	Western and Northern Europe	Southern Europe	Central and Eastern Europe
1: Not familiar	9%	39%	20%
2: Applied measures, but not systematically	30%	40%	57%
3: Experience with integrated planning	59%	17%	16%
Other	1%	5%	7%

Figure 3.9: Variance in the degree of experience with sustainable urban transport planning among cities located in different geographical regions of Europe. Source: SUMP-PLUS D1.1.

Based on these findings, the SUMP-PLUS project team developed a novel European City Typology with respect to sustainable mobility, presented within D1.1, and data was also collected on SUMP-PLUS partner cities in order to classify them in relation to this typology. This is discussed further in section 5.4, where we recommend how the Transition Pathways framework can be adapted for different types of cities across Europe.

4 Evidence base: pathways and successful urban mobility transitions

4.1 Existing definitions of transitions and pathways

Transitions is an increasingly popular term within European policy-making. In common language, a transition refers to 'the process of changing from one state or condition to another' (Oxford English Dictionary). 'Transition' is often used to refer to cases where such a process involves a large-scale and significant shift in society. In relation to sustainable development, transitions have become understood as long-term and large-scale shifts in 'socio-technical systems', from a less to a more environmentally sustainable state (Grin et al. 2010, EEA 2019b). For example, the shift from a fossil-fuel based energy system to a system based on renewable energy, or the shift from a mobility system dominated by the use of private ICE cars[17] to a system with collective mobility and low-emission vehicles. In general terms, here we use 'transitions' to mean a shift in urban mobility systems, from a state that is environmentally unsustainable and prioritises cars in planning, to a state that is environmentally sustainable and prioritises people and sustainable modes in planning.

Different theories have been developed to understand and explain how such socio-technical transitions occur (Geels 2002, 2012), but a discussion of this is beyond the scope of this deliverable. It is sufficient to say that in this deliverable, we define transitions as a process of incremental reconfiguration of urban mobility systems in line with the sustainable mobility paradigm (Geels 2018, Banister 2008).[18]

What is of primary interest in this section is defining the concept of 'pathways'. Different researchers and policy-making processes use the term 'pathways' to mean different things, and define the 'content' of a pathway in different ways. We review existing definitions and concepts below, and conclude by providing our own definition of a 'transition pathway' in section 4.1.6.

17 Internal Combustion Engine powered by fossil fuels, as opposed to hybrid, battery-electric, hydrogen vehicle.

18 The reconfiguration perspective (Geels 2018) reflects recent shifts away from the earlier conceptualisations of socio-technical transitions as more radical regime shifts, from one dominant socio-technological regime to another, e.g. from horse-drawn carriages to the automobile (Geels 2012). The emphasis on mobility transitions at the urban scale reflects the shift from the dominant tradition of studying sustainability transitions with respect to national systems and policy (Coenen et al. 2012, Frantzeskaki et al. 2017, Hodson and Marvin 2010). In line with this, our approach to thinking about urban mobility systems departs significantly from the framing of the multi-level perspective (Geels 2012), in line with other scholars (Schwanen 2015, Naess and Vogel 2015).

4.1.1 Transition pathways

The concept of 'transition pathways' originated with research on sustainability transitions in socio-technical systems, but this takes quite a technology-focused perspective and has primarily been applied at the national level.

The concept of sustainability transitions originates with a distinct field of research, established in the Netherlands from the late 1990s onwards, which can be split into two primary strands: (i) socio-technical systems and (ii) transition management (Grin 2010). Because this school of research focuses explicitly on transitions, existing use of the specific term 'transition pathways' can primarily be found in this literature.

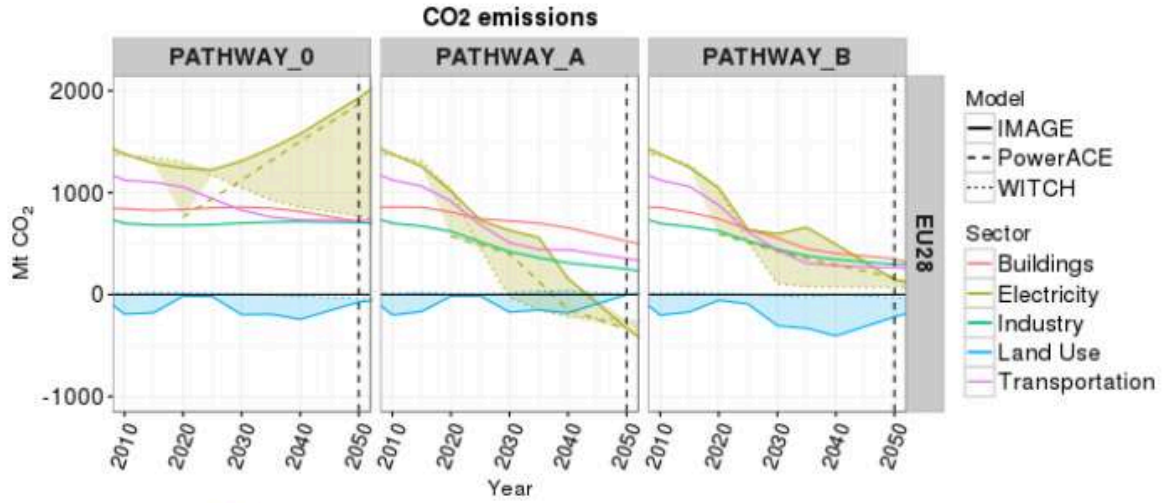
Sustainability transitions are defined as changes to different 'societal sectors of provisioning' (e.g. mobility, energy, agro-food, water, etc.) away from their unsustainable status quo and towards greater environmental sustainability. These sectors are understood as 'socio-technical systems', where society and technology are in interaction, for example the mobility system is defined as "a configuration of elements that include technology, policy, markets, consumer practices, infrastructure, cultural meaning and scientific knowledge" (Geels 2012, p.47), with these elements being linked to different actor groups (firms, policy-makers and politicians, consumers, civil society, etc.).

The most prominent theoretical framework for understanding how sustainability transitions occur is the multi-level perspective, which focuses on the interaction between three levels: the niche level, the regime level, and the landscape level (Geels 2002). The niche level is where innovation with radically novel mobility technologies and practices occurs, the regime level represents the institutions of the dominant regime (in industry, policy, science, etc.) where the status quo of the current unsustainable system is being maintained, and the landscape level as the wider 'external' context such as political and economic trends, societal values and beliefs. In most contexts, the dominant regime in the automobility system is centred around the private car. Niche innovations struggle to 'break through' and transform this dominant regime, because it is 'locked in' through a large number of interrelated institutions (Unruh 2000). In other words, this theory seeks to explain why it is, that despite the existence of so many niche-innovation activities related to sustainable mobility (e.g. through pilot or demonstration projects), we see relative overall stability in mobility systems and dominance of the car (Geels 2012)?

Based on historical case studies, e.g. the shift from mobility systems dominated by horse-drawn carriages to automobiles, researchers have proposed different types of 'transition pathways' characterising how transitions occurred as a result of different sets of interactions between niche, regime and landscape level (Geels and Schot 2007). The EU FP7-funded project PATHWAYS (Transition Pathways to Sustainable Low-Carbon Societies) drew on this research framework to explore transition pathways in the case of mobility and energy

systems in different EU member states, including Germany, the UK, Sweden, and the Netherlands.[19] The project combined analysis of technological and institutional dynamics with quantitative emission scenarios. For example, for the UK, three alternative transition pathways (0, A and B) with different quantitative CO_2 emissions scenarios were developed (Fig. 4.1):

- **Pathway 0** represents business-as-usual and continuation of the current emissions trajectory, with stable automobility (the car dominating UK mobility).
- **Pathway A** represents technological substitution, where some innovative technologies/ practices are adopted (e.g. cleaner-fuelled vehicles) but where automobility largely continues to dominate.
- **Pathway B** represents a 'reconfiguration' pathway, with a shift to a new socio-technical system, including changes not only in technologies but also in culture, institutions and user practices, and with a phasing-out of previously dominant automotive industries.



Source: WP1 PATHWAYS project

Figure 4.1: Three transition pathways developed on the basis of quantitative CO_2 emission scenarios for selected sectors in the UK, including transport. Source: Hodson et al. (2016, p.3), PATHWAYS Deliverable D2.5. Image © PATHWAYS project.

In the PATHWAYS project, transition pathways were defined as "patterns of changes in socio-technical systems unfolding over time that lead to a fundamental reconfiguration of technologies, business models and production systems, as well as the preferences and behaviour of consumers".[20] For example, PATHWAYS analysed how the use of selected mobility technologies would need to evolve in the UK up until 2050, in relation to Pathway A and Pathway B (Hodson et al. 2016).

[19] See https://www.pathways-project.nl/.

[20] See https://www.pathways-project.nl/project-information

It is thus fair to say that this research on transitions has been strongly technology-focused: transition pathways have been defined primarily as related to CO_2 emissions, the uptake of mobility technologies, and change in institutions surrounding these technologies. Sustainability transition dynamics have primarily been analysed in terms of national level trends and policy, rather than at the urban level (Hodson and Marvin 2010). Other scholars have pointed out that sustainability transitions at the urban scale include many other dynamics not captured by this perspective (Coenen et al. 2012, Frantzeskaki et al. 2017), including the spatial dimension of urban mobility as an interaction between transport and land-use (Naess and Vogel 2015); and thus transitions not being primarily a question of innovation with novel technologies or concepts, but a question of supporting existing sustainable modes and reconfiguring the existing built environment (Schwanen 2015).

The second strand of sustainability transitions research, 'Transition Management', is a more applied approach that focuses on the governance of transitions – how actors can come together to steer different systems towards sustainability (Rotmans et al. 2001, Kemp et al. 2011). Practical methodologies have been developed under this approach. The recommended Transition Management cycle involves four steps (Loorbach 2010):

1. The establishment of a 'transition arena', a network where stakeholders come together to define current problems and create a vision for the future;
2. Developing the vision into more concrete 'transition paths' that lead to the image of the future, including the investments and agendas of different actors
3. Undertaking 'transition experiments' – real-life projects that seek to explore the transition paths
4. Evaluation, monitoring and reflection among stakeholders.

This methodology has been applied to foster sustainability transitions across different sectors in European cities, for example within the EU MUSIC and ARTS[21] projects, and is currently being applied in the Horizon 2020 CIVITAS HANDSHAKE project.[22] The MUSIC project featured co-creation of 'transition pathways' with five partner cities in Europe, taking the envisioned future as a starting point and working backwards in time to identify actions and milestones (Nevens et al. 2013, Roorda et al. 2014).

It appears that the roadmaps laying out such pathways in both the MUSIC and ARTS project were primarily qualitative and focused on narratives agreed on by stakeholders, and strategies that might be used to upscale innovations. Furthermore, the Transition Management approach tends to focus on co-creation among a broad range of stakeholders and specific experiments, rather than on the formulation and implementation of municipal government policy. Indeed, the distance between transition management processes and

[21] Accelerating and Rescaling Transitions to Sustainability (ARTS), see http://acceleratingtransitions.eu/.

[22] See https://handshakecycling.eu/transition-management.

formal bureaucracies, policy and planning has been cited as a weakness of the approach (Loorbach et al. 2017). While we summarise several valuable take-aways from Transition Management below, this approach is not the most appropriate for the SUMP-PLUS Transition Pathways framework, as the focus is on producing municipal policy strategies and complementing SUMPs.

Take-aways from sustainability transitions research for the SUMP-PLUS Transition Pathways framework are:

- The role of real-life experimentation is important in allowing for learning: innovators (civil society, users, private sector) testing and tinkering with new mobility concepts 'on the ground'
- Upscaling innovations from experiments to larger-scale change requires dedicated planning and support
- Participatory processes involving a broad set of stakeholders is important in building momentum for change
- Visioning and connecting urban visions to more concrete transition pathways

4.1.2 CREATE policy pathways

In the CREATE project, transitions were defined as shifts in public policy over time, rather than technologies. Policy pathways that have been successful in reducing private car use have involved a complex mix of factors (the 8Ms), which go much beyond the policy measures implemented in a city.

Within the CREATE framework, transitions are defined as shifts between three policy perspectives that are referred to as 'Stages': Stage 1, car-oriented policy; Stage 2 sustainable mobility-oriented policy; Stage 3 as place-oriented policy; as well as a prospective Stage 4 integrating smart city principles (see section 3.3).

While at the general level, the transition between these Stages is understood as evolutionary (succeeding in each other in time), research on the evolution of mobility policy in the CREATE cities found that in practice, there was often a mix of different policy perspectives at a particular point in time (see Figure 4.2). In other words, the transition was not as clean-cut and orderly as the evolutionary model presented in Figure 3.4 would suggest. Figure 4.2 points to a transition in policy perspectives *over time* – a *temporal transition* – but with competing discourses apparent throughout.

The CREATE project also found that, in the Western European cities studied, there was also an important *spatial diffusion* – a distinction in the types of policy measures implemented in

different areas within the city boundaries/across the city territory, that diffuses over time, as shown in Figure 4.3. While city centres were often dominated by place-oriented policies (P) such as the prioritisation of pedestrian space, and inner-city areas by sustainable mobility policies, the outer suburban areas often feature car-dominated planning. Over time, there was often a diffusion of policy perspectives from the central areas outwards, with pockets of 'Stage 3' policies around local town centres in outer suburban areas.

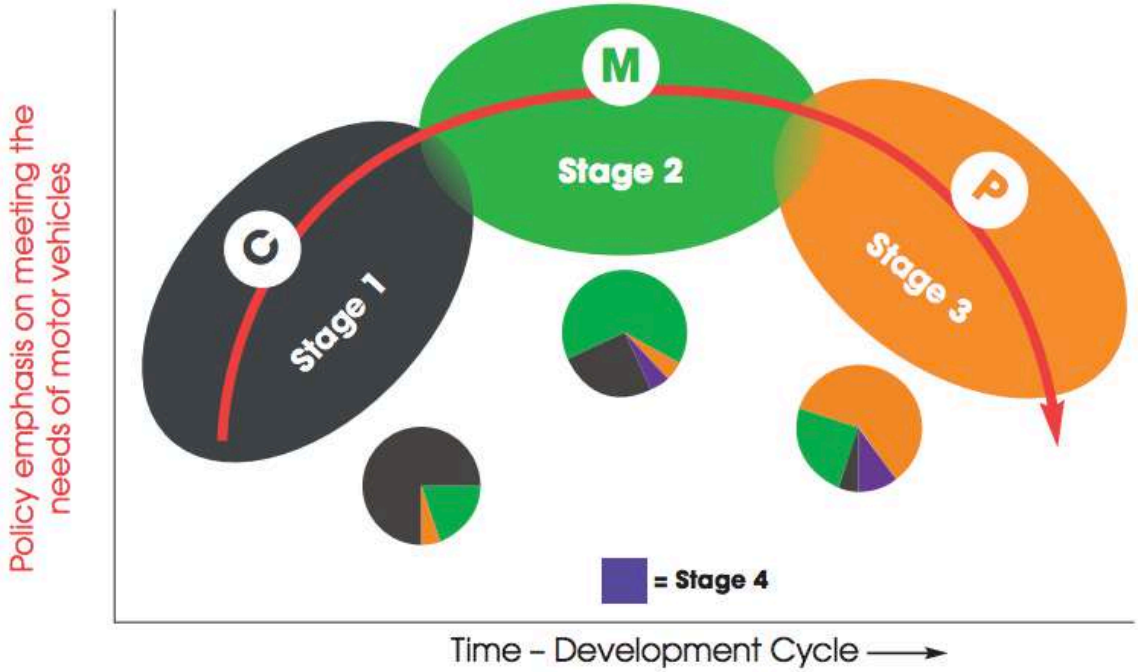


Figure 4.2: Temporal transition in policy perspectives, with the evolutionary model at the general level and the co-existence of policy perspectives at a more granular level. Source: Jones et al. (2018). Image © CREATE.

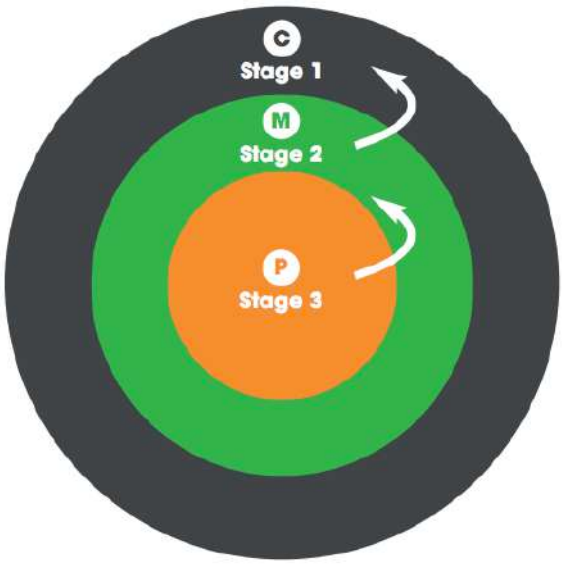


Figure 4.3: Spatial transition in policy perspectives, from the city core to the inner ring and the outer suburban areas. Source: Jones et al. (2018). Image © CREATE.

Finally, CREATE found that in the five cities where a transition to Stage 3 has taken place since the 1960s (Berlin, Copenhagen, London, Paris and Vienna), despite private car use having reduced significantly and converged on roughly the same level over time, the transition was characterised by different 'policy pathways' in each city (CREATE 2018). This is an important take-away from the CREATE project: that alternative pathways to the same end point are possible.

However, there were also some common factors underlying successful policy pathways in the cities, which are summarised as the '8Ms' (Table 4.1). Looking at the factors included, un CREATE a transition pathway is thus understood to include everything from dynamics in public and political opinion and exogenous 'trigger' events, to organisational capacity-building and technical planning tools, funding and financing, specific policy measures as well as governance arrangements.

Mood	Public, political and professional acceptability	**Mechanisms**	Engagement, enforcement, administrative, delivery, cooperation, coordination
Motivation	Internal and external triggers for change	**Measures**	Public transport and cycling investments, reallocation of road space
Mass	Capacity building: deepening and broadening the skills base	**Methods**	Better forecasting and appraisal methods
Momentum	Building on success: pilots and policy windows	**Money**	Funding mechanisms

Table 4.1: Eight success factors for mobility (policy) transitions in CREATE Stage 3 cities. Source: Jones et al. (2018).

Further details on the 8Ms are available in the CREATE Guidelines (2018), which provide guidance for other European cities. While all the factors encapsulated by the 8Ms are very pertinent, further work is needed to order these factors in a more conceptually clear framework, and to convert them into process-based guidance for other cities. The SUMP-PLUS Transition Pathways framework seeks to do exactly this, and although the 8Ms are not explicitly referred to, they are all captured within the framework.

Take-aways from the CREATE project for the SUMP-PLUS Transition Pathways framework are:
▪ Shifts between car-oriented and non-car-oriented policy perspectives are gradual,

with different perspectives overlapping within a city, at different points in time and in different parts or 'rings' of the urban area
- It is possible to reduce private car use through alternative policy pathways
- There are common factors to successful policy pathways (8Ms), which go much beyond the measures implemented in a particular city

4.1.3 Urban mobility roadmaps developed for the EU context

Within projects developing roadmaps for urban mobility within the EU, the focus has been on developing alternative policy pathways for different types of fictional European cities.

The TRANSFORuM approach

The EU TRANSFORuM project has developed a process to explore 'urban transformation pathways', which refer to different approaches of achieving the European Commission's 2011 goal for clean urban mobility: to halve the use of 'conventionally fuelled' (i.e. petrol or diesel) cars in urban transport by 2030, and entirely phase them out in cities by 2050 (Schippl et al. 2016).

The project focused on three alternative policy strategies to achieving this objective:

- Technological substitution of conventionally-fuelled passenger cars
- Reduced use of private passenger cars for transport in cities
- Increased utilisation of low carbon city logistics technologies and practices.

Qualitative roadmaps were then developed[23] for three fictional European cities, formulated to represent a broad variety of city types across Europe, illustrated in Figure 4.4. These are, in essence, brief storylines of three different contexts, with each fictional city equated with a different 'urban transformation pathway' towards the 2030 goal.[24] The three cities differ in terms of their existing characteristics: modal split, transport infrastructure, socio-economic profile, morphology and topography.

The cities are imagined to have chosen a different policy strategy to meet the 2030 goal:

[23] Through four workshops of 10-15 stakeholder representatives, held in different European cities.
[24] The storyline of each city represents a different pathway, i.e. the vision is formulated at the European level and roadmaps for urban policy are developed to meet the 2030 target.

- *Waterberg:* a strategy focused on 'technological substitution', including acceptance of continued high car use, but with ambitious policies for promoting the use of hydrogen, electric and other alternatively fuelled vehicles
- *Viga*: a strategy focused on reduced private car use, through investments in promoting cycling, car-sharing, and public transport accessibility – in addition to low-emission vehicles
- *Valanov*: a less ambitious strategy reflecting a lower degree of existing resources and experience, with a focus on developing and implementing a first SUMP and incremental change to improve public transport services, walking and cycling infrastructure and limited EV charging network.

The roadmaps included milestones for each element of the strategy, with Figure 4.5 depicting the roadmap for *Viga*, as one example.

	Waterberg	Viga	Valanov
Key strategy	Technical substitution: "technophilic" approach	Modal sharing: Reduce use of private cars	'Starter' pathway: Developing enabling conditions to 'catch-up' with frontrunner cities
Characteristics	Approximately 500,000 inhabitants University, local car manufacturer, low urban density, hilly, large lake	Approximately 900,000 inhabitants University, local car manufacturers, fairly high urban density, flat; sprawling	Approximately 250, 000 inhabitants No University, regional cultural centre, ageing population, no car industry, medium density Border city; very hilly
Transport system	Good public transport, tramway, cycling network, EV charging points	Good public transport, metro, cycling network	Poor bus system, no cycle lanes
Modal split (passenger)	65% drive/10% public transport/10% cycle/ 15% walk	45% drive/20% public transport/20% cycle/ 15% walk	53% drive/25% public transport/2% cycle/ 20% walk

Figure 4.4: Characteristics of the three fictional perspectives analysed in the TRANSFORuM project, and the differing mobility strategies pursued. Source: Schippl et al. (2016, p.2609).

(Baseline) 2010	2015	2020	2025	2030
Private car	Stabilise modal share of private cars	Modal share of private cars is below 35%	Modal share of private cars is below 30%	Modal share of private cars is below 25%
Quality of public transport	High quality public transport 500m away from 90% of dwellings	High quality public transport 400m away from 90% of dwellings	High quality public transport 300m away from 90% of dwellings	High quality public transport 250m away from 90% of dwellings
Car-sharing	Car-sharing option less than 500m away from 50% of dwellings	Car-sharing option less than 400m away from 60% of dwellings	Car-sharing option less than 300m away from 75% of dwellings	Car-sharing option less than 300m away from 90% of dwellings
Cycling	Cycling network increased 10% from baseline	Cycling network increased 15% from baseline	Cycling network increased 20% from baseline	Cycling network increased 25% from baseline
Driving	20% of inhabitants under 35 subscribe to car-sharing or have no driver's license	40% of inhabitants under 35 subscribe to car-sharing or have no driver's license	60% of inhabitants under 35 subscribe to car-sharing or have no driver's license	80% of inhabitants under 35 subscribe to car-sharing or have no driver's license
Urban logistics	10% of retail uses CLSC; 5% delivered by 'CO_2-free' vehicle	15% of retail uses CLSC; 10% delivered by 'CO_2-free' vehicle	20% of retail uses CLSC; 15% delivered by 'CO_2-free' vehicle	25% of retail uses CLSC; 20% delivered by 'CO_2-free' vehicle
Public transport fleet	60% of public transport fleet is 'CO_2-free'	75% of public transport fleet is 'CO_2-free'	90% of public transport fleet is 'CO_2-free'	100% of public transport fleet is 'CO_2-free'

Figure 4.5: Milestones adopted as part of Viga's roadmap to clean urban mobility. Source: Schippl et al. (2016, p.2610).

The EU Urban Transport Roadmaps approach

An online tool called 'EU Urban Transport Roadmaps' was launched in 2013, to provide support for European cities in meeting the 2011 White Paper objectives for urban mobility by 2030, and continues to be maintained by DG MOVE.[25] The tool allows local authorities to define their city characteristics and input a mix of policy measures, producing quantitative output indicators for mobility, emissions and economic variables/financial cost, as described in the detailed user guide (Fiorelli et al. 2016). Here, we refer to the report by de Stasio et al. (2016), which provides a discussion of different example roadmaps developed by the project team to illustrate potential use of the tool.[26]

The report outlines three different 'policy scenarios', with a differing emphasis in terms of the types of policy measures pursued:

- *Promote & Regulate:* focusing on behaviour change through push and pull incentives, use of informational and regulation measures, rather than infrastructure
- *Plan & Build:* focusing on integrated transport and land-use planning, and a strong degree of investment in new technology and infrastructure
- *Charge & Provide:* focusing on economic incentives, like road user charging and parking pricing, and improvement of public transport services

Roadmaps for three fictional cities are then described, each one adopting a different policy scenario:

- *Promote & Regulate* in 'Villafantas', a city that is experienced with sustainable urban mobility planning and offers high quality public transport services, but prefers a lower-cost approach to further development of the mobility system.
- *Plan & Build* in 'Predistivice', a city that has grown and sprawled rapidly in the last two decades, while transport investment has been limited, with the municipality suffering from a lack of resources and planning capacity.
- *Charge & Provide* in 'Silverport', a city with very limited experience in transport planning, severe congestion and most commuting done by car.

Figure 4.6 (page after next) illustrates the roadmap described by de Stasio et al. (2016) for the 'Plan and Build' policy scenario. The roadmap descriptions are divided into:

- Measures implemented and their impact (based scale of implementation)[27]

[25] See http://www.urban-transport-roadmaps.eu/

[26] The report uses the term 'pathway' (only once) to refer to the real-life implementation of a roadmap.

[27] With reference to the diagrams in section 5 of the report (de Stasio et al. 2016, pp. 27-42).

  - Initial phase (2015-2020)
  - Short term (2020-2025)
  - Medium term (2025-2030)
  - Long term (2030 and onwards)
- Advice regarding implementation issues regarding specific measures
- The main stakeholders that would need to be involved

Our main take-away from this approach relates to the *phasing* of measures (immediate, short-term, medium-term and long-term), that is judged to be most effective in meeting an ambitious target by a certain year (in this case, 2030). Breaking down the temporal dimension of pathways in this way is helpful. De Stasio et al. (2016) do not explicitly define principles for what measures should be implemented in which phase, such as 'what can be implemented first' and working from there, but from the description of each roadmap, we can draw out the implicit principles that are listed in Table 4.2.

Three stylized roadmaps	Possible speed of implementation	Financial cost	Typical public acceptability
Promote & Regulate	Quick: many things can be implemented without physical intervention	Low cost	Possibility of backlash, e.g. from parking reform
Plan & Build	Slow: Infrastructure is slow to build	Very costly	High, since focuses on provision of 'more choice' rather than limiting choice
Charge & Provide	Medium	Some cost but generates revenues	Charging can be controversial but made more acceptable through hypothecation for PT (classic policy package design example)

Table 4.2: Principles for the phasing of measure implementation derived from EU Urban Transport Roadmaps. Source: author's interpretation of de Stasio et al (2016).

Take-aways from EU urban mobility roadmaps for the SUMP-PLUS Transition Pathways framework are:
▪ TRANSFORuM: an approach to developing context-specific pathways, that has value in acknowledging the diverging contexts and starting points of different cities in Europe, including path-dependencies and existing city characteristics which mean that not all types of pathways are realistic in all cities ▪ EU Urban Transport Roadmaps: time horizons and principles for phasing of measure implementation, as an important temporal dimension of pathways

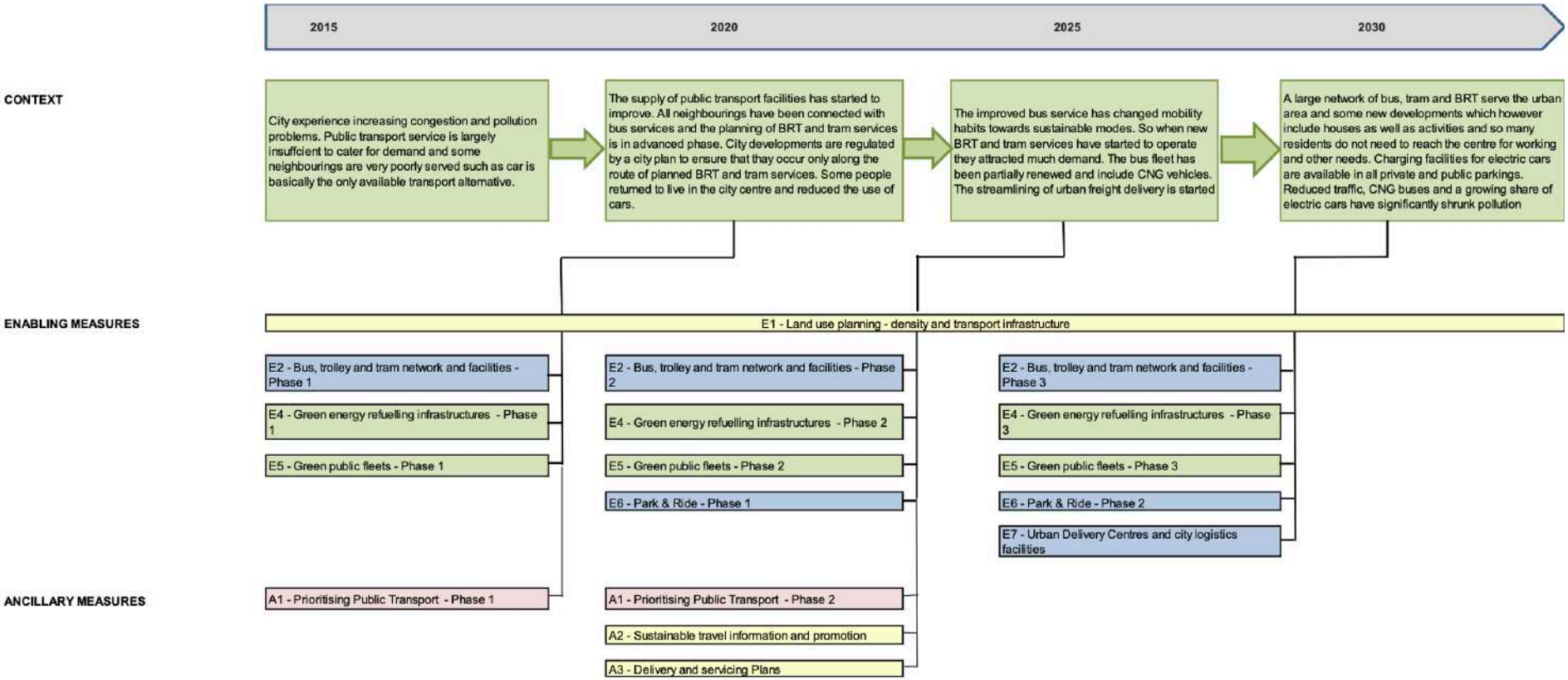


Figure 4.6: Overview of the roadmap described for the 'Plan & Build' policy scenario, within the EU Urban Transport Roadmaps project (de Stasio et al. 2016, p.34). Image © European Commission

4.1.4 Decarbonisation pathways: forecasting and backcasting

In studies focusing on decarbonisation, pathways are typically defined as sets of policy packages that would allow achievement of an emission reduction target by a certain year. Such pathways are developed through forecasting or backcasting methods.

Forecasting approaches

'Pathways' is today a commonly used term with reference to decarbonisation. At a high level, 'emissions pathways' is used to refer to different policy mixes through which reductions in net emissions can be achieved by a target year – e.g. the European Commission's vision for a climate-neutral economy by 2050 (EC 2018). In these high-level exercises, what the pathway thus looks like in practice is a curve on a graph of CO_2 emissions and a list of policies. Such emissions pathways can be developed with sophisticated modelling exercises, either through *forecasting* or *backcasting* methodologies.

Forecasting models analyse potential emission reductions against a baseline of current trends extrapolated into the future, such as a growth in travel demand (e.g. Bristow et al. 2008 for decarbonisation of the UK transport sector). Modelling tends to focus on the balance between electrification of mobility and reductions in private car use (Capros et al. 2014); however, simulation by the European Climate Foundation (CLIMACT 2018) found that action across *all three* types of sustainable mobility policy will be necessary: including *Avoid* (reducing the need to travel), *Shift* (away from private car use to more sustainable modes) and *Improve* (improved vehicle efficiency).[28] This emphasis on all three policy approaches is in line with the sustainable mobility paradigm as defined by Banister (2008).

Backcasting for sustainable mobility

In contrast to forecasting, where past and current trends are forecasted into the future, backcasting is a more normative methodology for developing decarbonisation pathways. Backcasting starts with the city's (or country's) desired vision for the long-term future, and then works backwards from that vision to ask what needs to be done between now and then, in order to achieve it. In this way, a pathway is traced 'backwards' from the future, to the present.

[28] The CTI 2050 Roadmap Tool (CLIMACT 2018) explored the feasibility of the EU reaching net-zero emissions by 2050, with the techno-economic simulation model finding that all pathways required: transport demand to be stabilised to 2018 levels; mode shift away from private car use by 10%; and improvements in vehicle efficiency as the third crucial element.

For example (see Figure 4.7), Banister and Hickman (2013) define sustainable mobility as the desired vision for the future (using environmental output/outcome indicators), in contrast to the business-as-usual scenario (red line), and trace a pathway backwards through time (the green dotted line). Figure 4.8 outlines the process the authors propose for a backcasting approach to developing pathways, including definition of a BAU scenario in Stage 1, scenario development within Stage 2, identification of policy packages in Stage 3 and appraisal of these packages using multi-criteria analysis within Stage 4.

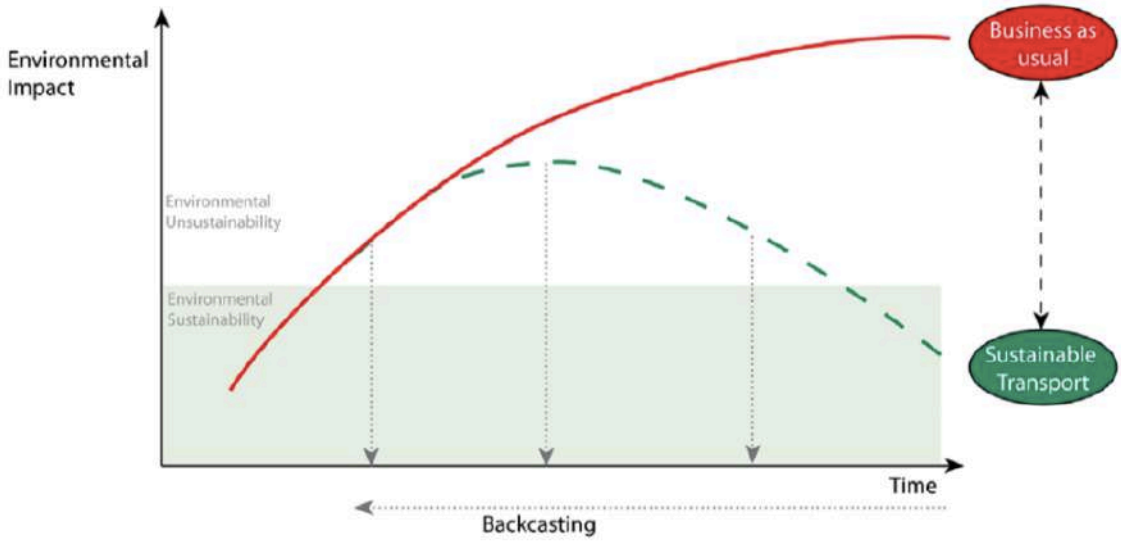


Figure 4.7: Conceptual framework for a backcasting approach to developing pathways to sustainable mobility. Source: Banister and Hickman (2013, p.286).

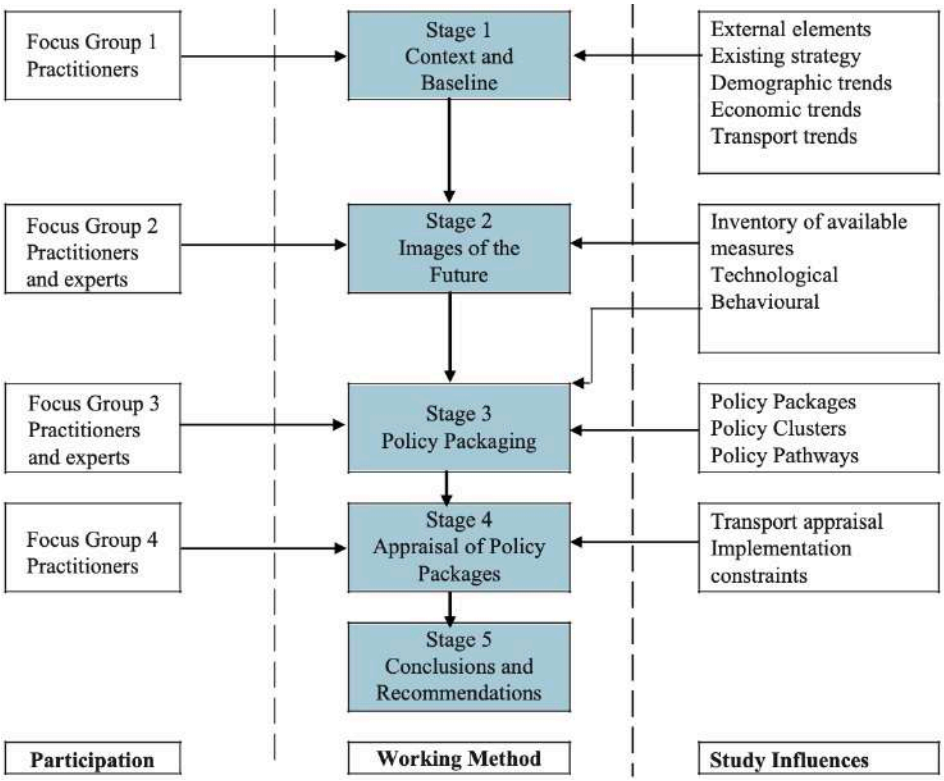


Figure 4.8: Proposed process for a backcasting approach related to sustainable mobility. Source: Banister and Hickman (2013, p.286).

Backcasting methodologies focusing on sustainable mobility were advanced by a number of European projects from the mid-1990s onwards (for an overview, see Miola 2008). Backcasting has been applied to analyse how different policy packages could achieve long-term transport emissions reductions in the Netherlands and Sweden (Geurs and van Wee 2000, Åkerman & Höjer 2006) and to develop EU scenarios for meeting the Commission's 2011 Transport White Paper's emission reduction targets (Höltl et al., 2018). The desired end state/future vision is typically defined as a target level of CO_2 emissions, and then the emission reduction potential of different policy packages is quantified, to identify what combination of packages will reduce emissions in line with this.

Assessment of existing approaches

Quantification through the forecasting and backcasting studies discussed so far is very important in making the challenge and urgency of decarbonisation concrete – including the type of 'radical' policy approaches are required – and linking them to climate and other targets: broadly speaking, *what mix of action needs to be taken and by when.* However, many of these efforts at developing decarbonisation pathways do not include the *institutional* dimension of policy change, and do not include in-depth discussion of *who* should take action, including the roles, responsibilities and capacities of different societal actors (Wangel 2011). Indeed, Banister and Hickman (2013) have pointed to the 'implementation gap' between policy packages identified in backcasting exercises conducted by researchers and the action taken by policy-makers, and the need to inject the process with realism with respect to implementation challenges. Researchers have sought to address this by developing more participatory forms of backcasting that intensively involve stakeholders in discussing policy packages (Tuominen et al. 2015), including at the urban level in London (Hickman et al. 2010, Hickman et al. 2011) and Stockholm (Olsson et al. 2015).

Backcasting for broader urban visions

Backcasting methodology has also been applied in more qualitative ways, to consider a broader range of urban issues. Neuvonen and Arche (2017) discuss a backcasting process conducted as part of *Greater Helsinki Vision 2050*, an international ideas competition launched as a joint project by 14 municipalities in the metropolitan area surrounding Helsinki, Finland. As is illustrated in Figure 5.23, the process was aimed at generating a vision for the city-region up until 2050, with the authors arguing that the exercise served as a strategic learning process between actors, and identified key strategic milestones along the way – for example new governance and spatial structures, and how technology has reshaped society broadly speaking, rather than focusing on detailed specification of policy packages. Participatory backcasting has also been used to develop holistic and long-term visions in other European cities, for example a 2050 vision for Reading in the UK (Dixon et al. 2018).

The UK Government Office for Science provides a valuable practical overview of how to conduct a simple backcasting process (GO-Science 2017). Four aims are defined for a backcasting exercise conducted as a workshop:

- To agree a preferred future (or 'desired vision' as referred to above)
- To identify what needs to change between the present and the preferred future
- To build a timeline that sets out the key changes
- To determine and address the key internal and external factors that might affect the timing or scale of change.

What is particularly important about backcasting as an approach, according to the GO-Science (2017) approach, is that there is a focus on identifying not only what lies within the control of policy-makers – and can thus be directly *implemented* – but also external factors that lie *outside* the control of (urban) policy-makers and thus need to be *managed*.

Summary of take-aways

Considering the legacy of forecasting models as linked to the 'predict & provide' approach to transport planning, we find backcasting a more appropriate methodological basis for the SUMP-PLUS Transition Pathways framework, as discussed further in section 3.2.1. As we have discussed in this section, there are many different approaches to backcasting, and thus we summarise our take-aways in the next section.

However, we can note that there are some limitations to the backcasting approaches reviewed, in terms of their potential to provide practical guidance for developing mobility transition pathways in European cities:

- Despite participatory methods, to our knowledge, few backcasting studies discuss how persistent political and institutional barriers to implementation of policy packages will be overcome, even though issues of financial resources and governance have been shown to be the most important barriers –'how to do it' rather than 'what to do' (as per section 2.1). CREATE was more focused on the latter.
- Existing approaches tend to focus on defining the desired mobility future in terms CO_2 emissions targets, in line with which policy packages are quantified. The focus tends to be on examining the balance between more radical change to current systems and mode shift (e.g. between IMPROVE and SHIFT), and a technological efficiency/substitution scenario where private car use continues to be dominant but is electrified. CREATE, and the broader urban visioning exercises cited above are an exception to this (Neuvonen and Arche 2017, Dixon et al. 2018). The CREATE project found that 'Avoid' policies were important, and that successful cities articulated mobility policies in relation to wider urban policy objectives, including the quality of public life as per City of Places (P) policy visions.

4.2 Integration of approaches: a Pathways concept appropriate for SUMP-PLUS

In the previous section, we have reviewed different approaches to defining and developing transition pathways. We find backcasting an appropriate methodological basis for the SUMP-PLUS Transition Pathways framework, however, with some specific modifications.

We can define a pathway in a general sense as "the link between two end points representing a current state, on the one hand, and a future end state, on the other" (Givoni 2013, p.210), and the shift between states as a transition. The concept of transition pathways as developed in the SUMP-PLUS project, however, argues that a ***pathway should not be understood as a hypothetical scenario consisting only of emissions and policy packages, but as the full set of policies, resources, institutional and political changes that will allow a city to reach the 2050 target.***

While all approaches discussed here agree that connecting visions and targets to more concrete pathways is important, their emphases differ between: quantitative vs. qualitative approaches, and the emphasis placed on policy measures and packages (decarbonisation pathways, EU roadmaps) vs. governance and policy implementation processes (CREATE, Transition Management).

The SUMP-PLUS Transition Pathways framework thus seeks to integrate and balance the different approaches reviewed in this chapter, as further described in Chapter 4:

- **Participatory backcasting** from a broader long-term vision of the desired future city, which goes beyond GHG emission reduction and urban mobility alone.
- **Quantitative backcasting** to identify the mix of core mobility policies, and key milestones for these, that can achieve emissions reductions in line with the EU 2050 climate target and other urban level targets.
- **Qualitative backcasting** to build a strategic timeline that sets out how the institutional, financial and political *framework conditions* for policy-making will need to change in order to achieve the vision, i.e. affecting what lies *outside the control* of policy-makers (GO-Science 2017). This includes specifying the responsibilities of different actors. Capturing aspects across the CREATE 8Ms is important here.
- **Recognition of the context-specificity of pathways**. Although all cities will need to consider policies across *Avoid*, *Shift* and *Improve* approaches in order to achieve sufficient emission reductions, the mix will vary on the basis of local preferences and each city's unique path-dependencies.

In addition to this approach to developing long-term visions and strategies with a timeframe leading up until 2050, cities will need to plan implementation in greater detail over the short- to medium-term. Specifying high-level policy packages and policy actions does not guarantee successful operational delivery of measures. Thus we propose additional

guidance on developing Implementation Strategies in Chapter 5, which picks up other take-aways from this section:

- The need for dedicated strategies for the upscaling of innovations and experiments
- The attention needed to the spatial dimension of transitions, across different areas of the city
- The need for strategies to consider the phasing and/or sequencing of measure implementation

Now that an overarching *concept* for the SUMP-PLUS Transition Pathways framework has been defined, the rest of this chapter reviews some further evidence on contemporary best practice regarding the urban mobility policy/planning *process*, to support development of successful Transition Pathways and Implementation Strategies.

4.3 State-of-the-art perspectives on urban mobility policy-making

Thinking about what constitutes an effective and realistic policy process for achieving urban mobility goals has evolved significantly in the last two decades. In this section, we discuss state-of-the-art perspectives regarding urban mobility policy-making, and identify a set of guiding principles to further inform the SUMP-PLUS Transition Pathways framework.

The four perspectives discussed here are:

- Vision-led planning
- Path-dependencies
- Policy change through small and big steps
- Accelerating implementation on the ground

4.3.1 Vision-led planning

The traditional rational planning model

Planning theory refers to the way that academics have codified different approaches to spatial and transport planning, which has influenced the way that planning is done in practice. Up until the 1960s, modernist planning was heavily dominated by a 'rational-technical' model, where experts made decisions based on a rigid 'objective' process – in relation to transport this is associated with the 'predict and provide' approach. In the 1970s, there was a shift towards a 'collaborative' model of planning, which reflected a greater degree of participation (Healey 2002). Both of these models can be found reflected in the SUMP approach. The Guidelines emphasise the need to involve stakeholders and citizens in

the planning process, using a transparent and participatory approach. However, the SUMP Guidelines also contain strong elements of the rational-technical model, with the planning process depicted as data-led orderly cycle with a series of logical steps – which reflects an engineering mindset.

This falls in line with previous work stemming from European projects, such as the influential KonSULT *Transport Decision-maker's Guidebook* (University of Leeds 2016). The KonSULT Guidebook distinguishes between vision-led, plan-led and consensus-led approaches to urban mobility planning, and recommends a plan-led 'logical' structure of decision-making based on extensive prediction, appraisal and optimization of measure impacts. Vision-led approaches are portrayed as being ephemeral and unreliable, being dependent on an individual leader, and thus too vulnerable to political changes to form an appropriate basis for a planning.

The prominence of vision-led planning today

Across today's European cities, there are many examples of bold visions and radical policy experiments. As the Mayor of Paris, Anne Hidalgo has pushed for the removal of traffic from the city's central areas, starting with car-free Sundays along the Champs Elysées and the permanent closure of the Seine riverbank to traffic, gradually building up to further pedestrianisation such as plans to halve the space for motor traffic on the primary shopping street Rue de Rivoli.[29] Hidalgo has also launched a comprehensive vision for Paris to become a '15-minute city', where all services and activities forming a part of daily life are accessible within a 15 minute walk or cycle. On this visionary platform, Hidalgo was re-elected in June 2020.

Although often attributed to a particular individual leader, vision-led approaches to sustainable mobility transitions go beyond such a narrow base. For example, *Paris en commun,* the name of Hidalgo's mayoral campaign platform, has grown into a broader political movement within Paris and is now also being launched as a national network.[30] This reflects the fact that Mayoral visions are based on the ability to build support across a spectrum of stakeholders, including local citizens, civil society organisations, party political groups, business coalitions and other public institutions.

[29] See https://www.bloomberg.com/news/articles/2017-01-09/mayor-anne-hidalgo-pushes-pedestrian-paris-plans-yet-further.

[30] See https://www.ouest-france.fr/elections/municipales/municipales-le-paris-en-commun-d-hidalgo-devient-une-structure-politique-6884140.

Vision-led planning is also not limited to large, capital cities. For example, the second edition SUMP Guidelines cite strong senior political leadership for SUMPs in Dresden, Groningen and Ljubljana. One example of vision-led planning in a mid-sized city is Leicester in the UK (see Box 4.1 below).

Box 4.1: A car-free city centre in Leicester, UK

Leicester is a city of approximately 330,000 people in the East Midlands area of England. In the post-war period, like in most European cities, the city's medieval centre was transformed by road-building to increase the space for car traffic. Starting from a debate about the availability of pedestrian space in the 1980s, the area around the city's historical clock tower was pedestrianised to form a large new public square in 1999. Peter Soulsby became Leicester's first elected Mayor in 2011, and set about connecting past and new initiatives to form a cohesive, barrier-free city centre for pedestrians and cyclists. This has included demolishing the Belgrave elevated highway flyover that split the city centre in two, reallocation of road space from cars to pedestrians and cyclists along narrow and convivial shopping streets, and the transformation of a car park into a Jubilee Square).[31]

Source: Steve Melia (2017), University of the West of England. For a 7-minute film on Leicester's transformation, see: https://www.youtube.com/watch?v=0in6Er344Dc.

'Predict & Provide' vs. 'Vision & Validate'

The 'Predict & Provide' approach to traditional transport engineering relied on forecasts, used as inputs into models, that typically project continued growth in travel demand and traffic into the future, thus justifying and building on the historical expansion of road infrastructure. Cost-benefit appraisals of major transport infrastructure investments rely on forecasts regarding the use of that infrastructure, in terms of vehicle traffic or public transport passengers, but international comparisons show that they are mostly inaccurate: overestimating benefits and underestimating costs (Flyvbjerg et al. 2003).

Despite the recognition that 'Predict & Provide' is unsustainable, much policy-making continues to rely on data-heavy and technically complex forecasting models. As a profession built around predicting and shaping the future, transport planning continues to have a problem with recognizing the real scale of uncertainty (Lyons and Davidson 2016, Bertolini et al. 2008). There is thus an argument that the transport policy process must also change

[31] See https://www.theguardian.com/cities/2015/nov/26/lessons-from-leicester-the-uks-unlikely-new-poster-city-for-cycling

significantly, in recognition of uncertainty, rather than seeking 'more of the same' in 'new clothes'.

Figure 4.9 contrasts the traditional 'Predict & Provide' approach with 'Vision & Validate': a conceptual approach proposed within the CREATE project to support vision-led planning.

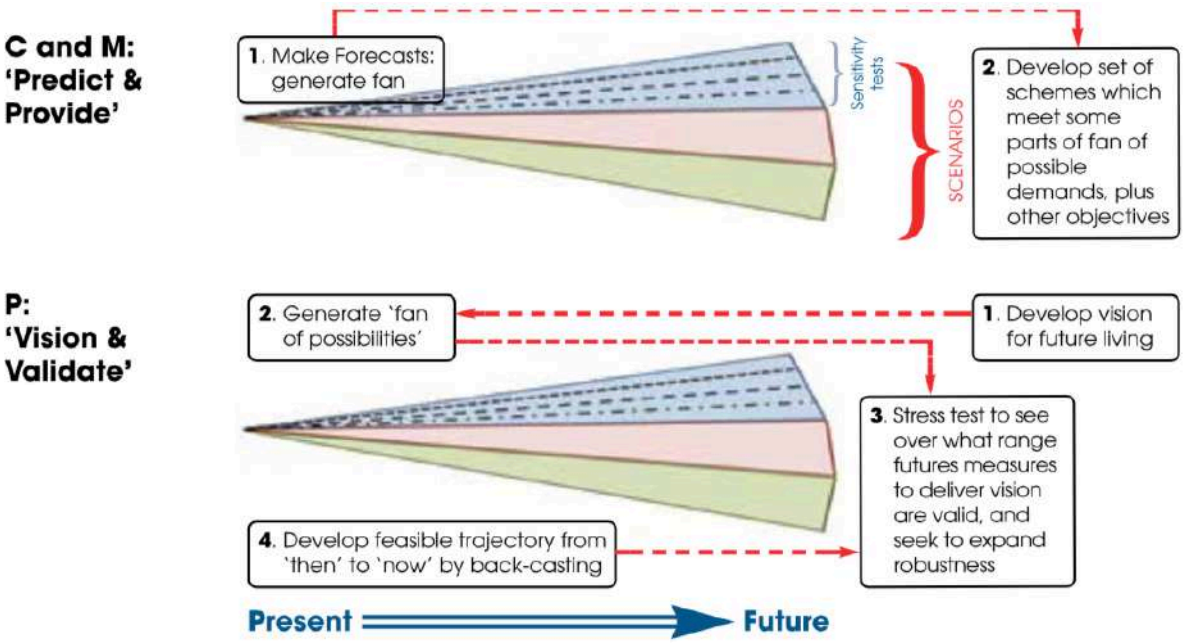


Figure 4.9: Contrasting the traditional 'Predict & Provide' approach reliant on forecasting, with the 'Vision & Validate' approach reliant on backcasting from a desired future. Source: D5.3 CREATE Guidelines (CREATE 2018, p.39). Image © CREATE.

The argument made by the 'Vision & Validate' approach is that the traditional role of forecasting models in transport planning should be 'inverted'. Instead of using forecasting to determine what is required (e.g. how much road capacity is needed in the future), policy-making starts with developing a vision for the desired future of city living, and then uses modelling to identify a robust policy package that will achieve the desired outcomes under different potential future economic and social development scenarios. This uses uncertainty constructively. Under 'Predict & Provide', uncertainty makes it difficult to know what future travel demands will be and hence what to construct. With 'Vision & Validate', scenario analysis is used to stress-test policy packages intended to achieve the city's vision, to validate that they are robust under different future trends.

It is because of the comparison of forecasting and backcasting described here, that the SUMP-PLUS Transition Pathways framework favours a backcasting approach, as discussed in section 3.1. In essence, Vision & Validate is a specific articulation of a backcasting approach, in relation to transport policy-making. The approach differs from both many existing backcasting approaches (e.g. Figure 4.8) and the SUMP cycle, in using scenarios to

stress-test policy packages, rather than analysing scenarios (including a 'Business as Usual' scenario) based on forecasts *prior to* and *to inform* vision development. Vision development is thus designed to be *trend-breaking* and oriented around what the future *should* be like, rather than based on speculation of what the future *will* be like based on trend analysis.

4.3.2 Path-dependencies

Another approach that has been proposed as an alternative to 'Predict and Provide' is *adaptive* (rather than *predictive*) transport policy-making making (Marchau et al. 2012, Walker et al. 2010, Lyons and Davidson 2016). A key aspect of adaptive policy-making is the need to carefully consider what legacies and path-dependencies major policy decisions leave for future policy-makers and citizens. A path-dependency refers to a situation where an investment or other policy decision constrains subsequent decisions or actions; so that a city's current configuration may limit what can be achieved in the future (e.g. through historical land development policies). See Box 4.2 for a practical example.

Box 4.2. Path-dependencies in the evolution of Amsterdam's mobility system

Bertolini (2007) studied the evolution of Amsterdam's mobility system between 1946 and 1999, which illustrates issues of uncertainty and path-dependency in transport policy. Today, Amsterdam is widely considered as a global exemplar of how more sustainable urban mobility systems are possible. In 2016, 48% of home-to-work trips were by bicycle, 16% by public transport and 21% by driving a car (Harms and Kansen 2018). However, Bertolini's analysis points out that the policy-making journey to this outcome was not straight-forward, nor even planned in full.

The current shape of the mobility system and the modal split is the outcome of a very long and complex chain of policy decisions, and thus the final outcomes could not have been predicted along the way. This modal split is enabled by a specific morphology and infrastructure network that has developed over the decades. Key path-dependencies in Amsterdam has included a well-preserved historical city centre, with widespread protest by civil society organisations and the general public in the 1960s halting the expansion of both motorway and railway infrastructure through this area, which has led to a policy position favouring conservation that has not been reversible ever since.

Analysis of any city's mobility situation reveals the unique path-dependencies of decisions taken in that city, with respect to infrastructure, real estate development and land use. This is discussed further in section 4.4, in relation to context-sensitive transition pathways.

Bertolini (2007) has argued that acknowledging the consequences that policy decisions will have in the future can help avoid unintentionally creating path-dependencies, with an important question for transport policy-makers being: “How does a particular transport and land-use policy affect the possibility of future generations in making their own mobility choices?” (p. 2018).

Some policy measures are more easily adaptable and reversible than others. For example, bus routes running over an existing road network can relatively easily be adapted, as circumstances change. Whereas measures like investing in new rail or road infrastructure are typically cited as the least adaptable, because of the large-scale, fixed physical construction and investment required. Further, the former is very flexible in terms of its scale and pattern of operation, while the latter infrastructure is a fixed and very ‘lumpy’ asset, and has to be built in units of numbers of road lanes or rail tracks.

However, in practice this inflexibility can also apply to non-physical policies, such as the decision to make weekend parking free-of-charge across the city, in the hope of boosting the local economy and the number of people shopping. After 20 years of such a policy in place, the degree of ‘political lock-in’ will mean it will be very challenging to reverse the policy decision.

4.3.3 Policy change through small and big steps

The SUMP planning approach is depicted as circle with steps following each other in a logical order. This mirrors the classic concept of the public policy process as ‘cycle’ involving steps of: agenda-setting (identifying problems), policy formulation (objectives and measures), legitimation (political or legislative approval), implementation (organisation and resources), evaluation, and policy maintenance/succession/termination (deciding whether the policy should be continued, modified or discontinued).

The plan-led approach assumes policy-makers make rational decisions based on this logical process and have comprehensive information available regarding a large number of policy alternatives. The idea of the policy cycle is simple to understand and will continue to be used as a practical guide. However, research observing real-life policy implementation in the UK, US and Europe has shown that in practice, these conditions of rational decision-making are very rarely fulfilled.[32]

[32] For an easy-to-read and open/free access overview of the key insights derived from academic research on the complex reality of policy-making, see Cairney (2015). Open access available at: https://paulcairney.files.wordpress.com/2013/11/cairney-2015-teaching-public-administration.pdf.

Research has found that policy-making is influenced by the 'bounded rationality' of its participants and cannot be based on entirely logical criteria and full information or certainty; hence the famous phrase that most policy-making involves 'muddling through' or a series of small, much more incremental steps (Lindblom 1959). This means that the plan-led approach can in fact never be 'optimal', and that policy-making is often more of a process of trial-and-error based on small incremental policy changes.

In reality, the policy process does not take place in an orderly cycle, but rather proceeds through alternating periods of a small and big changes.

Two well-known theoretical models of the policy process, that have been formulated on the basis of studies of real-life policymaking, offer ideas for building political momentum within transition processes.

The first model is the 'punctuated equilibrium' theory of policy-making (Baumgartner and Jones 1993), where an equilibrium phase, characterized by long time periods of relative stability in policy-making and incremental changes, is punctuated and followed by a shorter period of radical policy change (see Figure 4.10). This trend has been observed in relation to many human and natural systems, for example, the evolution of biological species. While most people are interested in understanding periods of rapid change, this model acknowledges the fact that most policy decisions are made during incremental periods where radically new policy solutions may not be considered.

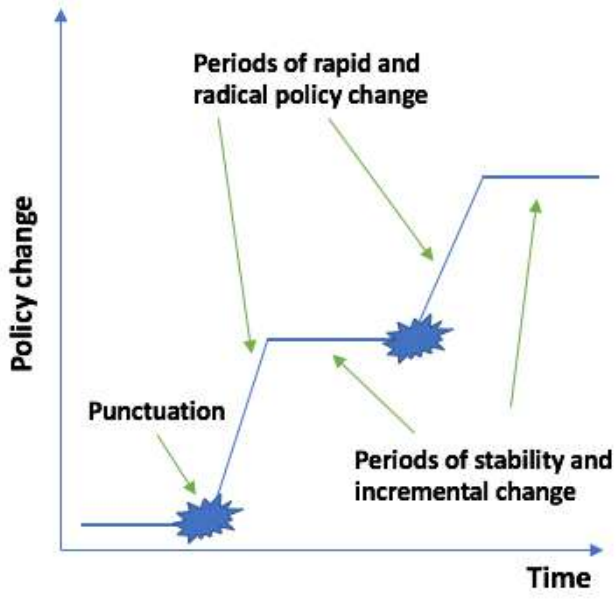


Figure 4.10: Simplified illustration of how policy evolves according to the punctuated equilibrium theory of policy-making (Baumgartner and Jones 1993). Source: illustration by the authors.

The second is the 'Multiple Streams Framework' formulated by Kingdon (1984), as visualised in Figure 4.11. Kingdon pointed out that a focus on the power of an idea, by thinking of 'an idea whose time has come', ignored the *conditions* for policy change have to be in place during a brief 'window of opportunity' *for* an idea to be adopted in policy formulation and implementation.

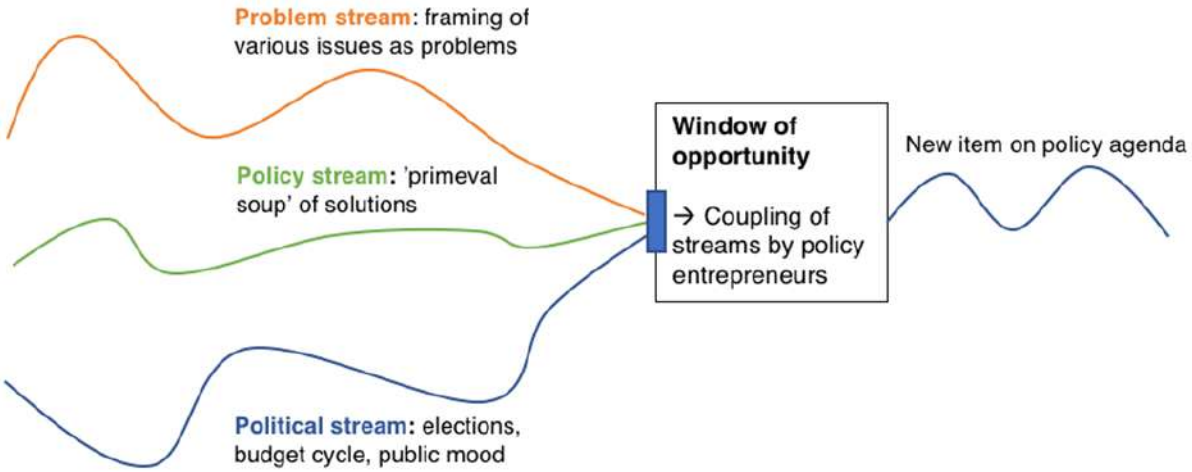


Figure 4.11: Simplified conceptual depiction of the Multiple Streams Framework as a model of policy-making (Kingdon 1984). Source: authors' illustration.

Policy change requires the coupling of three 'streams' during windows of opportunity: (i) the problem stream, (ii) the policy stream and the (iii) politics stream. Policy-making is about generating solutions to a range of public issues perceived as problems – of which mobility issues are only one part. We know that different issues rise and fall on the political agenda and in public attention. Once an issue is on the rise in the problem stream, there is a need to act quickly – but to act, there has to be an available policy solution to the problem, that is perceived as being viable, ready and waiting within the policy stream. The third dynamic is when change in the politics stream also causes existing or new decision-makers to be motivated to address the problem and turn the solution into policy.

'Coupling' the three streams creates a 'window of opportunity', where new policies emerge on the agenda. Creating these windows requires active work by 'policy entrepreneurs', who strategically link up the three streams.

The Multiple Streams model has been used to analyse sustainable mobility policy development in Curitiba (Khayesi and Amekudzi 2011) and transport biofuels in Europe (Palmer 2014). The CH4LLENGE project's 'SUMP Manual for Institutional Cooperation' translates Kingdon's model into a specific matrix for analysing the required mix of competences in institutional partnerships for implementing SUMPs.

The SUMP-PLUS Transition Pathways approach draws on the basic concepts highlighted above in a different way, as presented in Chapter 4. This draws partly on the findings of the CREATE project regarding the role of external and internal 'triggers' in creating windows of opportunity, described in the case study below (Box 4.3).

Box 4.3: Dynamics of policy change in CREATE Stage 3 cities

The study of CREATE Stage 3 cities revealed that policy changed both through:

- *Large steps,* where more radical policies diverging from the dominant policy paradigm at the time were introduced. For example, the introduction of the congestion charging zone in London.
- *Small steps*, with gradual upscaling of policies through a series of incremental policy changes. For example, the spread of controlled parking zones.

The CREATE findings thus support the fundamental concept of alternating periods of radical and incremental policy change. CREATE looked specifically at the 'internal' and 'external' trigger factors that stimulated more radical policy shifts, e.g. the 1970s oil crisis (see section 6.4.3 and Figure 6.24 for further discussion). In relation to the Multiple Streams Model, we can interpret these triggers as events leveraged by policy entrepreneurs to create 'windows of opportunity' for pushing a new item up the urban policy agenda.

Electoral cycles may strongly influence the policy process

Newly elected city administrations will often retain certain policies from the previous administration and continue to advance major projects, such as key infrastructure schemes. However, to some extent, the policy process can also be 'restarted' or be taken back to 'square one' by a new administration. Each administration will want to formulate some of its own visions and policies – which does not mean a SUMP is discarded, but its measure package may well be modified or reprioritised. This means that the job of an urban mobility professional is often more that of a 'strategic policy entrepreneur' creating convincing arguments for the new administration to adopt certain policies, rather than a technocratic planner.

4.3.4 Accelerating implementation 'on the ground' through small-scale interventions

A major trend within urban mobility policy-making in recent years has been the emphasis – and inspiring real-life examples from cities – of accelerated

implementation of sustainable mobility measures 'on the ground' – typically by rapidly redesigning urban streets.

Streets make up the majority of urban space, yet realizing visions for the transformation of street space to provide for better active mobility and public life often gets caught up in delays. This may be due to issues such as the need to draw up and sign off on technical designs from a road safety and highway engineering perspective, the bureaucratic process of inter-departmental coordination with respect to designs (e.g. impacts on underground water and energy infrastructure), or simply having insufficient financial resources.

In recent years, a growing number of cities around the world have adopted a strategy of undertaking **temporary interventions to transform street space**, as exemplified by the 'pop-up' bike lanes implemented within a few weeks during the COVID pandemic. Linked to the reversible nature of the intervention, this involves use of low-cost temporary materials (e.g. traffic cones, road markings, in-house moveable objects like planters), typically involving less extensive public consultation compared to proposed permanent designs.

This type of strategy is sometimes referred to as 'tactical urbanism' following Lydon and Garcia (2015), and can be used for a range of purposes, including:

- Street space reallocation, walking and cycling infrastructure
- Place-making or transformation of public spaces, e.g. Transport for London (2017) has launched a Toolkit to support resident and community groups in undertaking public space transformations to deliver the London Mayor's Healthy Streets approach.
- Supporting public transport or 'tactical transit' (Garcia and Wall 2019), for example bus lanes segregated using temporary materials (e.g. bollards) and temporary bus boarding platforms (see Figure 4.12) put in place to improve bus speeds and ease of boarding, while waiting for permanent extensions of concrete kerbs.

Figure 4.12: Temporary bus boarding platform in Pittsburgh, US. Image © Zicla.

The aims of temporary, small-scale interventions vary, including:

- 'Placeholder' interventions, where temporary materials are put in place
- Testing or 'experimenting' with designs or novel types of measures (e.g. through a time-defined trial or a pilot project)
- Demonstrating the benefits of a measure, to increase public acceptability

In all cases, they can be implemented more quickly, with less risk (of 'sunk' investment) and more cheaply, than interventions where extensive time is spent on preparatory studies (e.g. appraisal) and technical design – and **can help to build public and political momentum for change,** as demonstrated by many cities in the US and Europe.

Related to these types of interventions is the more general idea of **'quick wins' in policy implementation.** 'Quick wins' is sometimes used to refer to politicians seeking to score 'easy victories', but if understood as a series of moderate and small improvements, they can accumulate to larger-scale change (Temeer and Dewulf 2019). This is linked to the idea of incrementalism discussed in the previous section – periods of incremental policy change can be very productive, if many 'quick wins' are implemented and accumulate over time. Quick wins are not limited to pilots and experiments – at its essence, they follow the principle of taking action in small steps, rather than being paralysed by the complexity of mobility problems and delaying policy action until impacts have been established with complete certainty as a result of technical analysis and prediction.

Quick wins meet the desire of people in the city to see concrete, positive change take place – building public acceptability which translates into political will for change.

However, despite the potential power of quick wins, it is also important to be aware of the limitations of a 'tactical' implementation approach:

- The appropriateness of this approach is context-specific. Some cities may benefit from more structural changes to mobility governance and policy-making. Carefully consideration of the transferability of interventions across contexts, and adapting them to suit the local context – rather direct replication of interventions that may be currently receiving a lot publicity in other cities – is crucial.
- It is important to consider the sustainability of this approach in the long term. For example, is the quality and aesthetics of materials and the design high enough to convince more skeptical population groups within the city? How will resources be found to maintain temporary materials, and/or ensure that temporary designs can at some point be converted into permanent, higher-quality designs?
- Although temporary trials and pilots can generate 'demonstration effects' building public acceptability of sustainable mobility measures by allowing the public to experience change with their own eyes, the wisdom of using them as a long-term

method for circumventing the thorny issue of public engagement *prior* to implementation also needs careful consideration. The rapid introduction of COVID-related measures (e.g. Low Traffic Neighbourhoods) is already causing a backlash from motorists in many urban areas of the UK.

4.3.5 Guiding principles for the Transition Pathways framework

Based on the three perspectives discussed in this section, we can distill four guiding principles for urban mobility policy-making:

1. Adopt a **vision-led planning** approach, supported by backcasting
2. Recognize existing **path-dependencies**, be cautious of creating new ones, and seek to maximise the extent to which policies are adaptable
3. Pursue **policy innovation** using small incremental steps, while leveraging 'triggers' and creating **'windows of opportunity'** to pursue more radical policy change.
4. **Accelerating implementation** on the ground through **small-scale interventions and 'quick wins'** builds **political momentum**

5 Transition Pathways

5.1 Benefits of the approach for cities

As discussed in section 3.2.3, the SUMP-PLUS Transition Pathways framework focuses on supporting cities in developing long-term strategies for a 20 to 30-year time horizon, in order to achieve carbon-neutral mobility by 2050, and allow mobility policies to support urban well-being and equity objectives. The Pathway is complemented by a mid-term strategic plan (e.g. SUMP) and 5-10 year Implementation Strategies.

5.1.1 What are the benefits of thinking long-term?

What are the practical benefits of developing a Transition Pathway focusing on, say, 2050? Why should a city undertake a strategic visioning and planning exercise extending two to three decades into the future?

Historically, urban and transport planning was focused on imagining what cities and society should or would look like in the longer-term future, for example, as a result of rising car ownership and opportunities offered by the automobile (Figure 5.1). Today, planning is predominately focused on the short- to medium-term (e.g. 5-15 years ahead), and is in many cases dominated by political cycles and dealing with immediate problems.

Figure 5.1: A car-based vision for the future of Oxford Street in London, from Buchanan's (1961) Traffic in Towns.

In this deliverable, we argue that there are many benefits in having a long-term strategy:

1. **Allowing more 'out of the box' thinking and ambition in policy-making, when the focus is shifted from immediate problems and the current policy context**

   For example, the Greater Manchester city-region has developed a Transport Strategy for 2040, because the framework conditions for planning changed: "the opportunities offered by devolution [decentralization of powers] and greater local determination of policies, funding and delivery allow us to take a much bolder and longer-term view of our transport needs" (p.1).[33]

2. **Having a strategy in place for ensuring the EU 2030 and 2050 climate targets are met, through the contribution of emission reductions from urban mobility**

   Because of new international, national and EU targets, many cities are now developing climate strategies focused on 2040 or 2050. A city's Transition Pathway includes a strategic timeline with intermediate targets and milestones, against which progress towards these targets can be assessed. For example, the Australian city of Canberra has developed a Transition Pathway strategy that serves as a zero-emission transition plan for transport 2040, including a timeline and action plan.[34]

3. **Integration of the possible long-term impacts of emerging technology**

   Many new services and technologies are currently emerging in relation to urban mobility, in addition to cross-cutting technological trends such as digitalization, automation and the Internet of Things. However, the past decade has shown that the adoption has been very fast in the case of some services/technologies, and quite slow in other cases – for example, teleworking has taken a long time to grow in scale. A long-term Transition Pathway allows integration of services and technologies that are beginning to emerge today, but will realistically have had time to develop and became an integrated part of daily urban mobility 20-30 years from now – thus allowing for a vision of 'Stage 4' mobility policy (Figure 3.6).

[33] See https://tfgm.com/2040.

[34] See https://www.transport.act.gov.au/about-us/planning-for-the-future/zero-emission-transition-plan-for-transport.

5.1.2 Integration with other strategies

The long-term focus of the Transition Pathways framework is intended to fill identified gaps in existing guidance: rather than seeking to duplicate existing planning approaches, the framework seeks to complement these. All European countries have their own national planning frameworks, which require local governments to develop various types of strategic planning documents. These might include longer-term urban development strategies, master plans and spatial strategies, climate strategies, SUMPs or equivalent mobility plans, etc.

Figure 5.2 depicts the typical timeframe of different types of strategies, and indicates how the SUMP-PLUS concepts proposed in this deliverable [highlighted in blue] fit into this picture. The integration of these concepts with the other strategies shown in this figure is envisioned as follows:

- The (Urban Mobility) Transition Pathway can draw on an existing long-term urban vision or development strategy, and can articulate the mobility-specific elements of this[35]
- Implementation Strategies translate the Transition Pathway into documents focused on the next 5-10 years and detailed planning of measure implementation, with measures derived from SUMP or equivalent plan.

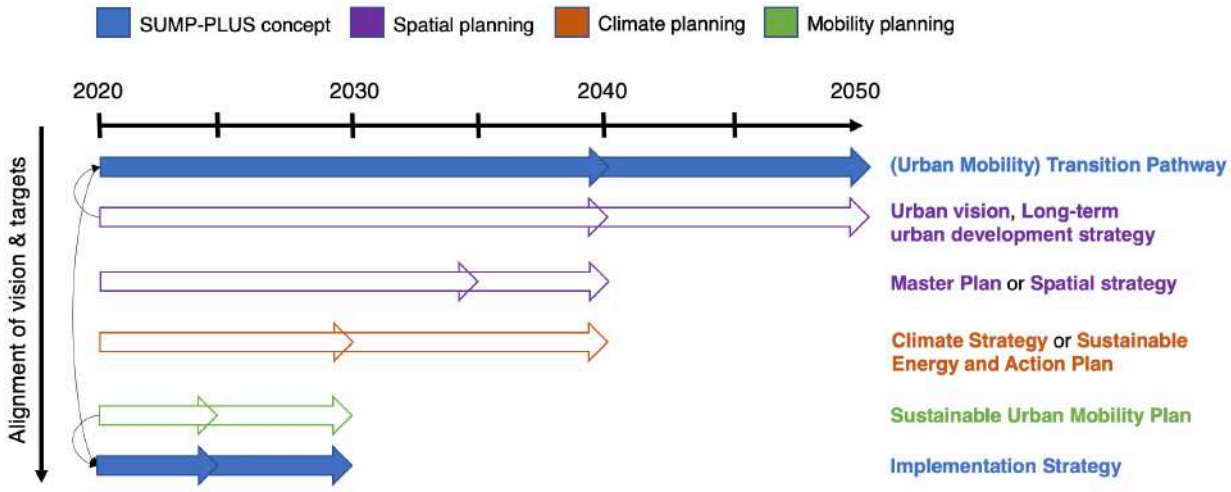


Figure 5.2: Typical timeframes of different types of urban policy strategies, and how the SUMP-PLUS Transition Pathway and Implementation Strategy concepts compare to these.

[35] Step 2 (Activity 2.2) of the SUMP cycle indeed also mentions that SUMPs should strive for integration: "Some cities and regions have a long-term local development strategy or vision with a perspective of 20-30 years. If such a strategy is available it can provide orientation for the SUMP for defining overarching aims" (Rupprecht Consult 2019, p.57).

5.2 Conceptual framework

The conceptual framework for developing a Transition Pathway towards achieving a city's long-term vision is depicted in Figure 5.3 (next page). The framework draws on the range of evidence discussed in Chapter 4.

The continuation of trends characterising the city's **current mobility conditions** into the future would lead to an unsustainable mobility system that fails to achieve the required objectives and targets. To set out an alternative framework that supports a mobility transition, a Vision & Validate approach is followed (see section 4.2.1).

The elements shown in Figure 5.3 can be summarised as follows:

- Developing a pathway begins with **defining a vision** of the desired future city and mobility, as well as associated **objectives and targets.**
- Through a **backcasting** approach, a pathway is traced backwards from this vision to the present: this is the dotted green curve depicted in Figure 5.3. The question asked for defining the pathway is: *What do we need to do, and by when, to achieve our vision by 2050 (or equivalent target year)?*
- The first part of the answer includes identification of a high-level **mix of policies ('policy mix'**) that can achieve the desired vision, objectives and targets.
- The performance (or 'robustness') of the policy mix in achieving the outcomes is validated by **stress-testing** the mix through analysis of **alternative future scenarios**, which capture external trends influencing the drivers of demand of urban mobility.
- The second part of the answer includes **identifying the enabling actions that are necessary to implementing the policy mix**, including building **institutional capacity** (governance, autonomy) and securing sufficient **financial resources.**
- Bringing together the necessary policy mix, capacity and resources will allow **a real-life Transition Pathway, represented by the yellow curve in Figure 5.3,** to unfold over time and allow realisation of the vision, ending with the aspiration of 100% achievement of objectives and targets (y-axis).

The final element of the framework is depicted on the right as **'Zooming in on the pathway'** and the reality of policy implementation. Following the third guiding principle of 'small and big steps' summarised in section 4.2.4, this recognises that **the pathway is not 'smooth',** but instead lurching between incrementalism and radical change, generated by triggers and enabled by windows of policy and funding opportunity. As mentioned, in the short- to medium-term, the Transition Pathway is translated into **a series of sequential Implementation Strategies**, which seek to incorporate this reality of policy-making, described in Chapter 6.

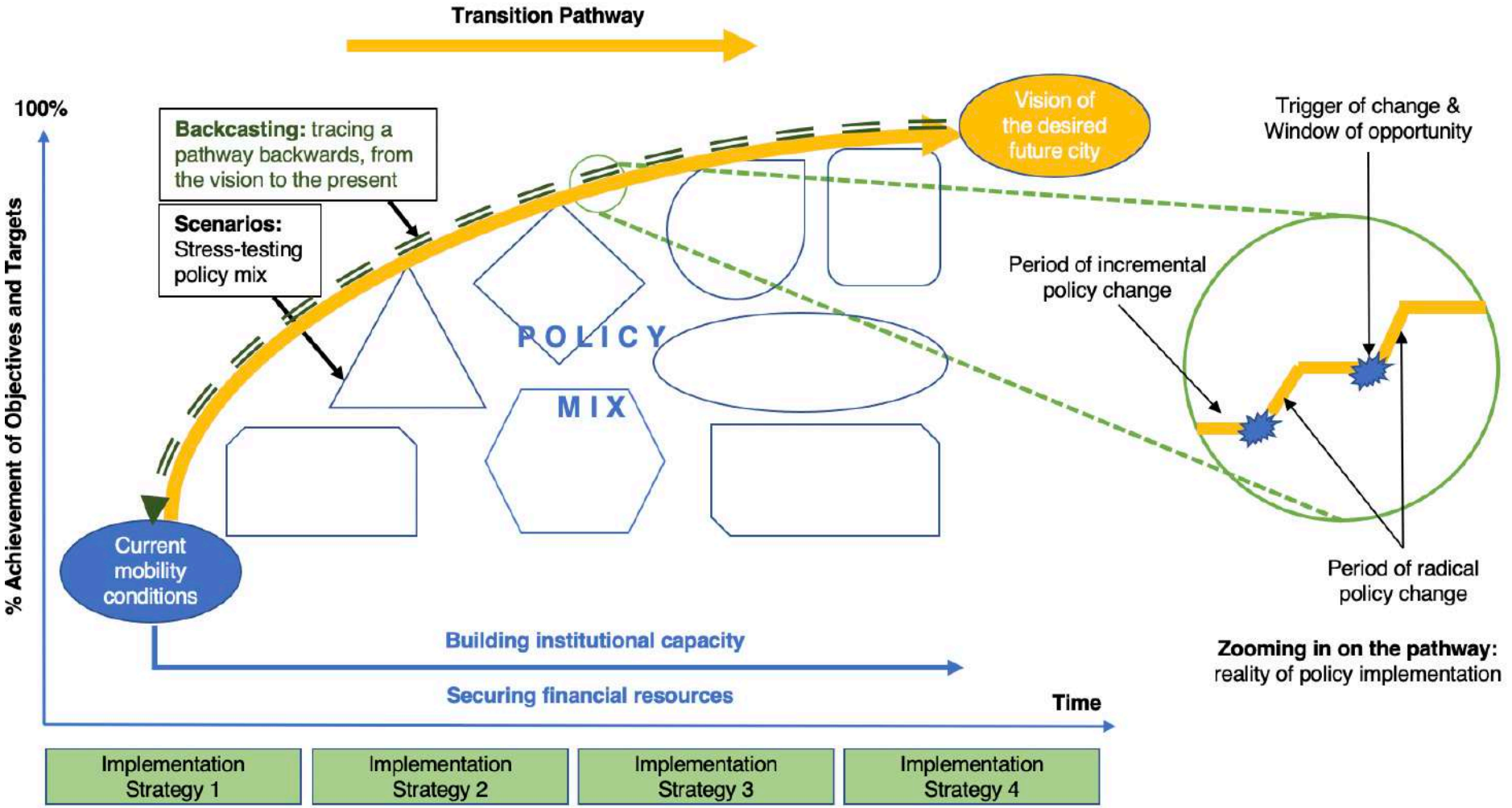


Figure 5.3: Conceptual framework for the development of Transition Pathways (depicting also linked Implementation Strategies).

Backcasting to create an accelerated, purposive transition

The CREATE Stage model (Figure 3.4) identified an evolutionary cycle in relation to the development of mobility policy in Western European cities over time, with a transition occurring from Stage 1 (car-oriented planning) to Stage 2 (sustainable mobility-oriented) and 3 (place-oriented). A foundational question discussed in section 3.3 of this deliverable, is to what extent this evolutionary cycle could be 'short-circuited' (Figure 3.5). In other words, can the Stage 1 cities of today – including those outside Western Europe – possibly transition to Stage 2 or 3 more rapidly than the CREATE cities did, by 'jumping forward'?

Figure 5.4 below contrasts this idea (top diagram in the Figure) with the SUMP-PLUS concept of backcasting to create a Transition Pathway (bottom diagram in the Figure).

The transition of CREATE cities occurred as a result of common processes (8Ms), but were not foreseen or 'planned' by the city authorities as such, but reflect broader shifts in society from the 1960s to 2000s and an 'organic' evolution of the pathway, to some extent.

The bottom diagram in Figure 5.4 illustrates the ambition of the SUMP-PLUS approach: 'tracing backwards' from an integrated vision of the future (incorporating Stage 2, 3 and 4 policy perspectives – see Figure 3.6) to the current conditions to allow a city to define a Transition Pathway, and thus create a more a more *purposive* (or 'controlled') and accelerated transition over 20-30 years.

In essence, Stage 1 cities need to employ 'out of the box' thinking, to seek to avoid simply replicating the same policy evolution as the CREATE Western European cities followed. This is also relevant to the development of context-specific Transition Pathways in Southern and Central and Eastern European cities, as discussed in section 5.4.3.

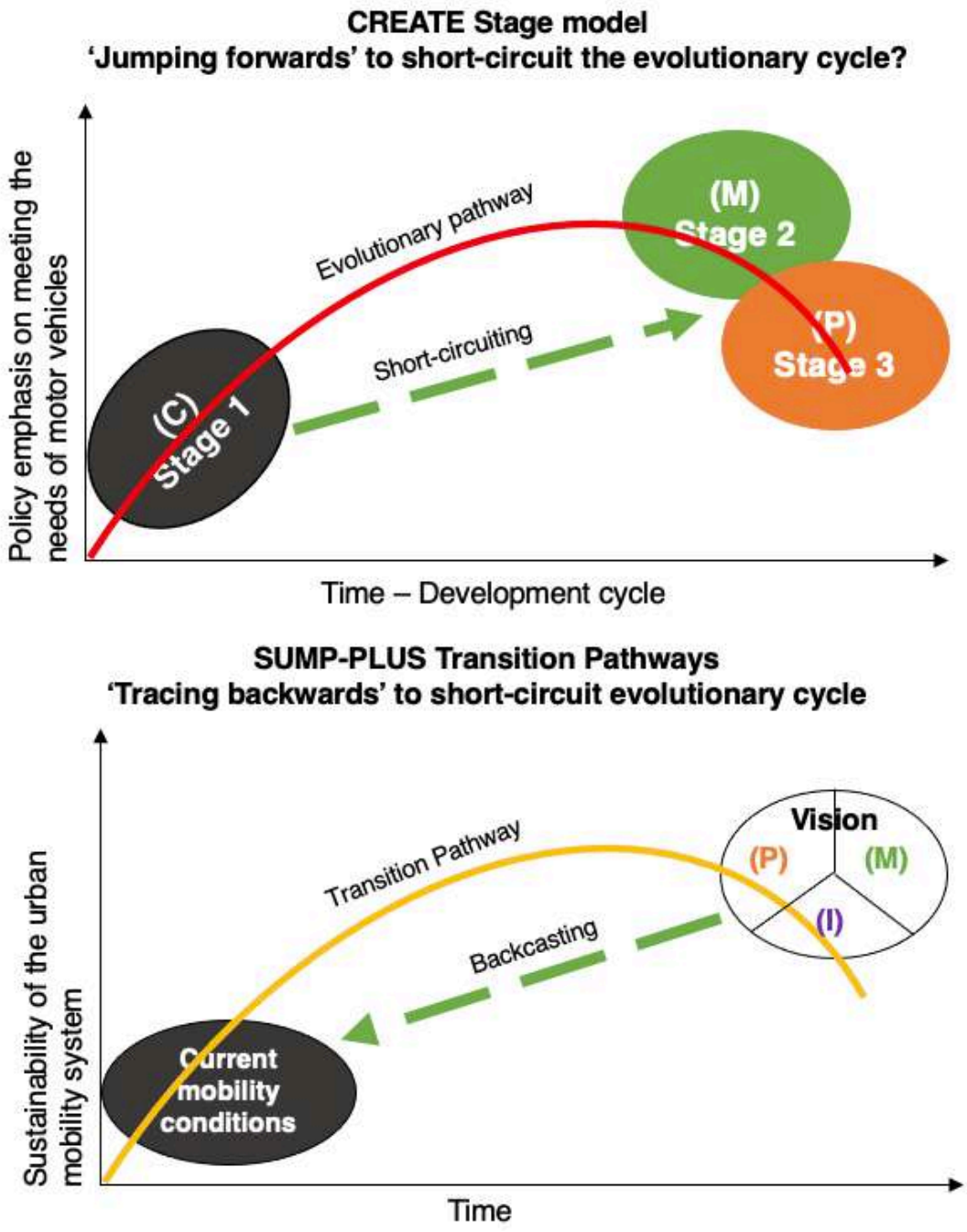


Figure 5.4: Contrasting the concept of 'short-circuiting' the evolutionary cycle of the CREATE Stages (Figure 3.5) with the SUMP-PLUS concept of backcasting from an integrated urban vision to the present conditions, to create a purposive Transition Pathway.

5.3 Recommended process: developing a Transition Pathway

5.3.1 Overview of the process

Figure 5.5 outlines the recommended process for developing a Transition Pathway, translating the conceptual framework (Figure 5.3 above) into 8 practical steps.

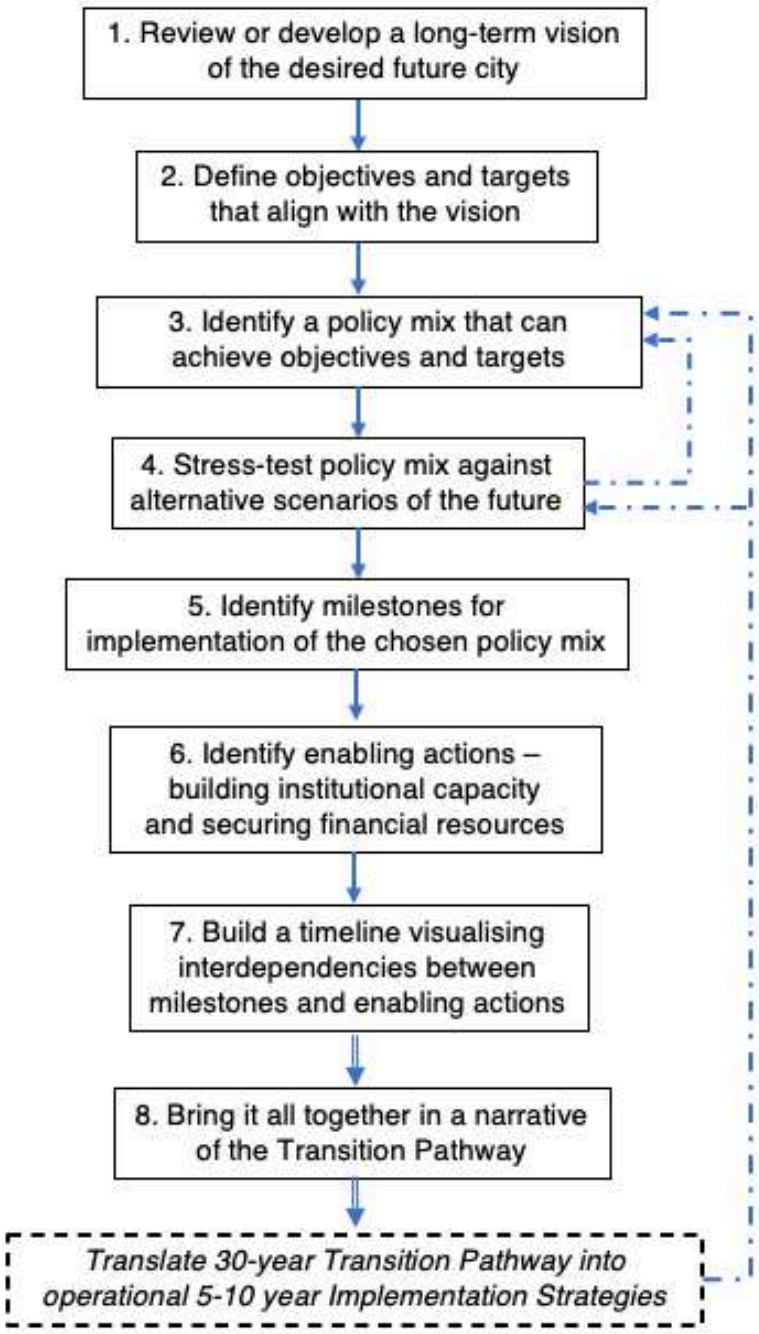


Figure 5.5: Recommended process for developing a Transition Pathway in eight steps.

Comparison with the SUMP cycle

As depicted in Figure 5.6, the eight-step process for developing a longer term Transition Pathway corresponds roughly to Steps 4-8 of the SUMP cycle, including scenario analysis (which comes after visioning in our framework, since scenarios are used in a different way); visioning; target-setting; selecting measure packages (in our framework, at the level of a more broadly-defined policy mix); and agreeing actions and responsibilities.

As the Transition Pathways framework is strongly focused on vision-led planning for the long-term future, the process starts with developing a vision, and does not include analysis of the existing situation (SUMP Steps 1-3) prior to developing a vision; instead, this is addressed in relation to *context-specific* pathways (see Section 5.4).

We could thus characterise the Transition Pathways approach as extending SUMP Steps 4-8 into the longer-term future, but taking a backcasting approach and thus ordering the steps in a different way. We argue that the Transition Pathways approach strengthens, in particular, Step 8 – in incorporating analysis of how institutional capacity can be built and answering the question of '*what will it take and who will do what?'.*

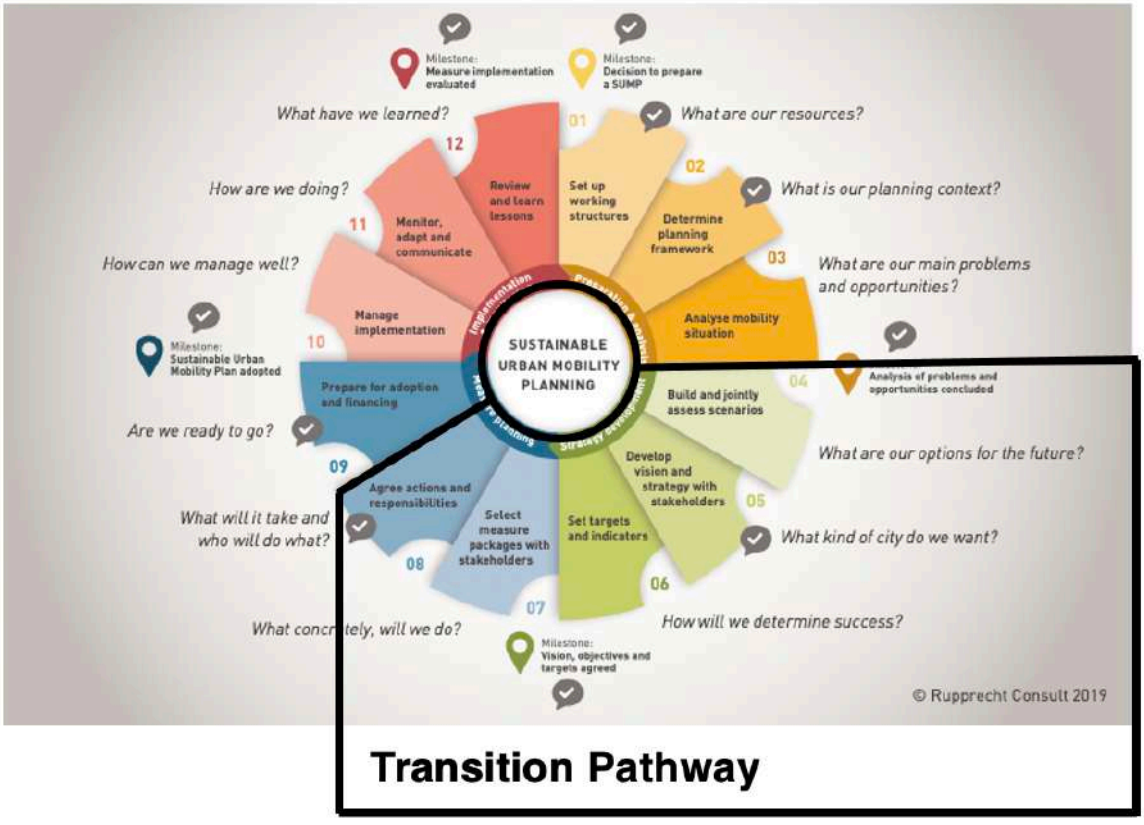


Figure 5.6: Steps of the SUMP cycle covered by the Transition Pathways framework.

A participatory process

Thinking about and visioning for *long-term* city futures is sometimes called 'urban foresight', for example in the *Cities of Tomorrow* report published by the European Commission (EC 2011), where the insights of 50 experts and cities have been compiled to discuss the future of the European model of sustainable urban development. This document emphasises the need to build capacity for long-term visioning and strategic planning, and that foresight should be seen as being central to new forms of participatory governance – collaboration between sectors and stakeholders – needed to respond to the challenges faced by European cities.[36] Beyond the traditional 'triple helix' concept, many co-creation processes are today based on the concept of the 'quadruple helix', emphasising the participation of civil society as crucial, addition to government, industry/business and academia/universities.[37]

Key participatory aspects of the process include:

- **Development of a Transition Pathway should be participatory throughout the process shown in Figure 5.5**, with input and active engagement of a broad range of city stakeholders, including: public sector, private sector and civil society organisations, as well as citizen engagement.
- The best method of developing the Transition Pathway will be through a series of participatory workshops with stakeholders. These issues are not discussed in detail in this chapter, as guidance is available in the SUMP Manual on Participation, developed within the CH4LLENGE project.[38]
- The Pathway development process recommended here is **intended to be led by the local municipality**, including representatives of different municipal departments. An appropriate team for managing the Pathway development process should be assembled before beginning.[39]
- As the Transition Pathway approach is focused on vision-led planning, **involvement of local political leaders will be important** to allow the Pathway to reflect the priorities of these democratically elected representatives, particularly in defining a long-term vision (Step 1) and setting objectives and targets (Step 2).
- However, beyond this, **institutional ownership of the Pathway could also be strengthened through establishing a 'transition arena'**, as a small network of organisations across different sectors (public, private, civil society, academia) that are interested in actively acting 'stewards' of the Pathway in the long-term (see section 3.1.1). Beyond being involved in development, the arena can act as a forum for debate and revision of the Pathway over time.

5.3.2 Step 1: Review or develop a long-term vision of the desired future city

[36] Recommendation that "foresight is a specially relevant tool for managing transitions" (p.vii) and discussion of foresight "as a participative governance tool to manage complexity" (EC 2011, p.76).

[37] See Dixon et al. (2018).

[38] See http://www.sump-challenges.eu/kits.

[39] See Activity 1.2 'Create inter-departmental core team' in the second edition SUMP guidelines.

The starting point for developing a Transition Pathway is to define a long-term vision for the future city, for the next 20-30 years. This is based on the first guiding principle identified in section 4.3.5 (and discussed in section 4.3.1): *adopt a vision-led planning approach, supported by backcasting.*

Starting points

- Adopting the Vision & Validate approach, **vision development should not be based on analysis of forecasts and future possible trends, rather the essence of backcasting is that the vision can be *trend-breaking* and normative.**
- We argue that mobility should be thought of as an *enabler* of urban living and economic activity, rather than considered as an end *in itself* or in a silo.
- Developing a vision thus involves asking: ***What do we want the city to look like, in 2040 or 2050, and how can mobility support this?*** Ideally, there is thus a broader vision of the future city – including land use and housing development, energy transition, health and well-being, public services – that can be used as a starting point for considering the urban mobility transition.
- If there is an existing local vision or development strategy over such a time horizon, this can be used as a starting point for further elaborating the mobility-specific aspects, to produce a vision for mobility in the future city (as per section 4.1.2) – hence the reference to a potential *review* rather than a development 'from scratch'
- If an adopted SUMP includes a vision with a 20-30 time horizon, this can be reviewed and potentially adopted as a starting point for the Transition Pathway
- If existing visions for urban mobility are only articulated for a period shorter than 20 years, we recommend starting vision development 'from the beginning'.

Developing a long-term, holistic urban vision

This typically includes:

- Some degree of territorial/spatial delineation
- Technological changes
- Economic conditions and development
- Environmental and climate considerations
- Consideration of everyday life in the city

See Box 5.1 below for examples of visions.

Box 5.1: Cities with long-term, holsitic urban visions

Examples of cities with visions that describe the evolution of land use and multiple urban systems and infrastructures, including mobility, are:

- Ljubljana (Slovenia) – *Vision of Ljubljana 2025* is an integrated considering quality of life, public and green space, and economic development, and which has been a driving force for sustainable mobility in the city.[40]
- Brussels (Belgium) – *Bruxelles 2040* is a metropolitan vision with strong territorial and social dimensions, including a 'no car' scenario of the future.[41]
- Gothenburg (Sweden) – Göteborg 2050 is a long-term strategy for the city-region, developed through a backcasting approach. This included specific sub-visions and roadmaps for spatial structure (including daily life and mobility), as well as for transport infrastructure and emissions.[42]

A vision document typically includes:

- A vision statement: a short paragraph or list describing the city of the future
- Concrete images of the future: maps, plans, illustrations of future living or built environment
- Some visions also include 'personas': narratives describing the daily mobility of imaginary residents of the city, with different socio-demographic profiles

See Box 5.2 for an example from Stockholm (Sweden).

Box 5.2: Integrated urban visions and strategies in Stockholm

Figure 5.7 depicts how an integrated set of visions, plans and strategies have been created for a time horizon of over 20 years, in Stockholm (Sweden). The City of Stockholm has a holistic long-term vision called *Vision 2030,* which was adopted in June 2007. The vision focuses on accommodating 25% growth of the city's population while maintain quality of life and citizen well-being, ensuring economic competitiveness and environmental sustainability, laying out the role of major infrastructure investment that will support these objectives.[43]

[40] Adopted in 2007, see https://www.ljubljana.si/en/about-ljubljana/vision-of-ljubljana-2025/.
[41] Developed in 2012, see https://urbanisme.irisnet.be/lesreglesdujeu/les-plans-strategiques/le-prdd/bruxelles-metropole-2040.
[42] Finalised in 2005, see http://www.goteborg2050.se/.
[43] See https://international.stockholm.se/globalassets/ovriga-bilder-och-filer/framtidsguiden_eng.pdf.

Figure 5.7: Integrated long-term visions and strategies at different scales in Stockholm, Sweden. Source: City of Stockholm (2012).

Exactly how the city will meet the *Vision 2030* is described in spatial terms within the Stockholm *City Plan: The Walkable City*, adopted in 2010.[44] This plan focuses on how planning can enable more people to live and work in the same area, reducing the need to travel through densification and walkability. This document includes many concrete illustrations of the future, in terms of land use and lifestyles.

Stockholm's *Urban Mobility Strategy,* adopted in 2012, refers to both of these visions and strategies for 2030, as well as the city's action plan for climate and energy.[45] The vision for transport in 2030 is described as:

> "*The transport system contributes to creating a larger job and housing market in the Mälardalen region. Measured worldwide, Stockholm will be the city whose inhabitants use public transport the most and which has an effective and safe network of cycle routes. The city will actively conduct campaigns to change travel patterns towards high-capacity and energy-efficient means of transport. The city will develop and invest in technical traffic solutions in close collaboration with other municipal and regional operators. Under the vision, Stockholmers' car fleet should be almost completely comprised of green cars and availability of eco fuel should be excellent. In addition, smart transport solutions and modern information technology have increased*

[44] See https://international.stockholm.se/globalassets/ovriga-bilder-och-filer/the-walkable-city---stockholm-city-plan.pdf.

[45] City of Stockholm (2012). Urban Mobility Strategy. English version, The City of Stockholm Traffic Administration. Available online at: https://international.stockholm.se/globalassets/ovriga-bilder-och-filer/urban-mobility-strategy.pdf.

accessibility and thereby reduced emissions."

How to develop a long-term mobility vision

- Plan a set of participatory workshops with decision-makers and stakeholders, and include opportunities for members of the public to contribute
- The SUMP Guidelines include guidance on vision development (Steps 4-5)
- Concepts from the CREATE project can be used for inspiration, see Box 5.3.

Box 5.3: Using CREATE concepts to develop an urban mobility vision

The CREATE concepts discussed in this deliverable can be used as a simple source of inspiration in the development of an urban mobility vision.

- *Three policy perspectives* (Figure 3.5): what are your key priorities for the future, are they oriented around cars (C), mobility (M) or place-making (P)? Is your ultimate objective to keep traffic moving, to enable as much movement of people and goods as possible, or to ensure the city is filled with high-quality streets and places for people?
- *Overlapping policy perspectives* (Figure 4.2): Does your current strategy or vision include a mix of these policy perspectives; what actors are pushing for which perspective? How should this change, in terms of the vision for the future?
- *The 'spatial transition'* (Figure 4.3): What is your vision, and which policy perspective do you adopt, for the 'three rings' of the city? Does it vary for the (i) city core, (ii) inner ring, (iii) outer suburban areas?

As discussed under Activity 5.1 of the SUMP cycle,[46] CREATE found that in large Western European cities that successfully reduced private car use, there was a clear trend towards Place-based visions (P), including: (i) safe and attractive streets and public places, and (ii) attracting young families back into the inner city by investing in affordable housing with good public transport links and active mobility infrastructure, allowing for car-free lifestyles.

Source: adaptation of the CREATE (2018) Guidelines.

In cities that do not yet have any mobility vision in place, e.g. smaller cities, cities with limited resources or cities without a sustainable mobility planning culture, a more simplified process may be appropriate. Such a process, successfully trialled by the Municipality of Platanias (GR) as part of SUMP-PLUS, is outlined in Box 5.4.

[46] Figure 23 in the second edition SUMP guidelines (Rupprecht Consult 2019, p.90)

Box 5.4: A simplified vision development process (as adopted in Platanias)

1. Inputs to developing the wider vision and transport objectives

Background briefing notes should be prepared in advance of the vision workshop, covering:

- Summary of existing policy and planning documents that are relevant to the development of a broadly-based vision.
- Data on existing conditions and future projections. This would cover basics such as population and employment, tourist numbers, etc; and data on air pollution, congestion, traffic accidents, as available.

2. The vision-development process workshop

'SWOT' exercise covering aspects/topics related to sustainability

- The **Strengths** of the city: what do participants like about it (as residents, business owners, etc)? Why do people come to the city?
- The **Weaknesses**: what do they dislike about the city, maybe feel ashamed of? What might be putting people off from coming here? How do traffic and current public transport services contribute to these problems?
- The **Opportunities**: what are the city's potential strengths, and how might these be built upon and better exploited in the future?
- The **Threats** facing the city: what are its vulnerabilities? Where might future competition come from?

The long-term vision

(a) Show participants examples of:

- Similar size/functioning urban areas from around the world:
  - Which photographs do they like or dislike, and why?
- Vision statements from around the world:
  - Which ones seem inappropriate, or resonate with their feelings about their city?

(b) Developing a vision for the city (refer back to SWOT analysis):

- What type of place would people like the city to be in 20-30 years' time:
  - For residents and their children?
  - For employers and employees?
  - For tourists and other visitors
- What words would they use to describe the experience of being here then?
- What might it look like, visually/physically?
- What types of services and quality of life would it provide?
- How might carbon reduction/elimination targets affect this?

(c) The vision statement:

- Invite participants to write their own vision statement, or identify key components of a vision
- Discuss various ideas and see if can reach a short list – and ideally a consensus.

Source: developed within SUMP-PLUS WP1.

5.3.3 Step 2: Define objectives and targets that align with the vision

Once a city has agreed on its long-term mobility vision, the next step is to agree on long-term objectives and targets that align with the vision. Objectives are statements that describe improvements that the city is seeking, translating the vision into concrete directions for the development of the urban mobility system. Targets translate these objectives into measurable form, by stating exactly what should be achieved and by what specific year, with reference to a particular indicator.

Starting points

There might be existing strategies in place, including a potential SUMP, with objectives and targets. Rather than 'extending' these into the longer-term future 20 or 30 years from now, we recommend starting with the freshly formulated or updated long-term vision.

How to develop objectives and targets

The SUMP Guidelines provide guidance on how to develop objectives and targets (Activities 5.2, 6.1 and 6.2). As stated in the Guidelines, the starting point should be to analyse the vision in greater detail, to identify concrete objectives. For each objective, one or more targets should be defined.

- Targets should be defined against a *baseline*: a quantitative indicator representing the current mobility conditions. For example, emission reductions of 30% by 2030, against a 2020 baseline; or see Figure 5.9 (below) for an example related to mode shares. If you do not have a baseline figure for a particular target, some data collection might be necessary, to create one.
- The SUMP Guidelines advise that targets should be 'SMART' (Specific, Measurable, Achievable, Relevant and Time-Bound). But the definition of A – targets "based on technical, operational and financial competences available and the stakeholder arrangements/commitments that have been made"[47] is too limited. The very motivation for developing a Transition Pathway towards 2050 with a backcasting

[47] SUMP guidelines, SMART Targets (Rupprecht Consult 2019, p.99).

approach, is to envision the desired future city *beyond* these existing framework conditions, rather than as constrained by them. Thus we argue that targets for a Transition Pathway should reflect the full degree of ambition that a city has, beyond what might currently be deemed as achievable – a lot can change and be achieved in 20-30 years.

Inspiration for setting objectives and targets

- The European Commission has defined a set of 18 indicators under the name SUMI (Sustainable Urban Mobility Indicators)[48] that can be used to define objectives and targets, of which the SUMP Guidelines highlight four as core indicators: (i) road safety, (ii) access to public transport, (iii) greenhouse gas (GHG) emissions, and (iv) air quality.[49] Many cities also develop targets for modal shares/modal split. There are relevant goals agreed at EU and international levels. For example, there are EU climate targets for climate-neutrality by 2050, and an interim 2030 target for GHG emission reductions.
- But these are not the only priorities. Many cities or countries have also adopted a Vision Zero objective for road safety, following Sweden's pioneering national policy from 1997, with an objective of zero traffic-related fatalities or serious injuries.
- While the sustainable transport target under United Nations Sustainable Development Goal 11 focuses on achieving high-quality public transport systems for all citizens by 2030, with a focus on those in vulnerable situations, women, children, persons with disabilities and older persons.[50]
- Box 5.5 provides examples of objectives and targets that have been specified within urban mobility strategies.

Box 4.5: Examples of objectives and targets

Stockholm (Sweden) - *Urban Mobility Strategy* objectives[51]

- An increasing number of people and amount of goods need to be moved, through greater use of high-quality public transportation means; that is, public transport, bicycles and walking as well as goods vehicles with a high load factor
- Accessibility in the road and street network is to be enhanced by increasing speeds for high-capacity transportation means and raising travel-time reliability for all road users
- The role of roads and streets as attractive areas is to be strengthened through improved walkability in the walkable city
- The negative effects of road and street traffic must be minimised through promoting car use journeys that generate the most public good.

[48] See https://ec.europa.eu/transport/themes/urban/urban_mobility/sumi_en

[49] Figure 24, p.97.

[50] See https://indicators.report/targets/11-2/.

[51] See footnote 67.

New York City (US) – *OneNYC 2050* objectives and targets

OneNYC is New York City's holistic long-term strategy leading up to 2050.[52]

- Prioritize expanding sustainable transportation modes – public transit, walking, and bicycling – to limit GHG emissions that contribute to climate change (building on existing commitment to reduce emission by at least 80% by 2050)[53]
- Continue efforts to eliminate traffic injuries and fatalities and foster a liveable streetscape in all our neighbourhoods (building on existing Vision Zero objective)[54]
- Reduce traffic congestion, increase bus performance, modernise our subway system, and improve our connections to the region and the world

Targets and indicators specified to meet these objectives are displayed in Figure 4.8 below; note that target dates differ by topic. Figure 5.9 provides further detail on the modal share target in Figure 5.8, as an example of how such targets can be set against a baseline year.

INDICATORS

NEW YORK CITY WILL MEASURE PROGRESS BY TRACKING THE FOLLOWING INDICATORS:

INDICATOR	LATEST DATA	TARGET
SHARE OF NEW YORK CITY TRIPS BY SUSTAINABLE MODES (WALKING, BIKING, MASS TRANSIT)	68% (2017)	80% BY 2050
AVERAGE CITYWIDE BUS SPEEDS	8.0 MPH (2018)	10.0 MPH BY END OF 2020
TRAFFIC FATALITIES	202 (2018)	0 FATALITIES
NEW YORKERS THAT LIVE WITHIN 1/4 MILE OF THE BIKE NETWORK	80% (2016)	90% BY 2022
VEHICLE REGISTRATIONS IN NEW YORK CITY	2,189,374 (2017)	DECREASE

Figure 5.8: Targets and indicators for mobility within the *OneNYC 2050* strategy.

[52] See OneNYC 2050 Volume 8 of 9, Efficient Mobility: http://onenyc.cityofnewyork.us/about/.

[53] See *New York City's Roadmap to 80 x 50*, https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/New%20York%20City%27s%20Roadmap%20to%2080%20x%2050_Final.pdf.

[54] See *Vision Zero Action Plan* (2014) and subsequent editions: http://www.nyc.gov/html/visionzero/pdf/nyc-vision-zero-action-plan.pdf; https://www1.nyc.gov/office-of-the-mayor/news/101-19/mayor-de-blasio-new-vision-zero-action-plan-make-most-dangerous-streets-safer#/0.

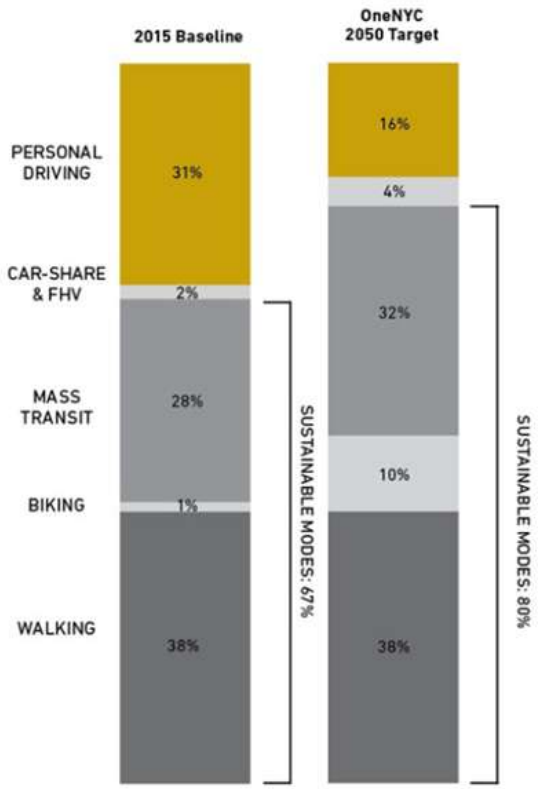


Figure 5.9: 2050 target for mode shares against a 2015 baseline, within *OneNYC 2050.*

How to translate long-term targets into interim targets

Since targets for 2040 or 2050 are a long time away, it is useful and necessary for programming purposes to translate these long-term targets into shorter-term, interim or 'intermediate' targets. For example, in relation to GHG or CO_2 emissions, drawing the entire 'emissions curve' up until 2050 is essential, in order to identify interim targets: if a city has a target of net-zero emissions by 2050, how much must emissions be reduced by 2030, in order for this to be achieved?

Indicative guidance on how high-level climate targets can be translated into specific emission reduction targets for urban mobility is provided in Box 5.6.

Box 5.6 Developing GHG emission reduction targets for urban mobility

High-level targets, such as 90% GHG emission reductions from the transport sector by 2050 (European Green Deal target) or a national target for net-zero CO_2 emissions, must be translated into mobility-specific targets at the urban level, before they can meaningfully be incorporated in a Transition Pathway.

For example, Surrey County Council, an administration representing 12 local authorities in

South East England (UK), has developed a *Climate Change Strategy* in alignment with the UK government's goal of net-zero carbon emissions by 2050. The Strategy is based on a carbon emissions trajectory to meet the net-zero goal (see green dashed line in Figure 5.10), stretching from 2005 to 2050, against a business as usual scenario (dark line).[55] Based on this, interim targets against a 2019 baseline of GHG emissions were defined as: 46% reduction by 2025, 67% by 2030, 80% by 2035, 87% by 2040, 92% by 2045 (and 100% by 2050).

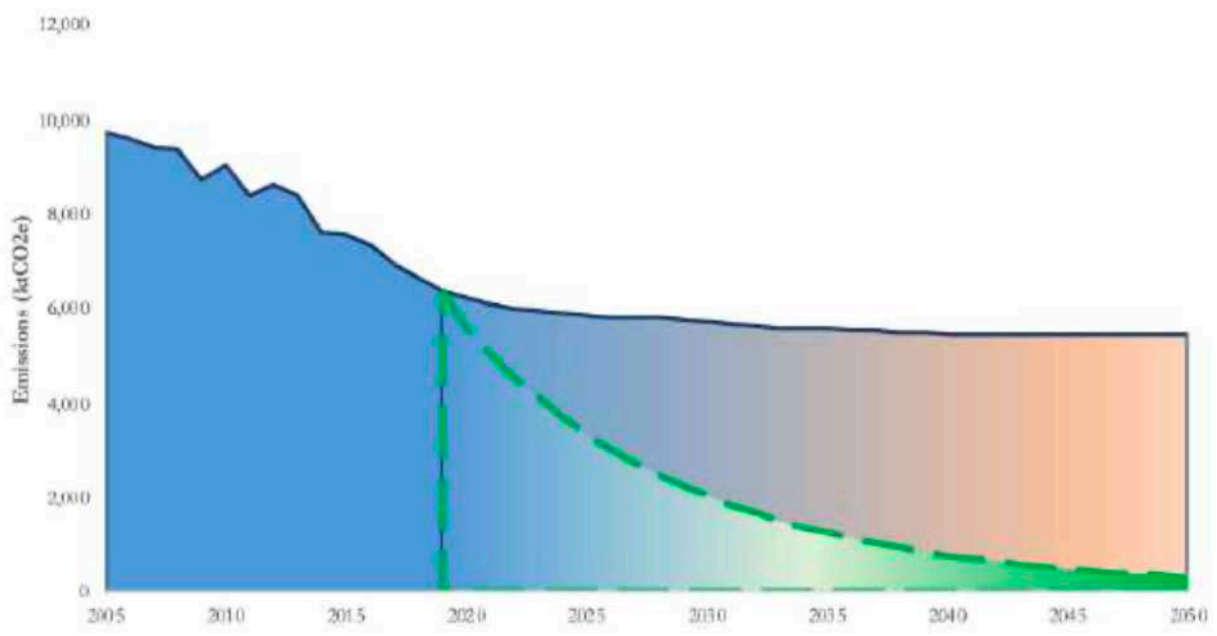


Figure 5.10: Surrey's net zero carbon emissions trajectory (green dashed line) against business as usual (black line). Source. Surrey County Council (2020).

Taking into account lag and cumulative effects when setting interim targets

While delaying the introduction of any measure puts back the realisation of the benefits of that scheme, in most cases there are not long-term consequences from deferring introduction. There are two exceptions, however. The first is where there are **long-term lag effects**, as in the case of replacing carbon fuel vehicles with electric vehicles – where vehicles may be functional for up to 15 years. Thus, a commitment to ban fossil fuel vehicles from 2050 requires that the purchase of new such vehicles ceases by 2035, not 2050 – see Figure 5.11.

[55] See Surrey County Council (2020). *Surrey's Climate Change Strategy.* Available online at: https://www.surreycc.gov.uk/people-and-community/climate-change/what-are-we-doing/climate-change-strategy.

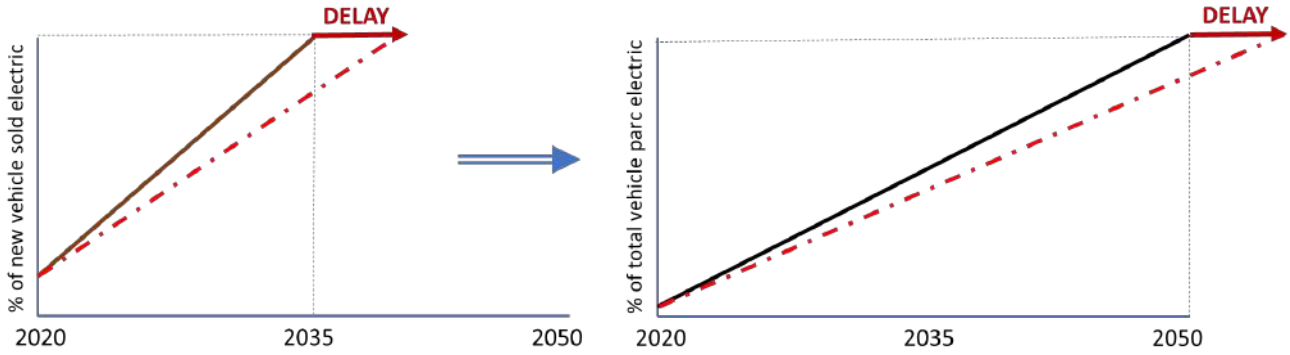


Figure 5.11: Longer-term consequences of delaying the elimination of sales of fossil fuel vehicles on ability to achieve fully electric vehicle fleet by 2050.

The second is that carbon emissions are **cumulative** in the atmosphere. Hence, the deferral of carbon reduction measures requires sharper decreases in later years, if overall targets are to be met – see Figure 5.12.

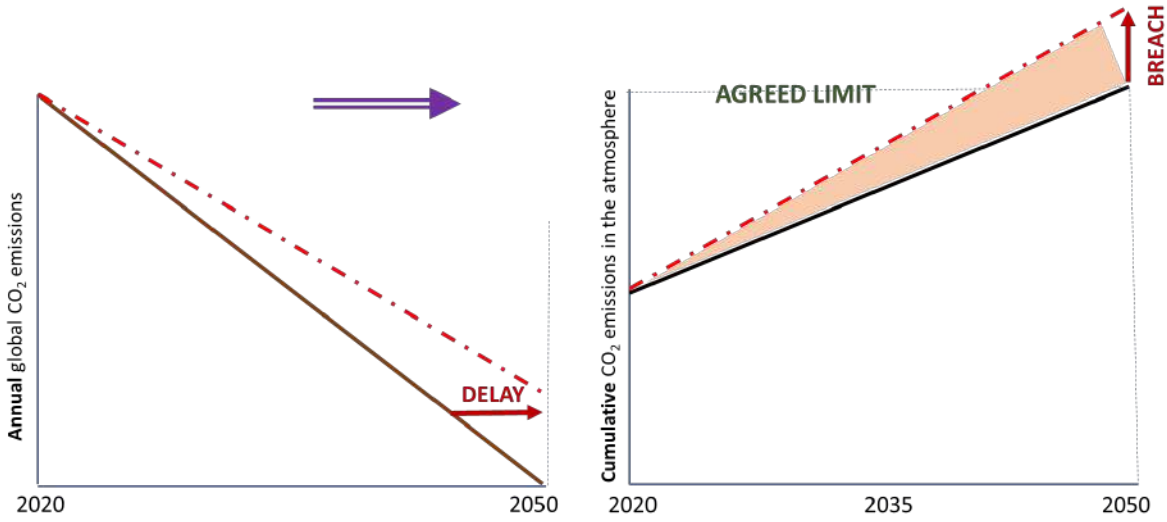


Figure 5.12: Longer-term consequences of delaying the global elimination of CO2 emissions beyond 2050.

5.3.4 Step 3: Identify a policy mix that can achieve objectives and targets

Given the agreed vision (Step 1) and objectives and targets (Step 2), cities will need to identify a mix of policies – or 'policy mix' – that can deliver these desired outcomes.

Level of specification

We use the term *policy mix* to a draw a distinction between identification of a mix of policies specified at quite a general level, with the longer-term future in mind, and the detailed specification of *measures* and *measure packages* within a SUMP (Step 7 of the SUMP cycle). This is because when thinking 20-30 years ahead, it is not productive to specify policy

interventions at the level of detailed measures, since things will inevitably change. So, by *policy mix*, we mean the broad mix of policy interventions that will be necessary to achieve the agreed the long-term objectives and targets.

Starting points

Existing strategies and plans can be used as a starting point, however bearing in mind that ambitions for the longer-term future (e.g. 2050) might include types of policies that are incorporated into current plans. Thus the focus should once again be on the meeting the longer-term vision, objectives and targets.

How to identify a policy mix

The guiding question to ask is: *What do we need to do to achieve our vision, in terms of policy interventions?*

- An appropriate first step is to create a long list of policies, based on a participatory process (see SUMP cycle Activity 7.1), and drawing on the many inventories of policy measures developed in previous EU projects (e.g. KonSULT). Many stakeholders will already have specific ideas for advancing sustainable mobility.
- Next, each policy should be assessed in terms of its likely performance against the agreed long-term objectives and targets. Figure 5.13 (next page) illustrates a matrix that can be used for scoring measures against multiple objectives.
- Figure 5.14 (page after next) illustrates a 'waterfall diagram' that can be used to assess whether a particular policy mix is likely to achieve a target – in this case, a 50% reduction in traffic levels in the central area of a city by 2050, against a current 2020 baseline. The ??? at the bottom of the diagram indicate that the policy mix is likely to be insufficient and will require more policies to be added to the mix.
- A real-life equivalent of this exercise, part of the VIBAT backcasting study (Halcrow Group Ltd. 2009) for decarbonisation of London's transport system, is displayed in Figure 5.15 (page after next). The Figure illustrates how assessment of the emission reduction potential of a combination of policies do not meet the 60% emission reduction target defined for London by 2025.

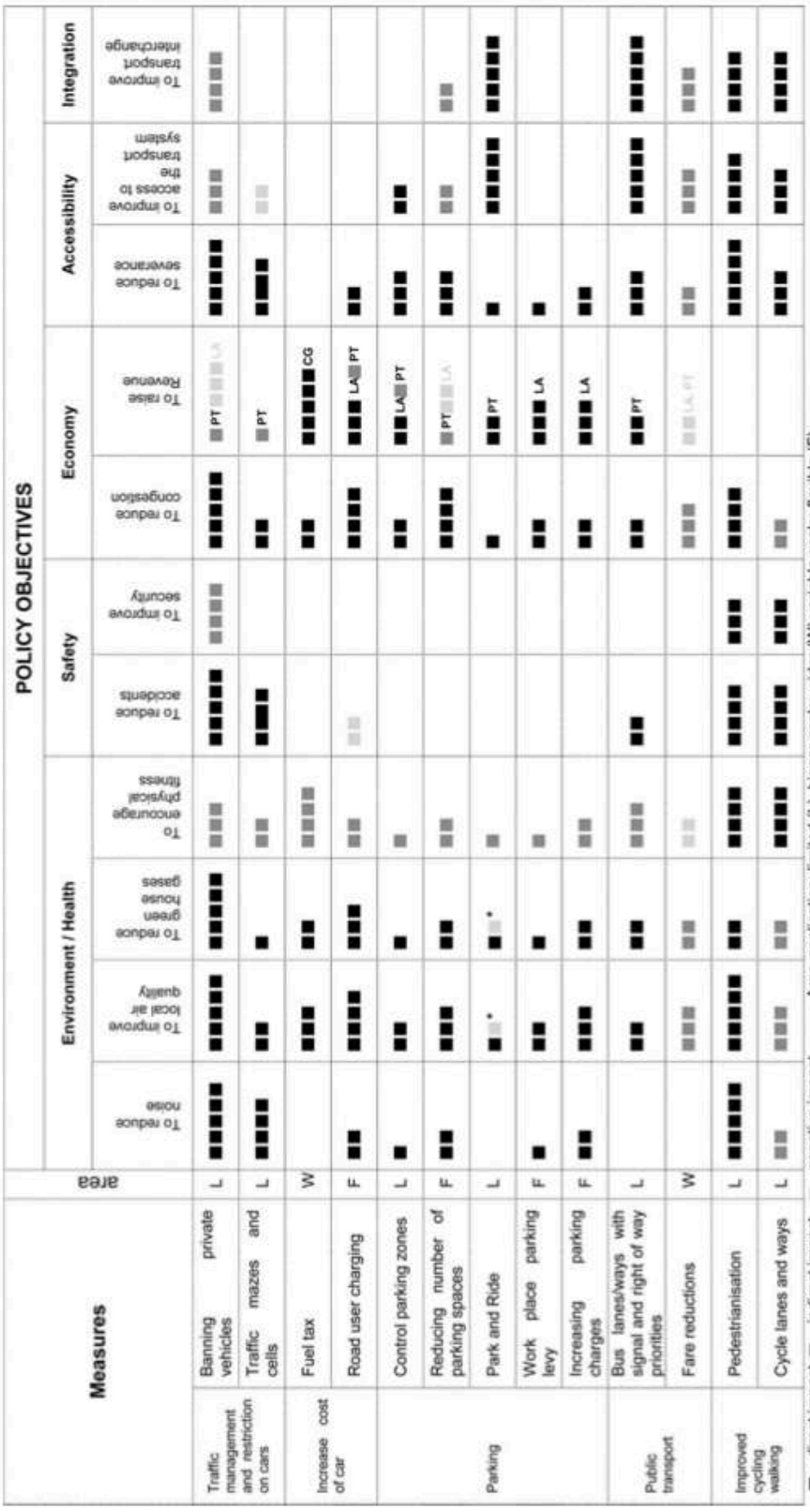


Figure 5.13: Example of a matrix for assessing measures against multiple policy objectives, developed by Kocak et al. (2005, p.397).

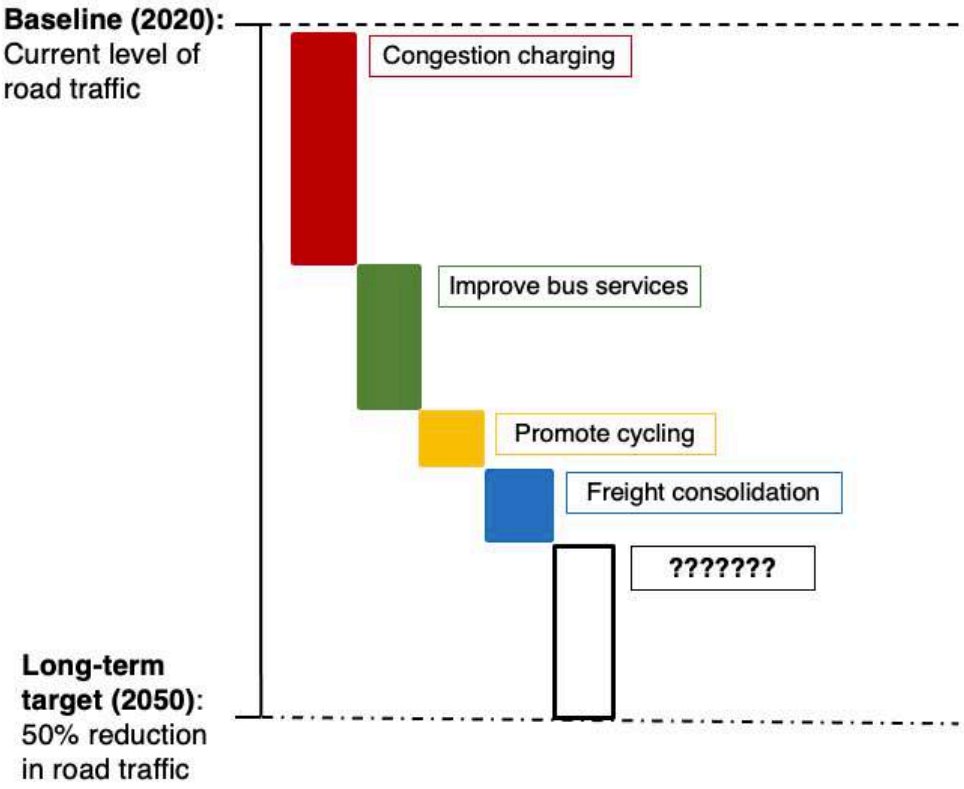


Figure 5.14: Waterfall diagram for assessing whether a policy mix is sufficient to achieve a long-term target.

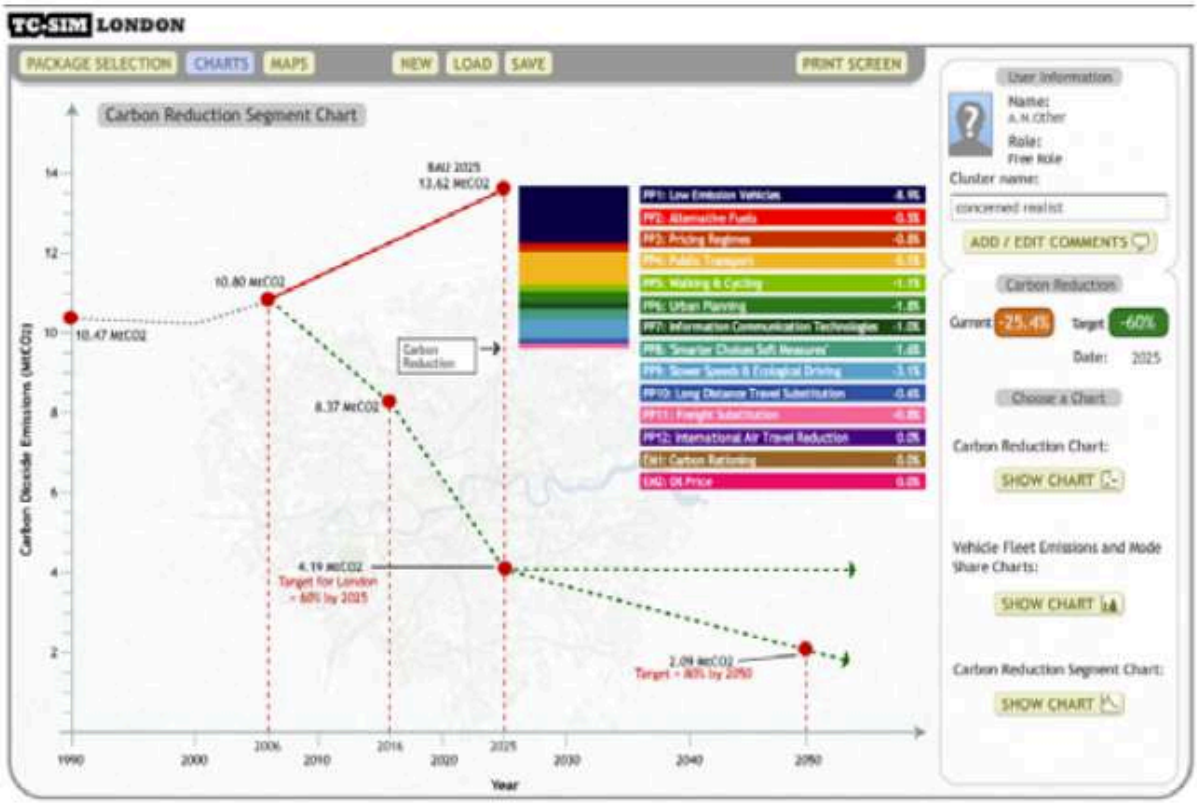


Figure 5.15: Waterfall diagram for assessing whether a policy mix is sufficient to achieve carbon reduction target for London, within VIBAT London study (Halcrow Group Ltd. 2009).

Appraisal methods for policy mixes

The role of transport modelling is also different when developing a Transition Pathway, compared to a SUMP. Models within the process proposed here are used for validation, not forecasting, and the generic level at which policies are specified at this stage (e.g. city-level car traffic restraint) makes it impractical to carry out a conventional, detailed modelling exercise.

Methods suitable for high-level appraisal of policy mixes linked to Transition Pathways are indicated in Box 5.7 below. A high-level of certainty regarding the impact of individual policies against quantitative indicators is not generally possible for long-term, vision-led planning. As long as policies align with a well-elaborated vision, and agreed strategic objectives, and there is evidence that they have worked elsewhere, then they can be considered as part of the mix.[56] Examining how specific policies have been adopted by cities in real life, we can see that they often originated outside formal appraisal exercises – often with civil society, for example.

Box 5.7: Policy appraisal methods for Transition Pathways

Appropriate methods include:

- High-level modelling of the impact of the policy mix on GHG emission reductions, i.e. whether a policy mix can achieve sufficient emission reductions by different target years, and incorporation of mobility policies in city-level Cost-Benefit Analysis focusing on climate change mitigation (e.g. 'Mini-Stern' review undertaken by Bristol City Council, UK)[57]
- For cities with less resources, there are tools available online for rapid appraisal of policies against quantitative indicators, based on simple inputs like 'intensity of application' and 'starting year', e.g. KonSULT Measure Option Generator and EU Urban Transport Roadmaps.
- More qualitative approaches such as Multi-Criteria Analysis involving local experts and stakeholders (see SUMP cycle Activity 7.1). Actors with a lot of experience and knowledge about the city will be well placed to judge policies against the strategic objectives, e.g. 'improve accessibility to bus services'.
- Innovative participatory approaches such as Citizen Assemblies involving deliberation and voting by the public on different policies.

[56] And be appraised in more detail later, e.g. as part of short- to medium-term plans, once the relevant conditions are established.

[57] See https://www.cccep.ac.uk/publication/the-economics-of-low-carbon-cities-a-mini-stern-review-for-the-city-of-bristol/.

Drawing on evidence regarding effective policy mixes

Important aspects for which there is well-established evidence include:

- **Dealing with path-dependencies**

In section 4.3.5, we identified a guiding principle of: recognise existing path-dependencies, be cautious of creating new ones, and seek to maximise the extent to which policies are adaptable. There will be multiple, different policy mixes that can achieve the same vision, objectives and targets. Not all cities will adopt the same approach, partly as a result of unique path-dependencies: how existing city characteristics may play a role in defining a city's policy mix is discussed further in section 5.4 on context-specific pathways. However, although of the 'exact composition of ingredients' in the mix will differ, it is also true that evidence suggests that policy mixes effective in reducing car use or CO_2 emissions will need to combine and include 'a little bit of everything'.

The second aspect of dealing with path-dependencies is considering how **adaptable** the policies in the city's policy mix are, or whether there is a risk that they could create 'lock-ins' for the future. This is particularly worth considering in relation to making investments in major new infrastructure, whether increasing road capacity, extending rail infrastructure or planning greenfield development, which are costly to reverse or adapt. How 'future-proof' do you consider these investments?

- ***A mix of Avoid, Shift and Improve***

Decades of research on sustainable mobility and recent modelling of how net-zero CO_2 emissions can be achieved in the EU by 2050 shows that it is necessary to implement policies across the classic typology of *Avoid, Shift,* and *Improve (*see Figure 5.16, next page, and section 4.1.4).

- ***'Push' and 'pull' measures.***

The CREATE project the policy mix that effectively reduced car use across all five Western European cities included a mix of 'push' and 'pull' policies (see Table 5.1, next page) – these can all be considered as being well-proven, 'no regrets' policies. The need to combine 'carrots' and 'sticks' to influence travel behaviour, particularly vis-à-vis private car use, is a widely-cited principle of sustainable urban mobility planning (e.g. KonSULT). While it is important to 'sell' policies to the public, the focus also needs to be on *providing convenient alternatives to private car use for all citizens.* Limiting private car use is challenging in the absence of high-quality public transport, for example.

- ***A mix of information, infrastructure, regulation and service provision***

The EU Urban Transport Roadmaps tool divides policy strategies into (i) 'Promote & Regulate'; (ii) 'Plan & Build'; and (iii) 'Charge & Provide', based on a different emphasis on (i) informational and non-infrastructural instruments, (ii) spatial planning and infrastructure investment, and (iii) financial incentives. In practice, all cities will likely need

to use a combination of these instruments, in order to achieve the very ambitious emission reduction targets for transport, agreed on by EU member states.

- ***Bringing in innovation and 'phasing out' the old***

  Policy mixes will need to incorporate *innovative* policies and support for upscaling of radically innovative services/technologies that can benefit the city – but also consider 'phasing out' existing infrastructure or regulations that support unsustainable aspects of the current mobility system (EEA 2019), e.g. removal of urban freeways.

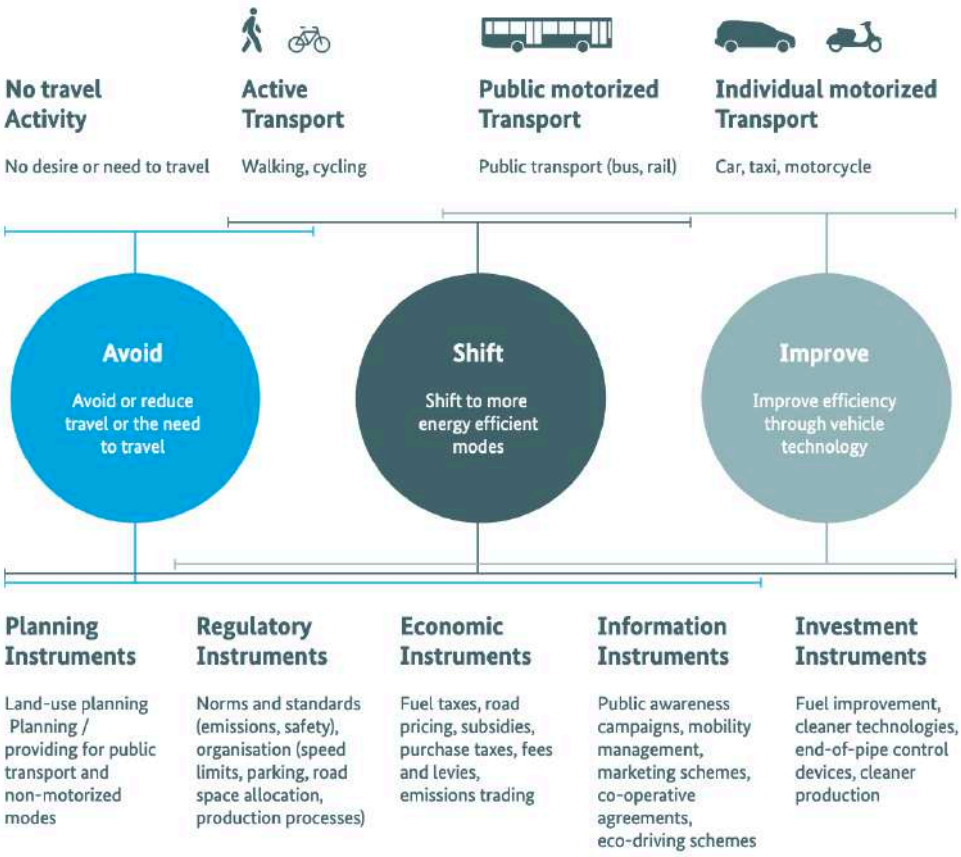


Figure 5.16: The Avoid, Shift and Improve approach to sustainable mobility policy, with associated policy instruments. Source: TUMI (2019).

Core pull measures	Core push measures
Public transport investment	Parking management
Cycling investment	Reallocation of road space
Enabling regulatory changes, e.g. making cycling in bus lanes legal, reserving car-sharing spaces in parking lots	Reduce speed limits

Table 5.1: Core push and pull measures found effective in reducing car use in CREATE Stage 3 cities. Source: CREATE (2018, pp. 67-68).

5.3.5 Step 4: Stress-test the policy mix against alternative future scenarios

Having identified a policy mix that can achieve the long-term vision, the next step is stress-testing the policy mix against a range of *scenarios.* Scenarios are stories that describe alternative ways that the external environment – the policy context for a Transition Pathway – might develop in the future, summarising different possible external forces and pressures at national, European and global scales. In particular, those that might influence future levels and patterns of travel demand.

Once scenarios have been developed, they can be used for *stress-testing* a policy mix. Stress-testing means testing whether the chosen policies are robust in the face of uncertainty (i.e. 'different' future pressures) – with the goal to design a policy mix that will 'perform well' in achieving the long-term vision, over a range of directions that the world and relevant external pressures might evolve in.

Starting points

- The SUMP Guidelines refer to scenario-building in Step 4 of the SUMP cycle, where scenarios are storylines of possible alternative futures for the city, which can then be discussed with citizens and stakeholders, prior to developing and agreeing on a full vision (Step 5).
- We recommend developing a vision first, and then use scenarios for stress-testing policies to assess how the vision might be achieved under alternative future conditions. This is because the Transition Pathway process is based on backcasting from a vision, rather than determining the vision based on forecasts and the choice of most feasible or likely scenario, as advised in the SUMP Guidelines.

How to develop scenarios

- In developing a Transition Pathway, we recommend defining the scenarios in relation to City X in 2050, and considering how national, EU and global drivers might influence urban mobility in the city.
- A simple approach to developing scenarios is by defining a 2x2 matrix, based on two *critical uncertainties* and resulting in four alternative scenarios – see Figure 5.17 below for an example from the UK Intelligent Infrastructure Futures project (DTI 2006). The two critical uncertainties were agreed on as whether or not the UK will develop a transport system with low environmental impact; and whether or not people will accept 'smart' mobility infrastructure – forming the axes of the matrix. Each scenario captures a type of possible future, e.g. in the case of 'Perpetual Motion' some forms of low-impact mobility have been successfully developed with support of ICT (e.g. acceptance of teleworking), whereas in 'Tribal Trading' a sharp global energy shock has reduced the opportunities for energy-intensive mobility and the UK has come to rely on low-tech modes instead.

- To arrive at a scenario matrix, a first step is to map relevant external drivers shaping the future up until 2050, for example using the PESTLE framework (Political, Economic, Societal, Technological, Legislative and Environmental drivers). See Box 5.8 for relevant drivers for urban mobility in the European context. The second step is to identify how these drivers might play out along an axis of uncertainty (e.g. climate catastrophe ←→ 1.5 degree target met). One approach is to then choose two uncertainties that are considered to be particularly *critical* (the most important) in relation to urban mobility (forming the x- and y-axis of the matrix, respectively).
- The UK Government's Office for Science (GO-Science 2017) has developed a *Futures Toolkit* for policy-making, that provides practical guidance on how to develop scenarios in this way, through a series of workshops.[58] This approach is purely qualitative and can be used by any city, irrespective of resources.
- The H2020 'MORE' project has also provided advice to cities on how to develop scenarios to stress-test future urban street design policies, offering three different methods, depending on data availability and the capacity of the city authority.[59]

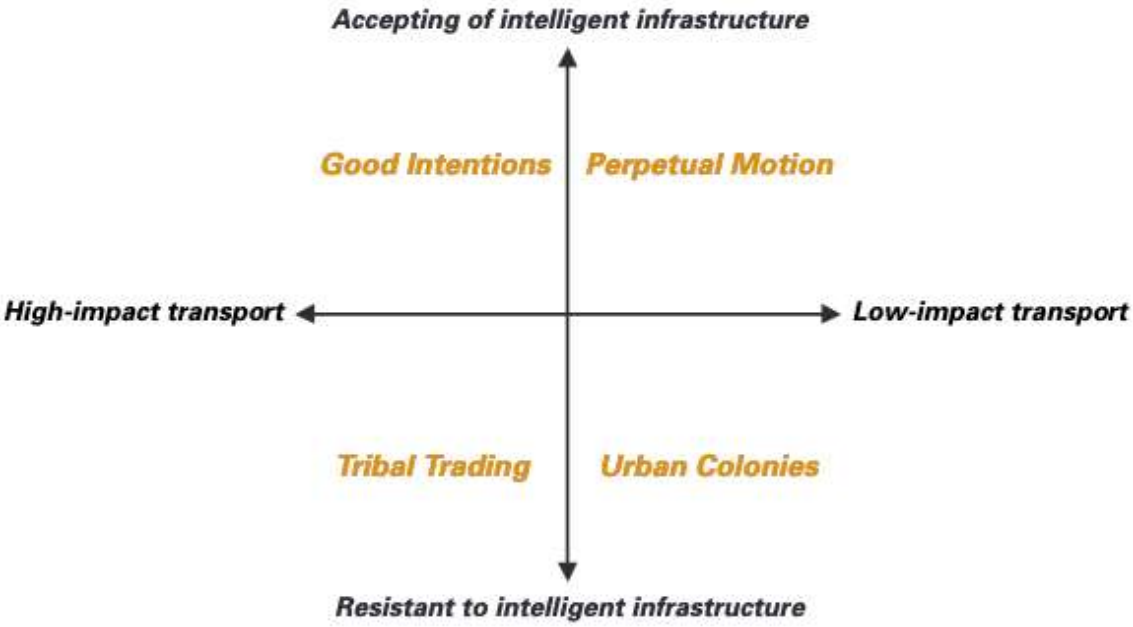


Figure 5.17: 2 x 2 scenario matrix developed as part of the UK Intelligent Infrastructure Futures project (DTI 2006, p.42). Image © HM Government.

[58] See pp.42-49 in GO-Science (2017).

[59] See Future Scenarios for TEN-T Feeder Routes (D3.3): https://www.roadspace.eu/wp-content/uploads/2020/01/2020.02-D3.3-revised-complete.pdf

Box 5.8: What drivers might influence urban mobility in Europe up until 2050?

To understand potential drivers of future uncertainty, there are many reports to draw inspiration from, including the European Commission's *Cities of Tomorrow r*eport (EC 2011), ESPON Territorial Scenarios for Europe 2050,[60] the EU strategic long-term vision for a climate-neutral economy 2050 (EC 2018), the EU Energy, Transport and GHG emissions Trends to 2050.[61] Particularly relevant drivers in relation to urban mobility include:

- Virtual accessibility: whether society will re-orient itself around virtual work and access to services and shopping (as demonstrated during COVID-19 pandemic), or continue to be dominated by physical interaction and access
- Technological change: automation, digitalisation, battery technology; EU policies for vehicle efficiency
- Climate change impacts: weather conditions, extreme events, energy prices
- Global events: financial and geopolitical shocks; global pandemics
- Demographics: population growth, population decline, migration and the ageing society; generational shifts and the impact on attitudes to car ownership (e.g. 'peak car' and young people getting a driving license)
- Politics: future of the European Union; citizen movements, e.g. climate-based or 'gilet jeunes' type movements

However, in building scenarios for a particular city, it is important to recognise context-dependent variation in mega-trends. It is thus recommended to think carefully about how the drivers listed above will play out in the local context – some drivers may have disproportionate impacts on specific urban contexts. For example:

- Potential shifts towards virtual accessibility of services and virtual work may be greater or more rapid in cities able to develop digital public services or with knowledge-intensive economies
- Population decline and population ageing is currently affecting smaller cities in Southern and Central and Eastern Europe to a greater extent, which has an impact on the viability of public transport services and municipal resources at large
- Climate change impacts may affect coastal and South European cities to a greater extent, e.g. with respect to the resilience of transport infrastructure

[60] See https://www.espon.eu/topics-policy/publications/policy-briefs/territorial-scenarios-europe-2050.
[61] See https://ec.europa.eu/transport/sites/transport/files/media/publications/doc/trends-to-2050-update-2013.pdf.

How to use scenarios for stress-testing

We recommend stress-testing *one* policy mix, identified after exploring options in the previous step (3). GO-Science (2017) provides guidance on a process for using scenarios to stress-test policies.[62] It involves discussing individual policies or parts of the policy mix in light of the alternative futures identified in scenario narratives. The approach is simple, purely qualitative and workshop-based, and largely based on expert judgment; it can be used by any city, irrespective of resources.

See Box 5.9 below for an example of stress-testing conducted by Transport for London. This approach was more resource-intensive, as each scenario includes quantitative estimates, used as inputs into transport modelling.

Iterative refinement of the policy mix

If the policy mix is found to be robust under multiple scenarios, it can be retained and finalised – proceeding to the next step. Whereas, if the policy mix is found to perform weakly under some scenarios, then it is recommended to return to step 3, in order to adjust and refine the policy mix accordingly.

Stress-testing using scenarios is thus recommended to be used as a tool for iterative refinement of the policy mix in relation to the long-term vision, as reflected by the feedback arrow in Figure 4.4 (between steps 3 and 4).

Box 5.9: Scenario development by Transport for London

Figure 5.18 shows three high-level scenarios that Transport for London has developed to assist them in preparing or future uncertainty. These ‘stories’ have been refined and turned into detailed scenarios which provide specific estimates of future population and employment structure, GDP, etc across London. They have been used in strategic forecasting models to look at the implications for future travel patterns in London, and to stress test the likely effectiveness of a preferred policy package in these different environments, and adapt it as appropriate. This work has subsequently been very valuable to TfL in assessing the likely impacts of COVID-19.

[62] See pp.64-67 in GO-Science (2017); footnote 83.

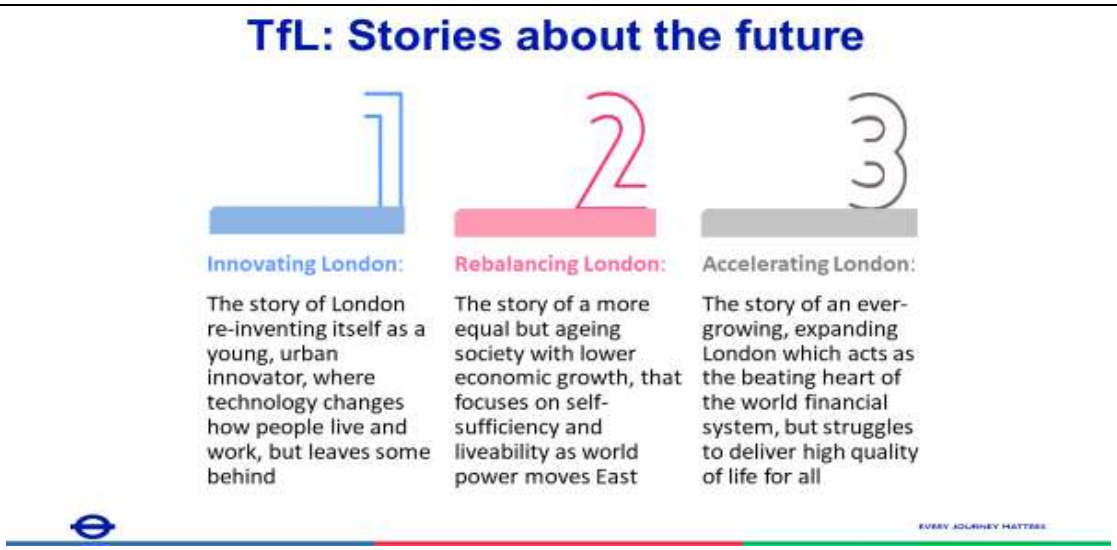


Figure 5.18: 'Stories' used by Transport for London, that have provided the basis for developing different scenarios with potentially major impact on levels and patterns of demand in London in the future. Source: with permission from TfL; MORE Project D3.3 Future scenarios for TEN Feeder Routes.[63]

[63] See www.roadspace.eu.

5.3.6 Step 5: Identify milestones for the implementation of the policy mix

Now that the policy mix has been 'validated' through stress-testing and finalised, the fifth step will be to refine this by laying out the policy mix on a timeline. To meet the city's interim targets for specific years, policies within the policy mix will need to be delivered by a particular points in time. Milestones in relation to the actual implementation of the policy mix will thus need to be identified.

- Figure 5.19 illustrates an example of such milestones indicated on a timeline for 2020-2050. Targets are identified at the top (defined within step 2), with milestones indicated for four core elements of the chosen policy mix. This timeline can be created by starting with visualising the targets, and then working 'backwards' from 2050, in order to identify a set of (mostly qualitative) milestones that will allow you to achieve the target.
- If what is considered possible to be implemented by a certain year, in terms of a particular policy, is not sufficient to reach the interim target, then the interim target will potentially need to be revised by returning to Step 2. If the interim target is related to a long-term emissions pathway or similar, revising the interim target may require redrawing the entire 'curve'.

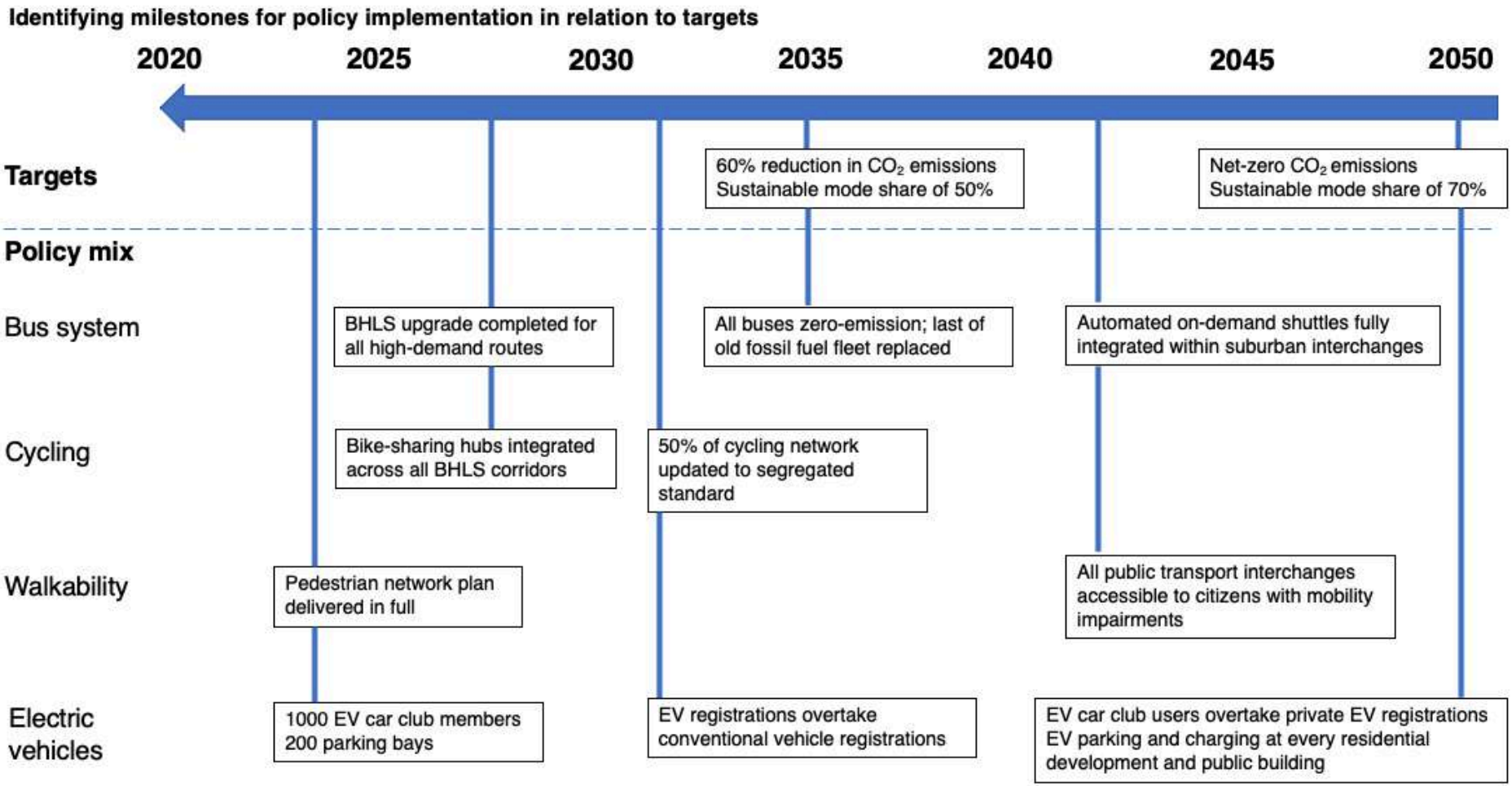


Figure 5.19: Example of a timeline indicating major milestones for a chosen policy mix, against a city's targets. BHLS refers to 'Bus with High Level of Service', EV refers to electric vehicle

5.3.7 Step 6: Identify enabling actions – institutional capacity and financial resources

As discussed in section 3.1.2, some of the greatest barriers to transitions towards sustainable urban mobility tend to be institutional and financial. The distinctive feature of developing a Transition Pathway based on a backcasting approach is the focus on identifying the *full range* of actions that are needed to make the desired future happen.

Indeed, in section 4.2 we argued that a Transition Pathway ***should not be understood as a hypothetical scenario consisting only of emissions and policy packages, but as the full set of policies, resources, institutional and political changes that will allow a city to achieve a long-term vision.***

The full range of changes that 'need to happen' to enable transitions thus includes much more than implementation of the policies identified in a policy mix – it is also necessary to identify the actions that will enable these policies to be implemented, which includes building institutional capacities of various kinds and securing financial resources. This 6th step is thus crucial for the realism and success of the Transition Pathway as a whole.

Starting points

The development of a short- to medium-term plan, as per the SUMP Guidelines, focuses on what measures will be implemented *given* a municipality's current legislative powers, institutional capacities, and financial resources.

The focus of identifying **enabling actions** within this step of the Transition Pathway process is on development of *new* capacities or sources of funding and financing. This includes both actions that lie *within* the current control and powers of urban policy-makers, and that lie *outside* the current control of urban policy-makers - and thus require municipal governments to think of strategies for affecting policy frameworks at the regional, national or EU levels.

Policy-makers and local experts will already have a lot of existing knowledge regarding current gaps in institutional capacity and financial resources. Discussions around such barriers can often become negative, if framed as being a case of insurmountable problems. This step links discussion of these issues to concrete, positive milestones of policy implementation, and achievement of a vision in the long-term – making the discussion *solution-oriented*.

Building blocks proven to be crucial – across any policy mix

Irrespective of the nature of the chosen policy mix, there are two fundamental building blocks that are crucial to capacity-building for urban mobility transitions, in relation to which all cities should consider formulating actions as part of their Transition Pathway

- **Governance across the functional urban area**

The capacity for some degree of integrated governance of mobility across the functional urban area (roughly corresponding to a travel-to-work area) is crucial. As per the first guiding principle stated in the SUMP Guidelines, "planning on the basis of actual flows of people and goods is an important criterion to make a plan relevant and comprehensive, even if municipal boundaries may follow a different logic and make this difficult to achieve".[64] Such planning is particularly important in order to be able to shape inward and outward commuting across municipalities, by car and public transport (as well as leisure and shopping trips).

As discussed in section 2.2.2, the SUMP Guidelines do not extend to providing advice on how to establish the mechanisms and governance structures that allow municipalities to cooperate. However, these are the kind of longer-term, strategic aims and actions that should be incorporated into a Transition Pathway.

The CREATE project found that in all five Western European cities that transitioned to Stage 3, the establishment of city-regional coordination mechanisms was crucial in enabling the transition to sustainable mobility and liveability (Stage 3). There are some European best practices for public transport governance (e.g. *Verkehrsverbund* in Germany),[65] however, working towards effective city-regional governance institutions will thus need to start from the unique context of each European city and country.

In all contexts, establishing closer policy and governance integration is likely to be a gradual process, and European cities can learn from each other in this regard. CREATE found that many different integration mechanisms were used: (i) Forums for interest groups, (ii) Light cooperation through digital communication, (iii) Integration of functions, and (iv) Political integration.

An example from SUMP-PLUS partner city Alba Iulia (RO) is provided in Box 5.8.

Box 5.8: Developing a regional public transport association in Alba County

Alba County is located in Romania's historic Transylvania region, with a population of approximately 325,426 inhabitants; the city of Alba Iulia is its capital, with a population of approximately 75,000. In 2012, Alba Iulia municipality and six other smaller local administrations came together to form AIDA, a regional public transport association that provides integrated transport across the city-region in partnership with a private sector operator.

AIDA was among the first such governance structures in Romania, replacing a

[64] Rupprecht Consult (2019), p.11

[65] Public-private associations for public transport covering all public transport services within metropolitan regions (Pucher and Kurth 1995, Buehler et al. 2018).

less effective exiting county transport system. The integration process started in 2008 with Alba Iulia leading the establishment of AIDA, authorisation of the association by the national government in compliance of Romanian law, and an open public tender for a public transport operator and specification of the contract.

AIDA's achievements to date include an increase in passenger numbers, and establishment of a single information service, timetable and ticketing scheme.

Source: Presentation by Stelian Nicola, General Manager of STP Alba Iulia (regional public transport company). Available online at: https://www.eltis.org/sites/default/files/16-06-2015_a_nicola-perspectives_on_mobility_poverty_alba_iulia_region.pdf.

- **A stable and sufficient financial resource base**

Delivering ambitious long-term objectives, such as carbon-neutral mobility and significant improved accessibility, costs a lot of money. A sufficient level of financial resources is a precondition for any policy implementation, and the resource base must also have some degree of certainty and stability, to enable confidence in long-term planning.

Developing a Transition Pathway that has a chance of being successful in practice will thus require some honest conversations among stakeholders regarding how implementation of the chosen policy mix could be funded and financed. Not all funding sources can or need to be identified 10, 20 or 30 years in advance; but general types and levels of funding and financing that are required should be identified. This includes: external funding and financing streams (national, EU, international); municipal income and potential to generate new income through mobility policies (e.g. parking charges, road pricing); and new ways to capture private sector contributions.

One approach is to prepare a financial estimate for the entire policy mix that has been defined in the Transition Pathway: what would it cost to deliver all the policies in the mix**? Box 5.9 provides an example of such a financial estimate**, and the 'funding gap' between required and current levels of funding, **from the mobility plan of the West of England (UK) city-region.**

Box 5.9: Financial assessment in West of England's Joint Local Transport Plan

The West of England Combined Authority, a relatively new city-regional administration in the South West of the UK representing four local administrations (Bristol City Council, South Gloucestershire, North Somerset and Bath & North East Somerset), has adopted a *Joint Local Transport Plan* for 2020-2036. The Plan includes an objective to reduce carbon emissions to net zero by 2030, and reducing car commuting by 14% by 2036; including proposed investment in major schemes such as rail service upgrades, a new mass transit

system for Bristol and interurban cycle routes.

The total cost of delivering these interventions are estimated at £8.9 billion, equivalent to £450-600 million per year, which is recognised to represent an unprecedented level of investment in the area. The gap between current and typical historical levels of funding, and the overall cost estimate, is depicted in Figure 5.20 below.

To close the gap, the Plan both advocates for greater funding opportunities from UK national government, and lists potential new way to generate income that can be retained by the local authorities, including: a planning charge to get private developers to pay for local infrastructure connected to new development; a 'workplace parking levy' where employers are charged for having private parking spaces; and road pricing.

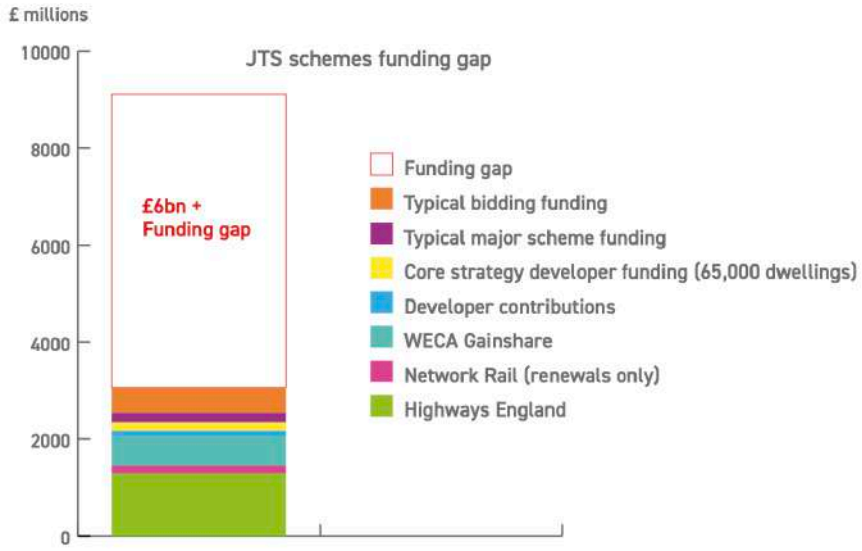


Figure 5.20: Estimated 'funding gap' for delivering policies in the West of England Combined Authority's Joint Local Transport Plan 2020-36. Source: WECA (2020, p.124).

How to identify actions enabling implementation of specific policies

In addition to developing actions in relation to institutional capacity and financial resources at the strategic level, the second aspect of Step 6 is to identify enabling actions that can enable implementation of specific policies, in the policy mix.

- Figure 5.21 (next page) illustrates how this can be done using a so-called 'fishbone diagram', for a hypothetical component of a policy mix, focused on cycling. The 'spine' (in blue) lays out the implementation milestones identified for cycling in Step 5. The 'bones' sticking up from the top and bottom of this timeline represent actions that need to be taken to enable implementation.

- As exemplified, different policies will require specific types of institutional capacities and funding and financing mechanisms to be developed. To construct the diagram, consider 2-3 supporting actions important for enabling each milestone.

- **There will be actions that are *beyond* municipal control, such as changes to national legislative and institutional frameworks, but these should also be included.** By identifying these actions well in advance of the defined policy milestones, preparatory activities be planned and begun in a timely manner (Step 7).

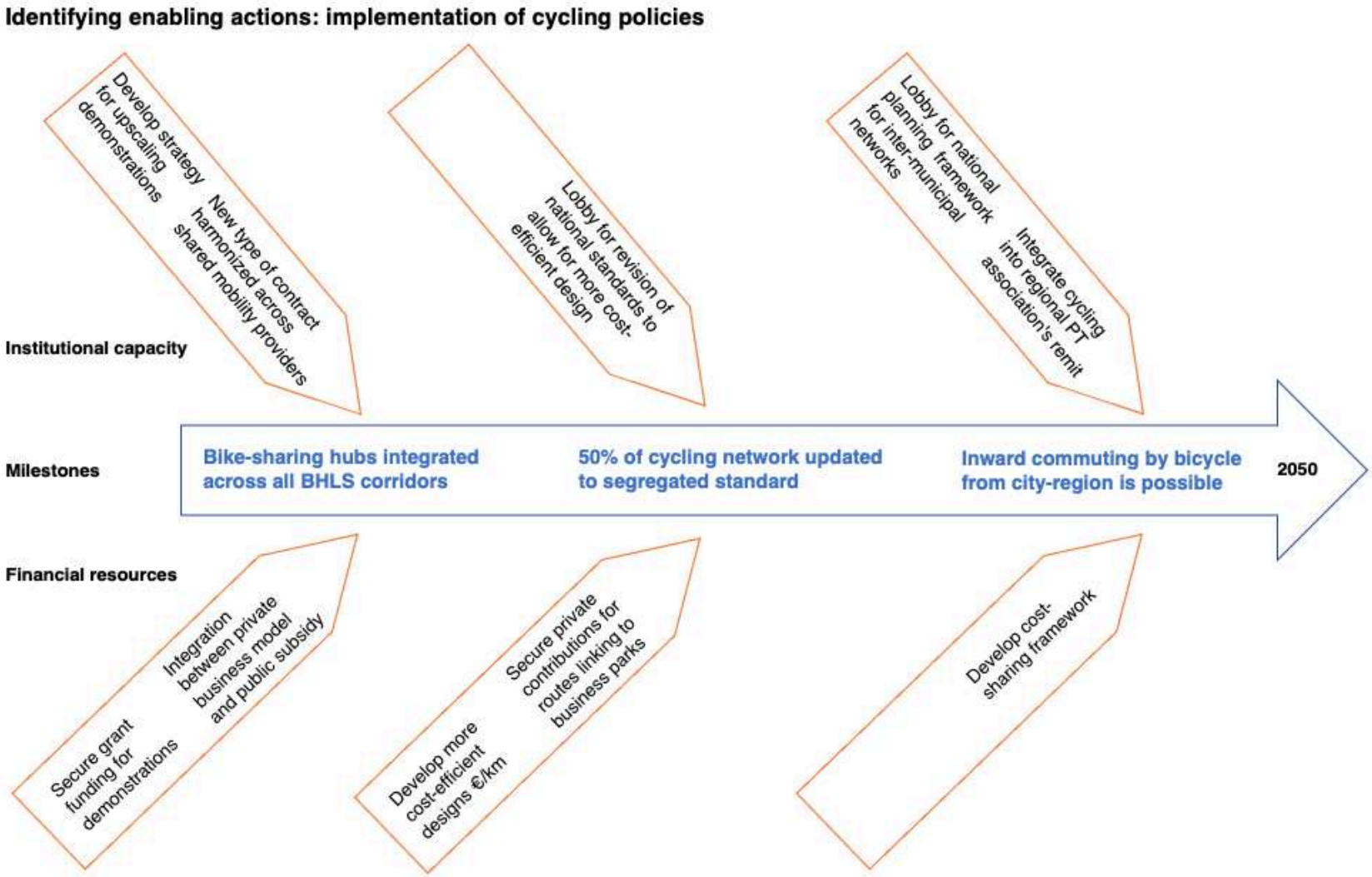


Figure 5.21: Example of a 'fishbone diagram' that can be used to identify actions (institutional capacity, financial resources) that enable achievement of policy implementation milestones for a chosen policy mix. BHLS refers to 'Bus with High Level of Service', EV to electric vehicles.

5.3.8 Step 7: Build a timeline visualising interdependencies between policy milestones and enabling actions

The final step of developing a Transition Pathway will be to visualise the interdependencies between policy milestones and enabling actions, over time.

Starting point

Draw together all the material produced as part of Step 5 and 6. This should include milestones and enabling actions identified for all components of your policy mix.

How to assemble a timeline

In Step 6, interdependencies between policy milestones and enabling actions have already been identified for individual policies – as the latter have been defined as necessary to achieve the former.

The focus of assembling the timeline should be to try to visualise these interdependencies *over time* for the whole policy mix, in order to build an overview of how the timing of different policy milestones (e.g. for cycling and bus system) and the timing of milestones in relation to enabling actions interrelate. The key point is to use the timeline to identify *when preparatory activities must begin, in order for a milestone to be achieved by a certain year.*

Illustrative example

Figure 5.22 (next page) provides an example of building such a timeline, drawing on the examples given in Figures 5.19 and 5.21. It illustrates:

- **Bus system.** To complete upgrades of existing inter-municipal bus routes to a higher 'Bus with High Level of Service' standard by a certain year (see Figure 5.19, it will be necessary to begin preparatory activities relating to ticket pricing and financing for procurement of new low-floor electric buses, much in advance.
- **Cycling policies.** A policy milestone may have been defined as making inward commuting into the core city possible by bicycle by 2035, through provision of an inter-municipal network of cycling infrastructure (see Figure 5.21). However, the lack of a national planning framework for such inter-municipal networks, including a mechanism for cost-sharing in relation to cross-boundary infrastructure, that would give confidence in planning this major investment, has been identified as a problem. Thus, a strategy for lobbying national government to issue a new institutional framework will need to commence during the early planning phase.
- An extra layer of analysis involves breaking down the time required to achieve a policy milestone into different phases, from planning to operational delivery/ construction, at the end of which the infrastructure/service/regulation will often be subject to an initial 'soft launch', where adjustments are still made before implementation is finalised. This analysis will be more appropriate to milestones in the next 10-20 years, rather than those defined for the very long-term future.

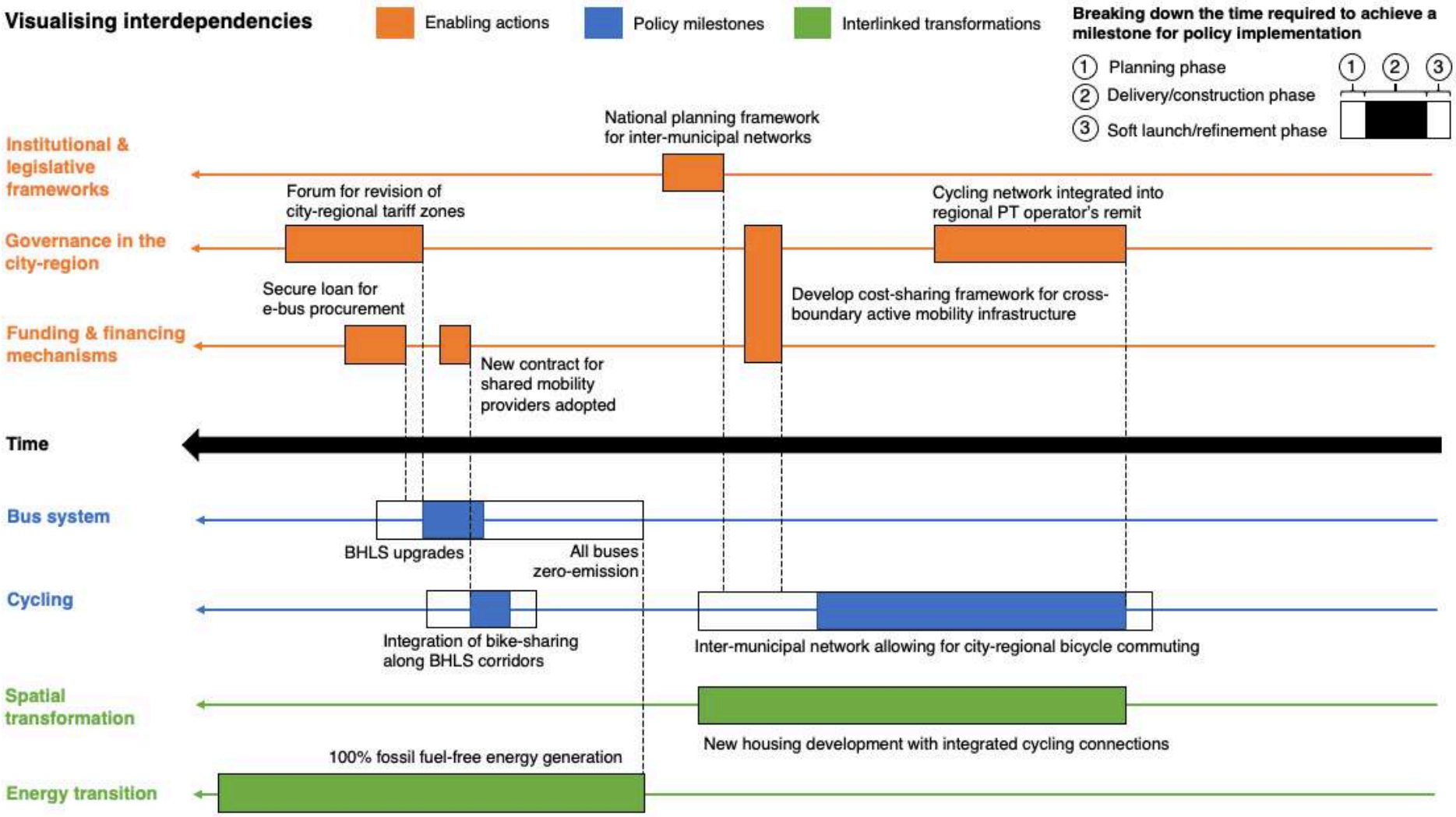


Figure 5.22: Example of a timeline visualising interdependencies between policy milestones, enabling actions and other transformations interlinked with the urban mobility transition.

5.3.9 Step 8: Bring it all together in a narrative of the Transition Pathway

The end result of the process is a fully-elaborated Transition Pathway, which can focus on a set of key diagrams laid out in a brief strategic document. This includes a:

- Description of a long-term vision for urban mobility (e.g. for 2040 or 2050), and how it is related to other urban visions and strategies, along with corresponding objectives and targets
- Summary of the chosen policy mix, including information on the stress-testing conducted and scenarios used for this
- Roadmap that describes how the policy mix will be delivered to realise the vision, including how the milestones for policy implementation and the actions enabling these (institutional capacity, financial resources) unfold over time

We recommend integrating these aspects into a coherent narrative and visual timeline, that serves as an inspiring overview of your Transition Pathway – telling the story of how your long-term vision is achieved. This should be developed and agreed upon by all stakeholders, to close the development process. This involves translating output from Step 7 (Figure 5.22) into something like Figure 5.23 – an example from Helsinki (Finland).

Figure 5.23: Timeline illustrating the most important examples of short-term and long-term actions part of a roadmap for the Helsinki city-region that emerged through the Greater Helsinki Vision 2050 competition (text in Finnish). Report developed by WSP Finland, Helsinki University of Technology and Demos Helsinki (2008, p.35), available online at: https://www.demoshelsinki.fi/julkaisut/helsingin-seutu-2050/.

5.3.10 Putting the Pathway into practice

Once the Transition Pathway has been developed, it is crucial to:

- **Ensure there is a sense of institutional 'ownership' regarding the Pathway**, including what team within municipal government is in charge of managing and maintaining the Pathway, and whether there is a broader group of stakeholders (e.g. 'transition arena', see section 5.3.1) that act as 'stewards' of the Pathway in the long-term, advocating for the long-term thinking it represents (sometimes in the face of prevailing short-term thinking)
- **Translate its contents – which are about the long-term policy mix and enabling factors – into short- and medium-term strategies**. A medium-term strategic plan for mobility, e.g. SUMP, can be updated on the basis of the Transition Pathway; in terms of visions and targets, measure packages etc. Harmonisation with other strategies depicted in Figure 5.2, such as spatial, energy or climate strategies, is also desirable.

We propose that the first 10 years of the Transition Pathway should be developed further within an Implementation Strategy (as per Figure 5.3), which translates the policy mix into more detailed measure packages, and describes in detail *how* measures will be implemented, with more detailed specification of phasing, sequencing and spatial integration. Guidance is provided in Chapter 6.

5.3.11 Updating the Pathway based on monitoring and evaluation

The Transition Pathway should be updated based on data and lessons derived from monitoring and evaluation, as reflected in the 'feedback arrow' within Figure 5.5.

While the vision, objectives and targets may change or evolve over a 20-30 year period – particularly as a result of the impacts of policy implementation in the early years - it may primarily be the policy mix that needs updating, if it has been found to be ineffective in achieving objectives and targets.

It may also be relevant to repeat stress-testing of the policy mix using a new set of scenarios, based on unfolding external forces and the emergence of new drivers of uncertainty over time.

5.4 Context-specific Transition Pathways in different types of European cities

As discussed in section 3.4, the specific objective of SUMP-PLUS Task 1.2 was to develop a *context-sensitive* conceptual framework for Transition Pathways, that recognises and incorporates differences between European cities. In this section, we: (i) discuss how the proposed *process* for developing Transition Pathways presented in this chapter can be adapted to allow for its use by a range of cities, and (ii) illustrate how the process can be used to generate *context-specific* Transition Pathways, in terms of *content*, using SUMP-PLUS cities as an example.

5.4.1 The SUMP-PLUS City Typology as the basis for defining 'context'

SUMP-PLUS D1.1 proposes a novel typology of European cities, providing a basis for the development of context-sensitive frameworks within the project, and also forms the basis of the consideration of *context* in relation to Transition Pathways in this deliverable. The typology is depicted in Figure 5.24 below. Section 5.3.1 of SUMP-PLUS D1.1 provides a justification for each variable in the City Typology.

Within the 3x3 matrix at the top, the two Level 1 indicators used for classifying cities – city population size and the location of a city within three different 'regions of Europe' – were chosen based on:

(i) analysis of survey data (see section 3.4), which found that these variables were correlated with the degree of experience with sustainable urban mobility planning, with less experience among very small and small to mid-sized cities in Central and Eastern Europe and in Southern Europe.
(ii) a review of existing city typologies related to urban mobility, produced by international organisations, experts and other EU projects; which confirmed the importance of population size as an important variable, that also serves as a proxy for the scale of mobility demands and movement patterns, range/scale of land use provision, etc.

Based on this review, a further three Level 2 indictors are also included in the typology (lower part of Figure 5.24).

In addition, a further five 'Categories' representing qualitative variables capturing existing economic, spatial and institutional characteristics of cities are also indicated alongside the core matrix (Figure 5.25), to provide further granularity to the typology for purposes such as developing context-specific pathways or assessing transferability.

Region / City population size	less than 50.000	between 50.000 and 500.000	more than 500.000
Northern and Western Europe	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
Central and Eastern Europe	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
Southern Europe	.....	.....	.....
	.....	.....	.....
	.....	.....	.....

Level 1 indicators:	Level 2 indicators:		
City population size	Population density	GDP (PPP) per capita	Car modal share and trend
Region of Europe			

Figure 5.24: Overview of the SUMP-PLUS City Typology, including Level 1 and 2 indicators for classification. Source: SUMP-PLUS D1.1 (p.60).

F	S	C	L	P
Function(s) of the city	Spatial Context	CREATE stages	Local Autonomy	Planning Capacity
Main economic sectors and user groups that define the city.	*Location of the city in relation to Functional Urban Area and interdependence of movement patterns*	*Political and public acceptability for different kinds of policies according to the CREATE H2020 project categorisation.*	*Local autonomy is a highly valued feature of good governance. It is the ability of local governments to have an independent impact on the well-being of their citizens.*	*Capacity for integrated sustainable transport planning, as indicated by adoption of SUMP or other strategic mobility vision and action plan.*
Administrative	Free-standing urban core	Car-based	**High:** score of 26-30 on Local Autonomy Index	**High - Fully integrated planning** - the administration has now experience with SUMP and it has been through at least one development and implementation process
Agricultural	Polycentric	Sustainable mobility-based	**Medium:** score of 21-25 on Local Autonomy Index	
Commercial	Commuting zone	Place-based	**Low:** score of 12-20 on Local Autonomy Index	**Medium - Some integration of measures** - The administration is not familiar yet with SUMP but wishes to learn or beginner, getting familiar with SUMP
Industrial	Metropolitan area			
Port				**Low - No strategic planning** - The administration is not familiar with mobility planning.
Touristic				

Figure 5.25: Five Categories of the SUMP-PLUS City Typology representing qualitative variables that characterise cities: primary economic functions, sub-regional spatial context, mobility-related policy priorities, degree of local government autonomy and degree of planning capacity. Source: SUMP-PLUS D1.1 (p.61).

5.4.2 Adapting the Transition Pathway development process in cities of different size

Here we set out to demonstrate the context-sensitivity of the proposed process for developing a Transition Pathway in cities of varying size and characteristics. In section 5.1, we argued that there are three benefits to European cities, of developing a Transition Pathway, as a long-term strategy focused on the next 20-30 years:

- Allowing more 'out of the box' thinking and ambition in policy-making, when the focus is shifted from immediate problems and the current policy context
- Having a strategy in place for ensuring the EU 2030 and 2050 climate targets are met, through the contribution of emission reductions from urban mobility
- Enabling the integration of the possible long-term impacts of emerging technology

We argue that these three aspects are equally relevant to cities in all regions of Europe. We thus focus on how the proposed process for developing Transition Pathways could be adapted in cities of different (population) size, which survey data from European cities indicates is correlated with the degree of experience with sustainable urban mobility planning.

An adapted version of the second edition SUMP Guidelines ('Topic Guide') is being developed for smaller cities within the framework of the H2020 SUMPs-Up project.[66] That document is oriented around the commonly-cited issue of smaller cities having limited resources for mobility planning, both in financial terms but also in terms of limited staff, e.g. a lack of a dedicated mobility department altogether, and thus equally less experience with and capacity for sustainable urban mobility planning. Experts from different parts of Europe, who have provided input into the Topic Guide, suggest that staff working on mobility issues within smaller municipalities often are occupied with routine tasks and thus have limited time for the development of strategies.

Although we recognise that there might be exceptions where smaller cities have strong planning capacity and larger cities comparatively weak capacity, for the purposes of this discussion, we thus equate the Level 1 indicator of city size with Category P (Planning Capacity).

Transition Pathways in small and large cities

[66] Only available in draft format, at the time of writing in October 2020. Rupprecht Consult (editor, 2020). *Topic Guide: Sustainable Urban Mobility Planning in smaller cities and towns.*

Although the core of many small cities and towns across Europe attest to a historical legacy of sophisticated master planning, it appears true that development of long-term strategic visions, like a Transition Pathway, is currently mainly undertaken in larger cities, or in some countries also in medium-sized cities, e.g. in Spain.[67]

In larger cities, development of a Transition Pathway for urban mobility can act as a complementary process and document, to be integrated with other strategies (see section 4.1.2). The value added of developing a Transition Pathway is, in particular:

- The longer-term perspective, as already discussed
- The 'backcasting' approach working 'backwards' from important goals (e.g. climate-related), as a complement to more traditional strategies typically oriented around *accommodating forecasted growth* (either of the population or travel demand)

Given limited resources and capacities, are the proposed benefits of developing a Transition Pathway equally valid in the context of smaller cities? We argue they are:

- **The need to have a strategy in place for meeting EU climate targets for 2030 and 2050 is equally relevant to smaller cities.**

  Smaller cities will also have to reduce their GHG emissions in line with national strategies that every member state is mandated to produce. The Covenant of Mayors has 1657 signatories from mayors of European cities and towns with a population of 10,000-50,000 (SUMP-PLUS classification of a very small municipality in Figure 5.21), which have already submitted Sustainable Energy and Climate Action Plans for meeting EU 2020 or 2030 targets.[68] This demonstrates the appetite that small cities have to develop pathways to 2030 or 2050 targets, which will need to include urban mobility.

- **The potential of emerging mobility concepts will differ considerably – and potentially be even greater – in smaller cities.**

  There may be advantages for smaller cities in adopting more of a 'wait and see' approach in relation to emerging mobility concepts, by benefiting from the results of experimentation with these concepts in larger cities with more resources to spend on innovation activities – allowing technologies to mature, evidence on their effectiveness in solving mobility problems to emerge and business models to develop.

[67] E.g. Bilbao, Victoria-Gasteiz

[68] Authors' calculation based on Covenant of Mayors signatory database: https://www.eumayors.eu/about/covenant-community/signatories.html.

However, this does not mean that smaller cities should *only* focus on 'basic' policies and measures that have been long-proven elsewhere.

A model of urban development that allows for a car-independent lifestyle is not as well developed for less densely populated urban areas in Europe (including smaller cities and city-regions including rural areas), where public transport operation is less profitable or effective in offering attractive alternatives to car use. The opportunities offered by emerging technologies like on-demand mobility services and autonomous vehicles might be *especially* relevant to these areas.

There are also examples of smaller cities – such as the SUMP-PLUS partner city of Alba Iulia (RO) – that are involved in very active experimentation with smart mobility concepts, in partnership with the private sector. This demonstrates the relevance of developing Transition Pathways linking such concepts to a longer-term city vision, and Stage 4 policy perspective, also in smaller cities.

Adapting the Transition Pathways process

The Transition Pathways process outlined in section 5.3 has strategic and participatory thinking about the future at its core, rather than prescribing a large number of activities or particular types of analysis. A key challenge for smaller cities is the lack of human and financial resources, but we argue that there is nothing particularly resource-intensive about what we propose:

- Rather than employing external consultants, we emphasise that Pathway development can rely on – and indeed benefit from – the existing knowledge and skills of the local 'quadruple helix' (public, private, civil society and academic organisations), including in-kind contributions and possible engagement of volunteers.
- A lot of the Pathway development process can be conducted using qualitative methods, supported by existing open-source tools for quantitative analysis, as appropriate. Employing one external team member with some experience of backcasting methods to act as an independent facilitator for workshops can be useful. Open-source tools for capturing and analysing publicly available mobility are also being developed within the SUMP-PLUS project.

In Table 5.2 we briefly outline some possible adaptations of the Pathway development process below, depending on a city's Planning Capacity.

Transition Pathways process	City's capacity & resources for planning	Adaptation of process and methods
Step 2 – objectives and targets	High	Modelling of carbon emissions trajectory for the entire urban area based on SECAP and existing GHG emission trajectory (e.g. up until 2050), and using this to define a long-term emission reduction target for mobility specifically, with identification of interim targets to ensure achievement of long-term target (see Box 4.6)
	Low	Analysing how the achievement of long-term objectives like carbon-neutral mobility or Vision Zero will require mobility patterns to change, and identifying a desired modal split with estimated mode share targets (e.g. for commuting: 20% private car use, 40% public transport, 30% walking, 10% cycling), and then breaking down those long-term mode shares into interim targets.
Step 3 – identifying policy mix	High	Modelling the impact of the policy mix on GHG emission reductions, assessing the cost-effectiveness of different policies using cost-benefit analysis (e.g. to compare the benefits of expensive policies like investment in EV infrastructure with less expensive policies such as investment in cycling infrastructure). A more extensive multi-criteria analysis programme with stakeholders; a more extensive public engagement programme; policy 'sandbox' type exercises for non-core stakeholders from private sector and civil society to contribute ideas.
	Low	Data collection and analysis using in-kind contributions from local 'quadruple helix'; open-source online tools for rapid appraisal (KonSULT Measure Option Generator, EU Urban Transport Roadmaps); series of Citizen Assemblies representing a cross-section of the local population, to discuss and vote on policies
Step 4 – stress-testing policy mix	High	Link scenarios to estimates of quantitative impacts on mobility patterns, which can be used as inputs into transport models (see Box 4.7)
	Low	Use qualitative scenarios to think about the key vulnerabilities of the city and the policy mix, as a risk management approach

Table 5.2: Possible adaptations of Steps 2, 3 and 4 of Transition Pathway development, in cities with high versus low resources and capacity for sustainable urban mobility planning.

5.4.3 Development of context-specific Transition Pathways

The second aspect is considering how context-specific Transition Pathways can be developed in different cities, where the *substance* or 'content' of the Pathway depends on the local context.

Recognition of each city's unique *path-dependencies* is central to the development of context-specific Pathways, as per the guiding principle identified in section 4.3.5. We identify three types of path-dependencies: historical, physical/spatial and institutional. We briefly comment on the relationship between historical trajectories and specific Transition Pathways across the different 'regions of Europe' (Level 1 indicator), while other path-dependencies are discussed in relation to Steps 3 and 6 of the Pathways development process.

Transition Pathways across the different regions of Europe

Any discussion of context-specific mobility transitions must recognise that, at a macro-level, there are historical path-dependencies that differ across the various regions of Europe (Level 1 indicator), which determine the differing starting points of transitions towards sustainable urban mobility.

Mass motorisation (widespread car ownership among the population) began in the 1950s in Western and Northern Europe, slightly later from the late 1960s to 1980s in Southern Europe, and only during the post-socialist period in Central and Eastern Europe. Although private car ownership[69] (with strong variation between individual countries) and private car use has largely converged during the 2000s, private car use has still been growing in Eastern European countries (Focas and Christidis 2017). In these countries, sustainable urban mobility planning (as defined by the EU) is a more recently introduced concept.

However, it would be wrong to conclude that countries outside Western and Northern Europe are somehow 'behind' in the evolutionary cycle of mobility policy. Many cities in Southern Europe benefit from the historical legacy of walkable and compact urban form. Many cities in Central and Eastern Europe have extensive public transport systems and housing areas planned with high accessibility of services by foot, as a result of the socialist era.

[69] https://ec.europa.eu/eurostat/statistics-explained/index.php/Passenger_cars_in_the_EU#Overview

For example as is shown in Figure 5.26 below, among the six SUMP-PLUS partner cities,[70] the city of Klaipėda (Lithuania) currently has the most 'sustainable' modal split – also in comparison with two large Western European cities (Manchester and Antwerp) – with a mode share for private car use of 34% (currently on a decreasing trend) and a mode share for public transport of 29%.[71]

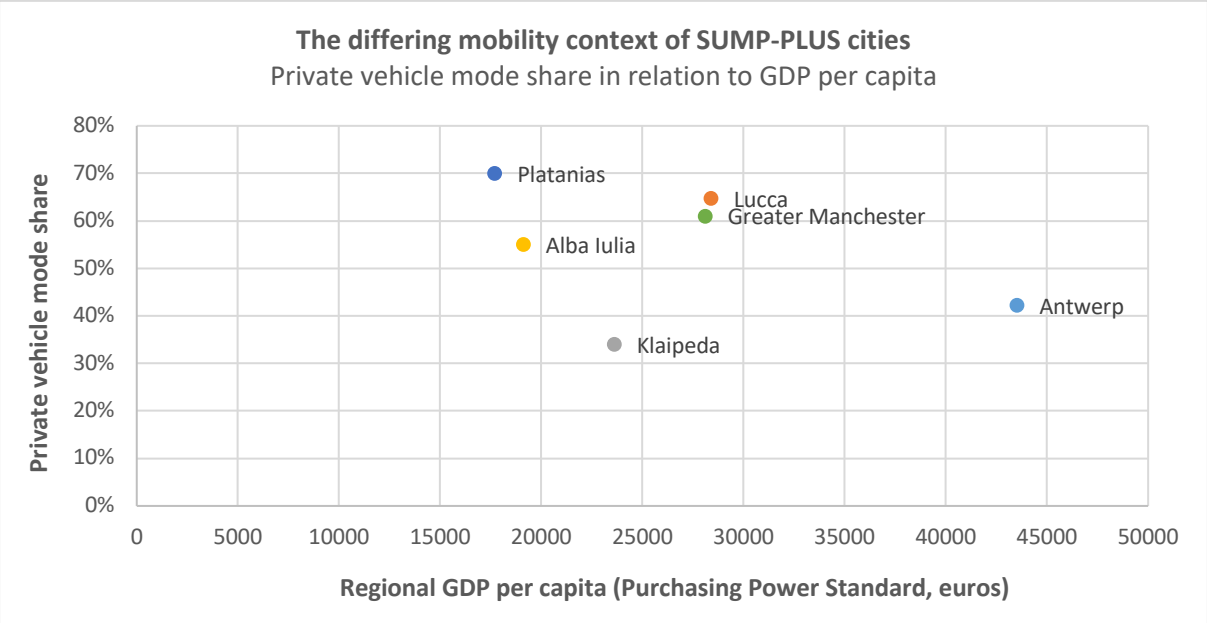


Figure 5.26: The differing context of SUMP-PLUS partner cities in relation to urban mobility. Source: updated version of SUMP-PLUS D1.1 Figure 34 (p.63), based on most recent data.

Developing context-specific Pathways may thus well be about imagining an alternative to what has been the Western European model of urban development and transport policy, i.e. 'repeating the mistakes of the past'. All regions of Europe thus have their own strengths and weaknesses; however, it is impossible to generalise as there is considerable variation between cities even within countries. Because of this, the rest of our discussion focuses on path-dependencies at the urban level.

[70] Platanias (Crete, Greece), Alba Iulia (Romania), Klaipeda (Lithuania), Lucca (Italy), Greater Manchester (UK) and Antwerp (Belgium).
[71] 2017 data from EPOMM database.

Specific contexts in relation to Step 3: identifying a policy mix

Alternative policy paths based on existing city characteristics

When identifying a policy mix that can meet objectives and targets associated with a long-term vision, it is important to consider existing city characteristics. Taking the target of carbon-neutral mobility in Europe by 2050 as an example, there will be alternative 'policy paths' to meeting this target that different cities will choose to pursue. These 'paths' can be understood as a context-specific articulation of the relationship between a long-term vision and different policy mixes.

The chosen path will depend partly on local values and preferences related to car use and lifestyles, and partly based on the constraints imposed by physical and spatial path-dependencies (Level 2 indicators: population density, existing car mode share, public transport provision).

- *Population density, existing car mode share and public transport system*. These variables determine both the mobility patterns/flows of the city's residents and logistics, the feasibility of providing public transport services or the average trip distances – determining the ease of walking and cycling. Cities with smaller or less dense populations tend to be less able to support high-frequency public transport services; whereas in sprawled, large cities or sprawled city-regions accessibility to services by foot and bicycle may be limited.
- *F-category.* The local economic context (F-category) may also influence the policy mix, for example in relation to accommodating freight in industrial or port cities, or making the city attractive for visitors in tourism-oriented cities.

Example of policy paths and mixes with reference to SUMP-PLUS typology

In relation to existing city characteristics, the TRANSFORuM approach (see section 4.1.3) considered population size density, modal split, transport system, existence of local car industry and university, and topology of the urban area (see Figure 4.4). Here we take a slightly different approach. Table 5.3 below provides an illustration of alternative policy paths and policy mixes based on the SUMP-PLUS City Typology.

Existing city characteristics (SUMP-PLUS City Typology)	**Population size:** small (50,000-100,000) **Population density:** high, historical urban form	**Population size**: mid-sized city-region (100,000-500,000) **Population density:** low, including more	**Population size:** large (>500,000) **Population density:** medium

		rural areas	
	Car mode share: medium **Public transport provision:** low; limited access to inner city, some regional rail and bus services	**Car mode share**: high **Public transport provision:** declining ridership	**Car mode share:** low **Public transport provision:** mature, extensive coverage
	F: touristic	**F:** industrial	**F:** commercial, administrative
POLICY PATH			
National policy	**e.g. Actions to decarbonise vehicle fleet and promote low-emission vehicles across all EU member state governments**		
City policy emphasis	**Avoid +++** **Shift ++** **Improve +**	**Avoid +** **Shift ++** **Improve +++**	**Avoid +** **Shift +++** **Improve ++**
POLICY MIX **(inner and outer areas of the city)**			
Urban living	Inner: 15-minute neighbourhoods; live-work and car-free development Outer: densification of peri-urban areas	Lower density, individual family living	Inner: new housing development attractive to young families Outer: transit-oriented development, compact suburban centres
Private car use	Inner: access regulations and road space reallocation Outer: mobility marketing to promote use of public transport to reach city centre, tourist attractions	Inner: reduce traffic levels, smart traffic management/parking Outer: stabilise car use levels, by encouraging shared mobility	Road user charging and elimination of free parking to discourage private car use Strong regulation of private mobility services
Public transport & collective mobility	Inner: ring of high-quality public transport hubs around city walls Outer: low-emission and shared mobility services for tourism sector	Investment in maintaining and incrementally enhancing existing services Proactive development of public-private ecosystem of shared	Inner: zero-emission bus fleet with service upgrades Outer: investment in expanding city-regional rail network

		mobility services	
Cycling	Network of strategic cycling routes to reach city walls and along the seafront	Local, short trips are facilitated through infrastructure	Large investment in segregated infrastructure, integration of cycling with other modes through 'mobility hubs'
Public space	Pedestrian zones and public space activation, catering to residents and tourists	Inner: no significant expansion in town centres Outer: 'pocket parks' allow citizens to connect along residential streets	Mobility hubs and public transport stations act as public space
Freight	Last-mile logistics, e.g. bicycle deliveries	Freight consolidation centres through industry partnership	Focus on reducing emissions from e-commerce logistics

Table 5.3: Example of alternative 'policy paths' and associated policy mixes to achieve the EU target of carbon-neutral mobility by 2050, in European cities with different characteristics (as per the SUMP-PLUS City Typology).

The key points illustrated in the table are that:

- *Not all policy paths will be feasible in all cities, depending on existing city characteristics***.** Not all cities can be – or necessarily need to be – 'compact', nor can sprawled settlements easily transform themselves into a 'city of 15 minutes' or a city with seamlessly accessible public transport by 2030 or 2050.

- To achieve the EU target of carbon-neutral mobility by 2050, all national governments in the EU will be taking policy action to decarbonise vehicle fleets, through regulation and incentives promoting low-emission vehicles. *Although all cities will need to take policy actions across the spectrum of Avoid, Shift and Improve (supporting national government efforts with regard to the latter), the policy emphasis between cities may differ.*

- *Not all cities and regions in Europe will have a similar vision of desired urban lifestyles.* Areas with existing high levels of car use, where local values and identities may be tied to lower-density living or the city-region encompasses many rural areas, may prefer lifestyles where the car continues to play an important role, and thus may emphasise investing in Improve policies and promoting innovative/shared mobility services. Dense cities with mature public transport systems may instead emphasise Shift policies to facilitate car-free lifestyles.

- *This policy emphasis also translates into a policy mix that differs between the inner and outer areas of the city***,** following the CREATE concept of distinguishing between 'rings' of the city (Figure 4.3).

Specific contexts in relation to Step 6: identifying enabling actions

In identifying actions to build institutional capacity and secure financial resources for enabling the successful implementation of a policy mix, and wider achievement of a vision, a city will come up against existing institutional path-dependencies. This aspect is further developed within SUMP-PLUS WP3 focused on governance and capacity-building – some relevant dimensions are briefly mentioned here in relation to the SUMP-PLUS typology, to recognise this crucially important dimension of context-specific Transition Pathways:

- *Municipal resources*.

  Within the SUMP-PLUS City Typology, regional GDP per capita (Level 2 indicator) serves as a proxy for the degree of financial resources available to municipal government. This is often cited as the most fundamental aspect of context-specificity – in line with the idea of 'no money, no implementation'. Creativity in identifying actions to secure additional financial resources, particularly to increase the continuity and certainty of resources, and 'making the most of your money' by finding cost-effective methods of implementation is crucial.

  As cited in the draft Topic Guide on Sustainable Urban Mobility Planning in Small Cities and Towns (Rupprecht Consult 2020), many cities who have successfully achieved big 'improvements' in relation to sustainable urban mobility have employed modest investments and clever decisions, rather than expensive projects. The CIVITAS PROSPERITY project found that limited budgets can be a positive factor, because this makes it "impossible to try to 'build your way out' of problems with even bigger infrastructure, and instead forced cities to be creative with the city structures they have".[72]

- *Local autonomy, the fiscal and policy autonomy of local government*.

  This varies widely across Europe. Within the SUMP-PLUS typology, the L-category is tied to the Local Autonomy Index developed by Ladner et al. (2015) for the European Commission, which gives each EU member state a score, which for the purposes of SUMP-PLUS was translated into a High, Medium and Low classification.73 Municipal governments suffering from a low degree of local autonomy (L-category) will need to address this as a priority, and seek to identify new funding and financing

[72] Cited on p.16 of the Topic Guide (Rupprecht Consult 2020). Original source: Tom Rye, CIVITAS prosperity presentation, "Experience and good practice in Sustainable Urban Mobility Planning in other European countries", 9th May 2019.

[73] See SUMP-PLUS D1.1 pp.61-62 for further details. There are some limitations to existing available indicators such as the Local Autonomy Index (Ladner et al. 2015) and regional GDP capita (as one of the only regional financial indicators comparable across the EU) to act as proxies for local fiscal and policy autonomy in relation to urban mobility specifically, and thus more nuanced assessment of the institutional context of specific cities are needed (as is undertaken in SUMP-PLUS WP3 for SUMP-PLUS partner cities).

mechanisms, and identify actions to overcome institutional barriers relevant to specific components of the policy mix, as discussed in Step 6 of the Pathway development process.

- *Spatial context.*

  The spatial context of the city (S-category) is strongly linked to the important aspect of building capacity for governing urban mobility flows, infrastructures and services across the city-region (or 'functional urban area'), as discussed for Step 6. The actions pursued by different cities in this regard will vary depending on whether the city is currently relatively free-standing, part of a polycentric system, a sprawling commuting zone or a large metropolitan area.

Because of the complexity of these variables, it is not possible to offer general advice across different cities represented by the SUMP-PLUS City Typology**,** beyond the aspects already discussed in Step 6. Instead, *seeking inspiration from other cities to overcome institutional and financial barriers is a way forward.* To identify enabling actions relevant to a particular context, *seeking lessons from cities embedded within a similar institutional context is crucial* (using L and S categories to identify transferability).

Development of context-specific Pathways in SUMP-PLUS cities

Existing approaches to creating context-specific roadmaps for urban mobility, developed within EU projects such as TRANSFORuM and EU Urban Transport Roadmaps (see section 3.1.3), have done so with reference to 'fictional' cities imagined to represent a cross-section of cities in Europe. SUMP-PLUS delivers added value, in having developed a novel evidence-based City Typology (D1.1) and illustrating or developing Transition Pathways in relation to real cities that are partners in the SUMP-PLUS project. This will allow for validation and/or updating of the concepts and guidance proposed in this deliverable, at the end of the project (SUMP-PLUS Task 1.5).

The classification of the six SUMP-PLUS partner cities within the SUMP-PLUS City Typology is described in full in D1.1 (Table 17, pp.64-65). An overview with reference to Level 1 indicators is provided in Table 5.4 below.

Region of Europe	**City population size**		
	Very small municipality (<50,000)	**Small and mid-sized cities (50,000-500,000)**	**Large cities and city-regions (>500,000)**
Western and Northern Europe			Greater Manchester (UK)

			Antwerp (Belgium)
Central and Eastern Europe		Klaipeda (Lithuania) Alba Iulia (Romania)	
Southern Europe	Platanias (Greece)	Lucca (Italy)	

Table 5.4: Classification of the six SUMP-PLUS partner cities according to Level 1 indicators of the SUMP-PLUS City Typology.

Within the project, the intention is to apply the Transition Pathway or Implementation Strategy concepts in four partner cities: Alba Iulia, Greater Manchester, Klaipeda, and Platanias. Linking to the previous section, existing characteristics of these cities (Table 5.5 below) will be taken into account in developing context-specific pathways and strategies, while seeking to draw some lessons that are transferable to other European cities (including 'follower cities') of a similar type/classification, with reference to the SUMP-PLUS typology.

SUMP-PLUS city	**Platanias (Greece)**	**Alba Iulia (Romania)**	**Klaipeda (Lithuania)**	**Greater Manchester (UK)**
Physical, spatial and economic characteristics				
Population size	20,972	74,885	172,272	2,881,569
Population density	42.6 / km^2	720 / km^2	1136 / km^2	2031 / km^2
Car mode share (and trend)	70% (increasing)	55% (increasing)	34% (decreasing)	61% (increasing)
Public transport provision	Limited bus services	Comprehensive bus system (incl. city-regional)	Comprehensive bus system (incl. intermunicipal)	City-regional network incl. bus, light and heavy rail
Spatial context (S)	Municipality within broader commuting zone	Centre of polycentric region (Alba County)	Urban core within polycentric area	Polycentric city-region
Function of the city (F) – primary economic sector(s)	Agricultural, tourism	Administrative, tourism	Industrial, port	Commercial, industrial
Institutional capacity and financial resources				

Regional GDP per capita[74] (proxy for municipal resources)	€14,700	€9,600	€15,000	€32,100
Planning capacity (P)	Low	Medium	Medium	High
Local autonomy (L)	Low	Low	Medium	Medium

Table 5.5: Existing characteristics of SUMP-PLUS cities undertaking Pathways activities, with reference to SUMP-PLUS City Typology variables.

[74] As this indicator is taken as a proxy for municipal resources here, it's not adjusted for purchasing power (as opposed to the figures in D1.1, Table 17, which are in Purchasing Power Standard)

6 Implementation Strategies

As discussed in section 5.2, the conceptual framework for Transition Pathways includes Implementation Strategies covering a 5 to 10-year period, to support the realisation of a longer-term pathway.

6.1 Benefits of the approach for cities

Cities that have started by developing a Transition Pathway will have produced a high-level policy mix and strategic timeline covering a 20 to 30-year period, that will need to be translated into specific measure packages and detailed plans for how these will be implemented in the coming 5 to 10-year period.

Cities that have developed a SUMP will already have defined a set of measure packages, linked to strategic objectives and targets. However, as discussed in section 3.2, the SUMP Guidelines (Rupprecht Consult 2019) are relatively brief on advice regarding how measures will be implemented in practice. Without clear planning and implementation, there is a risk that implementation becomes piecemeal, with measures as 'pieces' of an implementation 'jigsaw', but with little strategic overview or how the 'puzzle fits together'.

The SUMP-PLUS Implementation Strategy concept addresses this gap in existing SUMP guidance and provides solutions in relation to five key dimensions of planning and managing implementation, which are described in Table 6.1 below. By having a more detailed Implementation Strategy in place, a city can demonstrate to external funders and stakeholders that SUMP implementation is well managed, and that any project-funded interventions are linked to strategic transport plans, thus encouraging stakeholders to make a long-term commitment to supporting the city's SUMP.

Dimension	Realities of implementation	Solutions provided by an Implementation Strategy
Packaging of measures	Broadly-defined policies need to be translated into detailed measures, that can be packaged to achieve the desired outcomes	• Advice on how to translate policies into detailed core measures • A tool to assist in developing supporting measures, to develop 'core measure packages'
How measures are ordered in	The ultimate (cost-)effectiveness of measures in producing desired	• Temporal sequencing pf measures (order of

time and space	impacts (e.g. mode shift) depends, in many ways, on *how* they are implemented – with appropriate timing and with appropriate spatial co-location or 'targeting'.	implementation) • Creating an implementation timeline, with measures programmes across three phases • Spatial clustering of measures, to maximise synergetic benefits
Institutional frameworks and financial resources	As discussed in section 2.1.2 and section 4.3.7 of this deliverable, successful implementation depends critically on enabling institutional, political and financial factors – not just what measures are implemented.	• Integration of enabling actions into implementation timelines as pre-requisites for specific measures
Integration of projects with strategic transport plans	Project-based national or EU funding is an especially common way through which implementation of SUMP measures actually happens. Yet these projects are not always well integrated with strategic transport plans/the SUMP, and instead existing in silos of individual projects. This can lead to piecemeal, and less effective, implementation approach.	• Using smart organisational approaches for integrating projects with strategic transport plans. • Structuring implementation in terms of linked teams, projects, programmes and portfolios.
Scanning for and leveraging windows of opportunity	In reality, it is nearly impossible to plan and secure funding for all measures in advance, because funding opportunities cannot be anticipated. This is equally true for other windows of opportunity related to political cycles/shifts and trends and events that act as 'triggers' for policy change.	• Advice on how to be prepared for funding calls, adapt to political opportunities and anticipate trigger points

Table 6.1: Dimensions and realities of policy implementation addressed by the SUMP-PLUS Implementation Strategy guidance.

Relation to the SUMP cycle

Within the second edition SUMP Guidelines (Rupprecht Consult 2019), after finalising measure packages in Step 7 of the SUMP cycle, the Guidelines advise that these should be translated into a comprehensive list of actions, including 'factsheets' with a timeline and responsibilities of different actors (Step 8) and then "creating a financing plan for all SUMP measures, with indicative sources of funding and financing" (Step 9). Step 10 'Manage Implementation' briefly refers to coordination between actors regarding implementation, and procurement of goods and services.

This chapter on developing an Implementation Strategy provides complementary guidance regarding the aspects covered by these Steps 7-10 of the SUMP cycle (Figure 6.1).

Figure 6.1: Steps of the SUMP cycle covered by the SUMP-PLUS Implementation Strategy concept and guidance.

6.2 Overview of the concept

Figure 6.2 provides an overview of the SUMP-PLUS Implementation Strategy concept, which consists of two parts:

- **Part A: Implementation Planning** – a recommended process for planning measure implementation in a sequential series of four steps, to produce a list of core measure packages, an implementation timeline and a spatial overview of implementation. Combined, these elements form an Implementation Plan.
- **Part B: Implementation Management** – a flexible set of organisational approaches for managing measure implementation.

The **end product is an Implementation Strategy,** with the core contents of the Implementation Plan produced through the Part A process, complemented by potential description of approaches drawing on Part B.

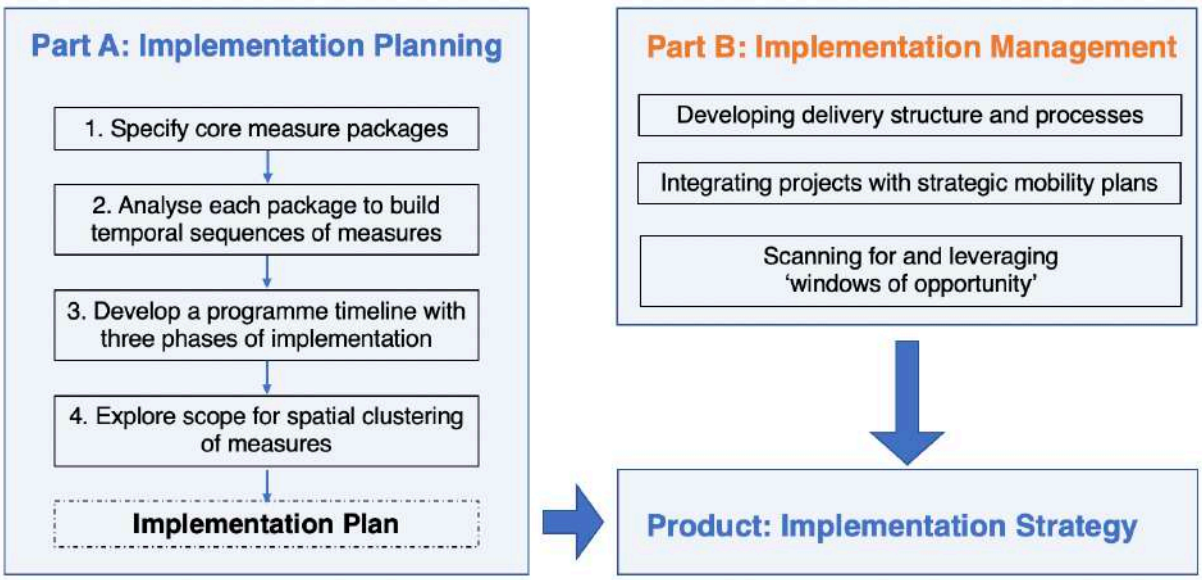


Figure 6.2: Overview of the Implementation Strategy concept.

6.3 Part A: Implementation planning

6.3.1 Step 1: Specifying core measure packages

The first step of developing an Implementation Strategy is to specify the measures to be implemented as holistic packages of the most important 'core' measures and 'supporting' measures that provide positive synergies or make the implementation of the core measure technically/practically feasible.[75] The end result is a set of several 'core measure packages', each with its own set of supporting measures (Figure 6.3).

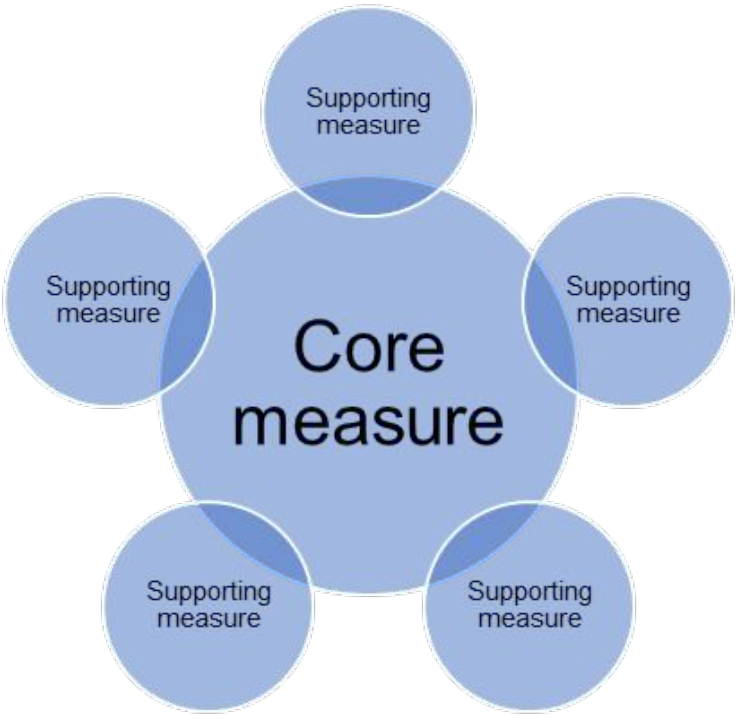


Figure 6.3: A core measure package.

Step 1 involves three activities:

- Defining individual core measures
- Identifying supporting measures
- Finalising core measure packages

[75] In other approaches to packaging, such as that of Givoni et al. (2013) and EU Urban Transport Roadmaps (de Stasio et al. 2016), 'core' measures are referred to as 'primary' and 'supporting measures' as 'ancillary'; however we think our terms are self-explanatory.

Defining individual core measures

A core measure is one of the 'key' or most significant urban mobility measures to be implemented in a city.

Starting points

If a city has developed a SUMP, measures will already have been subject to careful consideration and described in some detail to enable appraisal, and then incorporated into integrated measure packages seeking to provide a balanced mix of measure. Thus, where a SUMP already exists, then the core measures for an Implementation Strategy can simply be defined by analysing what the 'key' measures are within finalised measure packages (defined in Step 7 of the SUMP cycle) – cities will have an intuitive feel for what the most significant planned interventions are.

But where a city has started by developing a Transition Pathway (Chapter 5), then Step 3 of the process has only defined policies at a broad level, to form a policy mix for the achievement of long-term objectives and targets. In that case, the chosen policy mix will need to be analysed investigated to describe policies in greater detail, to arrive at a proper definition of core *measures.* Guidance regarding this is provided below.

If there is neither a SUMP, Transition Pathway nor a description of policies in another type of urban mobility plan, then cities can draw on the extensive EU guidance available on how to consider options for and select sustainable urban mobility measures.[76] Measures can then be defined in greater detail following the guidance below.

How to define core measures

Each significant urban mobility policy intervention that is planned should be described with more precision and in greater detail. For example, a high-level policy to 'restrain car use' might be achieved through a variety of core measures, including:

- Physically restricting road access to some areas (e.g. by closing some roads or reducing the number of traffic lanes; or using traffic signals to limit capacity)
- Regulating access for some groups to certain parts of the city (e.g. access for buses, delivery vehicles and residents only), or
- Charging for driving around or parking in certain areas of the city.

[76] See KonSULT Measure Option Generator, SUMPs-Up measure selection manuals, EU Urban Transport Roadmaps, CIVITAS Urban Mobility Tool Inventory.

Figure 6.4 illustrates the various design parameters and options that need to be considered when developing the core measure ‘congestion charging scheme’ (Kocak et al. 2005). Each column represents one design parameter (e.g. area of coverage, hours of operation) and beneath that are the various options (e.g. whether it is the vehicle or the occupant who is charged). The shaded boxes describe the choices that were made for the Central London Congestion Charging scheme, first introduced in February 2000.

Appraisal of core measures

When refining policies into core measures, some form of scheme appraisal on the different options will be necessary. This might be based on a range of criteria, from selecting schemes that best meet political objectives, to carrying out a cost-benefit analysis, or a multi-criteria analysis. The SUMP Guidelines (Activity 7.2) provide further guidance on appraisal. External funding is likely to be required to implement the larger schemes (e.g. from national governments or through the EIB or EBRD) and for these schemes the required appraisal procedures are well documented.

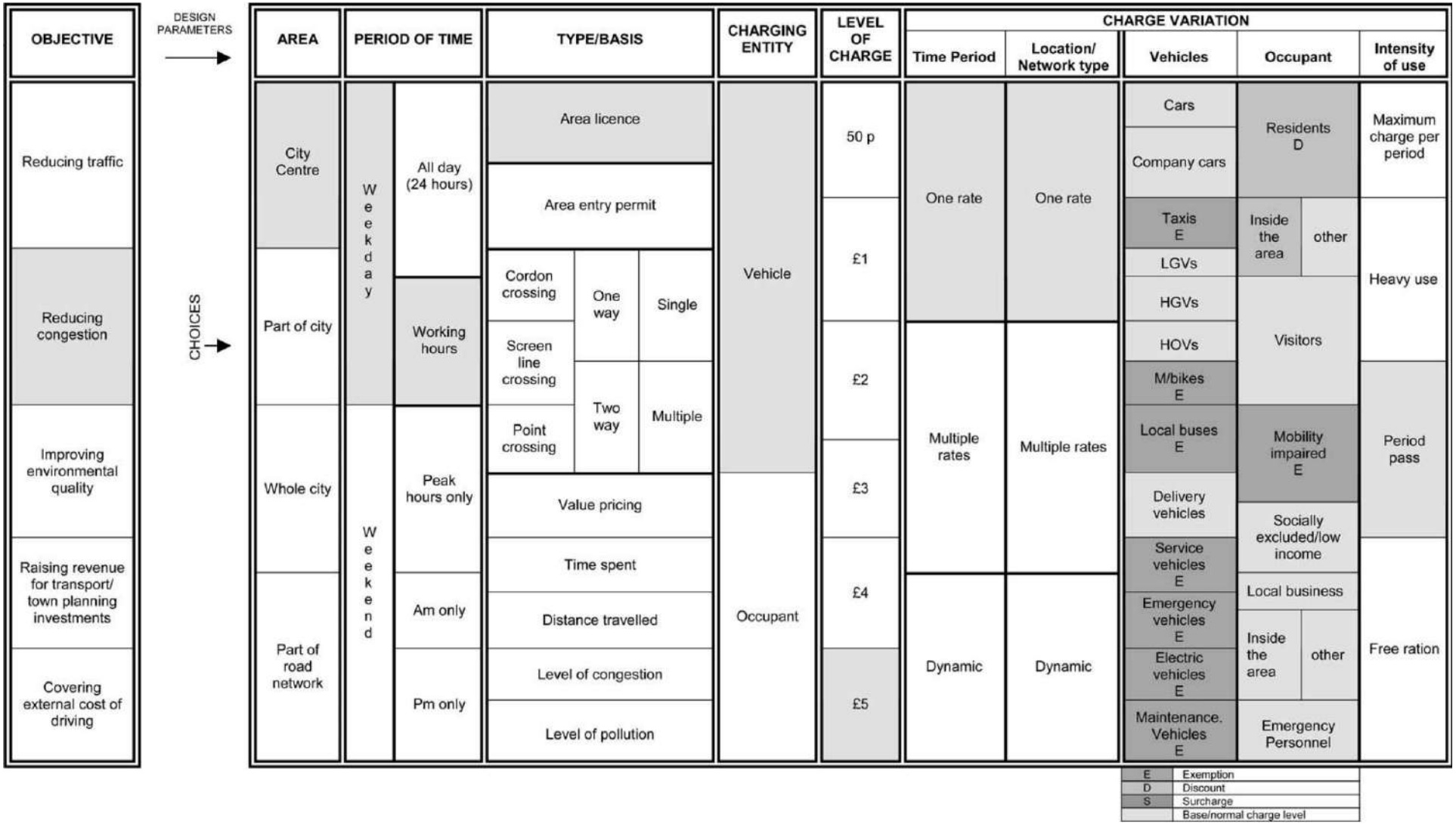


Figure 6.4: Potential components of a congestion charging scheme (features of London scheme shown shaded). Source: Kocak et al. (2005).

Identifying supporting measures

Most 'core' measures are likely to benefit from the introduction of a number of 'supporting' measures that make implementation technically/feasible possible, or that provide positive synergies by enhancing the effectiveness of core measures. An example of a 'core measure package' consisting of one core measure and several supporting measures is provided in Figure 6.5.

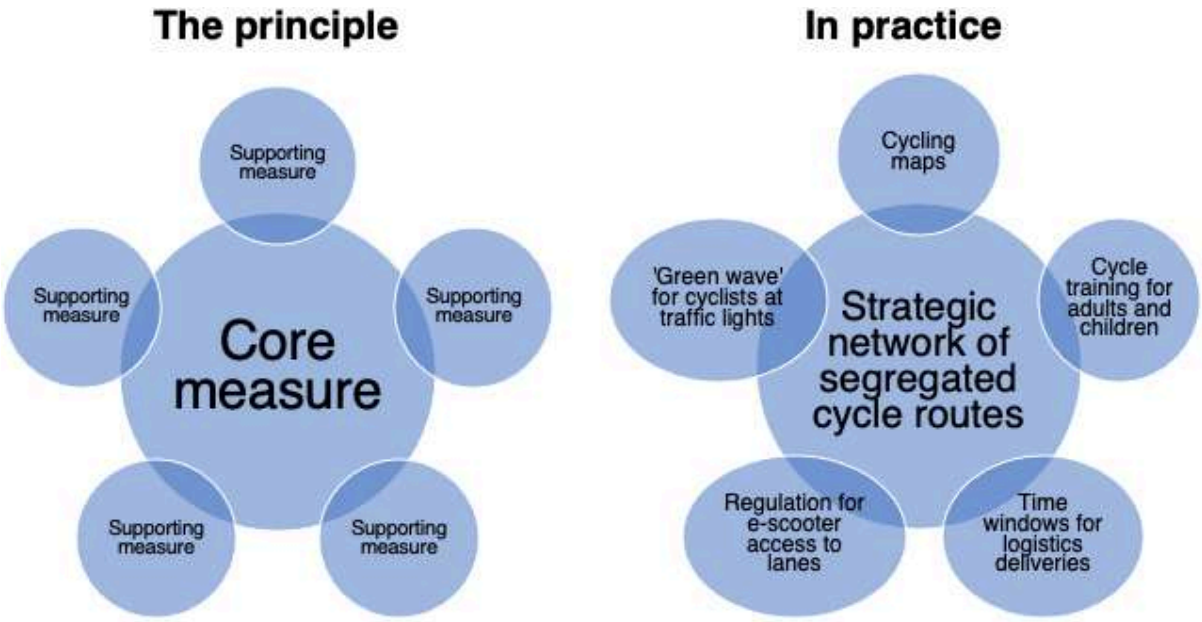


Figure 6.5: Application of the concept of a 'core measure package', using an example of a 'strategic network of segregated cycle routes' as a core measure.

For each core measure, several supporting measures can be identified. Figure 6.6 below illustrates an example of a new higher-quality bus service (e.g. 'Bus with High Level of Service') as a core measure.[77] The core measure itself might include priority bus lanes, and branding of buses and shelters to raise the status of the service.

[77] Bus with High Level of Service (BHLS) is defined as a "a bus-based system, clearly identified, that is an element of the primary public transport network. It offers to the passenger a very good performance and comfort level, as a rail-based system, from terminus to terminus at station, into vehicle and during the trip" as defined by the EU COST Action on BHLS (Finn et al. 2011, p.20).

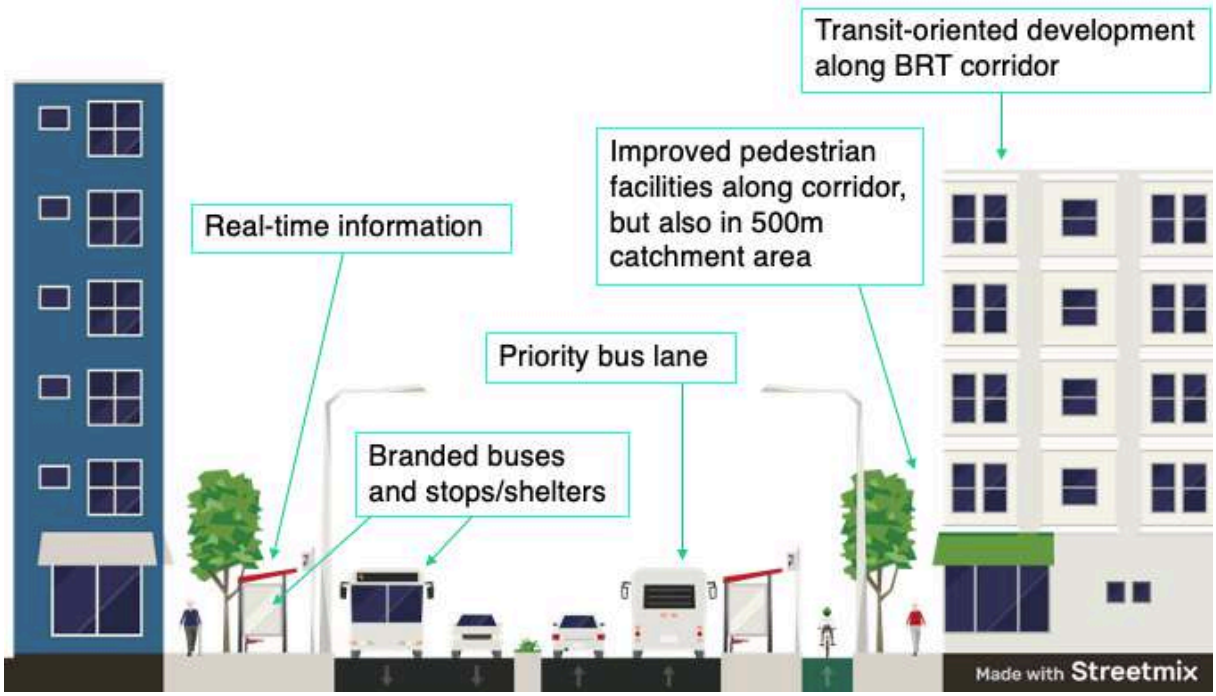


Figure 6.6: Illustrative example of 'supporting measures' to enhance the effectiveness of a core measure 'Bus with High Level of Service'.

Possible supporting measures include:

- Improving pedestrian facilities along the bus corridor and in the catchment area, which will allow people currently cut off from public transport to reach bus stops.
- Real-time information displays at bus stops, and planning regulations to encourage transit-oriented development along the corridor.

Figure 6.7 (next page) presents a matrix developed within the SUMP-PLUS project, that cities can use as a simple tool for brainstorming and identifying supporting measures.

The rows of the matrix describe four types of policy measures (physical, pricing, regulation and information) and the columns six areas of implementation (from public/collective transport to land use and public space). In this example, the core measure is 'Bus with high level of service' and the components of the core measure ate to be found under the four rows of that column. Then the rest of the matrix can be used to consider what other measures might support successful implementation of the core measure, within each of the other cells. The matrix is designed for generating the widest range of options for supporting a core measure – it is unlikely in practice that every 'cell' would be included in a measure package.

Core measure: Bus with High Level of Service

Components of 'core' measure
Potential 'supporting' measures

TYPE OF MEASURE	CORE MEASURE	SUPPORTING MEASURES				
	Public/ Collective transport	Walking/ Cycling/ Micro-mobility	Private vehicle ownership/use	Urban Freight and Logistics	Traffic/Kerbside Management	Land Use and Public Space
Physical (infrastructure, operations)	• Bus lanes and signal priority • Bus shelters and seating • CCTV to improve on-board safety	• Improved infrastructure in bus stop catchment area; • Safer crossings to stops	• Park & Ride provision at key stops/interchanges	• E- lockers at major bus interchange	• Kerb build-outs and raised platforms at bus stops to enhance boarding	• Concentrate development around major interchanges • New public spaces
Pricing (fares, charges, incentives)	• Payment system with pre-boarding or quick on-board payment				• Higher parking charges in the city centre	
Regulation (space, time, type)	• Electric vehicles • Low-floor buses	• Designate cycle and e-scooter parking spaces close to bus stops	• Designate city centre as ultra-low emission zone	• Time windows for kerbside goods deliveries along routes	• Camera-based enforcement of bus lanes • Restrict parking along bus corridors	• Planning for provision of health and library services close to bus interchanges
Information (ICT-enabled, marketing)	• Dedicated website • Real-time information displays at bus stops	• On-street signage to bus stops	• Campaign targeting car commuters to switch to bus	• Awareness campaign about bus lane rules		

Figure 6.7: SUMP-PLUS matrix that can be used to identify potential 'supporting measures' to be packaged with a core measure. Here illustrated with the core measure of 'Bus with High Level of Service' as an example.

Another way to identify synergistic supporting measures is to *draw on evidence regarding combinations that are effective in changing travel behaviour* – see Box 6.1 for examples different ways in which this might be done.

Box 6.1: Evidence on measure combinations that are effective in changing travel behaviour

- Research on the factors determining people's travel behaviour – why people make the travel choices they do, e.g. using specific modes for specific types of trips – offers insights into effective combinations of core and supporting measures. Many of these are summarised in the UK Department for Transport's Behavioural Insights Toolkit, which provides guidance on how to design policies that effectively change travel behaviour.[78]
- Rational choices, travel experiences and cultural factors. Individual travel choices are based on (i) rational factors like cost and travel time, but also (ii) perceptions regarding aspects of the journey experience such as comfort and safety, and (iii) perceptions of status and individual identity, e.g. driving or cycling might be a lifestyle choice linked to how individuals see themselves or how they think they will be seen by others.[79] Effective core measure packages can integrate different supporting measures addressing all three types of factors.
- Commonly-cited principles for effective measure combinations include integrating 'soft' and 'hard' measures, which captures the concept of enabling individual travel choices through both 'hard' infrastructure (e.g. cycling path) and 'soft' measures targeting behaviours (e.g. cycling map)
- This can be complemented with the 'three elements' perspective of materials, meanings and competences. Materials includes infrastructure, but also equipment and facilities, e.g. access to a bicycle, showers and lockers at the workplace; meanings includes social norms, but also cultural representations e.g. image of cyclists in the media; competences refers to people's skills, e.g. ability to ride a bicycle.[80]
- Education, enforcement and engineering is a principle developed in relation to road safety: achieving safer behaviour of road users through greater awareness (e.g. education about driving in bus lane), regulations and their enforcement (e.g. speed cameras), and better design of vehicles and infrastructure (e.g. traffic calming measures, signage).

[78] DfT (2011). *Behavioural Insights Toolkit.* Social Research and Evaluation Division, UK Department for Transport. Available at: https://www.gov.uk/government/publications/behavioural-insights-toolkit.
[79] See Anable and Gatersleben (2005).
[80] Following social practice theory (Shove et al. 2012, Watson 2012), see DfT (2011) Behavioural Insights Toolkit for an easily-accessible overview.

Finalising core measure packages

To complete Step 1, an overview description – for example, a list – of core measure packages can be assembled. In line with the general structure in Table 6.2 below, this includes several core measure packages, each consisting of one core measure and several supporting measures.

Core measure package	Core measure	Supporting measures
Package 1 – title [short description]	Core measure 1	Supporting measure 1.A
		Supporting measure 1.B
Package 2 – title [short description]	Core measure 2	Supporting measure 2.A
		Supporting measure 2.B
		Supporting measure 2.C

Table 6.2: Illustrative example of a final list and overview of core measure packages.

6.3.2 Step 2: Analyse each package to build temporal sequences of measures

Once the set of core measure packages has been defined, the next step is to determine how implementation will be phased over time. This is referred to as 'temporal sequencing' – in what order, measures and other actions will be taken.

Figure 6.8 below illustrates the temporal sequencing of one core measure package, where the order of actions to be taken is defined in relation to a core measure, including both implementation of *supporting measures* and *enabling actions;* the latter refer to institutions or financial resources that are necessary to enable measure implementation (see step 6 of the Transition Pathway process, section 5.3.7, for a definition of the latter).

There are two factors to take into account for measure sequencing:

- *Pre-requisites that make measure implementation possible*: actions that have to be taken before other actions – 'what comes first' due to interdependencies
- *Strategic and pragmatic considerations* for 'what comes first'

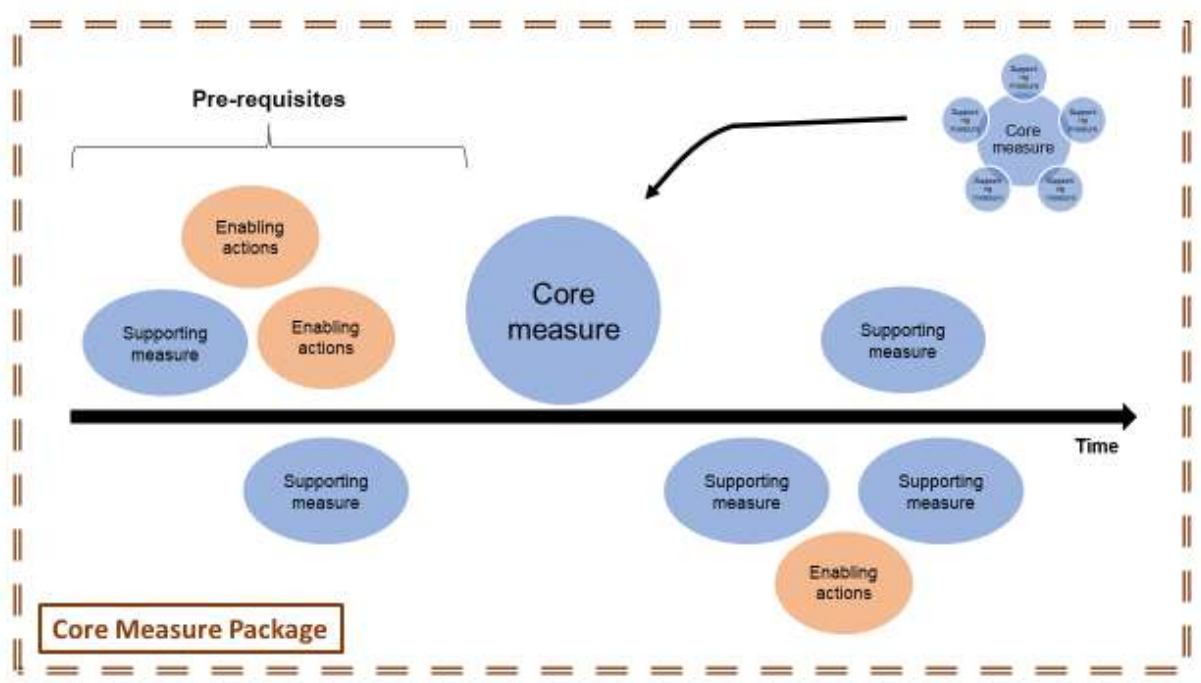


Figure 6.8: Temporal sequencing of a core measure package, including enabling actions and pre-requisite actions that have to be taken before implementation of a core measure.

Analysing pre-requisites: 'what comes first' due to interdependencies

Pre-requisites include both supporting measures (physical, pricing, regulatory, or information) and enabling actions (institutional, financial) that need to be implemented *prior to* implementation of a core measure – as marked in Figure 6.8 above.

- **Physical pre-requisites**, e.g. the need to widen a road to in order to implement a bus priority lane without removing general traffic capacity; or, to install electric charging points before encouraging local EV purchase. Some of these pre-requisites will include *supporting measures* identified within Step 1.
- Ensuring adequate **enforcement mechanisms** are in place for measures involving regulations, e.g. camera-based enforcement being available prior to implementation of bus priority lanes or speed limits.
- **Enabling actions** are actions that are necessary to enable implementation of policies, but are not measures in themselves. This includes actions to affect **institutional change** (e.g. new institutional capacities, modified institutional frameworks, acquiring new local powers) or **secure financial resources** through new funding and financing mechanisms. Step 6 of the Transition Pathway process (section 5.3.7) provides guidance on how enabling actions can be identified in relation to a policy mix. If a Transition Pathway has been developed, enabling actions relevant to measures that will be implemented during the timeframe of the Implementation Strategy can be 'imported' from the Pathway document. If a Transition Pathway has not been developed, a simplified version of Step 6 and 7 for identifying enabling

actions can be undertaken to identify enabling actions for inclusion in an Implementation Strategy, drawing on Figures 5.21 and 5.22.

Strategic and pragmatic considerations for 'what comes first'

In addition to the effectiveness-related considerations discussed above, measure sequencing can also be approached from a strategic and pragmatic perspective. Core and supporting measures can be analysed by considering the following factors:

- **Measure Maturity Level** – how mature is the measure (see Figure 6.9, next page)?
- **Cost of implementation** – is the measure potentially low-cost or inherently expensive? This includes considering whether initial implementation using temporary, low-cost materials is possible and appropriate (see section 3.3.4) and in general, trying to be creative in the face of resource constraints.
- **Feasible speed of implementation** – how quickly can the measure be implemented?
- **Reversibility and adaptability** (related to the path-dependency principle discussed in section 4.3.5) – how reversible or adaptable is the measure, once implemented? Can the measure be implemented as a temporary intervention (e.g. trial/pilot) or does it require relatively permanent intervention? Is it a measure that can be implemented with 'no regrets', or may it potentially create a path-dependency?
- **Public acceptability** – how controversial is the measure, is there sufficient political momentum for the measure to be implemented?

Some general, recommended principles for sequencing from a strategic and pragmatic perspective[81] *– somewhat in line with the idea of 'smaller-scale measures first' – are outlined in Figure 6.10 (next two pages).*

Indicative timing for each core measure package

Once the three factors described above have been considered, an indicative timeline for each core measure package can be constructed, following the general template provided in Figure 6.8. This will need to be adjusted once the implementation of this package is considered in relation to other core packages within the Implementation Plan. Information could be collated within an Excel spreadsheet, e.g. using Gantt charts to indicate sequencing.

[81] Partly drawing on EU Urban Transport Roadmaps, see Table 4.2.

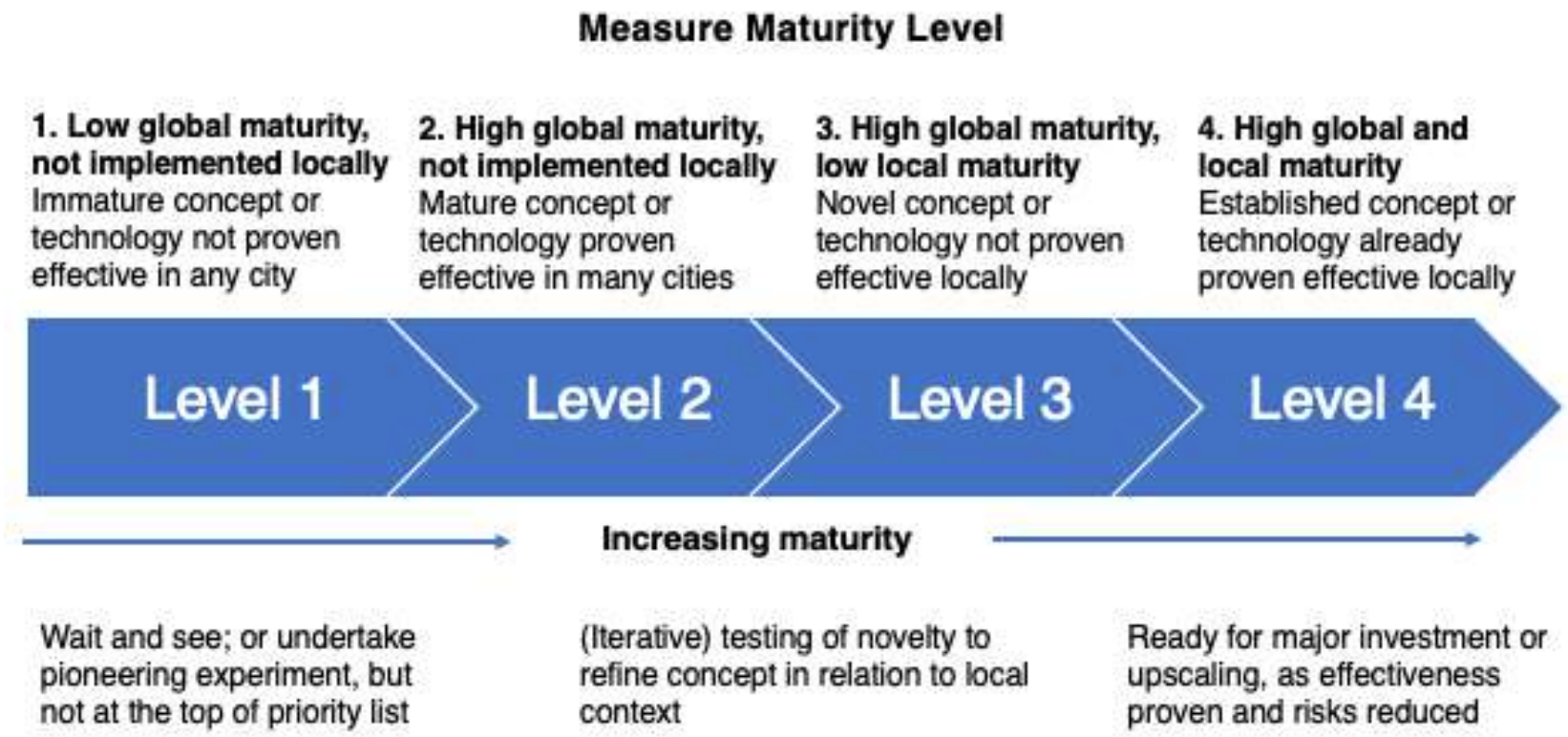


Figure 6.9: Framework for assessing Measure Maturity Level and relevant strategies to pursue. Source: developed by Emilia Smeds.[82]

[82] The Measure Maturity Level concept is a reinterpretation of the concept of 'Technology Readiness Level' that is commonly used within EU R&D funding programmes.

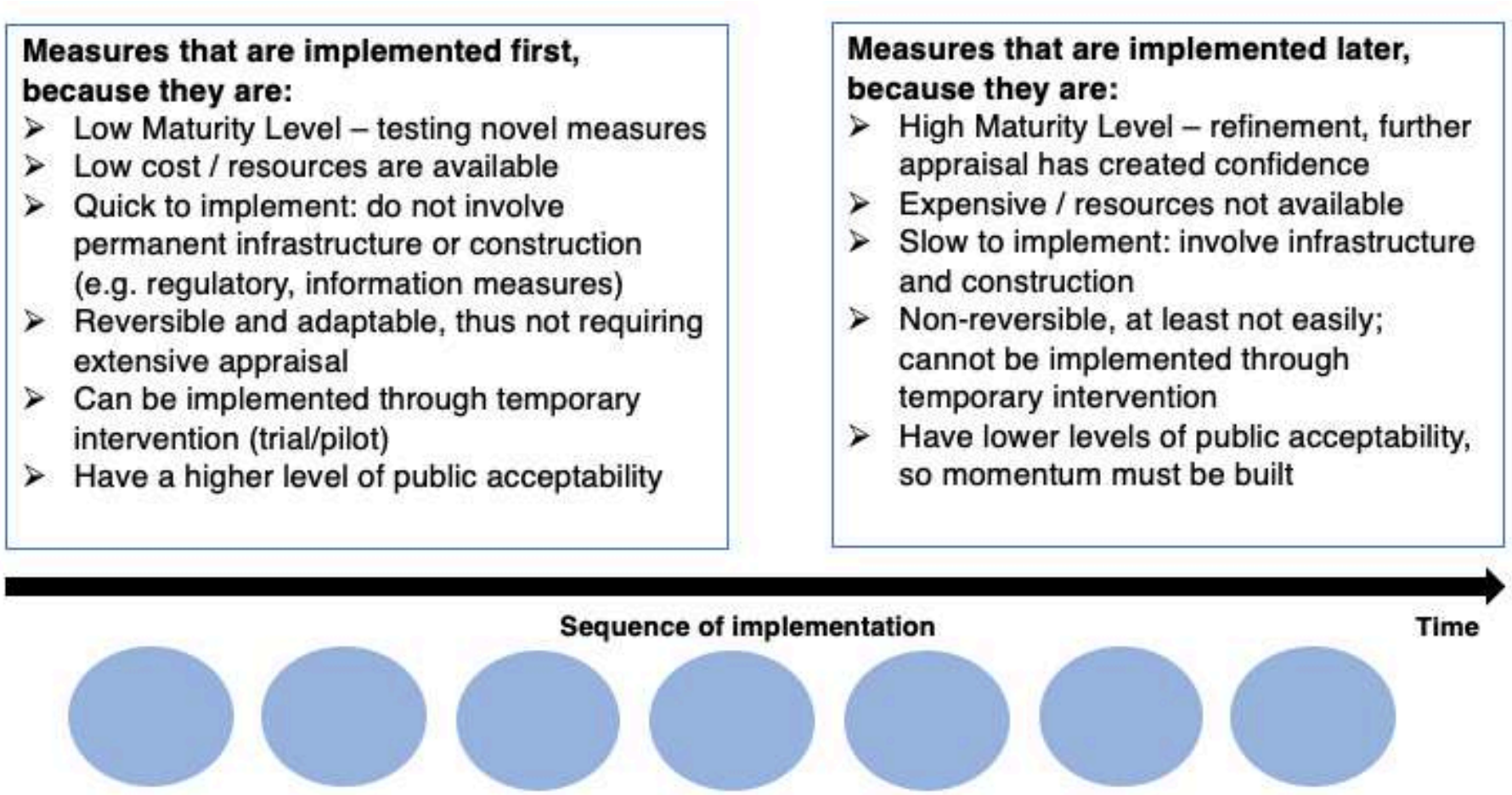


Figure 6.10: General principles for measure sequencing from a strategic and pragmatic perspective.

6.3.3 Step 3: Develop a programme timeline with three phases of implementation

Once the sequencing and indicative timing for *each* core measure package has been completed, the next step is to translate this into a *comprehensive* timeline of implementation, that includes the phasing for measures within *all* core measure packages. At this stage, implementation is also defined with respect to actual dates (months/years).

The Implementation Strategy concept and this Step is based on the guiding principle discussed in section 4.3.4– that accelerating implementation 'on the ground' through small-scale interventions and 'quick wins' builds public acceptability and momentum for change. It takes time for momentum for more radical policies to be built, so an implementation time period can start with 'quick wins' and evolve from there.

Three phases of programme implementation

Across the programme of core measure packages, we divide the 5 to 10-year implementation period into three phases, depicted in Figure 6.11 below:

I. **Quick wins[83] & experimentation** – an initial, shorter phase where momentum starts to be built through 'quick wins', and of testing new solutions/refining measure design through trials. This will include pre-requisites and smaller supporting measures that are quick to implement. Activities to prepare for Phase II will also need to be undertaken, e.g. planning of major projects.
II. **Build & upscale** – a 'middle', longer phase where larger-scale (typically 'core') measures and investments, that have taken more time to prepare for, are implemented, including physical construction of infrastructure. During this phase, measures that were tested in Phase I are either integrated into core measure design or upscaled. Momentum continues to build, as significant new travel options are made available to people in the city. Implementation of 'quick win' measures may continue, if available.
III. **Consolidate & leverage –** a final phase, where the focus is on consolidating what has been achieved through further enhancing effectiveness of measures, including synergistic supporting measures. This includes in particular information-oriented

[83] We use 'quick wins' to refer to smaller-scale measures that have the potential to deliver moderate but concrete improvements in relation to local objectives and targets, which are quicker, less controversial – and often less expensive – to implement than major investments or radical policy changes (e.g. strong constraints on car use). The accumulation of such small and quick wins can result in significant change over time, to complement other types of intervention (e.g. larger-scale infrastructure) and can have a positive 'demonstration' effects.

measures seeking to promote new infrastructure and services implemented in Phase II. The momentum that has been built is leveraged to implement measures that were controversial initially. Towards the end of the period, built-up momentum allows for a push towards a more radical change in policy, resulting in achievement of an ambitious policy milestone or interim target.

Preparatory institutional and financial 'enabling actions' are also undertaken prior to each Phase, to make measure implementation possible.

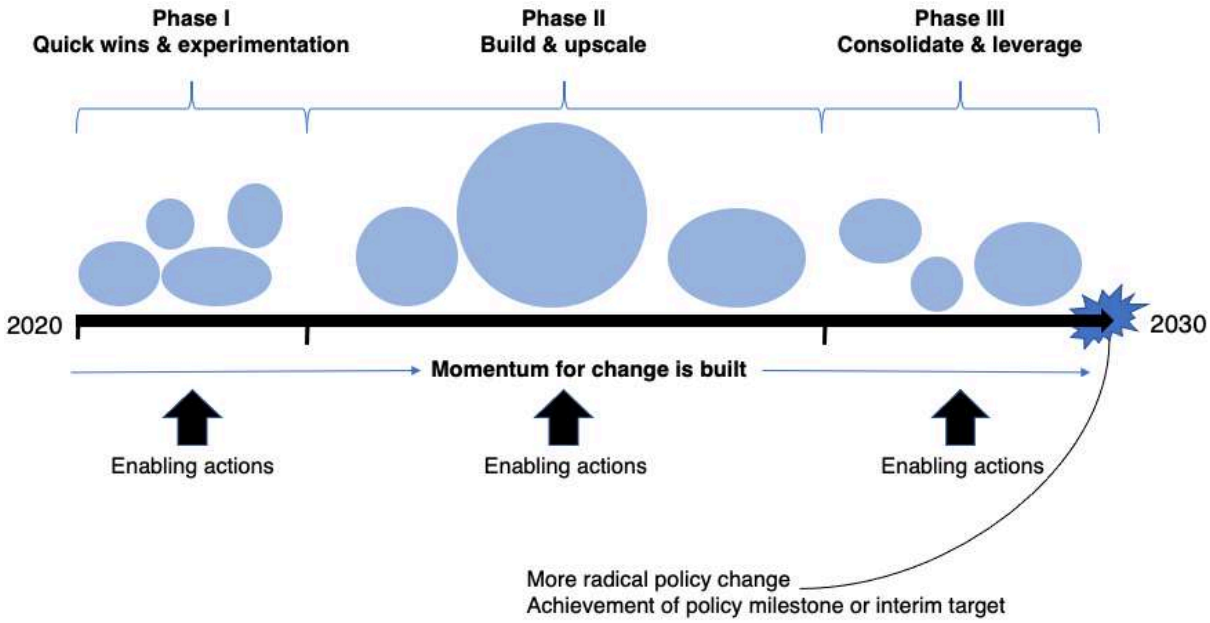


Figure 6.11: Proposed three phases for a programme implementation timeline.

Figure 6.12 (next page) illustrates an aligned implementation timeline for three core measure packages (i) 'electric vehicle (EV) charging and sharing network', (ii) 'Bus with High Level of Service' and (iii) 'strategic cycling network'. The timeline culminates in a policy milestone of achieving sufficient emission reductions from mobility in the city, to meet the relevant contribution to EU 2030 climate targets (or the city's Covenant of Mayors target).

Figure 6.13 (page after next) provides a more detailed schematic illustration of timelines for a programme of core measure packages, showing that:

- Some core measures will be preceded by testing of different elements through trials/pilots and demonstrations with subsequent upscaling and/or integration of elements into core measures;
- Some core measures will benefit more than others from a comprehensive set of supporting measures; and necessitate more pre-requisite supporting measures and enabling actions.
- Some core measures might benefit from being introduced at the same time – illustrated by Core measure 1 and 2 (e.g. opening of a new Bus with High Level of Service system and city centre parking restrictions).

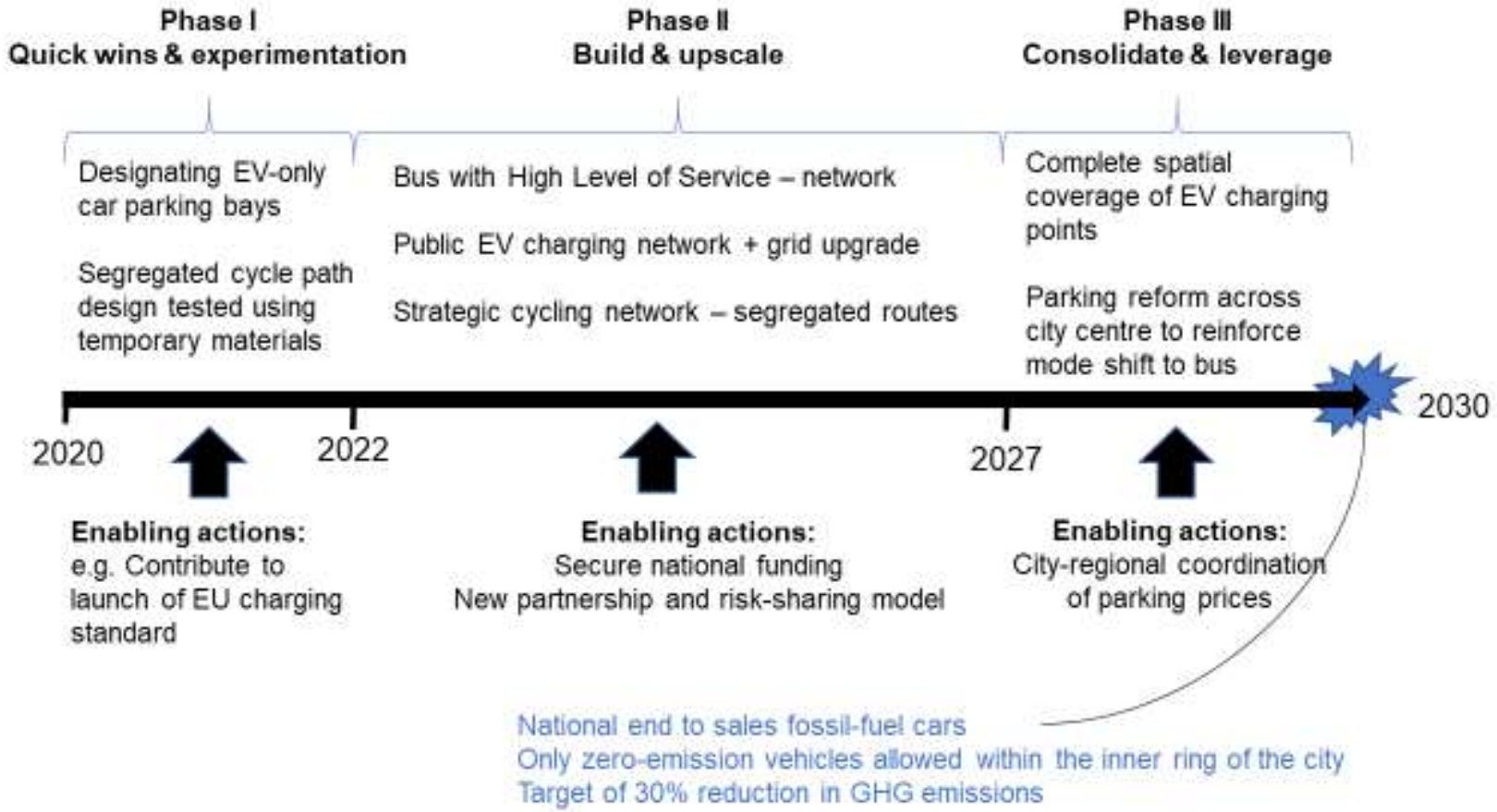


Figure 6.12: Example of a comprehensive Implementation Timeline for a programme of several core measure packages.

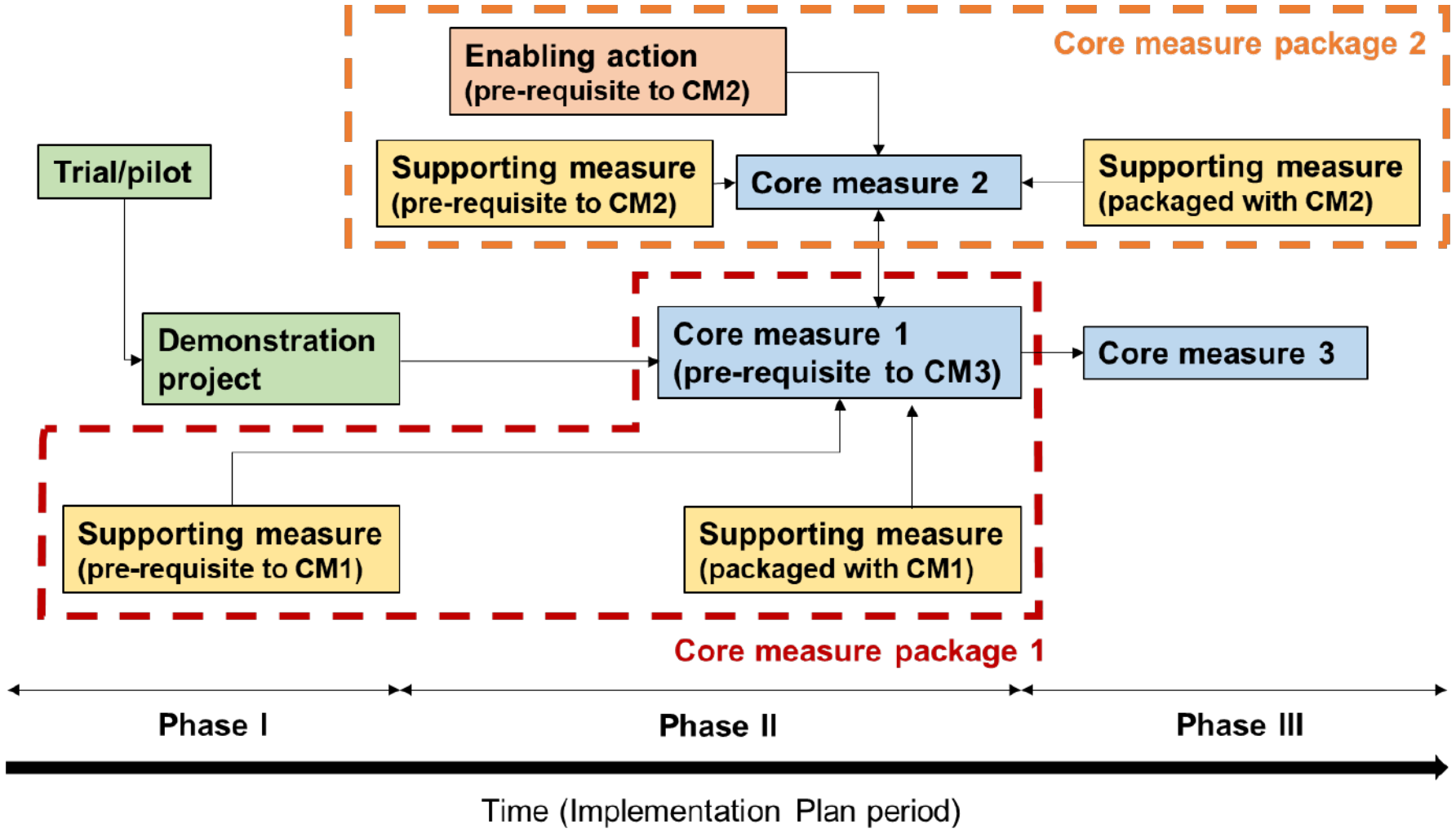


Figure 6.13: Example of an Implementation Timeline for a set of core measure packages, with different requirements.

Lead and lag times in relation to major schemes

When planning implementation timelines for major schemes, it is necessary to recognise the lengthy time periods involved, not only during the actual implementation stage, but also during the preparatory stages (including ensuring that *enabling actions* have been taken) and in the post-implementation stage. These time periods can span several Implementation Plan periods.

Figure 6.14 summarises the type of preparatory tasks that may need to be carried out in the case of a major scheme, including enabling actions such as necessary legislation and governance arrangements – resulting in 'lead' time.

There might also be issues following on from implementation resulting in 'lag' times. There may be ongoing net running and maintenance costs and, at some point, major renewal and reconstruction costs, at the end of the measure's design life. The latter are rarely planned for and can result in major physical infrastructure being closed, for safety reasons. In the case of major urban rail projects, the various stages of planning and design, and associated approvals, can take a decade or more.

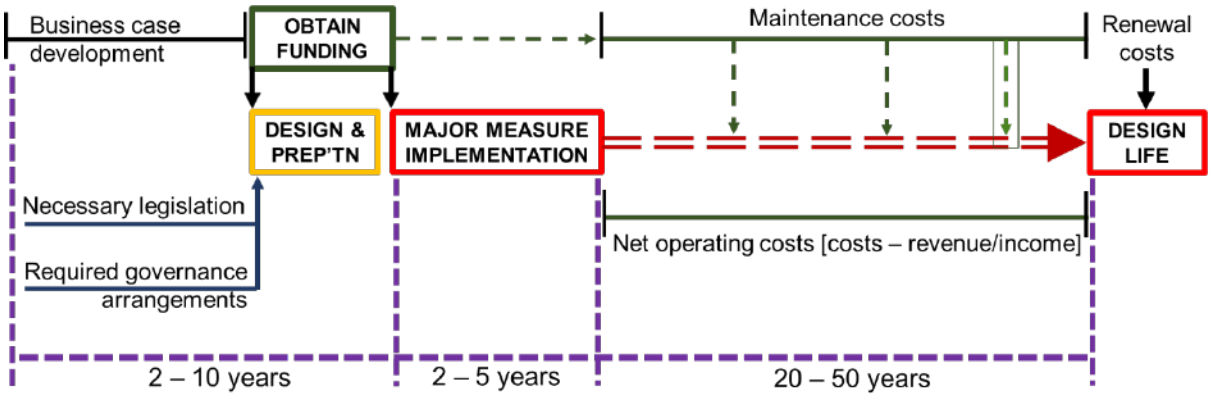


Figure 6.14: Time taken to implement and manage a major scheme, with lead and lag times.

6.3.4 Step 4: Explore scope for spatial clustering of measures

Once implementation has been planned over a time period, a further step is to explore implementation in relation to urban space, by considering the scope for spatial clustering of different measures. A cluster means a group of similar things positioned or occurring closely together. Spatial clustering will definitely apply to a core measure and its supporting measures, but clustering of different core measures might also be relevant.

Some measures naturally apply across a whole administrative area (e.g. revised fare tariffs for public transport), but most are implemented in specific areas, even where they are planned as part of an extensive programme.

Aspects to consider

There are four spatial aspects to consider:

- What are the appropriate spatial units for implementation?
- How are priority areas for implementation selected?
- What benefits can be derived from spatial clustering of measures?
- How to manage spatial roll-out, over time?

Each is considered, in turn, below.

Spatial units for implementation

The type of spatial unit used for implementation will depend on the type of core measure, but relevant units include (see Figure 6.15):

- Networks: for rail, bus or cycle infrastructure
- Corridors: e.g. for bus priority schemes or ‘green waves’ for smoothing traffic flow
- Zones, usually based on technical criteria, to address a specific problem: controlled parking or low emission zones, low speed limit zones

For example, for a core measure of bus service upgrades, this could be achieved through a network approach, a corridor approach; or by focussing on introducing low-emission vehicles within a particular zone.

Other types of spatial approaches include:

- Neighbourhoods: for community-level initiatives, such as the Barcelona ‘superblocks’, or low-traffic neighbourhoods (e.g. Walthamstow ‘Mini-Holland’ in London)

- ‘Acupuncture’ spots: small interventions dotted around a city, such as the development of public spaces through dispersed intervention, ‘shaving off’ vehicle road space for reallocation to public life. Examples include Design for London’s 100 Public Spaces programme and the New York City Department of Transportation’s Public Plaza Program.

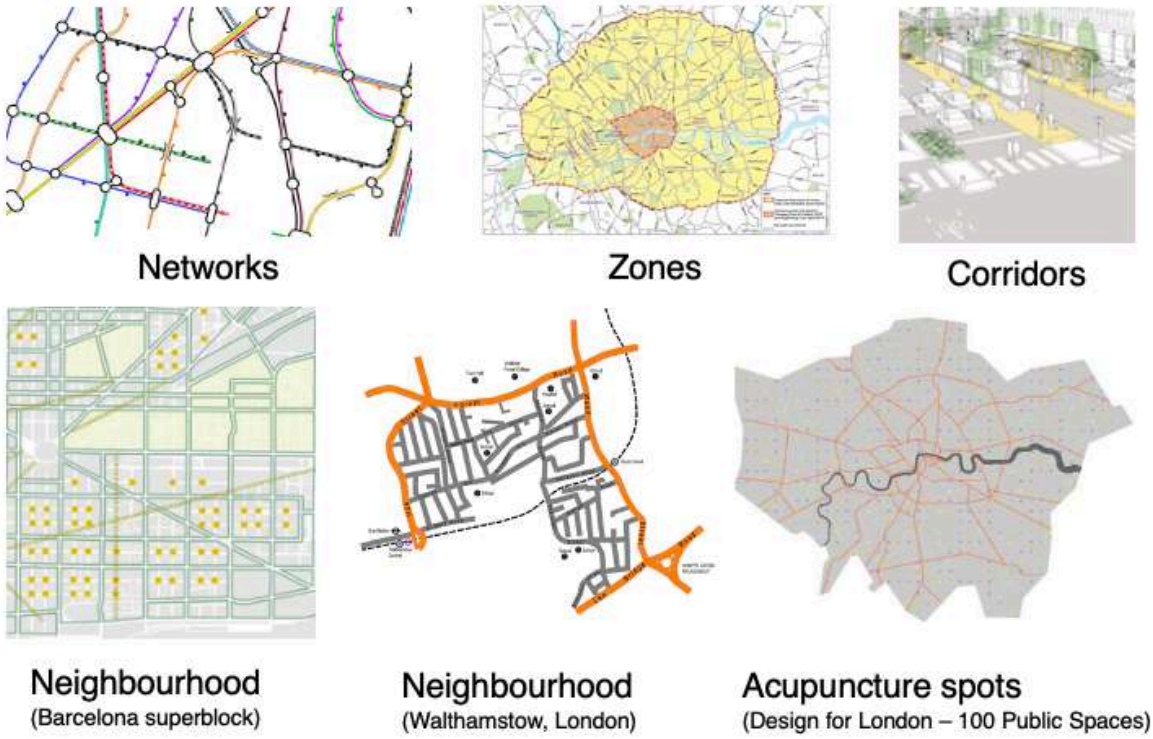


Figure 6.15: Different types of spatial units for measure implementation.[84]

Selecting priority areas for implementation

Areas selected for early implementation are chosen for a variety of reasons, including:

- A city-wide hot-spot analysis of problems that need addressing, such as accident black spots, areas with severe air quality exceedances
- Areas where infrastructure is in poor condition (e.g. pedestrian footways and crossings)
- Areas identified for attention or development in development plans or neighbourhood plans

[84] Images © NACTO (corridors); Ajuntament de Barcelona, Urban Mobility Plan of Barcelona 2013-2018 (superblock); Walthamstow Borough Council; Design for London.

- Likelihood to have the greatest positive impact, in terms of size or improvement and/or numbers of people who benefit; or based on a cost-benefit analysis of different spatial options
- Funding being available in a particular area (e.g. to mitigate multiple deprivation) for a major trial, pilot or demonstration project
- Ease of implementation (physically, politically, etc)
- Political/equity requirement to introduce something in each part of the city

Spatial clustering of measures

One aspect to consider carefully is the *clustering of core measures*, by considering where there might be spatial synergies between them. For example, city centre congestion charging might be complemented by bus priority measures on corridors leading to the city centre, in order to provide existing car commuters with a fast, attractive modal alternative.

This approach can become quite sophisticated. For example, at the time of the introduction of the London congestion charge, it was anticipated that longer distance car commuters would be more attracted to travel by rail than bus, but the rail services were already at full capacity as they approached central London; so inner London bus services were improved to attract some existing shorter distance rail users to switch, thereby freeing up capacity for the displaced car commuters – a 'cascade' effect.

A more common aspect to explore is the *clustering of supporting measures across space*, with their associated core measure, as supporting measures will often be co-located with core measures, to provide synergies or necessary supporting interventions.

Figure 6.16 illustrates how a core measure and supporting measures may be spatially clustered:

- The core measure involves a new BRT corridor to encourage modal shift from car trips.
- Supporting measures within the BRT measure package are aligned along the corridor. The surrounding district has a poor walkability score, and thus supporting measure I, improved pedestrian facilities within the bus stop catchment areas, is delineated as a zone (catchment area) around the corridor. Supporting measure II encourages multimodality by providing high-quality cycle parking facilities along side streets adjoining bus corridor stops.

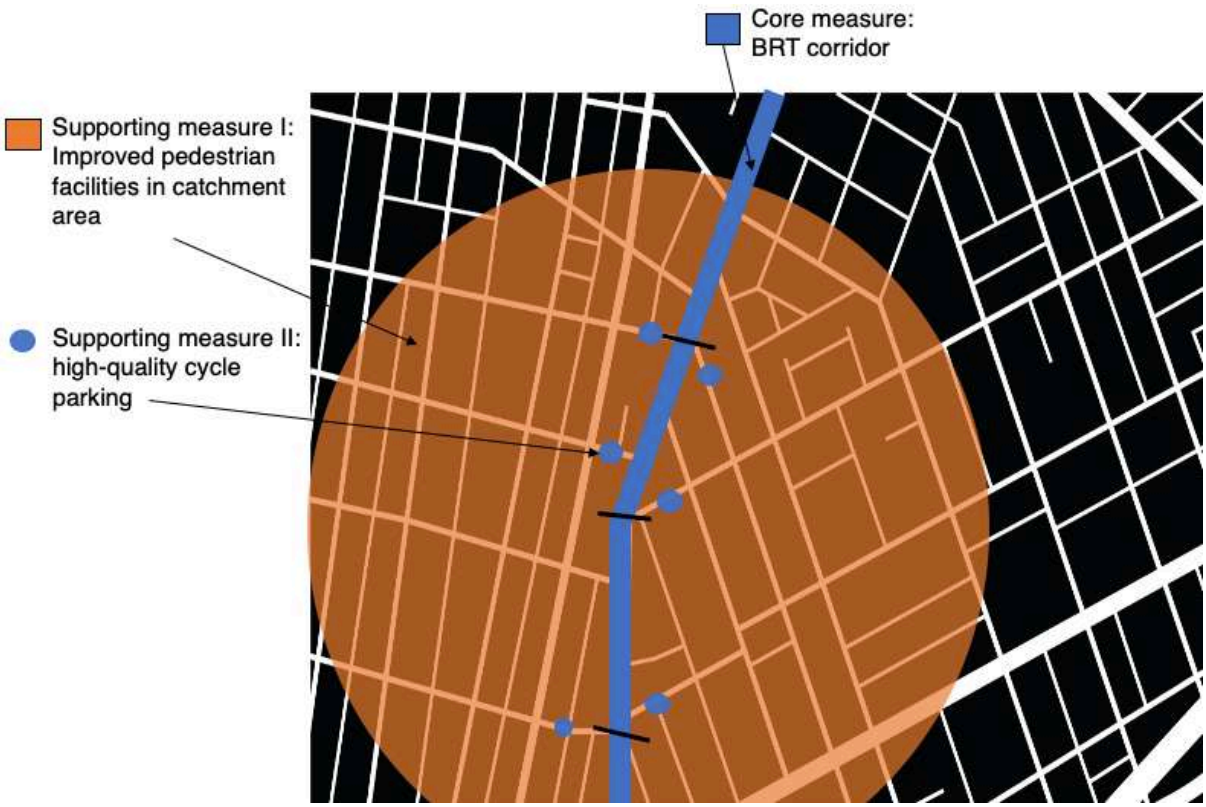


Figure 6.16: Example of spatial clustering of a BRT core measure, and two supporting measures.

Creating a visual overview of implementation: integrating temporal and spatial dimensions

City masterplans or spatial strategies often include a map of existing or new major transport connections, e.g. network of routes (public transport, streets, cycle paths) in relation to land uses and key destinations. However, many strategic urban mobility plans (including SUMPs) often remain weaker in their spatial articulation compared to the technical dimensions of the various measures, and do not present a clear spatial overview of where the various core measure packages will be implemented.

Creating a series of maps and diagrams that provide a clear visual overview of what areas of the city, or using what spatial units, your measures will be implemented, will add value to your Implementation Strategy. It will be particularly useful to provide a **clear picture of how the Implementation Plan will be rolled out, over time.** Figure 6.17 below illustrates how temporal sequencing/phasing and spatial clustering can be brought together, to provide a valuable overview of the Implementation Plan.

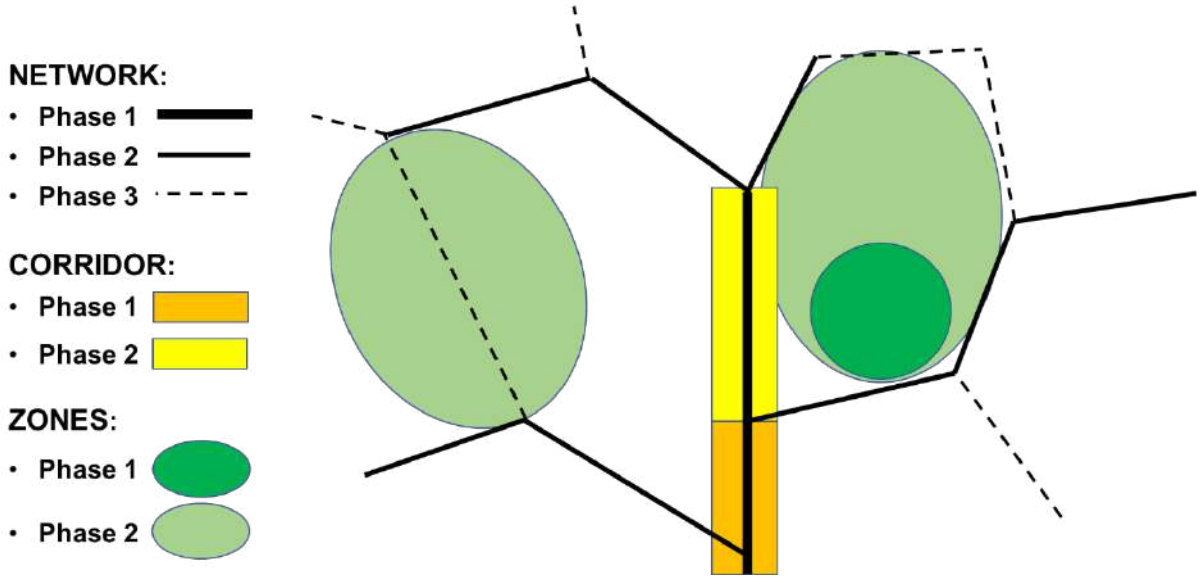


Figure 6.17: Illustrative overview of an Implementation Strategy, by integrating temporal phasing and spatial clustering dimensions.

6.3.5 End product: Implementation Plan

The end product of the Part A process is an Implementation Plan, containing:

- a list of core measure packages (mirroring Table 6.2);
- an implementation timeline (mirroring Figure 6.12); and
- a spatial overview of implementation (mirroring Figure 6.17).

For a real-life illustration of an implementation timeline, see Box 6.2 below describing the Municipality of Klaipeda's (Lithuania) – a SUMP-PLUS city partner – implementation timeline defined in relation to the city's SUMP.

Box 6.2: Klaipeda's SUMP implementation timeline

Klaipeda adopted its first SUMP in 2018, which included an implementation timeline created in Microsoft Excel displayed in Figure 6.18. The timeline lists all the measures included in the SUMP that address the city's three core aims: (i) provision of high-speed public transport, (ii) promotion of non-motorised movement, and (iii) sustainable car traffic.

All measures are listed under headings of measure packages, followed by columns for 'beginning of implementation' (year), duration (years) and a Gantt chart of the implementation timeframe between 2018 and 2030, where the first three years are identified as an initial implementation period.

This document provides a visual overview of the city's ambitions and the timing of measures. A starting point for the co-creation of an Implementation Strategy with Klaipeda within the SUMP-PLUS project is to further analyse and unpack on what criteria or guiding principles have informed this timeline, to understand and potentially refine the sequencing and timing of different elements of the measure packages.

SUMP of Klaipeda implementation timeline

Note: The recommended start-up and duration of implementation is indicated preliminarily, based on expert judgment and experience in implementing similar projects.
Įgyvendinimo planas gali būti keičiamas atsižvelgiant į įgyvendinančių institucijų poreikius.

Puspose	Task and measure	Beginning of implementation	Duration (year)	Implementation (year) 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
1. HIGH-SPEED PUBLIC TRANSPORT	**1.1 Implementing rapid, eco-friendly public transport system**			
	1.1.1 Preparation of rapid, eco-friendly public transport feasibility studies and related projects	2018	3	
	1.1.2 Implementation of rapid, eco-friendly public transport infrastructure (Alternative I - fast, separated buses)	2021	4	
	1.1.3 Implementation of rapid, eco-friendly public transport infrastructure (Alternative II - tram)	2021	4	
	1.1.4 Purchase of high – speed adapted vehicles (Alternative I - fast, separated buses)	2024	2	
	1.1.5 Purchase of high – speed adapted vehicles (Alternative II is tram)	2024	2	
	1.1.6 Optimization of suburban and main urban public transport routes by adapting the network to the rapid,	2025	1	
	1.2 Improving the comfort and quality for public transport users			
	1.2.1 Adaptation of schedules and routes for urban and suburban public transport	2018	13	
	1.2.2 Installation and renewal of public transport light boards and informational boards in Klaipeda city	2018	3	
	1.2.3 Public transport integration system equipment purchase and renewal (bus and route taxi)	2018	3	
	1.2.4 Public transport fleet renewal (purchase of buses)	2018	2	
	1.2.5 Installation and renewal of public transport stops	2018	13	
	1.2.6 Preparation of a technical project regarding public transport lanes marking and labelling	2021	1	
	1.2.7 Marking and labelling of public transport lane network	2022	2	
	1.2.8 Study courses of safe and careful driving, customer service for public transport drivers	2021	10	
	1.3 Promoting inter-modality			
	1.3.1 Installation of combined travel links	2020	3	
	1.3.2 Interation of stations and ferries with the city's public transport system	2021	10	
	1.3.3 Pilot project: roll-out of a collective car journey system (carpooling)	2021	10	
	1.3.4 Publicity of interactive intermodal travel planning tools (web pages, mobile apps)	2021	10	
2. PROMOTION OF NON-MOTORISED MOVEMENT	**2.1 Old Town - for pedestrians, cyclists and disabled people**			
	2.1.1 Pilot projects: closing of streets for cars on weekends in the main streets of the Old Townеatvėse	2020	10	
	2.1.2 Technical project regarding the Old Town paving renovation	2018	2	
	2.1.3 Implementation of Stage I in renovation project of the Old Town paving	2019	2	
	2.1.4 The installation of parking places around the Old Town - preparation of technical projects	2022	2	
	2.2 Zones in the city without CO2			
	2.2.1 Installation of traffic limiting infrastructure around the Old Town (marking, road barriers, surveillance	2025	3	
	2.2.2 Installation of traffic limiting infrastructure around Smiltynė (marking, road barriers, surveillance cameras)	2028	3	
	2.3 Adaptation of New Town Centre for a non-motorized transport			
	2.3.1 Project preparation regarding the adaptation of the New City Centre for the non-motorized transport	2023	1	
	2.3.2 Project implementation of adaptation of the New City Centre for the non-motorized transport	2024	3	
	2.4 Promoting non-motorized transport in local centres			
	2.4.1 Renovation and installation of pedestrian paths	2018	3	
	2.4.2 Renewal and development of cycling paths in city district centres (local centres)	2021	10	
	2.4.3 Installation of traffic safety measures	2023	3	
	2.4.4 Installation of smart bicycle stands, helping people choose safe driving speed	2021	2	
	2.5 Promotion of cycling in the city			
	2.5.1 Installation of missing infrastructure sections (connections) for arterial and other bicycle paths.	2025	4	
	2.5.2 Installation of the main city cycling path network axis – bicycle highway	2023	2	
	2.5.3 Installation of network of the main city cycling paths *	2018	3	
	2.5.4 Installation of bicycle racks next to city attraction objects	2022	3	
	2.5.5 Installation of closed, locked bicycle storage facilities in residential areas, near the public and public serving	2021	4	
	2.5.6 Installation of bicycle technical inspection and quick repair stops (next to top attraction objects)	2025	3	
	2.5.7 Development of bike sharing system by installing bicycle parking points for shared bikes	2019	1	
	2.6 Enrichment of the urban environment			
	2.6.1 Installation and repair of access roads and pavements to budgetary institutions	2018	3	
	2.6.2 Trainings for public transport drivers to provide assistance to the SPE are held once a year	2021	10	
	2.6.3 Adaptation of all city traffic light junctions to people with visual impairment	2022	4	
	2.6.4 Installation of warning surfaces	2021	10	
	2.7 Urban environment and infrastructure management			
	2.7.1 Renovation of public spaces and natural territories	2018	3	
	2.7.2 Renewal of apartment house yards	2018	3	
	2.7.3 Reconstruction of underground pedestrian crossings	2018	2	
	2.7.4 Installation of security camera network at bus and railway stations and intermodal centres	2023	2	
	3.1 Implementing ITS tools			
	3.1.1 Implementation of coordinated traffic control system	2019	4	
	3.1.2 Installation of information exchange between cars and infrastructure sensors (vehicle-to-infrastructure)	2025	3	
	3.1.3 Establishment of a traffic management centre and purchase of the necessary hardware and software	2023	2	

Figure 6.18: Screenshot of a part of Klaipeda's SUMP implementation timeline.

See SUMP-PLUS website for more information on Klaipeda's ambitions: https://sump-plus.eu/city-labs/creating-a-sump-implementation-pathway.

Box 6.3 below describes a tool that is being developed within the SUMP-PLUS project, that will allow cities to keep their core measure packages and sequencing organised, over time. This Action and Budget Tracker can be linked to a starting point alike the measure list/timeline discussed for Klaipeda in Box 6.2.

Where possible, we recommend that cities involve their municipal GIS department in the development of the Implementation Plan. Linking the measure packages and implementation timeline to a spatial database that can be updated, is likely to be very useful – and will highlight potential synergies or conflicts (e.g. major disruption to two adjacent corridors at the

same time (one bus-related and the other cycle-related), being sponsored by different departments within the city authority.

Box 6.3: SUMP-PLUS Action and Budget Tracker

In working through the first two steps for developing an Implementation Strategy, described above, a lot of information has already been generated.

The Action and Budget Tracker being developed within the SUMP-PLUS project is a tool that will provide a structured format for this information, including core measure packages (e.g. as illustrated by Table 6.2), cost estimates and funding sources, enabling actions linked to measures, and sequencing of measures.

This will be available in MS Excel and is an open-source tool, that European cities can use to support development, monitoring and refinement of an Implementation Strategy or SUMP Action Plan. This will allow cities to 'stay on track' of implementation and turn the Implementation Strategy into a 'living document'.

Once existing and planned measures are encoded within a city's GIS system, it will be easy to have a complete picture of the city's Plan to meet its core objectives and targets. This can provide a lot of practical benefits, e.g. coordinating the timing of interventions to minimise streetworks and disruptions to mobility flows.

6.4 Part B: Implementation management

Once an Implementation Plan has been developed following the guidance in Part A, a number of institutional, political and financial issues still need to be considered.

Part B introduces three organisational approaches to *managing* implementation:

- Developing delivery structures and processes,
- Integrating projects with strategic transport plans
- Scanning for and leveraging 'windows of opportunity'

6.4.1 Developing delivery structures and processes

How implementation is organised across municipal teams is very important for ensuring success. The work of implementing the core measure packages set out in the Implementation Plan will need to be structured within and across particular *units* of the municipality's organisational structure.

Reviewing organisational structure

As illustrated in Table 6.3, for different common types of measures, this includes consideration both of (i) which (staff) team is implementing a measure (often implemented by…), and (ii) how the measure itself is introduced (often implemented through…).

A question that should be asked in relation to the Implementation Plan is thus: *which teams will implement what measures, and how can we ensure effective coordination between different organisational units?* This includes coordination within a mobility/transport department and with other departments (e.g. spatial planning).

Types of measure	**Often implemented by…**	**Often implemented through…**
Innovative measures, that are novel in the context of the city and typically initially implemented at smaller scale	**'(EU) projects' team** Team specialised in city innovation	Sometimes internally-funded trials, but more often specific **pilot and demonstration projects**
Major infrastructure or	**Team in charge of major**	Longer-term **project**

investments, that are large-scale and complex	**projects** (e.g. public transport, roads) or **bespoke structure** drawing on staff from different teams	with more extensive governance structure
Regular maintenance and expansion of infrastructure, e.g. street design, cycling infrastructure, road safety	**Highways engineering** team; **team specialised in specific policy area (e.g. cycling unit)**; road safety and traffic calming team	Continuous **programme**
Non-physical measures, e.g. workplace travel plans and mobility marketing	Team specialised in specific policy area/mode	Continuous **programme**
Regulatory measures, e.g. permits, parking, access regulations	Specialised team	Continuous **bureaucratic process**

Table 6.3: Examples of how an Implementation Plan is delivered by particular municipal teams and through a variety of organisational forms.

Developing different types of skills

In addition to the teams in charge of measure implementation that are discussed above, there are also other general types of competences that are needed:

- Policy-making and strategic planning – keeping a strategic overview and overseeing implementation in relation to objectives and targets
- Grant management – applying for external funding, managing funding grants and ensuring funding requirements are met
- Project management – technical competence in delivering measures on time, on budget, and to specification

6.4.2 Integrating projects with strategic mobility plans

Avoiding a piecemeal approach to implementation

Because many European cities rely on external EU and national co-funding to implement sustainable mobility measures, and because this funding is typically 'lumpy' and awarded in the form of *projects* with a specific timeframe, budget, eligibility and evaluation requirements attached to it, 'piecemeal' approaches to implementation are a common issue.

SUMP-PLUS researcher interactions with city administrations suggest that many cities' SUMPs and measures contained within them set out a plan that is often quite disconnected from the large number of project-funded interventions that are ongoing in European cities.

By a piecemeal implementation approach we mean that:

- Implementation is managed through 'silos' of individual projects, that are not well integrated with each other, or with strategic transport plans
- Exploitation of lessons and strategies for upscaling once short-term projects ends is often lacking (see Box 5.3).
- Project-based implementation often becomes too dominated by grant management, i.e. satisfying the requirements of external funders, rather than contributing to delivery of a holistic Implementation Plan.

Box 5.3: Evaluation of EU-funded sustainable mobility projects in 140 cities

Tomassini et al. (2016) conducted an ex-post evaluation of EU financial support for projects covering sustainable urban mobility policies and the use of alternative fuels, that were carried out between 2000-2013.[85] The research found that EU financial tools were perceived as creating significant added value, with small and medium-sized cities reporting particularly high effectiveness of EU support. However, the lack of financial sustainability of pilot and demonstration measures beyond the EU funding period – often resulting in their subsequent closure – was raised as a significant issue.

The findings of this study confirm the well-known challenge of upscaling pilot and demonstration projects, where envisioned exploitation of project lessons and further action may not materialise due to a lack of further funding. In other words, implementation may become a stop- start, ad-hoc process, with 'dead ends'. This issue is also confirmed by research on both energy and mobility transitions in European cities.[86]

[85] This included projects funded by the Framework Programmes, Intelligent Energy for Europe, ERDF/INTERREG, Cohesion Fund, LIFE, TEN-T and loans funded by the European Investment Bank. 525 projects in 140 cities were evaluated using survey and case study research, primarily reporting on the perspectives of city beneficiaries.

[86] See Schwanen (2015), Hodson et al. (2018), Hodson and Marvin (2010), Hodson et al. (2013).

Best practices to ensure a strategic implementation approach

The good news is that there are documented solutions to overcome the challenge of piecemeal implementation! Strategic planning, grant management and project management need to be coordinated, to ensure a strategic implementation approach. These include:

- **Embedding projects within a wider organisational structure** – see Figure 6.19. The best practice is to integrate short-term projects within longer-term programmes and portfolios.[87] This allows specific teams to have strategic oversight of what is being implemented. Within individual projects, specific managers can focus on delivering on time.

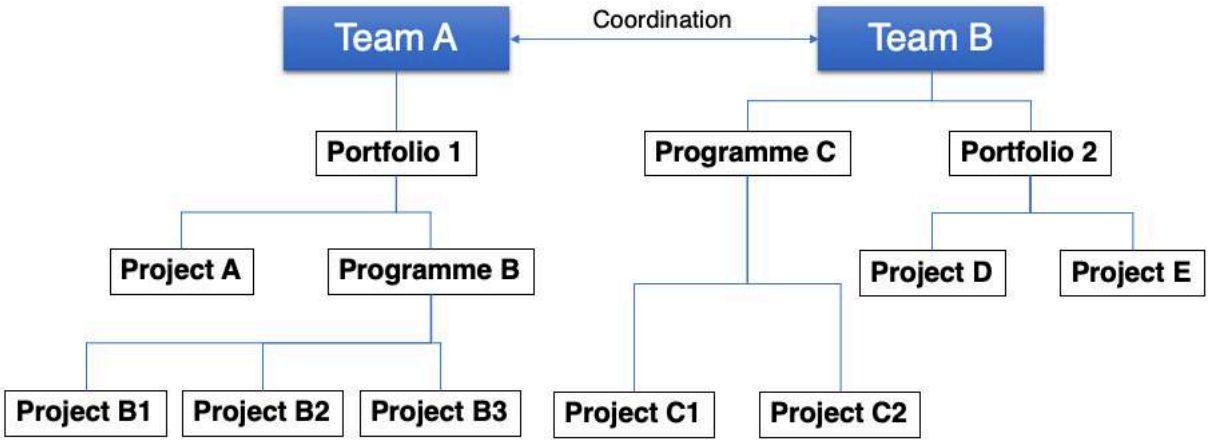


Figure 6.19: Recommended organisational structure for measure implementation with an integrated hierarchy of projects, programmes and portfolios.

- **Separating – or at least establishing some distance between – grant management and measure implementation can be effective**.[88] This means that, although grant funding for a particular measure might be awarded in the form of a project with specific design, bureaucratic (e.g. timeframe, budget) and evaluation requirements, these aspects are managed by a separate, specialised team. This allows other staff to focus on integration of the measures with strategic transport plans, e.g. by designing additional evaluation based on internal rather than external priority indicators, and staff who are in charge of implementation to focus on technical and operational aspects.

- **Projects should *flow from* strategic transport plans, and *feed back to* strategic transport plans**. **Figure 6.20 (page after next)** demonstrates the scope for

[87] A structure of portfolios, programmes and projects is a common practice for effective project management processes, e.g. see standard within UK central government (HM Government 2018).
[88] Finding of a comprehensive study of implementation practices in major US cities (NACTO 2018).

integration between strategic transport plans and three common types of EU co-funded projects, aimed at: (i) piloting/demonstrating measures, (ii) capacity-building (including knowledge exchange) and (iii) funding or financing of major projects involving large-scale intervention or investment.

If finances are constrained, it may be tempting to apply for all available types of grant funding – however, this is unlikely to be the most effective use of limited time and resources. When applying for external funding, the fit between the project focus (e.g. eligible activities) and pre-defined strategic objectives, measure packages and capacity gaps should be assessed. See section 6.4.2 for further elaboration.

Similarly, when drawing lessons at the end of a project, it is important that the resulting knowledge or infrastructural change as a result of measure implementation are linked back to inform the Implementation Strategy or SUMP.

- **Try to maintain some continuity of staff between the start and expiry of short-term grant funding**, i.e. try not employ too many staff on temporary contracts and try to find resources to keep employing them (at least for a while) after the project has finished. This way institutional memory is better maintained, start-up costs are reduced and successful exploitation of lessons is more likely.

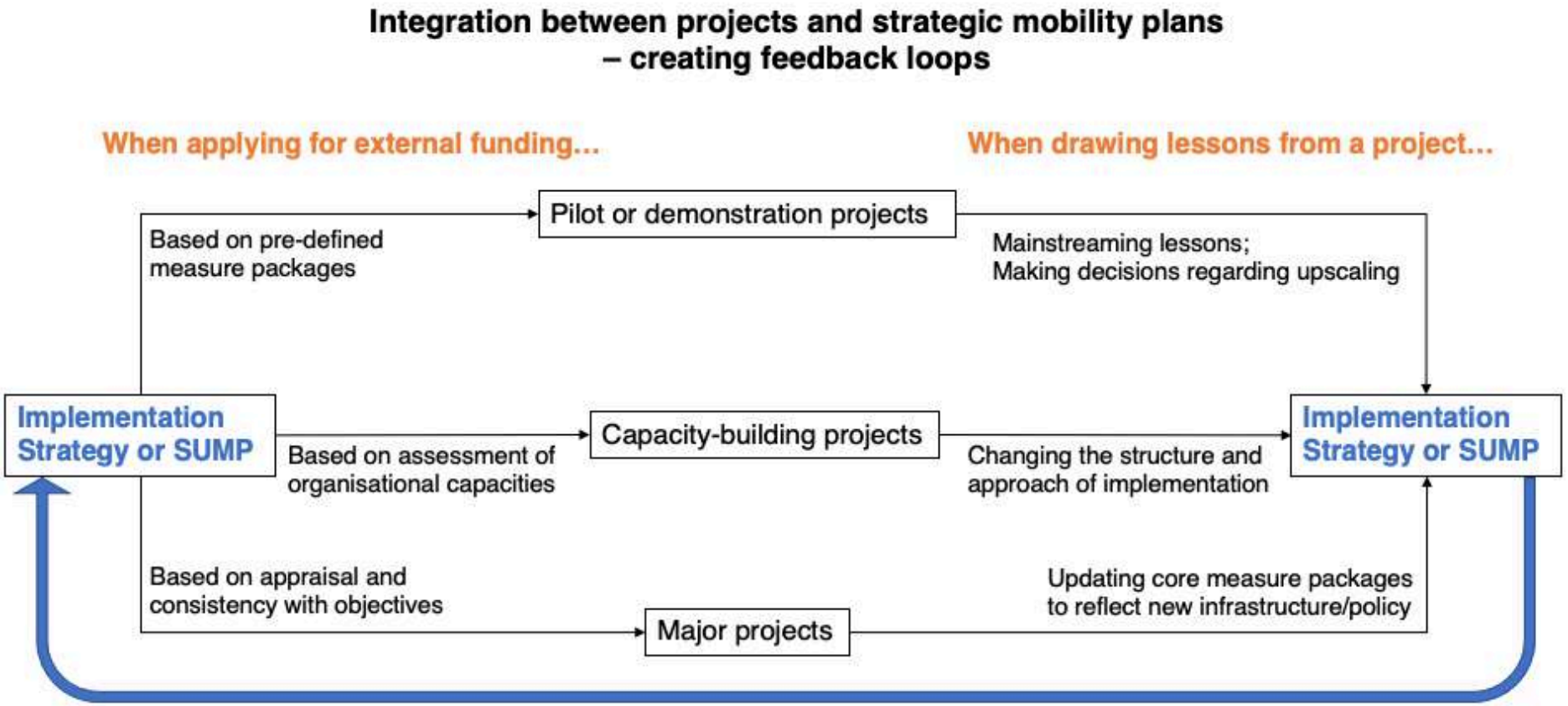


Figure 6.20: Feedback loops between strategic mobility planning and three common types of urban mobility projects.

6.4.3 Scanning for, and leveraging, windows of opportunity

Section 4.3.3 reviewed evidence which suggested that an effective management practice is to pursue policy innovation using small incremental steps, while leveraging 'triggers' and creating 'windows of opportunity' to pursue more radical policy change.

Here we address three issues:

- Funding cycles/timelines
- Political cycles
- Trigger points for major policy shifts

Funding cycles/timelines

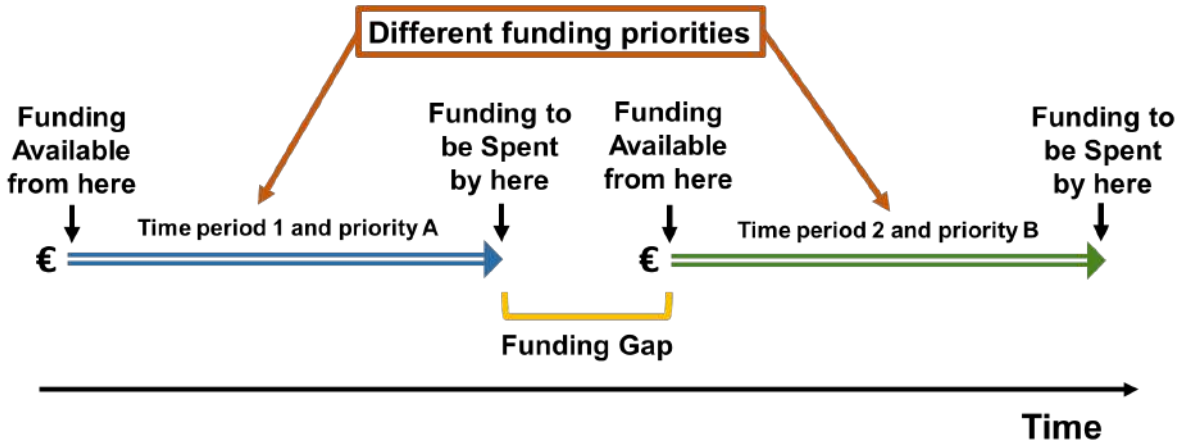


Figure 6.21: Timelines of external funding awards and a funding gap between them.

As is illustrated in Figure 6.21, funding tends to become available at certain points in time and often has to be spent within a specified time period, usually tied to one or more national financial years. This may result in funding gaps that can hold up implementation for a period of time. Where budgets are not confirmed until the start of that year, once allowance has been made for project submissions and evaluations, then start (and finish) times can be tight and heavily prescribed.

Cities therefore stand to benefit if they already have sets of measures that are ready to implement – or, as the UK Prime Minister likes to refer to them as 'shovel-ready' or 'oven-ready – that have already been designed, costed and justified, so that they can be submitted as soon as a funding competition is announced. This is where having a well- developed Implementation Plan, supported by the selected completion of some key prerequisites, can help to ensure success in securing funding.

Different funding rounds often come with different priorities – not least because politicians like to champion something 'new' and not just perpetuate (or be seen to endorse) an initiative

of their predecessor. They can have the effect of seriously 'distorting' the Implementation Plan – both in terms of sequencing and content. In particular:

- One-off calls for demonstration projects can affect what cities decide to bid for and implement (there is funding for X rather than our intended Y), resulting in lower-priority projects being brought forward – and the implementation of a patchwork of measures that lack synergetic benefits, rather than a coordinated programme.
- Some calls might support projects that require expensive on-going operating funding that are not covered by the funders (e.g. freight consolidation centres or LRT schemes), which may become a future burden by soaking up limited local funds and so constraining future options
- Funding requirements may include the need to commence or complete measure implementation by a particular date; this not only potentially affects the sequencing of measures, but also their duration, and hence the scale or type of measures that can be implemented.

Experience shows that cities which have a long-term mobility vision and a fully developed Implementation Plan are more likely to be able to take advantage of short-term funding opportunities by selecting a measure (core or supporting) for inclusion into applications for external funding, that will work towards the achievement of a city's objectives and targets (e.g. as specified in a SUMP or Transition Pathway).

Political cycles

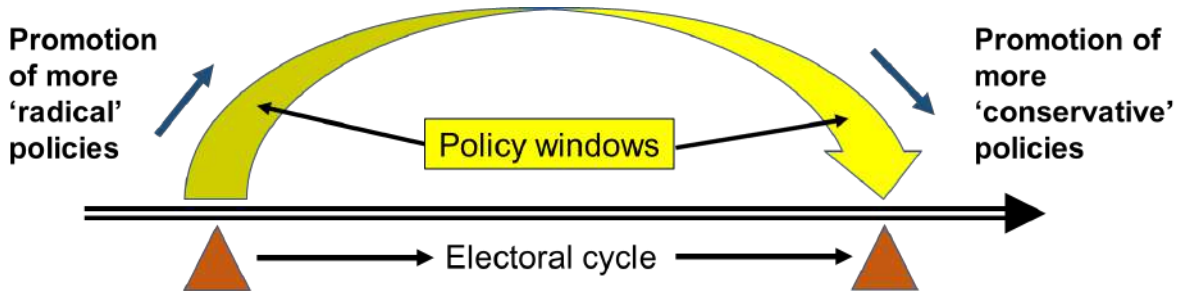


Figure 6.22: Windows for policy change opened up by political/electoral cycles.

Many core policy measures require strong political endorsement and this tends to be governed by electoral cycles. The timing of implementation of major and controversial schemes can be heavily influenced by 'policy windows', points in the electoral cycle where it becomes more attractive or feasible to take the political decision to implement a particular type of measure (illustrated in Figure 6.22). Such windows can arise:

- Immediately after an election, for measures that are seen as being necessary, but not widely popular (e.g. urban congestion charging)

- Shortly before an election, for measures that are seen as being very popular – but may not be so attractive in the longer term (e.g. a decision to introduce free bus travel passes for a specific population group, which involves substantial long-term financial commitments)

In both cases, temporal duration considerations are also important, and may determine what type of measure is chosen. In the case of the London congestion charging scheme, for example, a technically simple design was selected on the basis that it could be implemented within three years – so that it would have time to 'settle in' (i.e. for benefits to manifest and for acceptability to increase) before the next mayoral election, one year later. This meant that the London mayor could either take credit for a successful scheme, or have time to remove or modify it – if it had proved to be unpopular. City administrations are often able to judge what the next political leadership might be willing to champion, and so can carry out some preparatory works that would facilitate of that part of the Implementation Plan. For example, prior to the election of Ken Livingstone as the first London mayor in 2000, he had long campaigned to introduce congestion charging; thus feasibility studies and preliminary design work were carried out in advance, so that Livingstone could press ahead with implementation, if elected.

Figure 6.23 illustrates how funding or policy windows of opportunity can facilitate the delivery of the Implementation Plan shown in Figure 6.13. The Figure shows that funding or policy windows triggered a whole programme of work that led up to the implementation of Core Measure 1 and Core Measure 2; and another window enabled Core Measure 3 to be implemented.

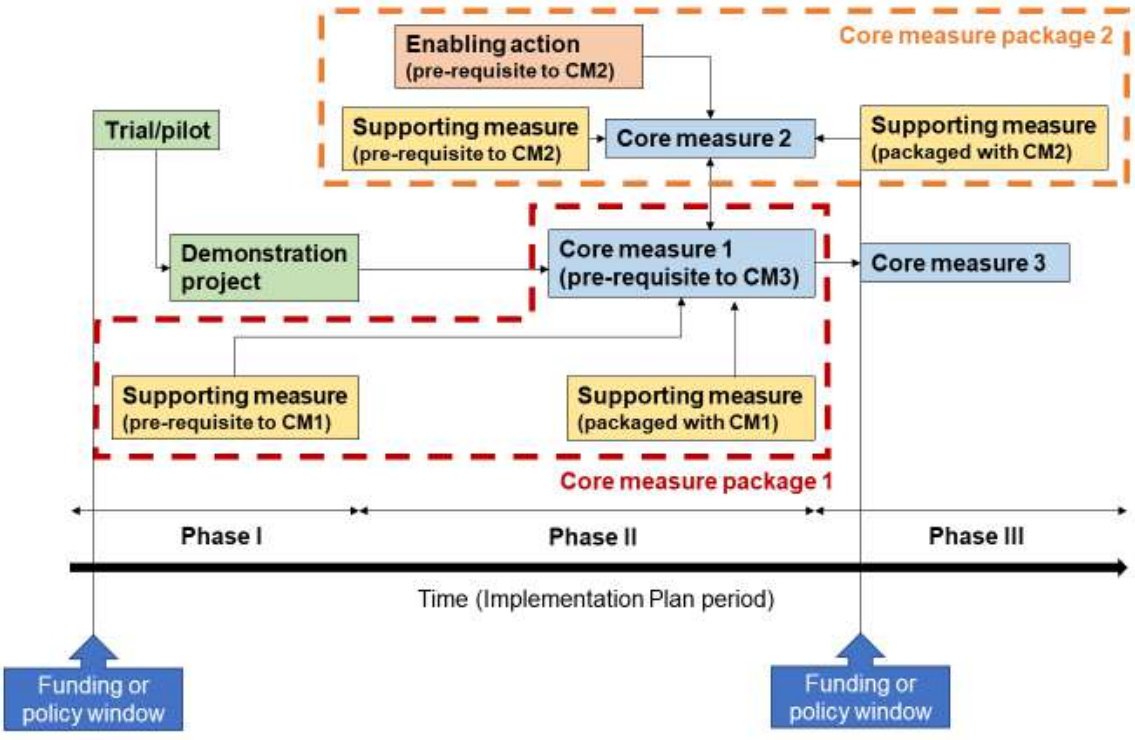


Figure 6.23: How funding and policy windows can expedite the delivery of an Implementation Plan.

Trigger points initiating major policy change

As discussed in section 4.3.3, in reality, policy implementation is not 'smooth', but alternatives between 'quiet' periods of more incremental change, and (often shorter) periods of more 'radical' or significant policy change.

Analysis of the sustainable mobility transition in six Western European cities within the CREATE project found that major policy shifts were 'triggered' by (usually unanticipated) events that can arise from factors internal or external to the city. A distinction was drawn between internal triggers (IT), arising from the consequences of dominant policy perspectives or the mobility system itself, and the external triggers (ET) driven by national or global politico-economic trends (see Figure 6.24 below).

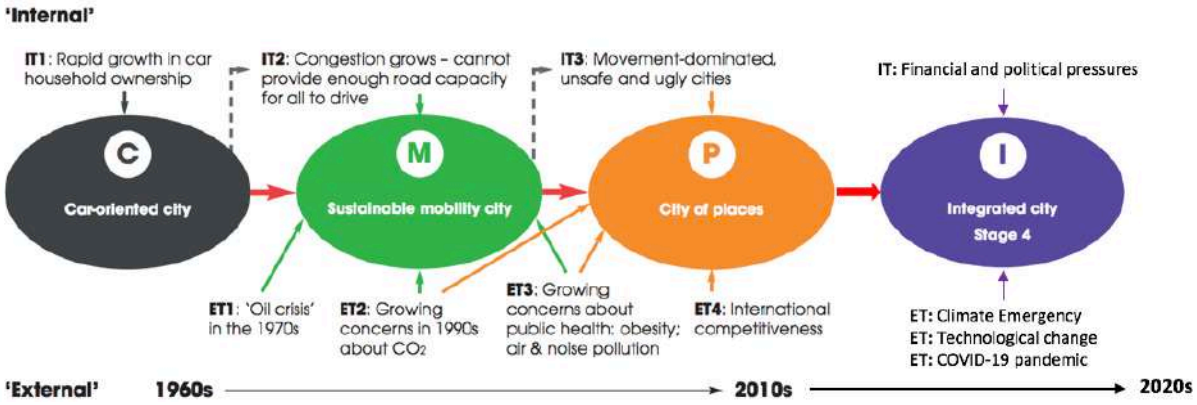


Figure 6.24: New triggers for policy change and a possible transition towards Stage 4 or an 'Integrated City' policy perspective. Source: image adapted from Jones et al. (2018).

As we move into the 2020s, many of the internal and external triggers for mobility transitions remain the same for European cities (IT1-IT3; ET1-ET4). However, the events of the last decade have also fundamentally transformed the European policy context for urban mobility, depicted at the end of the evolutionary timeline in Figure 6.24. The potential triggers for urban mobility transitions today are thus very different to that of the CREATE Stage 3 cities, who began transitioning towards sustainable mobility in the 1960s.

Contemporary external and internal triggers include:

- **IT: an uncertain politico-economic climate**

  Today's European socio-political landscape provides a different context for mobility transitions, compared to the 1960s. The financial crisis since 2008/9 has caused a decade of downward pressure on the economic prosperity and public finances of many European countries and municipalities, increasing the prioritisation of economic

competitiveness, creating an increase in citizen dissatisfaction and causing sustainability issues to slide down the political agenda. These two trends have in many contexts reduced both municipal capacity to work towards transitions, and the public acceptability of sustainable mobility policies.

Although driven by global economic conditions, in many ways this manifests as an Internal Trigger. The socio-political consensus has weakened in many countries, with increasing social polarisation and populist politics. Although municipalities will be expected to contribute towards achieving EU climate targets, non-environmental concerns including economic development, social equity and cohesion will continue to be important to cities. Transition Pathways can thus not be formulated on the basis of a narrow, techno-rational 'carbon management' logic only; we need to develop pathways that can achieve climate targets, while also meeting other objectives. The Green Deal recognises that the issue of Just Transitions is also central to achieving a climate-neutral Europe.

- **ET: the Climate Emergency and European Green Deal**

Compared to historical transitions in CREATE cities, climate change mitigation is likely to become an even stronger driver for transitions from 2020 onwards. The European Green Deal, already introduced in the Introduction (Chapter 2), is likely to act as a powerful trigger for urban mobility transitions over the next 20-30 years.

- **ET: long-term impacts of COVID-19**

A current global external trigger has been the rise of COVID-19. In many countries this has led to a major shift from 'physical' to 'virtual' mobility, with a substantial increase in the reliance of society and the economy on the internet, resulting in a strong growth in internet shopping, social exchanges and home working – all of which are expected to lead to a degree of permanent shift in travel behaviour. Within many cities, this has led to politicians giving a higher priority to the allocation of roadspace for walking, cycling and outdoor street activities (e.g. tables for restaurant meals), resulting in major reallocations of carriageway space away from private cars – on a scale that would have been difficult to achieve politically in 'normal' times.

Here again, cities that have been successful in adopting these new policy measures (e.g. large increases in the number of cycle lanes) had already completed design work as part of the delivery of their Implementation Strategy, but had not brought these measures forward for implementation, due to the previously prevailing policy climate.

The trigger effect of COVID-19 may have significant and positive longer-term implications for how cities address climate change, in that is has demonstrated that:

- 'Unlikely' events can happen: many professionals had warned of the likelihood of a global pandemic, but most governments outside China and South-East Asia had not taken the threat seriously; this might now encourage governments to take the warnings of climate change and global warming more seriously.
- The pandemic has led to massive changes in travel behaviour in a very short period of time. While much of this was mandatory, it does illustrate how quickly behaviour could change, if it was deemed that doing so was of national importance.
- Many countries are planning major infrastructure investments to counter the expected rapid rise in unemployment levels; this provides an opportunity to invest in 'green' infrastructure, to support zero carbon aspirations and speed up transition.

While the COVID-19 pandemic can be understood as a 'one in a hundred year' event, it may well not be the last significant disruption to Europe and its mobility systems. There is thus a need to incorporate the policy uncertainty associated with the possibility of unexpected disruptions into the Transition Pathways approach.

An integrated perspective on how to leverage windows of opportunity

Referring back to the conceptual model of 'windows of opportunity' discussed in section 4.3.3, we adapt Figure 4.11 below to provide some ''food for thought' for how to leverage windows of opportunity in order to create more radical policy change in real life.

Figure 6.25 (next page) depicts how:

- Triggers cause changes in public opinion, which allows policy entrepreneurs[89] to frame an issue as a problem (e.g. air quality)
- Funding cycles and political cycles open up opportunities for implementation and more radical policy change
- A well-prepared, ready-and-waiting Implementation Plan can then be used by policy entrepreneurs to couple the three streams and create a major window of opportunity for implementation of sustainable mobility measures

[89] Policy entrepreneurs' refers to progressive planners or decision-makers seeking to accelerate the transition to sustainable mobility.

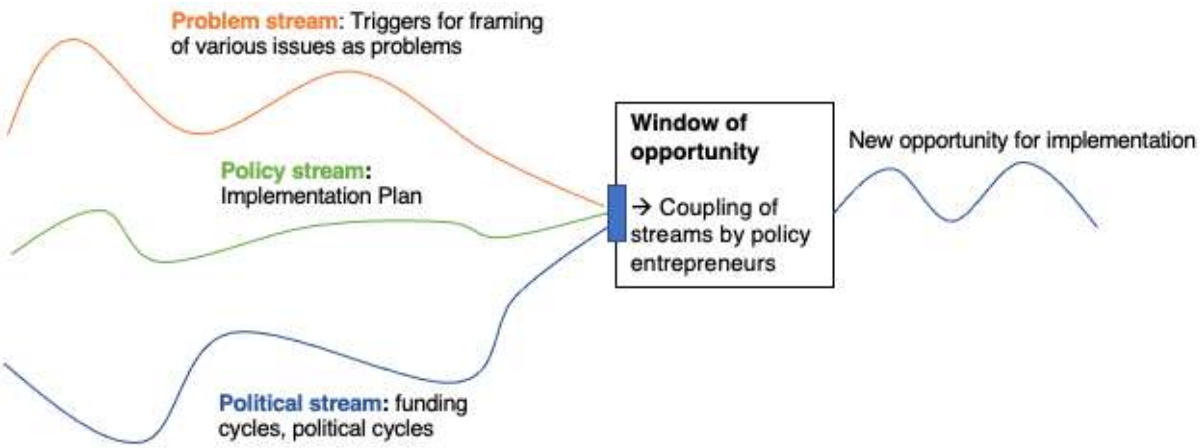


Figure 6.25: Coupling of political, policy and problem streams to create windows of opportunity, in relation to an Implementation Plan.

6.4.4 End product: Implementation Strategy

Outputs generated by following the guidance provided in Part B can be integrated into the Implementation Strategy, along with the final Implementation Plan (see Figure 6.26).

For example, management approaches could be represented by:

- An organogram, a diagram outlining the structure for how implementation of measures will be organised, addressing issues covered in Table 6.3 and Figure 6.19.
- Analysis of upcoming funding opportunities, and a list of priority measures related to them, for easy integration of measures into the most relevant funding applications
- An assessment of likely future political shifts and trigger events, and their implications for delivery of the Implementation Plan

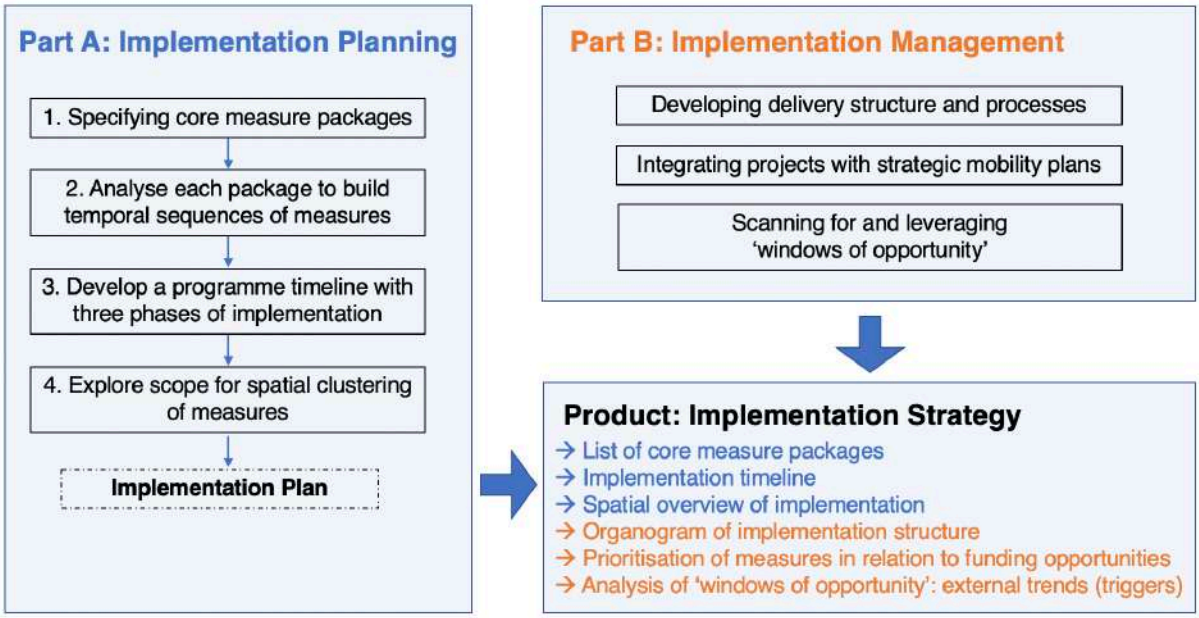


Figure 6.26: Recommended contents of a completed Implementation Strategy, drawing on both Part A and Part B outputs.

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