POCACITO

european post-carbon cities of tomorrow

SYNTHESIS OF STAKEHOLDER WORKSHOP REPORTS

DELIVERABLE 4.3 SYNTHESIS REPORT

FONDAZIONE ENI ENRICO MATTEI

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I EXECUTIVE SUMMARY

The aim of the Post-Carbon Cities of Tomorrow (POCACITO) project is to facilitate the evolution of European cities towards a post-carbon future by defining a roadmap for the transition. The project focuses on towns, cities, megacities, metropolitan areas and urban clusters larger than 1 million people, as well as small and medium-sized cities. At the core of the project is a series of participatory stakeholder workshops held in each of the case study cities.

The present deliverable proposes an analysis of the experiences reported by the POCACITO project partners from the first and second case study workshops. The workshops aimed at designing a vision for the city and at defining, in a backcasting exercise, the strategy for reaching this vision in the specific context of the city. In each workshop, stakeholders form the cities described possible actions and timelines for intermediate steps. The backcasting exercise aimed furthermore at defining milestones and identifying possible obstacles that each city might encounter during the course of their efforts to realise the post-carbon vision for their city.

II INTRODUCTION

The aim of the Post-Carbon Cities of Tomorrow (POCACITO) project is to facilitate the evolution of European cities towards a post-carbon future by defining a roadmap for the transition. The project focuses on towns, cities, megacities, metropolitan areas and urban clusters larger than 1 million people, as well as small and medium-sized cities. At the core of the project is a series of participatory stakeholder workshops held in each of the case study cities: in Barcelona, Copenhagen/Malmö, Istanbul, Lisbon, Litoměřice, Milan/Turin, and Rostock and Zagreb. The purpose of these workshops was to bring together local stakeholders for the design of a common post-carbon vision for 2050, and ultimately define an action plan for reaching the vision. For each of the participating cities, these workshops represent an arena to discuss current challenges facing the city and achievements obtained, and to develop a discussion on city-specific strategies for becoming a post-carbon city. The time horizon set for these visions is 2050; long enough to look beyond day-to-day policies and to reflect on structural changes.

The present deliverable analyses the experiences reported by the POCACITO project partners from the first and second case study workshops, which aimed at designing a vision for the city and at defining, in a backcasting exercise, the strategy for reaching this vision in the specific context of the city, describing possible actions and timelines for intermediate steps. The backcasting exercise aimed furthermore at defining milestones and identifying possible obstacles that each city might encounter during the course of their efforts to realise the post-carbon vision for their city.

The workshops referred to in this deliverable followed a common two-steps procedure defined for the POCACITO vision building and scenario building exercises. Entailing the discussion on long-term strategies for a context where the range of uncertainties increases with increasing distance in time. For this reason, a scenario-based approach was chosen among the different forms of future studies. Scenario techniques comprise a wide field of different approaches and techniques. Van Notten (2006) and Börjeson et al.(2005) have attempted to provide an overview of different types of scenario approaches. Börjesen et al. propose a continuity from “probable, possible and preferable”, to “predictive, explorative, and normative” types of scenarios (Börjeson et al. 2005, 14). Among these, the choice of a normative scenario is the most appropriate for designing policy strategies like the one considered by POCACITO which aim at a normative endpoint, a post-carbon urban future. One technique for building normative scenarios consists of the “backcasting” type of scenarios. Whereas scenarios generally are used to explore which futures are likely to occur under certain conditions, this approach helps define, “how desirable futures can be attained” (Robinson 1990). This involves, as suggested by Robinson (1990), working backwards from a particular desired future endpoint to the present in order to determine the physical feasibility of that future and what policy measures would be required to reach that point.

This approach, defined in collaboration between all POCACITO partners, consists of a first step for vision building, during which elements for a post-carbon vision have been designed and discussed among stakeholders, and a second step for building a backcasting scenario, during which the vision was made tangible by identifying actions, timelines, but also obstacles for reaching them. The frame for these scenario building exercises is represented by a set of background scenarios set out for the case study cities, which describe possible future for economic, demographic, and climatic

development. Multiple background scenarios have been proposed in order to allow for a first form of sensitivity analysis, verifying whether the external development factors described in these scenarios would have compromised the achievement of the goals defined in the city vision[1].

This report provides a synthesis of the participatory stakeholder workshops on the initial assessment, vision building, and backcasting exercises in 9 case study cities.

The first section of this report provides an overview on organisational aspects of the stakeholder workshops, including details on the participants and methodologies employed. The second section is focused on the cities' post-carbon visions, the output of the vision building exercise. Visions are considered in terms of the sectors addressed. For the backcasting scenarios, the steps needed to achieve the post-carbon vision, are presented in the third section of the report. These include the obstacles, opportunities, milestones, interim projects, actions, and actors identified in the backcasting exercise. Again, the scenarios are presented in terms of the relevant sectors. The fourth section provides some considerations on the creation and contents of the visions and scenarios of the joint case study cities Milan and Turin. Finally, the report concludes with some general findings from the participatory stakeholder workshop process and the outcomes of the visions and scenarios.

[1] A description of these background scenarios can be found in the POCACITO deliverable 4.1

III PARTICIPATORY STAKEHOLDER WORKSHOPS

The workshops held in the single case study cities varied in terms of the dates and locations, number and types of stakeholders, and to a small extent, by the methodologies employed in the vision building and backcasting exercises.

DATES

All stakeholder workshops were held between September 2014 and May 2015. The first of the stakeholder workshops was held in Milan on September 29, 2014, and the last on May 15, 2015 in Lisbon, while other cities' dates fell somewhere in between. Istanbul concentrated the three activities of discussing the initial assessment, creating the vision and defining the backcasting scenario in a single workshop. The Lisbon vision was built on individual interviews followed by a final workshop to summarise results. All other cities held 2 workshops, with the first workshop combining the presentation of the initial assessment and vision building, and the second workshop focused on backcasting. In addition to the two workshops, Litoměřice and Malmö also held a separate meeting with city officials to discuss initial assessment results.

Table 1: Workshop dates

CITY	INITIAL ASSESSMENT	VISION BUILDING	BACKCASTING
Barcelona	10 Dec 2014		12 Dec 2014
Istanbul		9 March 2015	
Lisbon		1-15 May 2015	
Litoměřice	Separate meeting with city officials	4 Nov 2014	2 Dec 2014
Malmö	21 Nov 2014		26 Nov 14
Milan	29 Sept 2014		27 Nov 2014
Rostock	4 Dec 2014		29 Jan 2015
Turin	15 Oct 2014		3 Dec 2014
Zagreb	19 Nov 2014		2 Dec 2014

III.I PARTICIPANTS

The types and numbers of stakeholders involved in the participatory workshops vary from city to city. As the POCACITO process is about technical and political decision making, the types of stakeholders that attended the workshops can be divided into five main categories: urban administration, public agencies, non-governmental organisations (NGO), private business, and research. Stakeholders grouped as urban administration are decision makers within the city. Public agency includes stakeholders working for publicly funded agencies. NGO stakeholders are those working for groups

that are neither government funded nor conventional for-profit businesses (including representatives from civil society). Research stakeholders include the students and professors affiliated with universities.

Figure 1: Types of stakeholders at each workshop

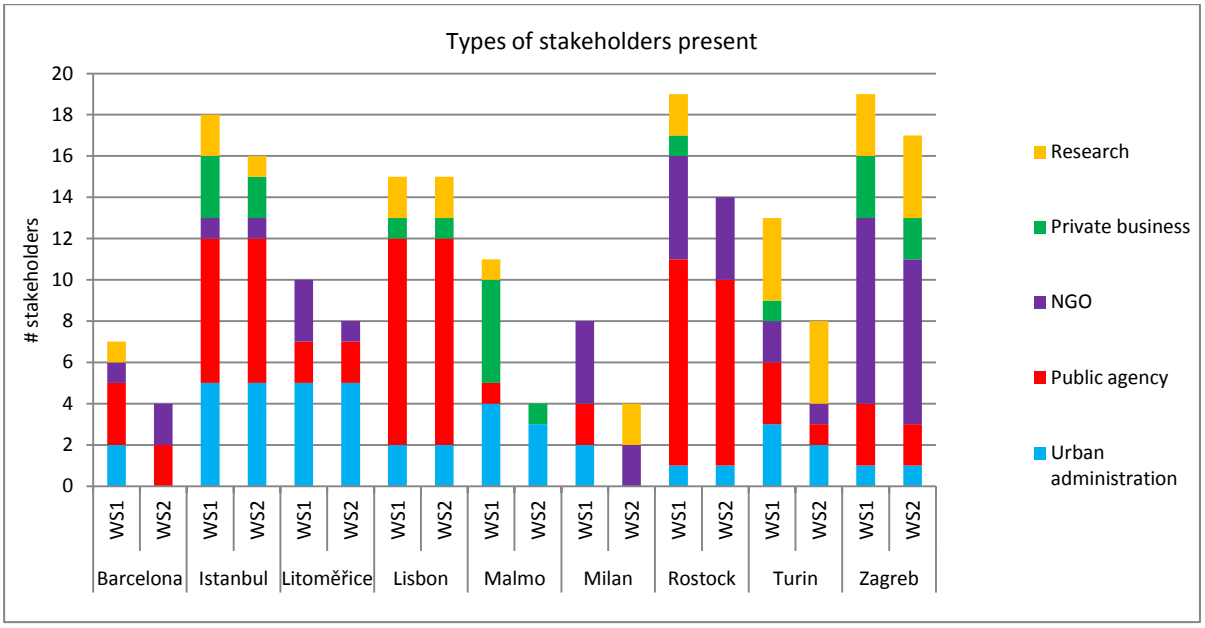
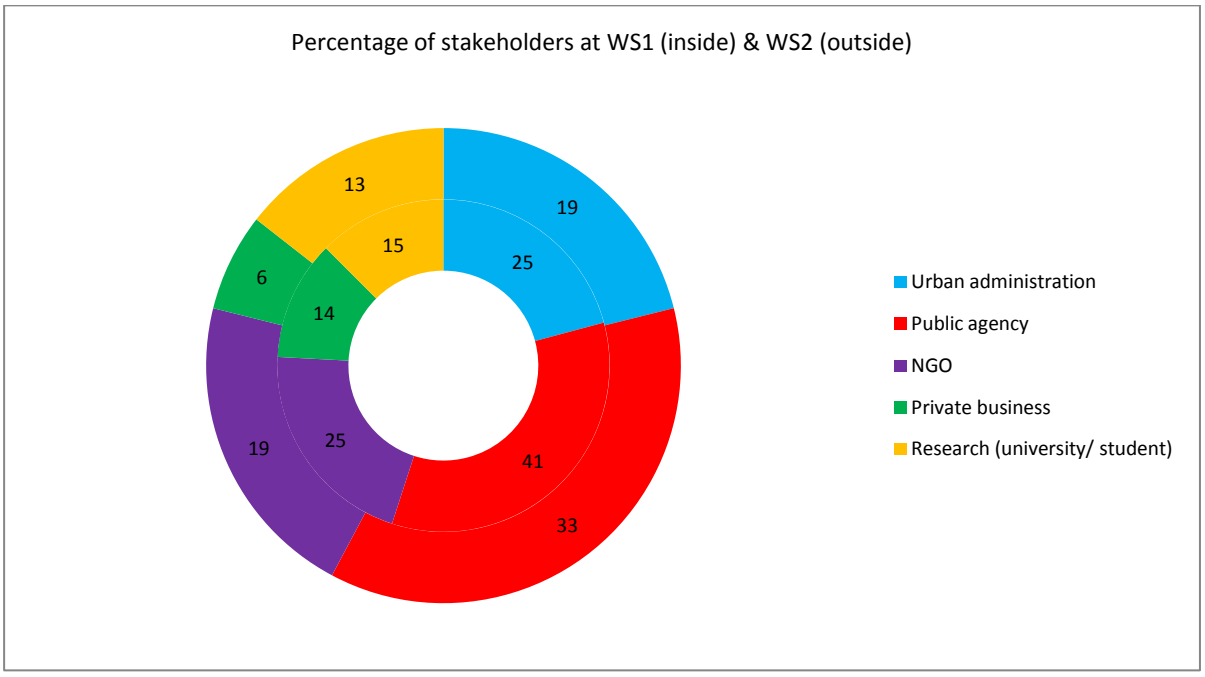


Figure 2: Percentage of stakeholders by type at each workshop



In total, 120 stakeholders participated in the first round of workshops and 75 stakeholders attended the second set of workshops. Of the total 140 different stakeholders, 72 participated in both workshops (57 excluding Lisbon, where both workshops were held in 1 day and therefore had the same participants at both). In all cities, there were more stakeholders present at workshop 1 than

workshop 2. Overall, urban administration, public agencies and NGOs were the stakeholder groups best represented in both workshops, with 25 urban administration, 41 public agency, and 25 NGO stakeholders in workshop 1, and 19 urban administration, 33 public agency, and 19 NGO stakeholders in workshop 2. Public agencies were represented in all workshops except Malmö and Milan's second workshops. Likewise, NGOs were represented at all workshops excluding the two workshops held in Lisbon and Malmö. Besides civil society, which was not directly represented (although stakeholders were asked to participate as citizens first, and only secondly as representatives of their respective organisations), private business and research sectors had the fewest stakeholders. Private businesses were only represented at ten out of the eighteen workshops, and research in twelve of the eighteen workshops. Both workshops in Istanbul and workshop 1 in Rostock, Turin, and Zagreb included the full range of stakeholders from the five sectors represented. Urban administration stakeholders were present for the first workshop in all cities, and for the second workshop in six cities.

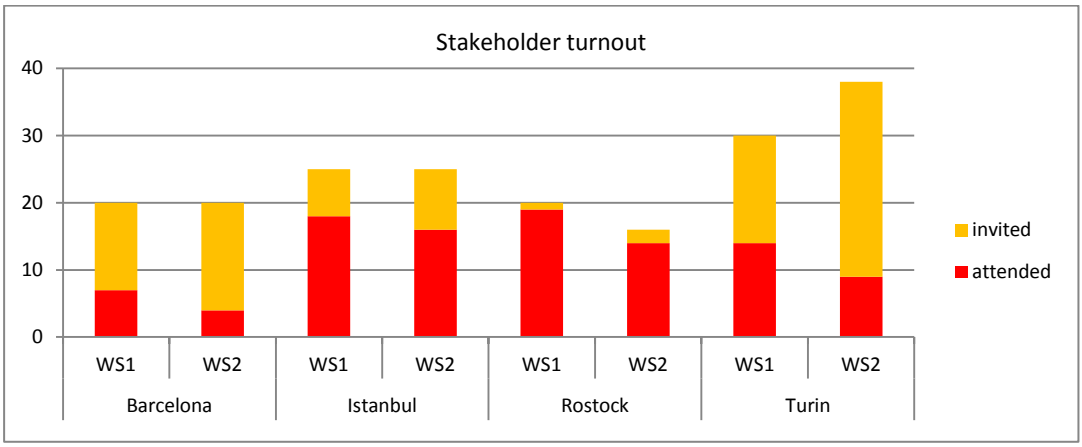
Zagreb and Rostock had the highest number of stakeholders present at workshop 1 (both 19) and workshop 2 (Zagreb 17, Rostock 14). Istanbul also had many stakeholders attend both workshops, with 18 at workshop 1 and 16 at workshop 2.

Because Lisbon followed a different method for the visioning exercise, namely through conducting individual interviews or questionnaires and a small meeting, their mode of stakeholder participation differs from that of the other 8 cities. While Lisbon contacted 15 stakeholders, only 5 attended the group meeting. However, because all 15 contributed to the creation of the visioning and the backcasting exercises, all are included in the description of workshop 1 and workshop 2 stakeholders.

III.I.I INVITED VS ATTENDED

Several of the case study cities reported on the number of stakeholders invited versus the number that attended the workshops. These cities include Barcelona, Istanbul, Rostock, and Turin. On average, the number that attended was about 55% of those invited. The percentage who attended was always higher for the first workshop than the second workshop, with 62% of those invited attending the first workshop and 49% of those invited attending the second. Rostock had the highest percentage of invitees attending (92%), followed by Istanbul (68%), Turin (34%), and Barcelona (28%). The best case was workshop 1 in Rostock, where 19 of 20 invitees attended. The lowest turnout was in Barcelona where only 4 of 20 invitees attended. Turin invited the most participants to each workshop, while Rostock invited the fewest. In many cases, more stakeholders replied that they would attend, and then did not show up on the day of the meeting.

Figure 3: Stakeholder turnout



III.II WORKSHOP METHODOLOGY

Workshops held in the case study cities followed a common three-step approach adopted by the common workshop guidelines produced in the POCACITO project, consisting of an initial assessment, and vision building and backcasting exercises. Both exercises are based on the participation of stakeholders, with the idea that participation is crucial for relevance, consistency, and hence usefulness of scenarios. After establishing the baseline state of the city, creative brainstorming was employed to induce stakeholders to first envision the future of the city, and then develop qualitative scenarios describing how the transition to reach their post-carbon vision might be possible. Obstacles and opportunities that might be encountered along the way were identified, and actions needed to meet future goals were highlighted. The feasibility and robustness of scenarios were tested to consider how the scenario might work in a different socioeconomic environment than business as usual.

III.II.I VISION BUILDING METHODOLOGY

The first participatory stakeholder workshop consisted of two parts, starting with the presentation and discussion of the initial assessment results, and proceeding with the vision building exercise. First, the results of an initial assessment of the city were presented to stakeholders and the key challenges the city is facing were identified. Social, economic, and environmental indicators were used to assess the baseline state of each city. Developing an understanding of the current strengths and weakness helps clarify what the municipal competencies are, where progress is needed most, and which potential problems need to be addressed. Stakeholders have local knowledge that might not be captured by the data sources used for the initial assessment, and discussion of the initial assessment provided an opportunity for the case study leaders to relay that information. The initial assessment defines the starting point from which the vision is projected.

The vision represents the desired endpoint, different than the one that would be reached proceeding with business as usual. Stakeholders were encouraged to imagine how their city might be in 2050 if they were to make changes to become post-carbon. To do this, stakeholders were divided into smaller groups and prompted to collectively draw images of their vision. This creative activity

encouraged stakeholders to relax and be more expressive, facilitating disconnection from daily policy discourse and encouraging interaction in a less formal way. They were furthermore invited to reflect on the vision as members of the community first and only subsequently as representatives of their organisations. Groups then rotated between tables until each group had contributed to each drawing. Returning to their original place, stakeholders then summarised the drawings, and organised their ideas using a mind map. The main themes were identified and the key messages were synthesised to develop the post-carbon vision.

All case study cities workshop leaders generally followed the POCACITO vision building methodology. The methodology proved to work quite well, and was generally well accepted by the participants. Nevertheless, the invitation to start with visual representation of the vision rather than with verbal descriptions provided, in some cases, some initial uneasiness among the participants, but all research groups convene in stating that these moments were quickly overcome and provided a good occasion for thinking out of the box. In Istanbul, instead of letting participants draw by themselves, some artists were involved with the task of visualising the verbal contributions by participants, whereas Lisbon and Barcelona for different reasons were not able to follow the guidelines in this point. In Lisbon, the process was focused on direct interviews with key stakeholders, followed by a workshop to organise and summarise the vision building results. In the workshop in Barcelona, stakeholders were invited to use verbal descriptions of their visions rather than to design them, and in Litoměřice and Istanbul, stakeholders were encouraged to use both words and drawings. In Rostock, stakeholders organised ideas to form the city's vision without using a mind map.

III.II.II STAKEHOLDER IMPRESSION OF VISION BUILDING EXERCISE

Several cities, including Malmö, Milan, Rostock, and Turin, noted that stakeholders were shy to begin the drawing exercise, yet this hesitation was quickly overcome, and the exercise proved to be useful in fostering more creative thinking. Other cities, including Barcelona and Turin, noted that stakeholders had a hard time imagining how the city should be in 35 years.

Stakeholders attending the workshop in Barcelona expressed some sceptical views about value added of this project, considering that the city has recently started as series of initiatives and projects related to innovation, urban future and sustainability. Nevertheless, the discussion developed within the workshop succeeded in triggering reflections on perspective for a long term future of the city, starting from very urgent social and economic problems related to the presence of tourism.

At the start of the first workshop in Rostock, the atmosphere was a distant "wait-and-see" as criticism was openly expressed and some existing power structures between the participants hindered a fully open interaction. The city had recently held public debates on perspective for the future development and necessary measures for achieving them in the context of the definition of a new urban master plan, so that the POCACITO exercise had appeared, in a first moment, as a repetition of what had been discussed in this context. Nevertheless, during the workshop, POCACITO researchers managing the process succeeded in focusing the discussion on longer term perspectives and objectives with respect to those discussed for the master plan.

A similar situation was confronted in Lisbon. In this case, the methodology had to be adapted to the context of Lisbon, due to several factors including the economic and financial crisis, profound changes in the city governance associated to the change of the City Mayor, and parallel organisation of similar

meetings, workshops and seminars in the scope of Portugal 2020 (framework program 2014-2020 under negotiation with the EC), so that the POCACITO team found it difficult to motivate and mobilise key stakeholders, for participating in the workshops.

III.II.III BACKCASTING METHODOLOGY

While the purpose of the first workshop was to imagine what a post-carbon future could look like, the purpose of the second was to consider what steps might be necessary to get there. The backcasting workshop was based on the visioning process and developed the pathway from the current situation towards the post-carbon vision. Specifically, the aim was to engage stakeholders to conceive of the intermediate steps of future action, measures and strategies for urban management, in achieving the vision. The qualitative scenario was intended to reflect local challenges and technological trends identified through the Initial Assessment of the case study city. As in the previous workshop, the methodology adopted during the backcasting was based again on visualisation techniques, so participants used coloured cards for writing down titles for actions, milestones and opportunities, which were then be placed on a sheet visually representing the timeline from the present day until 2050.

The backcasting workshop methodology consists of five key steps:

1. Define a normative “desired” endpoint (the vision from the previous visioning workshop)
2. Consider context-scenario specific obstacles and opportunities in reaching the endpoint
3. Identify milestones or interim projects that would signify progress in reaching the endpoint
4. Define actions that must be taken to get to the endpoint
5. Validate the robustness of actions in the case of other background scenarios playing out

Using the 2050 post-carbon vision, stakeholders created a clear definition of several endpoints that represent the main sectors and ideas proposed in the first workshop. For each normative endpoint, stakeholders discussed the various obstacles and opportunities that they anticipate encountering in working towards the endpoint under a business as usual scenario, and wrote them down on index cards. The index cards were then arranged on a timeline between now and 2050. The same process was carried out for milestones and interim projects, highlighting intermediate objectives that mark the way towards the desired endpoint. Next, stakeholders brainstormed concrete actions needed to reach interim and final goals (i.e. to reach milestone X by 2030, what actions must be taken?), and again placed them on the timeline. Attention was given to what has to be done, who needs to do it, and when it has to happen. Groupings of actions and interrelations between actions were considered. Finally, actions identified to achieve the vision were checked for robustness, considering the local impacts from possible global socioeconomic and environmental trends from now to 2050 represented under the form of different “background scenarios”. Actions proposed under a business as usual scenario (SSP Middle of the Road Narrative) were considered under sustainability and fragmentation scenarios (SSP Sustainability Narrative and Fragmentation Narrative) to see how differing socioeconomic conditions might affect the plan to transition to become post-carbon.

III.II.IV DEVIATIONS FROM THE METHODOLOGY

In some case study workshops, the backcasting methodology was implemented as proposed, whereas others found it more appropriate to make some deviations from the plan. However, even the cities that did very closely follow the methodology did not complete the fifth step of validating the robustness of actions – in all cases the cities were unable to complete this step. Cities that followed the POCACITO backcasting methodology include Istanbul, Litoměřice, Malmö, Turin, and Zagreb. Cities that deviated from the methodology include Barcelona, Lisbon, Milan and Rostock, all of which have some existing or ongoing plans that had to be taken into account in backcasting.

Litoměřice modified step 2 in that stakeholders identified external drivers rather than obstacles and opportunities. The participants were asked to identify potential obstacles and opportunities that the presented global development may induce for the city. They first tried to identify these for each of the five vision topics – energy, transport etc., but this process turned out to be inapplicable, due also to the small size of the city. Most of the selected impacts of the scenario did not intersect with the city´s level decision making or authority, some did not show clearly positive or negative impact. More importantly, the exercise to identify potential impacts evolved during just one hypothetical future development turned out to be limiting. Thus, the approach of identifying obstacles and opportunities given by the presented contextual scenario was abandoned and instead participants identified in a joint brainstorming only potential external drivers that may rise in the future for each of the vision topics, but did not further discuss their effect under specific background scenario.

In Milan, because few stakeholders attended workshop 2, POCACITO researchers did not follow the 5-step backcasting methodology, but instead had an open discussion. A lot of time was spent talking about the vision in general, and how it is not relevant if the municipal decision makers do not support the work or if there is not funding for the actions that stakeholders propose to meet the vision. During the open discussion, some ideas regarding actions, milestones, and obstacles emerged. Finally, based on the notes from the discussion, POCACITO researchers were able to organise some of these ideas that would signify progress in meeting the vision in the short-, mid- and long-term. Unfortunately, stakeholders were not able to arrive at a point where discussing the vision under different scenarios was possible.

In Rostock, the second workshop was adapted to the needs of the case study city and hence, the backcasting methodology was modified. The objective was to therefore to prioritise the existing measures identified in the Master Plan and align them with the POCACITO 2050 vision. Obstacles, opportunities, and milestones of implementing these measures were identified through the backcasting exercise. Afterwards, all participants had time to look at the 44 Master Plan measures. The participants were asked to evaluate the measures using a point-awarding system based on their priority, acceptance by the target group, and probability of implementation. Each participant was given five points to highlight one or more measures across these three categories. The measures were presented on a flip chart and participants gathered there or came to the chart later with a list of measures to be marked. Furthermore, the economic efficiency of the measures was assessed through written comments. One participant added additional comments regarding the content of the measures. Afterwards, a discussion began on the key measures identified in the area of transport, construction, energy management within businesses, and energy provision for the city.

III.II.V STAKEHOLDER IMPRESSION OF BACKCASTING EXERCISE

Lisbon case study leaders noted that the stakeholders seemed to be very influenced by the current situation in the city. It was more difficult for stakeholders to define concrete actions and milestones then to identify the vision, especially in the 2050 time horizon. They demonstrated some difficulties in thinking out-of-the-box and in a long-term time horizon (2050)

Rostock case study leaders made note of the stakeholders' reactions to the backcasting exercise in their workshop report. Rostock case study leaders noted that during the workshop, it was a challenge to balance participants' wants and needs with the POCACITO project methodology. Although not all opportunities, threats, goals and milestones were worked out for each Master Plan measure, the adapted methodology worked well with and structured the extensive existing measures. Furthermore, participants gave very positive feedback after the workshop and agreed that the discussions helped establish a shared mental model of the vision for Rostock as well as a common understanding of the purpose of vision-building exercises in general. Towards the end, a discussion evolved on the concept of vision building and some expressions of doubt were countered with the comment: "with dreams reality begins".

The participants in Rostock formulated their expectations, which pointed especially to inputs from "outside" as a means for enriching the local debate:

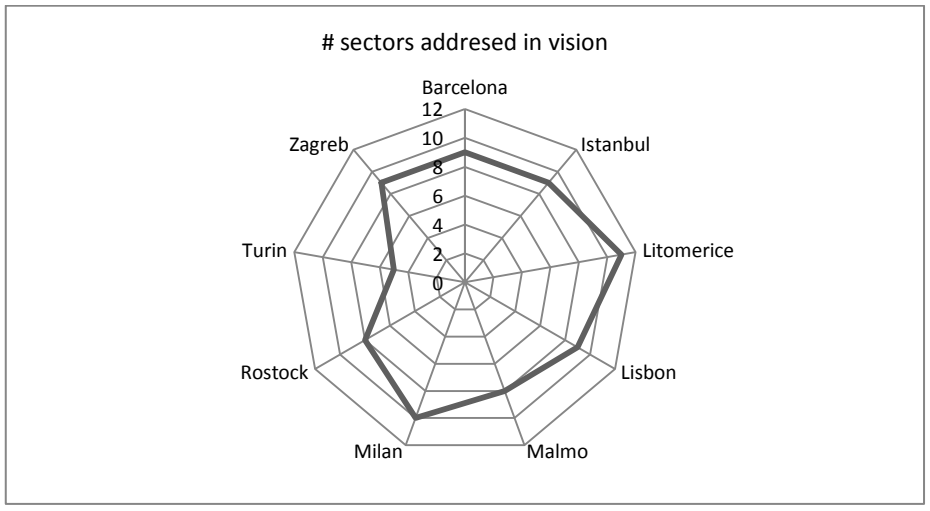
- Information on ideas and factors of success of other cities,
- Exchange with other cities regarding the development and implementation of a master plan,
- Experts showing new options e.g., in regards to demographic change, technical options
- Special measures should be worked on more intensely e.g., e-drive, heating supply
- The inclusion of stakeholders from the health sector, which was not represented in the previous workshops

In Rostock, the measures for climate protection are already planned for the period up to 2020. However, in this process, no measures for the years 2020 to 2050 had been planned as uncertainties deriving from unforeseeable technical and political developments had been considered too important. More concrete milestones and indicators can therefore improve long-term planning and decision making.

IV 2050 POST-CARBON VISIONS

Following the two steps approach, during the first round of workshops, stakeholders in the case study cities described their 2050 post-carbon visions. Visions altogether provide a good insight into relevant sectors for local policy making. The visions generated in each city were quite different, yet all of the visions share common themes and overlapping ideas for the future. Aspects of each post-carbon vision can be classified according to 12 main sectors that are relevant to local decision making for the transition to a post-carbon city: transport and mobility, energy, land use and infrastructure, social issues, economy, biodiversity and conservation, technology and innovation, education, tourism, governance, food production, and consumption and waste. For comparison and identification of common characteristics, the main points of each vision have been organised according to these sectors.

Figure 4: Number of sectors addressed in the cities' visions



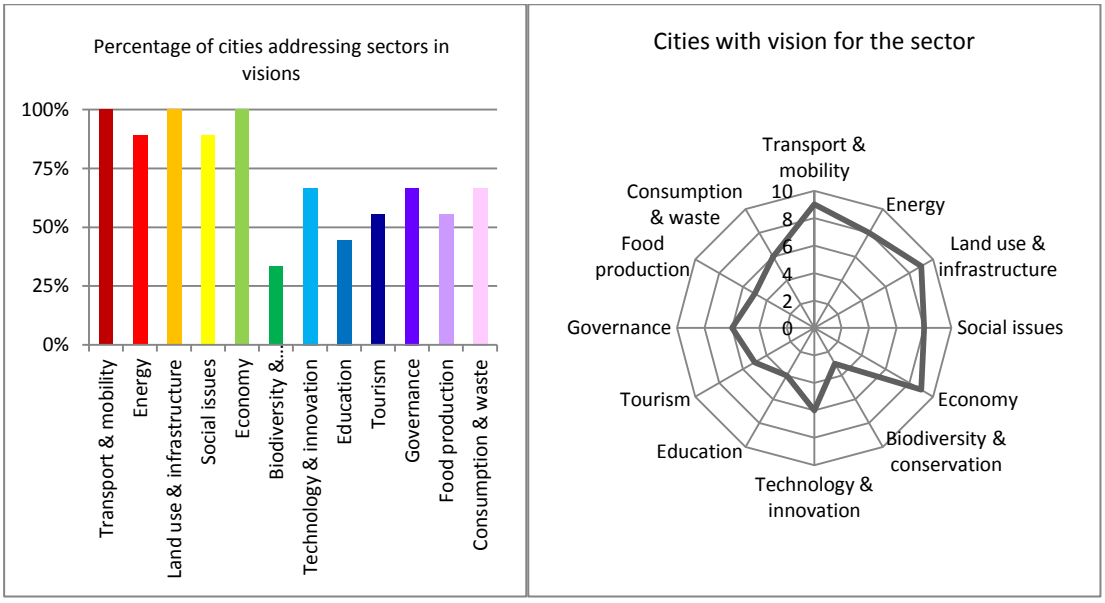
Attitudes towards the complexity of the visions varied between workshops like Turin, where only some strategic sectors were discussed, and others like Litoměřice, where almost the entire range of urban policies was considered, including also actions that are connected to a larger concept of sustainable urban future rather than to a vision strictly limited to post-carbon futures. Each city addressed between 5 and 11 sectors in their vision. Litoměřice addressed 11 sectors and Milan addressed 10 sectors in their vision. Barcelona, Istanbul, Lisbon, and Zagreb addressed 9 sectors in their visions. Malmö and Rostock each covered 8 of the sectors in their visions. Turin covered 5 sectors.

All 9 case study cities address transport and mobility, land use and infrastructure, and economy in their 2050 post-carbon visions. Energy and social issues are addressed as separate sectors in the visions of 8 cities. Technology and innovation, governance, and consumption and waste are included in 6 visions. Five of the cities covered tourism, and food production, while 4 addressed education. Only 3 cities included biodiversity and conservation in their visions.

Table 2: Sectors addressed in the 2050 post-carbon visions

CITY	TRANSPORT & MOBILITY	ENERGY	LAND USE & INFRASTRUCTURE	SOCIAL ISSUES	ECONOMY	BIODIVERSITY & CONSERVATION	TECHNOLOGY & INNOVATION	EDUCATION	TOURISM	GOVERNANCE	FOOD PRODUCTION	CONSUMPTION & WASTE
Barcelona	●	●	●	●	●		●	●	●	●		
Istanbul	●	●	●	●	●	●	●			●		●
Lisbon	●	●	●	●	●		●		●	●	●	
Litoměřice	●	●	●	●	●		●	●	●	●	●	●
Malmö	●	●	●	●	●		●				●	●
Milan	●	●	●	●	●	●	●	●		●		●
Rostock	●	●	●	●	●				●		●	●
Turin	●		●	●	●				●			
Zagreb	●	●	●		●	●		●		●	●	●

Figures 5a & b: Sectors addressed in cities' visions



IV.I TRANSPORTATION AND MOBILITY

Transportation and mobility are addressed in the post-carbon visions for all nine cities. The visions contain a range from qualitative ideas such as efficient, clean, and accessible public transport to management and form of transport means, like sharing and smart logistics. Issues covered in the

transport and mobility sector can be divided into five main categories: quality of transport with the implicit goal of changing the modal share in favour of public transport; carbon-free transport as a general goal for all types of transport; public over private transport; integration, connection, and multimodality; and reduced impact from traffic. Lisbon and Litoměřice's visions cover all of these aspects, while the other cities' visions focused on one or several of these aspects. Barcelona's vision focuses on quality of transport, and Zagreb defines the goal in terms of carbon-free transport. The other cities cover a range of topics. All aspects are addressed by 6 of the cities, except reduced impact from traffic, which is only considered by 4 cities.

Table 3: Categories of post-carbon visions in the transport and mobility sector

TRANSPORT & MOBILITY	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Quality of transport	•	•	•	•		•	•		
CO_2 free		•	•	•	•	•			•
Public over private			•	•	•	•	•	•	
Integration, connection, multimodality			•	•	•	•	•	•	
Reduced impact from traffic in some areas		•	•	•			•		

IV.II ENERGY

Energy generation and consumption is obviously crucial for any post-carbon strategy. Although cities generally hold scarce competences in terms of large scale policies for energy generation and distribution, practically all cities addressed this aspect in their visions, touching on energy efficient buildings and infrastructure, self-production and consumption of energy, alternative energy sources, increased use of and investment in clean energy, regulation of energy policies at city level, energy and the carbon market, and calculations of emissions from buildings. Visions on energy can be divided into 4 categories: reform of energy generation and distribution; new concepts, plans, and performances; the reduction of energy consumption; and increases in energy efficiency of buildings and the capacity of buildings to generate energy.

All cities except Turin include energy in their post-carbon visions. Litoměřice and Rostock cover all four areas in their visions. Istanbul covers all except reduced consumption, and Lisbon covers all except concepts, plans and performance. Barcelona, Milan and Zagreb each focus on 2 aspects of the energy sector, while Malmö includes only reform of energy generation and distribution, an area of action which is seen as crucial by seven of the cities. Six cities include energy efficient or generating

buildings, and five include concepts, plans, and performance in their post-carbon visions. Three cities have visions of reduced energy consumption.

Table 4: Categories of post-carbon visions in the energy sector

ENERGY	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Reform energy generation/distribution	•	•	•	•	•	•	•		
Overall concepts /plans /performance	•	•		•			•		•
Reducing energy consumption			•	•			•		
Energy efficient/generating buildings		•	•	•		•	•		•

IV.III LAND USE & INFRASTRUCTURE

The shape of urban areas and their buildings is one of the determinants of energy consumption, for instance for transport and climatisation of buildings. Under a broader vision of sustainable cities, city visions focus also on the quality of the urban environment and efficient management of natural resources, as well as building design and the re-use of urban areas. All 9 cities touch on land use and infrastructure in their 2050 visions, specifically on the quality of the urban environment and efficient management of natural resources. Other aspects that fall under the land use and infrastructure sector include buildings, and the re-use of urban areas, both of which are included in the visions of Rostock and Zagreb.

Table 5: Categories of post-carbon visions in the land use and infrastructure sector

LAND USE & INFRASTRUCTURE	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Quality of urban environment/efficient management of natural resources	•	•	•	•	•	•	•	•	•
Buildings							•		•
Re-use of urban areas							•		•

IV.IV SOCIAL ISSUES

Visions range from social inclusion, to safety, to cultural identity. Planning of the city development, transportation, and infrastructure are also included as they positively affect quality of life in the city, as do renewable energy usage, energy efficient buildings, citizenship, and environmental concerns. Generally, visions can be divided into 3 main groups: healthy community, safe community, and quality of life.

All cities, excluding Zagreb, have explicit goals related to social issues in their post-carbon visions. All cities that consider social issues include quality of life in their discussion. Four cities vision a healthy community, and two envision a safe community in 2050. Litoměřice and Malmö discuss aspects of healthy and safe communities and quality of life in their visions. Istanbul, Lisbon, and Turin include health communities and quality of life, while Barcelona, Milan, and Rostock focus solely on quality of life in their visions.

Table 6: Categories of post-carbon visions in the social sector

SOCIAL ISSUES	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Healthy community		•	•	•	•			•	
Safe community				•	•				
Quality of life	•	•	•	•	•	•	•	•	

IV.V ECONOMY

Visions are focused on improving competitiveness or on the transition of the urban economy to a sustainable low-carbon economy. Also under sustainability approach to post-carbon transformation, the transformation of the economic sector is highly relevant.

Economy is addressed in the post-carbon vision of all cities. All cities address improving competitiveness, while 7 of the 9 discuss the economic transition. Barcelona and Milan focus their vision for the economy solely on improving competitiveness.

Table 7: Categories of post-carbon visions in the economic sector

ECONOMY	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Improve competitiveness	•	•	•	•	•	•	•	•	•
Transition of urban economy to sustainable low-carbon economy (social)		•	•	•	•		•	•	•

IV.VIBIODIVERSITY AND CONSERVATION

Visions focus on cities as socio-ecologic systems, which entails the consideration of natural components of the system as biodiversity in urban areas. Visions range from the protection of natural resources, to cities rich in biodiversity, and ideas of encouraging the symbiosis of rural and urban areas inside a preserved green zone, and conserving the environment and natural resources.

Istanbul, Milan, and Zagreb include aspects of biodiversity and conservation in their post-carbon visions. While Istanbul mentioned the protection of natural resources, Milan visions the city rich in biodiversity, and Zagreb has ideas of encouraging the symbiosis of rural and urban areas inside a preserved green zone, and conserving the environment and natural resources. Lisbon registers the increase of surfaces for urban gardening as a positive signal for future development.

Table 8: Post-carbon visions in the biodiversity and conservation sector

BIODIVERSITY & CONSERVATION	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Biodiversity & conservation		•				•			•

IV.VII TECHNOLOGY & INNOVATION

Visions see technology and technological innovation are seen as tools for the post-carbon transition, which will help drive economic development. Visions on technology and innovation include ideas such as smart technology and integrated systems and networks.

Barcelona, Istanbul, Lisbon, Litoměřice, Malmö, and Milan include technology and innovation in their 2050 post-carbon-visions.

Table 9: Post-carbon visions in the technology and innovation sector

TECHNOLOGY & INNOVATION	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Technology & innovation	•	•	•	•	•	•			

IV.VIII EDUCATION

Participation and awareness raising were generally indicated as conditions for achieving the visions by all cities. Some cities addressed these issues more explicitly, including in their visions goals for education, aiming at providing a scholastic education and reaching a higher level of social and environmental awareness for all citizens. Visions focus either on schools, universities, and general education, or awareness raising, civic education, and resilience.

Barcelona, Litoměřice, Milan, and Zagreb included education in their post-carbon visions. Barcelona's visions include both aspects of education. Visions for Litoměřice and Zagreb are on schools, universities and general education, while Milan focused instead on awareness raising, civic education, and resilience.

Table 10: Categories of post-carbon visions in the education sector

EDUCATION	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Schools/University/general education	•			•					•
Awareness/civic education/resilience	•					•			

IV.IXTOURISM

Tourism is seen by the cities as an economic sector that allows for the economic valuation of urban qualities but which, at the same time, needs to be managed in order to achieve sustainability. Visions seek a balance between tourism and quality of life for the local population, where the city is attractive for tourism and tourism contributes significantly to the local economy. This issue represented a core element in the vision of Barcelona.

Barcelona, Lisbon, Litoměřice, Rostock, and Turin address tourism in their visions. In Barcelona, the vision is to have a balance between tourism and quality of life for the local population. The other 3 cities reference the city being attractive for tourism and tourism contributing significantly to the local economy.

Table 11: Post-carbon visions in the tourism sector

TOURISM	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Tourism	•		•	•			•	•	

IV.X GOVERNANCE

Changes towards a post-carbon future encompass, according to some of the visions, also changes in urban governance. Visions on governance mainly target 5 main areas: information systems, participation, procedures and coordination, instruments for governance, and resilience.

Six of the nine cities include governance in their 2050 visions. Participation, procedure and coordination, and instruments for governance were covered by 4 cities. None of the cities addressed all aspects of governance. Barcelona had visions in 3 of the 5 areas, Istanbul, Lisbon, and Zagreb had visions in 2, and Litoměřice and Milan had visions in 1 area.

Table 12: Categories of post-carbon visions in the governance sector

GOVERNANCE	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Information System									•
Participation	•	•	•			•			
Procedure and coordination	•	•							•
Instruments for Governance (Legal reforms, tax reforms)	•								
Resilience			•	•					

IV.XI FOOD PRODUCTION

Food production has several links to the consumption to fossil fuels. Visions for this area focus on self-sufficiency through local production of food, and in turn, reduced transport of food, as well as on healthy eating and enjoying a high quality of food.

Four of the 8 cities included food production in their post-carbon visions. Lisbon, Litoměřice, and Malmö focused on self-sufficiency and transport of food. Zagreb addressed healthy eating and food quality. Rostock's vision covered both aspects. Three cities covered self-sufficiency and transport, and 2 covered healthy eating and food quality.

Table 13: Categories of post-carbon visions in the food production sector

FOOD PRODUCTION	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Self-sufficiency / transport			•	•	•		•		
Healthy eating/quality of food							•		•

IV.XII CONSUMPTION & WASTE

Several visions considered cities also under a metabolism approach, where inputs and outputs of matter become relevant and allow for addressing phenomena of carbon leakage, avoiding thus that the urban transition to a carbon free future exports carbon intensive activities to other parts of the territory or abroad, and addresses, furthermore, the reduction of waste as a source of climate relevant emissions Consumption and waste visions can be categorised into 3 main areas: waste reduction, efficient use of resource, and closed cycle.

All cities, with the exception of Barcelona and Turin, include aspects connected to the reduction of consumption and waste in their visions. Five cities include waste reduction, 4 mentioned closed cycles, and 2 include efficient use of resources in their visions. Only Istanbul includes all 3 aspects in its post-carbon vision. Malmö, Rostock, and Zagreb include 2 aspects of waste consumption, and Litoměřice and Milan include only one of these aspects of consumption and waste in their vision.

Table 14: Categories of post-carbon visions in the consumption and waste sector

CONSUMPTION & WASTE	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Waste reduction		•		•		•	•		•
Efficient use of resources		•			•				
Closed cycle		•			•		•		•

V BACKCASTING SCENARIOS

The second round of workshops was dedicated to the design of backcasting scenarios. The guidance for these workshops suggested a five steps approach for this exercise, building off the post-carbon vision produced in the first workshop. This section of the report presents the individual parts that comprise the scenarios, and each city's scenario to reach a post-carbon future, broken down by sector. Like the post-carbon visions, backcasting scenarios tend to focus on the transport and mobility, energy, land use and infrastructure, social issues, economy, biodiversity and conservation, technology and innovation, education, tourism, governance, food production, and consumption sectors.

V.I ASPECTS OF THE SCENARIOS

The backcasting scenarios were developed for the time frame leading up to 2050. They consist of information on potential obstacles and opportunities that might be encountered along the post-carbon transition, milestones and interim projects that could help get there, actions to become less carbon focused, and actors involved in the process. Each of the 8 cities created different scenarios based on their own socioeconomic and environmental situation, and experiences in the workshops, including the influence made by the types of stakeholders in attendance.

V.I.I TIME FRAME

The objective of the scenario building process is to develop a timeline of events leading from present day until the post-carbon vision is achieved in 2050. Nevertheless, timeframes for intermediate goals differed from city to city. In Zagreb, stakeholders identified opportunities, threats, milestones, goals, and measures for 4 time periods: 2015, 2020, 2030, and 2050. Barcelona, Istanbul, Litoměřice, Malmö, and Turin each provided a date for all actions and milestones, ranging from 2015 to 2050. Barcelona considered the timing of milestones from 2017 to 2050, and actions from 2016 to 2025. Istanbul considered the timing of milestones, and Turin covered actions and milestones from 2020 to 2040. Litoměřice covered actions from 2015 to 2040. Istanbul actions, and Litoměřice milestones, and Malmö's actions and milestones were considered from 2015 to 2050. Lisbon considered actions and milestones in 2020, 2030, and 2050. Turin stakeholders also described obstacles and opportunities as likely to occur in the short-term from 2015 to 2020 or long-term from 2030 to 2040.

Milan and Rostock dealt with the issue of time frames in different ways. In Milan, timeframes were added to actions ex-post to signify short-, mid-, or long-term. In Rostock, stakeholders focused mainly on the years 2015 to 2020 and did not focus much on longer time frames due to uncertainties regarding the political and technical developments in the long-term. Actions were, however, placed on a timeline, ranging from ongoing to 2050. Also, obstacles and opportunities were identified as being likely exist in the short-term from 2015 to 2020 or long-term from 2030 to 2040.

V.I.II OBSTACLES & OPPORTUNITIES

Stakeholders were asked to identify potential obstacles that might be encountered along the way to achieving specific endpoints in their post-carbon visions. In Barcelona, Lisbon, Malmö, Turin, and Zagreb, stakeholders identified a few general obstacles and opportunities. In Istanbul and Milan, stakeholders identified obstacles and opportunities relative to different sectors or policy areas. In Rostock, obstacles and opportunities were identified for each action. Litoměřice stakeholders identified a set of external drivers of the city's future development. These external drivers were interpreted as obstacles and opportunities in a post-carbon transition.

V.I.III MILESTONES & INTERIM PROJECTS

Milestones are events or accomplishments that will be reached along the path towards the post-carbon visions setting intermediate goals on the road towards the vision. Barcelona and Zagreb stakeholders identified milestones with associated dates. Stakeholders in Istanbul identified milestones relative to the associated sector or policy area. In Litoměřice, stakeholders identified milestones, and in Milan, stakeholders identified milestones and interim projects relative to the associated sector or policy area and further by the vision target. In Lisbon and Malmö, stakeholders made a combined list of milestones and actions – for 2020, 2030, and 2050 in Lisbon and listed as short-, mid-, or long-term in Malmö – and are categorised by sector or policy field. In Rostock, action deadlines are considered milestones, but not all actions have a milestone or deadline. Turin stakeholders identified linked milestones and actions. No cities except Milan proposed interim projects.

Of the milestones identified by stakeholders, most were focused on energy (25%), transport and mobility (17%), land use (13%), and governance (11%); all other sectors had a share less than 10% of the milestones. Forty-eight percent of the milestones are envisioned in the short-term (up to 2025), 34% in the mid-term (2025-2035), and 17% in the long-term (after 2035).

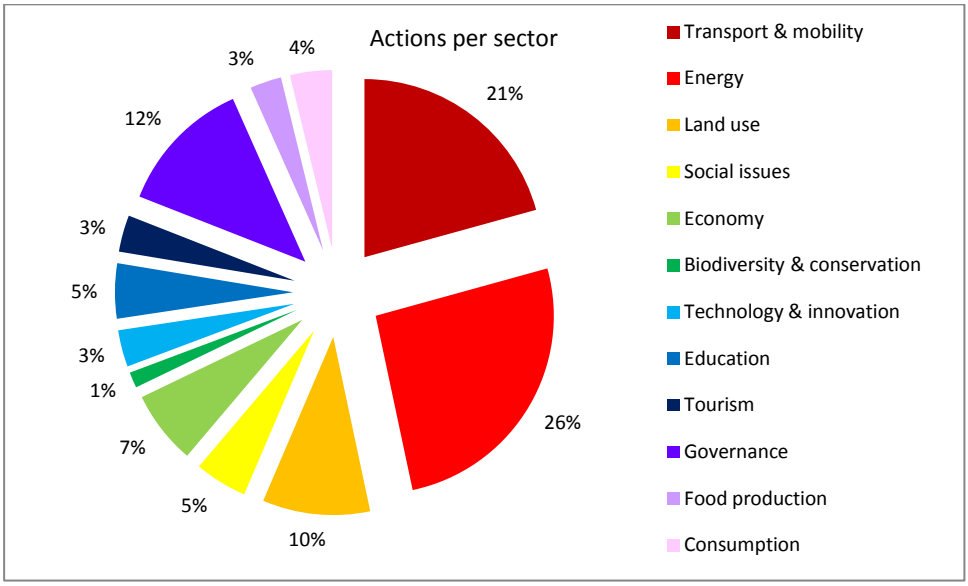
V.I.IV ACTIONS

Actions are specific moves and decisions that can be made by and within cities to help achieve the milestones along the road towards the post-carbon vision. Each of the cities took a slightly different approach in describing the actions needed for reaching the post-carbon vision. In Barcelona, stakeholders identified actions according to the milestone that they would help achieve, and provided a year or range of years when they should be taken. In Istanbul, stakeholders identified actions relative to each sector or policy area. In Litoměřice and Milan, actions were identified according to the relevant sector or policy area and vision target; these are grouped as short-, mid-, or long-term in Milan. In Lisbon and Malmö, stakeholders made a combined list of milestones and actions – for 2020, 2030, and 2050 in Lisbon and listed as short-, mid-, or long-term in Malmö – and are categorised by sector or policy field. In Rostock, actions were listed along a timeline, with actors responsible for implementation, milestones/deadlines, and opportunities and challenges. Most of the actions come directly from the Master Plan 100% Climate Protection. Many of the measures are currently running or are to be finished by 2020, so a few measures were added in order to reach the 2050 vision. Turin

stakeholders identified linked milestones and actions to take place between 2020 and 2040. In Zagreb, actions/measures were identified for the city in 2015, 2020, 2030, and 2050.

The actions have been organised by sectors, identifying the sector they look at. For example, technological improvements in the energy sector are coded as energy actions. Trying to assess the importance attributed to single sectors, the number of actions defined has been quantified, without considering the volume of activities requested by each of the actions, which can, in fact, be quite different from one case to another. Nevertheless, this exercise provides a glance on the detail of attention that has been attributed to the different sectors, as some sectors have received a larger number of actions compared to others. In particular, as indicated in Figure 6, the energy sector produced 26% of total actions suggested by the stakeholders. 21 and 12% of actions were identified in the transport and governance sectors, respectively. Land contributed to 10% of total actions, while economics seven percent. Education and social issues account for five percent of actions each, and waste four percent. Tourism, food production, technology and biodiversity are also considered in the backcasting exercise, and these sectors jointly contribute to 9% of total actions.

Figure 6: Distribution of actions by sector



Even if overall energy is the sector where the largest number of actions is, some divergences emerge if each city is considered separately. For example, during the development of the actions in Barcelona, the stakeholders focused largely on transport, governance and economics, while the energy sector received only 10% of contributions. In Istanbul, the land sector contributed to 21% of total actions proposed, followed by economics, then energy and governance.

V.I.V ACTORS

Actors relevant to the post-carbon vision were identified in Istanbul, Rostock, and Zagreb. In Istanbul, stakeholders identified actors relative to each sector or policy area. In Rostock, relevant actors were listed along with each action and in Zagreb along with each of the strategic goals. Barcelona, Litoměřice, Malmö, Milan, and Turin did not identify relevant actors.

V.II SCENARIOS BY SECTOR

Similar to the post-carbon visions prepared by the case study cities, the backcasting scenarios are broken down by sector. Obstacles and opportunities, milestones and interim projects, actions, and actors are organised according to the relevant sector. Again, the 12 sectors or policy areas include: transport and mobility, energy, land use and infrastructure, social issues, economy, biodiversity and conservation, technology and innovation, education, tourism, governance, food production, and consumption. In the case that the case study leaders did not report obstacles, opportunities, milestones, interim projects, actions, or actors according to the relevant sector, this work was done ex-post by the FEEM POCACITO team for comparison of the data across cities.

V.II.I TRANSPORTATION AND MOBILITY

OBSTACLES & OPPORTUNITIES

Cities identified obstacles and opportunities that may present themselves in the transport and mobility sector along the path towards becoming post-carbon. These have been further characterised by the specific aspect of the sector for which they are relevant. Obstacles inhibit growth and progress within the respective area, and opportunities allow for progress. For example, an obstacle for choosing public over private transport could be low fuel prices or lack of public transportation infrastructure, whereas an opportunity in this same area could be national policies supporting public transport, or a change in social norms and preferences for car ownership.

Table 15: Areas of identified obstacles and opportunities in the transport and mobility sector

●=obstacle ○=opportunity

TRANSPORT & MOBILITY	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Quality of transport						●			
CO_2 free				○	● ○	● ○	○		
Modal share			● ○	● ○		● ○	○		●
Integration, connection, multimodality			○	● ○	○	● ○	○	○	○
Reduced impact from traffic in some areas				●		●			

Neither Barcelona nor Istanbul noted any obstacles or opportunities for the transport and mobility sector, while Rostock and Turin noted only opportunities. The other 5 cities identified both obstacles and opportunities for transport and mobility.

Milan's stakeholders noted one obstacle in terms of the quality of transport; specifically, the attitude of the railway society hinders the convenience of taking the train due to regular delays and strikes and hinders improvements of the services offered.

Stakeholders in Litoměřice, Malmö, Milan, and Rostock identified several obstacles and opportunities in becoming CO_2 free. Obstacles are associated with generating energy for and charging electric cars, as well as the high price of electric vehicles. However, becoming CO_2 free also provides opportunities, such as the possibility to travel without using fossil fuel. Opportunities to help achieve CO_2 free transport include awareness raising through ongoing projects such as the Electric Vehicles in Urban Europe project, incentives for eco-friendly flying and driving, technological accessibility, and carbon tax.

In Lisbon, Litoměřice, Milan, Rostock, and Zagreb, stakeholders identified some obstacles and opportunities in modal share. Obstacles include public resistance, lack of infrastructure, and rapid technology change, private organisation of transport, growth in number of motorised vehicles due to increase in wealth and attitude towards car ownership, low fuel prices, fuel companies lobbying, and national policy (counteracting) public transport. Opportunities exist for the development of new technologically, as innovative applications will likely improve attractiveness of public transportation and reduce individual motorised traffic. There is also some opportunity for national policy and subsidy policies for public transport. High fuel prices, limited parking, decreasing populations, and change in social norms for car ownership present opportunities in the shift to public transport over private transport.

Litoměřice and Milan had stakeholders who noted obstacles for integrations, connection, and multimodality. Obstacles include the lack of coordination between transport systems, centralised outlay of networks, and lack of intercity transport infrastructure. All cities except Barcelona and Istanbul identified opportunities for integrations, connection, and multimodality, including public policies and incentives towards sustainable mobility, existing or ongoing mobility plans, and improved multi-modal intercity transport infrastructure.

MILESTONES & INTERIM PROJECTS

Barcelona, Istanbul, Lisbon, Litoměřice, Milan, Turin, and Zagreb each identified milestones in the transport and mobility sector. Interim projects for Milan are also included herein. Milestones are classified as short- (up to 2025), mid- (2025-2035) or long-term (after 2035).

Twenty-two milestones have been identified by stakeholders in the transport sector. Most transport milestones are seen in the area of carbon free transport, and stakeholders anticipate reaching most milestones in the 2025 to 2035 timeframe (10). Eight milestones have also been proposed for the short-term, and 4 for the long-term. Litoměřice has proposed the most milestones, whereas Malmö and Rostock have proposed none.

Table 16: Milestones in the transport and mobility sector

MILESTONE	CITY	TIMEFRAME
Integration , connection, multimodality		
Concentrate coordination powers in the AMB authority	Barcelona	short
City´s public transport system covers 100% of the city	Litoměřice	mid
Creation of an integrated public transport system	Milan	mid
30% of inhabitants use non-motorised transport for daily commuting to work and school	Litoměřice	mid
40% of inhabitants use city´s public transport	Litoměřice	mid
Increasing number of bicycle users	Zagreb	mid
Public transport	Zagreb	long
50% of households do not own a car	Litoměřice	long
Changes in transport Infrastructures		
Public transport is not only designed radially but in the form of a net	Barcelona	short
Reorganising the transportation system and management	Istanbul	short
Expanding the public transportation network, implementation of planned railway system	Istanbul	short
Complex network of cycling infrastructure	Litoměřice	short
A more widespread network of public transport, including extension of the circular lines to connect outlying areas.	Milan	long
Quality of public transport		
Public transport is free of charge	Litoměřice	mid
Public transport becomes faster and less expensive than private transport	Milan	short
Bicycles paths	Zagreb	short
50% of the population using mobility apps	Lisbon	mid
CO_2 free transport		
All (or a certain percentage of) cars are electric	Milan	mid
There are a sufficient number of electric car charging points inside and outside the city	Milan	short
Electric transport used for the distribution of a certain percentage of goods throughout and within the city	Milan	short
Reduce emissions from shipping in the port – ships no longer with motors on	Barcelona	short
No more fossil fuel transport in city	Barcelona	mid
Public transport with zero emissions	Litoměřice	mid
30% of cars use ecological fuels (electric or hydrogen)	Litoměřice	mid

MILESTONE	CITY	TIMEFRAME
50% of cars uses ecological fuels (electric or hydrogen)	Litoměřice	long
100% of individual motorised transport is emissions free	Litoměřice	long
10% transport consumption met by renewable energy	Milan	short
50% reduction of emissions from transport	Turin	mid

ACTIONS

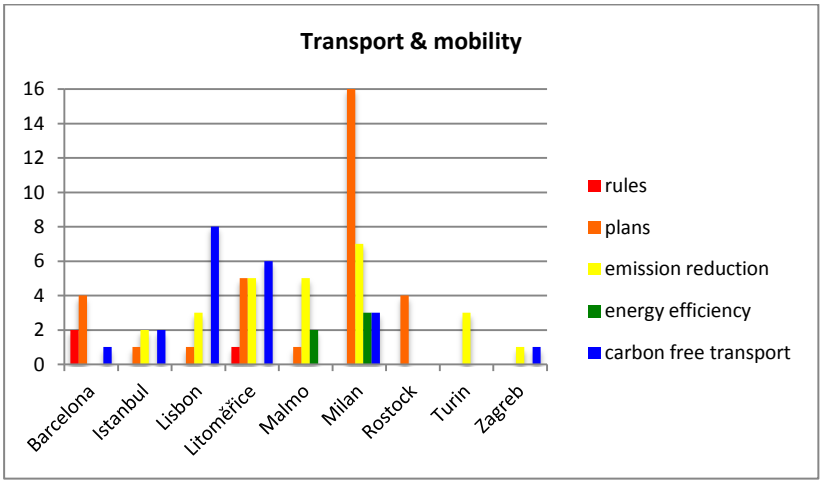
Stakeholders from each of the case study cities proposed actions to take in order to reach their post-carbon visions. In an attempt of finding common elements, these actions are classified by sector, and furthermore by the specific tools and strategies chosen for proceeding towards a decarbonisation of the sector for which they are relevant. The numbers of actions identified by each city are shown in the figure below to show the emphasis and importance placed by stakeholders in those areas and the detail of reflection dedicated to each of the aspects of this sector.

As far as the transport sector is concerned, the actions have been organised in five different sub-groups. Actions are related to:

1. Rules. An example in Barcelona is a law to ban fossil fuel transport and phasing in scheme.
2. Plans. An example in Litoměřice is central integrated traffic control and management system.
3. Actions aimed at emission reduction. An example in Turin is introducing congestion charge.
4. Actions related to energy efficiency. An example in Milan is develop informatics infrastructure including smart stops and smart times for public transportation on buses, trains, and trams.
5. Actions related to carbon free transport. An example in Litoměřice is construction of hydrogen production station.

The total number of action in the transport sector is 87, with 32 of the total related to plans, 26 to emissions reductions, and 21 to carbon-free transport.

Figure 7: Number of actions in the transport and mobility sector



All cities have proposed actions for a post-carbon transition in the transport and mobility sector, and most actions have been identified for emissions reductions, followed by plans which entail investments and physical transformations, actions for decarbonising transport, energy efficiency, and rules. Milan identified the most actions and Zagreb the least. Most cities have proposed a range of actions, while Rostock focused only on transport plans, and Turin only focused on emission reductions in the city centre, introducing a congestion charge.

ACTORS

For the transport and mobility sector, Rostock identified several actors including the waste company, University of Rostock, municipality, mobility coordinator, planning association, and service providers.

V.II.II ENERGY

OBSTACLES & OPPORTUNITIES

Cities identified obstacles and opportunities that may present themselves in the energy sector along the path towards becoming post-carbon. Obstacles could limit progress towards decarbonisation and improved efficiency, whereas opportunities could promote the shift from high-consumption of fossil fuel based energy sources.

Table 17: Areas of identified obstacles and opportunities in the energy sector

●=obstacle ○=opportunity

ENERGY	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Reform energy generation/distribution					●○	●○	●○		●○
Overall concepts /plans /performance		●○	○	○	○	●○	●○		
Reducing energy consumption		●○		○			○		
Energy efficient/generating buildings		●			●	●○	●		○

Neither Barcelona nor Turin indicated potential obstacles or opportunities for the energy sector, while Litoměřice noted only opportunities. The other 5 cities identified both obstacles and opportunities for achieving the milestones defined for the energy sector.

Stakeholders in Malmö, Milan, Rostock, and Zagreb noted several obstacles and opportunities in terms of the reforming energy generation and distribution. Obstacles are associated with existing private investment in energy systems, shifting the paradigm from carbon-efficient to zero-carbon, as well as questions on types of fuel and the distribution of energy. However reforming energy generation and distribution also provides opportunities, such as public and private investment in

energy infrastructure, renewable energy, smart grids and small-scale energy production, and potential for development of long-distance heating systems.

In Istanbul, Milan and Rostock, obstacles related to overall concepts, plans, and performance include insufficient control and monitoring systems, lack of public awareness on energy efficiency, insufficient coordination between institutions, lack of commercial management and other interested parties, undefined standards, and problems with regulations, and national energy policy for centralised energy sources. Istanbul, Lisbon, Litoměřice, Malmö, Milan, and Rostock stakeholders identified some opportunities for overall concepts, plans, and performance including urban renewal and transformation, availability of institutional capacity, new policies and regulations (including EU policies), cooperation and participation in EU networks for energy (i.e. Nordic energy cooperation, Covenant of Mayors), declining prices and accessibility of energy efficient technologies and storage, incentives, municipal support, spillover effects in energy efficiency, national energy policy for decentralised energy sources, national and EU climate and energy policy, and carbon tax.

Related to the goals of reducing energy consumption, Istanbul highlights obstacles associated to monitoring achievements, as data from previous years for establishing a baseline is missing, point furthermore to potential problems related to governance in terms of inefficient and untimely use of public resources. Istanbul, Litoměřice, and Rostock identify several opportunities associated with decreasing consumption, such as energy saving and increased public awareness on needs for energy saving, existing good practices, technical efficiency and minimum standards, and high energy prices leading to lowered consumption.

Stakeholders in Istanbul, Malmö, Milan, Rostock, and Zagreb identified a mix of obstacles and opportunities for energy efficient and energy generating buildings. Obstacles identified by Istanbul, Malmö, Milan, and Rostock include the small margins for improving energy efficiency in existing buildings, high investment costs, lack of qualified work force, and indicate unexplored regulative legal and tax issues related to the feeding excess electricity generated by buildings into the grid,. On the other hand, Milan and Zagreb point to the (economic) opportunities, for producers to feed energy back into the grid, and for energy efficiency.

MILESTONES & INTERIM PROJECTS

Barcelona, Istanbul, Lisbon, Litoměřice, Malmö, Milan, and Zagreb each identified milestones in the energy sector. Interim projects for Milan are also included herein. Milestones are classified as short- (up to 2025), mid- (2025-2035) or long-term (after 2035).

Stakeholders have listed 33 milestones in the energy sector. The highest number of milestones is projected for reducing energy consumption. Overall most milestones in the energy sector are considered short-term achievements (14), while 11 mid-term milestones and 8 long-term milestones have also been proposed. Milan has proposed the greatest number of milestones, while Rostock and Turin have identified none.

Table 18: Milestones and interim projects in the energy sector

MILESTONE	CITY	YEAR
Reform of energy generation and distribution		
Smart Grid	Barcelona	short
80% of the overall city´s accessible consumers is connected to the central heating system	Litoměřice	mid
The urban forests cover 10% of central heating supply energy sources	Litoměřice	mid
Dwellings not connected to the central heating supply use 100% of renewables for heating	Litoměřice	mid
17% final consumption of energy through renewable sources	Milan	short
The number or percentage of households or the city connected to the district heating/cooling network can be used to measure progress	Milan	long
The city is using more renewable energy than carbon energy sources	Milan	mid
Malmö's district heating system is fossil free by 2025	Malmö	short
30% solar energy	Malmö	mid
Overall Concepts and plans, improvements of energy performance		
Developing energy master plan, increasing renewable energy resources and integrating them to the daily life	Istanbul	short
Determining of action plans and targets for energy master plan, developing framework for legal governmental regulations	Istanbul	short
storage CO_2 in soil	Zagreb	long
Reducing energy consumption		
20% reduction of GHG emissions	Lisbon	short
20% improvement in energy efficiency	Lisbon	short
100% intelligent public lighting (LED, remote control)	Lisbon	short
The whole city is 80% energy self-sufficient	Litoměřice	long
90%-100% of the whole city is self-sufficient	Litoměřice	long
80% energy efficiency of Malmö achieved	Malmö	mid
3.5 tons of CO_2 per person per year achieved	Malmö	mid
1-2 tons CO_2 per inhabitant achieved in 2050	Malmö	long
Goals for emission reduction reached in time (PAES target: 20% by 2020, compared to the baseline year 2005)	Milan	short
20% reduction in GHGs	Milan	short
20% final consumption met with renewable sources (use electrical, thermal and transport)	Milan	short
20% reduction in consumption of primary sources compared to the forecast trend, by increasing efficiency	Milan	short

MILESTONE	CITY	YEAR
13% reduction in GHG emissions in non-ETS sectors compared to 2005	Milan	short
11.3% final consumption of energy from renewable sources	Milan	short
Energy efficient/energy producing buildings		
All buildings renovated and energy efficient	Barcelona	long
30% of buildings with green roofs/facades	Lisbon	mid
100% of NZEB – Nearly net zero energy buildings	Lisbon	long
Solar panels in 90% of the buildings stock	Lisbon	long
90%-100% of the city´s facilities are energy self-sufficient	Litoměřice	mid
100% of public buildings are in passive standard	Litoměřice	mid
50% of the whole city is energy self-sufficient	Litoměřice	mid
80% of flats are in passive standard	Litoměřice	long
50% of households contribute energy to the smart grid	Malmö	mid
Overall national energy savings of 9.6% by 2016 in accordance with the National Action Plan for Energy Efficiency (Piano d'Azione Nazionale per l'Efficienza Energetica – PAEE)	Milan	short
One hundred percent of new buildings are zero energy or carbon neutral	Milan	mid

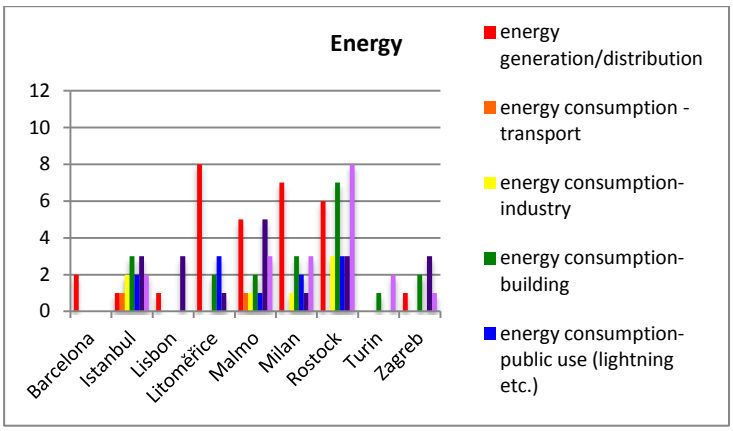
ACTIONS

To give an idea of the type of actions that have been proposed, the total list of actions has been sub-divided depending on their nature. Actions in the energy sector are related to:

1. The generation of energy and its distribution. An example in Litoměřice is centralised system of energy distribution and operation.
2. The energy consumption in the transport sector. An example in Malmö is Malmö's first fossil-free, sustainable tanker and service station is opened.
3. The energy consumption in the industry sector. An example in Istanbul is clean energy usage and automatisation in industry.
4. The energy consumption in the building sector. An example in Milan is to create a network for district heating and cooling.
5. The energy consumption in the public use. An example in Rostock is an energy-oriented city refurbishment & quarter management.
6. Concepts, plans and performance. An example in Malmö is that government policy instruments for energy efficiency are introduced.
7. Incentives. An example in Turin is to spread adoption of certifications of energy performance.

The total number of actions in the energy sector is 109, and the majority are related to the generation and distribution of energy. Actions related to the consumption in the building sector are the second largest group, followed by actions related to concepts, plans and performance and to incentives.

Figure 8: Number of actions in the energy sector



All cities have proposed actions for a post-carbon transition in the energy sector. All cities except Turin suggested actions for energy generation and distribution, and all except for Barcelona and Lisbon proposed actions for energy consumption in buildings. Rostock identified the most actions, and Barcelona and Turin the least.

Istanbul and Malmö both identified actions to address all aspects of the energy sector; Milan and Rostock considered all except for energy in the transport sector. Barcelona only focused on energy generation and distribution. Other cities proposed a range of actions.

ACTORS

Relevant actors in achieving the post-carbon vision for the energy sector include public private partnerships. Rostock has identified not only public private partnerships (PPPs), but also: energy alliance, service provider, municipality, public utility, regional municipal association, private households, NGOs, employment agency, public transport company, and waste company.

V.II.III LAND USE & INFRASTRUCTURE

OBSTACLES & OPPORTUNITIES

Cities identified obstacles and opportunities that may be faced during the post-carbon transition in the land use and infrastructure sector. These have been further characterised by the specific aspect of the sector for which they are relevant. Such obstacles could impede the efficient use of energy, complicate transport, or lead to the overconsumption of soil, whereas opportunities could potentially support the revitalisation of urban areas, and incorporate energy efficient design into new development, while cutting down on the need for fossil fuel usage.

Table 19: Areas of identified obstacles and opportunities in the land use and infrastructure sector

●=obstacle ○=opportunity

LAND USE & INFRASTRUCTURE	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Quality of urban environment/efficient management of natural resources		●		● ○	○	● ○	○	○	○
Buildings				● ○					
Re-use of urban areas		● ○	●	● ○		○			

All cities except for Barcelona noted some obstacles or opportunities for the land use & infrastructure sector, while Lisbon identified only obstacles, and Malmö, Rostock, Turin, and Zagreb identified only opportunities. The other 3 cities identified both obstacles and opportunities for land use & infrastructure.

Regarding the quality of the urban environment and efficient management of natural resources, Istanbul, Litoměřice, and Milan identified several obstacles, including lack of awareness, pressure on natural areas from population and development, and lack of research and support for natural resource management. Opportunities to improve the quality of the urban environment, as noted by Litoměřice, Malmö, Milan, Rostock, Turin, and Zagreb, include neighbourhood initiatives, green areas providing a link to surrounding suburbs, density improving efficiency, reform of land management and planning laws, low rates of demographic growth, evolving social trends, public awareness, and climate change adaptation and flood protection.

Only Litoměřice reflected on potential obstacles and opportunities related to improvements in the addressing design of buildings. The main obstacle identified consisted of social preferences for single family housing patterns, thus the opportunity would lie in transforming these preferences in a way that multifamily houses become trendy.

Istanbul, Litoměřice, and Lisbon noted low investments in urban regeneration, and low land prices or high land availability as obstacles for the reuse of urban lands. Istanbul, Litoměřice, and Milan identified opportunities for re-use of urban areas including urban renewal and transformation, scarcity of building land or high land prices, and taking advantage of large events such as the EXPO to transform urban space.

MILESTONES & INTERIM PROJECTS

Litoměřice, Malmö, Milan, Turin, and Zagreb each identified milestones in the land use and infrastructure sector. Interim projects for Milan are also included herein. Milestones are classified as short- (up to 2025), mid- (2025-2035) or long-term (after 2035).

Stakeholders have named 17 milestones. By far, the largest number of milestones has been identified for the quality of the urban environment. Eleven milestones are seen in the short-term, 6 in the mid-

term, and none in the long-term. Litoměřice has named the most milestones, while Barcelona, Istanbul, Lisbon, and Rostock have named none.

Table 20: Milestones and interim projects in the land use and infrastructure sector

MILESTONE	CITY	TIMEFRAME
Quality of the urban environment		
Castle as the centre of encounter	Litoměřice	short
Main square - place of encounters (events, performances, a living square)	Litoměřice	short
Cars are out of the city centre	Litoměřice	short
City parts are self-sufficient in services provision	Litoměřice	mid
Clean and transparent city - streets and green areas	Litoměřice	short
The garden of Bohemia - quality centre for sports and leisure activities	Litoměřice	short
The number of parks opened, percentage of permeable surfaces, and waterways re-opened increase	Milan	short
Acoustic classification of the Territory (Classificazione acustica del Territorio – Zonizzazione acustica): safeguard areas not yet hit by noise pollution, and identify areas that require recovery plans because detectable acoustic levels exceed the limits identified to risk to public health	Milan	short
Pedestrian areas in the periphery of the city, especially to link the centre to surrounding suburbs (make sub-centres in the periphery more attractive)	Milan	short
“Green mile”	Milan	short
The city at the river Sava (4 hydroelectric power station, green urban areas, new traffic path)	Zagreb	mid
Localisation and circular system	Zagreb	mid
Management of public green areas	Zagreb	mid
Buildings design		
Rainwater tanks on 50% of family houses	Litoměřice	mid
The living area is 40% less than in 2015, but with more shared space.	Malmö	short
20% reduction of emissions from buildings	Turin	short
Reuse of urban areas		
100% of brownfields is used for entrepreneurship, public services, housing etc.	Litoměřice	mid
Reduction of soil consumption	Turin	short

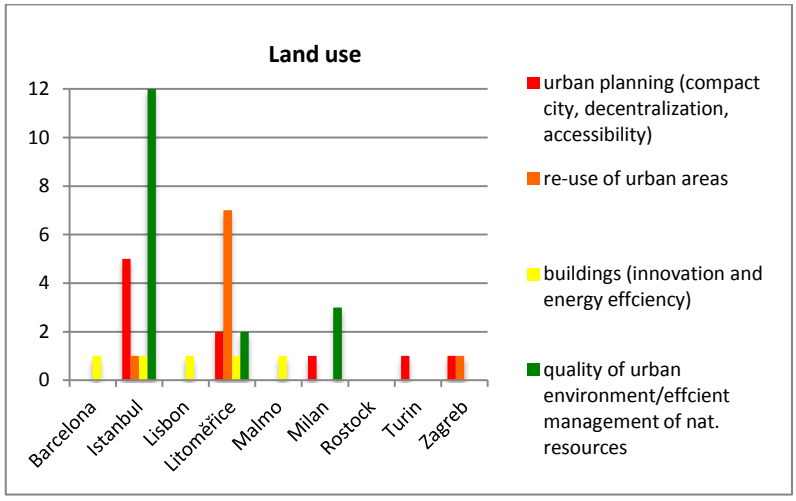
ACTIONS

The land sector contributed with 41 actions, which have been divided into four groups. Actions are related to:

1. Urban planning for a compact city, decentralisation and accessibility. An example is “Easy accessibility to green areas, parks” in Istanbul.
2. Re-use of urban areas. An example in Zagreb is the conversion of existing unused urban spaces for start -up business.
3. Innovation and energy efficiency in buildings. An example is in Zagreb greening the roofs.
4. Quality of urban environment and efficient management of natural resources. An example in Milan is to re-open some of the city’s waterways.

The largest number of actions aims at improving the quality of the urban environment and achieving an efficient management of natural resources, with 17 actions being produced in this group.

Figure 9: Number of actions in the land use sector



All cities except Rostock proposed actions in the land use sector, with Istanbul identifying the most actions at 19. Istanbul and Litoměřice were the only cities to propose actions in all 4 areas of land use. Milan and Zagreb identified actions in 2 areas, and Barcelona, Lisbon, Malmö, and Turin in 1.

ACTORS

Istanbul and Rostock identified actors relevant to achieving the vision on land use and infrastructure. In Istanbul, public institutions, private sector, non-governmental organisations (NGOs), and citizens are referenced. Zagreb has highlighted the role of the municipal construction department.

V.II.IV SOCIAL ISSUES

OBSTACLES & OPPORTUNITIES

Although only indirectly related to the post-carbon transition, cities identified obstacles and opportunities that may present themselves in the social sector. These have been further characterised by the specific aspect of the sector for which they are relevant. Obstacles might inhibit growth and progress of citizens; opportunities might foster better and more sustainable livelihoods.

Table 21: Areas of identified obstacles and opportunities in the social sector

●=obstacle ○=opportunity

SOCIAL ISSUES	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Healthy community					○			●	
Safe community				●					
Quality of life	●	● ○		●	● ○	●		○	● ○

Neither Litoměřice nor Rostock noted any obstacles or opportunities for the social sector, while Barcelona, Lisbon, and Milan noted only obstacles. The other 4 cities identified both obstacles and opportunities for social issues.

Turin identified 1 obstacle and Malmö 1 opportunity for healthy communities. The aging process is an obstacle, whereas the effects of a better lifestyle and a longer life are opportunities for healthy communities in the social sector.

Lisbon identified potential natural disasters as an obstacle for community safety.

Barcelona, Istanbul, Lisbon, Malmö, Milan, and Zagreb noted several obstacles to a high quality of life. These include loss of city character, uncontrolled urbanisation and physical space limitations, disengagement of citizens, lack of civic consciousness/awareness, lack of solidarity and sense of belonging, unequal income levels, migration pressures and wars, ineffective legislation, ineffective transport systems, social apathy about climate change, people unwilling to change their lifestyles, and risk aversion. Opportunities for improving quality of life include new cultural models, increased research and focus on quality of life, new cultural models, highly educated population, multidisciplinary teams of citizens, social innovation, green and local jobs with work for everyone, awareness about climate change, change in consciousness about sustainability and conservation of resources, more shared consumption, more free time, mild climate, and clean environment.

MILESTONES

Barcelona, Istanbul, Litoměřice, Malmö, Milan, Turin, and Zagreb each identified milestones in the social sector. Milestones are classified as short- (up to 2025), mid- (2025-2035) or long-term (after 2035).

Twelve milestones have been identified by stakeholders. Most milestones have been identified for healthy communities and quality of life. Six of the milestones are seen as mid-term objectives, five as long-term, and 1 as a short-term goal. Litoměřice has named the most milestones, and Rostock 0.

Table 22: Milestones and interim projects in the social sector

MILESTONE	CITY	TIMEFRAME
Healthy community		
Health system guaranteed for all	Barcelona	long
Inhabitant's responsibility for own health - be a doctor: first prevention, then health system services	Litoměřice	mid
Responsibility for one's life in general	Litoměřice	mid
Below threshold values of NOx, CO, O3 are met in all periods 1day, 1hour, 1year	Litoměřice	mid
Below threshold values of PM10 are met in all periods 1day, 1hour, 1year	Litoměřice	mid
monitoring the quality of environment and health	Zagreb	mid
Safe Community		
50% of the city with video surveillance	Lisbon	mid
Quality of life		
Planning for accessible city and implementing the plan	Istanbul	long
The population is 500,000 and has stopped increasing	Malmö	long
The city's inhabitants are happiest and most climate smart in the country	Malmö	long
Citizens change their lifestyles and become more sensitive	Milan	mid
Facing the ageing society	Turin	short
Turin as an inclusive and "shared" city	Turin	long

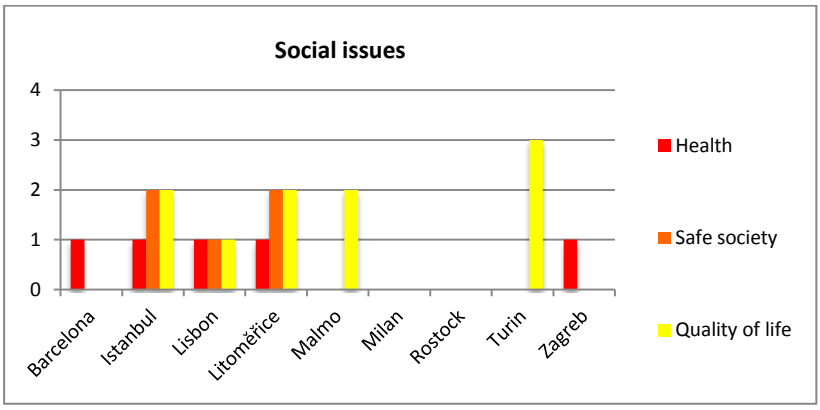
ACTIONS

Another important sector where stakeholders were asked to focus on is the social sector. Despite not being completely related to environmental issues, the social sector was considered essential as a vision of a carbon-free city cannot exempt a vision of a highly social city. The importance of the social sector is proven by the large number of actions suggested. Twenty actions have been proposed in 3 different categories. Actions are related to:

1. Health. An example in Istanbul is increasing health service and making it accessible for everyone.
2. Safe society. An example in Litoměřice is central security system (cameras).
3. Quality of life. An example in Malmö is 24 hour school / culture / hobby houses for all ages.

Stakeholder primarily focused on actions to improve the quality of life, with 10 actions in this group. Both other areas have 5 proposed actions.

Figure 10: Number of actions in the social sector



All cities except for Milan and Rostock proposed actions in the social sector. Istanbul, Lisbon, and Litoměřice identified actions for health, safety, and quality of life. Barcelona and Zagreb focused only on healthy communities, and Malmö and Turin focused only on quality of life.

ACTORS

Istanbul and Zagreb have mentioned several actors that are relevant to the post-carbon transition. In Istanbul these include public private partnerships and foreign investors. In Zagreb these include city offices, including the department of public health, and civil society organisations.

V.II.V ECONOMY

OBSTACLES & OPPORTUNITIES

Potential obstacles and opportunities for a post-carbon transition in the economic sector have been noted by stakeholders. These have been further characterised by the specific aspect of the sector for which they are relevant. Obstacles such as lack of funds or uneven distribution of wealth could inhibit growth and progress, while opportunities could allow for progress on the path to becoming a sustainable and circular economy.

Table 23: Areas of identified obstacles and opportunities in the economic sector

●=obstacle ○=opportunity

ECONOMY	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Improve competitiveness									

ECONOMY	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Transition of urban economy to sustainable low-carbon economy (social)		● ○	●	●	● ○	● ○		●	● ○

Neither Barcelona nor Rostock noted any obstacles or opportunities for the economic sector, while Litoměřice and Turin noted only obstacles. The other 4 cities identified both obstacles and opportunities for the economy.

Obstacles regarding the transition to a sustainable low-carbon economy, identified by Istanbul, Lisbon, Litoměřice, Malmö, Milan, Turin, and Zagreb include the economic crisis, insufficient national funds, lack of private financial resources, increasing poverty, depleted EU funds, austerity measures imposed by the European Commission and the International Monetary Fund, instability and conflict, and globalisation. Opportunities noted by Istanbul, Malmö, Milan, and Zagreb include democracy, economic potential, EU adaptation support, young and qualified people, increased industrial symbiosis, circular economy, economic redistribution, and the consequences of the economic crisis.

MILESTONES

Barcelona, Istanbul, Litoměřice, and Turin each identified milestones in the economic sector. Milestones are classified as short- (up to 2025), mid- (2025-2035) or long-term (after 2035).

Stakeholders have identified 7 milestones for the economic sector. Litoměřice has named the most, while Lisbon, Malmö, Milan, Rostock, and Zagreb have not identified any. Five milestones are foreseen as short-term goals, 1 as mid-term, and 1 as a long-term goal.

Table 24: Milestones in the economic sector

MILESTONE	CITY	TIMEFRAME
Having a large SME presence in the city – proximity shops and services preserved	Barcelona	long
Preparing economic vision plan	Istanbul	short
Entrepreneurs are welcoming the tourism	Litoměřice	short
Active pro-business environment	Litoměřice	short
Nomination of the city to UNESCO	Litoměřice	short
Most inhabitants work in Litoměřice	Litoměřice	mid
Turin as a touristic city	Turin	short

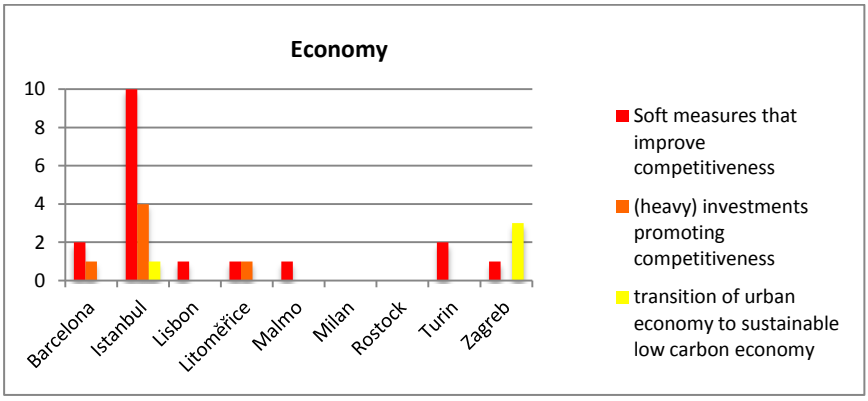
ACTIONS

Twenty-seven actions have been produced in total, and three distinct sub-groups have been identified in the economic sector. Actions are related to:

1. Soft measures that improve competitiveness. An example in Turin is increase cooperation between universities and local companies.
2. (Heavy) investments promoting competitiveness. An example in Litoměřice is identifying appropriate location and financial resources to build and exhibition centre of international importance.
3. Transition of urban economy to sustainable low-carbon economy. An example in Zagreb is breaking the monopoly and creating the conditions for socio-green businesses.

Of the 28 actions, the largest group of actions is related to soft measures to improve competitiveness, with 17 actions.

Figure 11: Number of actions in the economic sector



Seven of the 9 cities identified actions in the economic sector; all excluding Milan and Rostock. Istanbul proposed 19 actions, the highest amongst the cities, and was the only city to touch on the each of the 3 aspects of the sector. Barcelona and Litoměřice focused only on measures to improve competitiveness and investments promoting competitiveness. Lisbon, Malmö, and Turin proposed actions for measures to improve competitiveness, and Turin proposed actions for measures to improve competitiveness as well as for a transition to a sustainable low-carbon economy.

ACTORS

Istanbul and Zagreb have identified several actors that are relevant to their vision for the economy. In Istanbul these actors include PPPs and foreign investors. For Zagreb, these actors include city offices, civil society organisations, and small and medium enterprises.

V.II.VI BIODIVERSITY AND CONSERVATION

OBSTACLES & OPPORTUNITIES

Although biodiversity and conservation my not directly affect the shift towards becoming post-carbon, they are an essential part of sustainable and healthy cities. City stakeholders identified

obstacles and opportunities that may be encountered in the biodiversity and conservation sector along the path towards becoming post-carbon. These have been further characterised by the specific aspect of the sector for which they are relevant. Obstacles, such as giving priority to economic development, may lead to a dismissal of the importance of biodiversity, whereas opportunities to protect biodiversity and conserve natural areas might be supported by policies or actions taken by cities.

Table 25: Areas of identified obstacles and opportunities in the biodiversity and conservation sector

●=obstacle ○=opportunity

BIODIVERSITY & CONSERVATION	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Biodiversity & conservation		● ○				○			

Istanbul identified both obstacles and opportunities for biodiversity or conservation, and Milan identified opportunities for biodiversity and conservation. The other 6 sectors noted neither obstacles nor opportunities.

Istanbul noted that giving priority to economic development and making development decisions that adversely affect natural resources are obstacles to biodiversity and conservation. Istanbul and Milan identified several opportunities for biodiversity and conservation including EU environmental policies, existing natural resources, existing NGOs, ecologic zones that can provide habitat for more biodiversity, and rehabilitating deprived or derelict areas (instead of new development) provides more green space within the city.

MILESTONES

Istanbul, Lisbon, and Zagreb each identified milestones in the biodiversity and conservation sector. Interim projects for Milan are also included herein. Milestones are classified as short- (up to 2025), mid- (2025-2035) or long-term (after 2035).

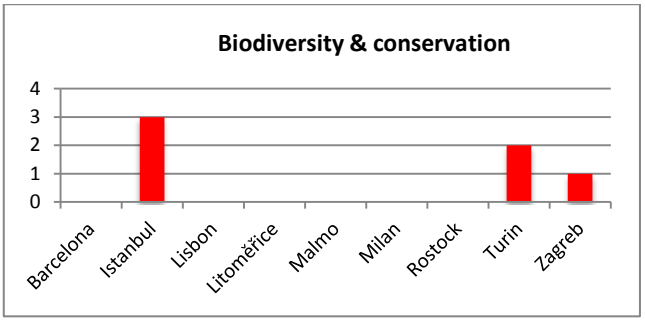
Three milestones have been named by stakeholders, 2 in the short-term and 1 mid-term. Istanbul, Lisbon, and Zagreb have each identified 1 milestones, and the other 6 cites 0.

Table 26: Milestones in the biodiversity and conservation sector

MILESTONE	CITY	TIMEFRAME
Consensus of stakeholders on valuable natural resources	Istanbul	short
30% increase in urban gardens	Lisbon	short
Increase bio capacity and resistance of flora and fauna	Zagreb	mid

ACTIONS

Figure 12: Number of actions in the biodiversity and conservation sector



Only 3 of the case study cities listed actions for the biodiversity and conservation sector, as this is not directly related to the idea of achieving a post-carbon vision. Istanbul proposed 3 actions focused on protecting important species and areas. Turin proposed 2 actions to preserve soils and re-naturalise abandoned built areas. Zagreb had 1 action aimed at using agroecology in the management of public green space. A total of 6 actions were proposed for the biodiversity and conservatino sector.

ACTORS

Istanbul has identified public institutions, private sector, NGOs, and citizens as being relevant in the biodiversity and conservation sector.

V.II.VII TECHNOLOGY & INNOVATION

OBSTACLES & OPPORTUNITIES

Technology and innovation have the potential to facilitate the transition to becoming carbon-free and smart-cities. Cities identified obstacles and opportunities that may present themselves in the technology and innovation sector along the path towards becoming post-carbon. These have been further characterised by the specific aspect of the sector for which they are relevant. Obstacles might inhibit growth and progress in technological innovation, yet there are many opportunities to support research and innovation in our increasingly technologically based society. Technology and innovation are particularly relevant to supporting the post-carbon transition in the transport and energy sectors.

Table 27: Areas of identified obstacles and opportunities in the technology and innovation sector

●=obstacle ○=opportunity

TECHNOLOGY & INNOVATION	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Technology & innovation			● ○	●	● ○	○	● ○	○	○

Neither Barcelona nor Istanbul noted any obstacles or opportunities for the technology and innovation sector. Litoměřice noted only obstacles, Milan, Turin, and Zagreb noted only opportunities, and Lisbon, Malmö, and Rostock noted both obstacles and opportunities for technology and innovation.

Obstacles in Lisbon, Litoměřice, Malmö, and Rostock include staff capacities, logistic systems that are not efficiently adapted, technical difficulties, reduced cyber security and personal privacy, and scarce resources for new technologies limiting development and utilisation on a larger scale. Opportunities for technology and innovation in Lisbon, Malmö, Milan, Rostock, Turin, and Zagreb include European funding, well equipped scientific community, using events to bring attention to sustainability (i.e. EXPO), advances in scientific knowledge, collaboration between universities and local companies, green technology, smart technology, clean energy technology, reinforcement of the digital fabrication trend, decreased energy consumption, and high CO_2 reductions.

MILESTONES

Barcelona, Turin, and Zagreb each identified milestones in the technology and innovation sector. Milestones are classified as short (up to 2025), mid- (2025-2035) or long-term (after 2035).

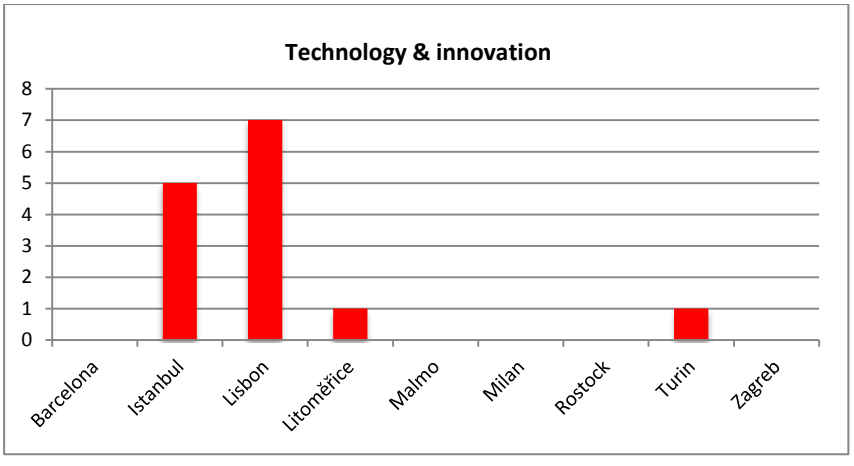
Stakeholders in Barcelona, Turin, and Zagreb have each identified 1 milestone each, for a total of 3 milestones in the technology and innovation sector.

Table 28: Milestones in the technology and innovation sector

MILESTONE	CITY	TIMEFRAME
Reaching the 3% investment in R&D for region	Barcelona	mid
New jobs from green tech	Turin	mid
Use of low-carbon technology	Zagreb	mid

ACTIONS

Figure 13: Number of actions in the technology and innovation sector



A total of 14 actions were proposed for technology and innovation. Only Istanbul, Lisbon, Litoměřice, and Turin identified actions in this sector. Actions for technology and innovation will help support the transition to smarter, more efficient, and in turn less carbon intensive cities.

ACTORS

In Rostock, the municipality and public utility are relevant actors in the transition to become post-carbon in the technology and innovation sector.

V.II.VIII EDUCATION

OPPORTUNITIES

City stakeholders have identified opportunities that may present themselves along the path towards becoming post-carbon in the education sector. These have been further characterised by the specific aspect of the sector for which they are relevant. Improving general knowledge base and increasing civil awareness are among the opportunities that will support the post-carbon transition.

Table 29: Areas of identified obstacles and opportunities in the education sector

●=obstacle ○=opportunity

EDUCATION	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Schools/university/general education					○				○
Awareness/civic education/resilience					○		○		○

Malmö, Rostock, and Zagreb each noted opportunities for education. The other 5 cities noted neither obstacles nor opportunities for education.

One opportunity for general education in Malmö and Zagreb is the possibility to export knowledge. Regarding awareness raising, civic awareness, and resilience, Malmö, Rostock, and Zagreb have identified the opportunity to support energy efficient behaviour and take advantage of spillover effects, to use existing proven solutions developed by others, and to increase the level of knowledge.

MILESTONES

Barcelona, Litoměřice, and Zagreb each identified milestones in the education sector. Milestones are classified as short- (up to 2025), mid- (2025-2035) or long-term (after 2035).

Four short-term milestones have been named in the education sector. Zagreb has proposed 2 milestones, and Barcelona and Litoměřice each have proposed 1.

Table 30: Milestones in the education sector

MILESTONE	CITY	TIMEFRAME
Young generations with better civic education	Barcelona	short
Branch of technical university in the city	Litoměřice	short
Objectively informing the public	Zagreb	short
Awareness about green technology	Zagreb	short

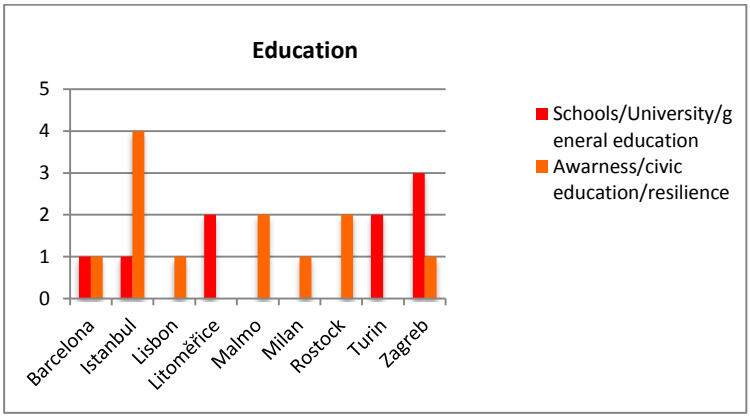
ACTIONS

As far as the education sector is concerned, the 21 actions have been organised in two different sub-groups. Actions are related to:

1. General education. An example in Turin is to define new models of education and training.
2. Awareness, civic education and resilience. An example in Barcelona is to ensure that citizens understand repercussions and costs of changes and demands.

Twelve actions aim at improving the awareness and increasing civic education, while 9 actions refer to general education. All cities have proposed some actions in this sector, although only Barcelona, Istanbul, and Zagreb considered both general education and awareness raising. The remaining cities focused on one of the two aspects.

Figure 14: Number of actions in the education sector



ACTORS

Rostock has named private households, the municipality, and service companies as relevant actors in the education sector.

V.II.IX TOURISM

MILESTONES

Lisbon and Litoměřice identified one milestone in the tourism sector, specific to the characteristics of the city. Milestones are classified as short- (up to 2025), mid- (2025-2035) or long-term (after 2035).

Two milestones have been proposed; 1 in the short-term by Litoměřice and 1 in the long-term by Lisbon.

Table 31: Milestones in the tourism sector

MILESTONE	CITY	TIMEFRAME
20% increase in tourism	Lisbon	mid
Development of congress tourism	Litoměřice	short

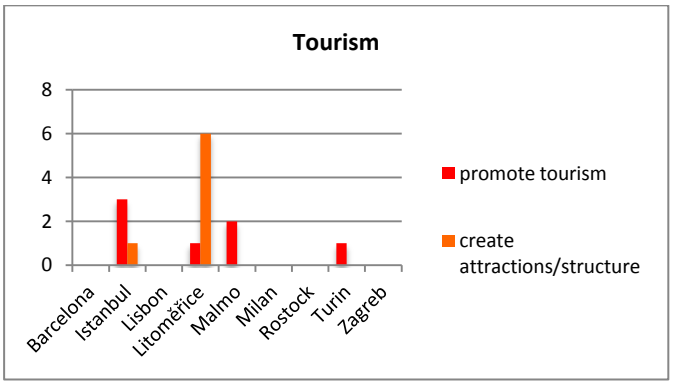
ACTIONS

During the backcasting workshop, stakeholders suggested 14 actions that are related to the tourism sector aiming at:

1. Promoting tourism at the city level. An example in Turin is to create innovative offers and holiday packages for tourists.
2. Creating attractions. An example in Litoměřice is city beach on the Elbe river side.

Seven actions have been suggested in each area. Litoměřice proposed the most actions, covering both promoting tourism and creating attractions. Istanbul also addressed both areas, while Malmö and Turin focused only on promoting tourism. Barcelona, Lisbon, Milan, Rostock, and Zagreb did not identify any actions in the tourism sector to help reach their post-carbon visions.

Figure 15: Number of actions in the tourism sector



V.II.X GOVERNANCE

OBSTACLES & OPPORTUNITIES

Cities identified obstacles and opportunities that may present themselves in the governance sector along the path towards becoming post-carbon. These have been further characterised by the specific aspect of the sector for which they are relevant. Obstacles limit the reach and effectiveness of

governance and public policy, whereas opportunities could enhance importance and effectiveness of policies, and inclusion of citizens in the process.

Table 32: Areas of identified obstacles and opportunities in the governance sector

●=obstacle ○=opportunity

GOVERNANCE	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Information System		○					● ○		●
Participation		○					○		● ○
Procedure and coordination	●	●	●			● ○		● ○	● ○
Instruments for governance (legal reforms, tax reforms)	○				● ○		○		
Resilience		● ○				● ○	○	● ○	●

Only Litoměřice did not note any obstacles or opportunities for the governance sector, while Lisbon noted only obstacles and the remaining 7 citied noted both obstacles and opportunities.

In terms of obstacles for information systems, Istanbul and Rostock noted the limitations in freedom of action, and the inefficient communication in municipality websites, whereas Rostock and Zagreb noted technological improvements and efficient communication as opportunities for information systems.

Zagreb noted the lack of inclusion of citizens in shaping city policies as an obstacle to participation. Istanbul, Rostock, and Zagreb identified several opportunities for participation, including democracy, NGO activities in raising awareness and increasing transparency, and informing and motivating citizens to support climate protection actions.

Barcelona, Istanbul, Lisbon, Milan, Turin, and Zagreb identified obstacles for procedure and coordination, while Milan, Turin, and Zagreb identified several opportunities. Obstacles include bureaucracy, corruption and greed, dysfunctional systems, changes in geopolitical trends, ineffective competencies of municipalities and models of governance, lack of balance between citizens' needs and tourism, lack of clarity on the authority of public institutions, lack of coordination between urban stakeholders and among city council departments, lack of coherence in policies of cities located in the metro area, resistance to change and risk aversions, deficiency in information sharing, and lack of coordination in ecologic movements and policies. Opportunities include co-benefits of other policies for climate, national commitments from UNFCCC COP21 for emission reductions, better integration with public policies, and sustainable management.

Regarding instruments for governance, Malmö listed lack of policy for science and lack of clear national policies and regulations as obstacles in the governance sector. Barcelona, Malmö, and

Rostock noted several opportunities including multi-municipality governing bodies, policy incentives for reduced consumption, and influence in conceptual phase.

Istanbul, Milan, Turin, and Zagreb each identified obstacles for resilience. These include politicians without visions, lack of awareness and consciousness in citizens and governing parties, lack of plans for a post-carbon vision, pressure on politicians to continue with current policies, and weak public administration. Opportunities for resilience, noted by Istanbul, Milan, Rostock, and Turin include the EU adaptation process, lack of carbon lobby, post-carbon vision for the city, and efficient communication on municipality websites.

MILESTONES

Barcelona, Istanbul, Litoměřice, and Zagreb each identified milestones in the governance sector. Milestones are classified as short- (up to 2025), mid (2025-2035) or long-term (after 2035).

A total of 14 milestones have been identified by stakeholders. Zagreb has named 6 milestones, while Lisbon, Malmö, Milan, Rostock, and Turin have not identified any. All proposed milestones are envisioned in the short-term.

Table 33: Milestones in the governance sector

MILESTONE	CITY	TIMEFRAME
Reform of management	Barcelona	short
Concentrate coordination powers in the AMB authority	Barcelona	short
EU Fiscal decentralisation directive	Barcelona	short
Citizen involvement stronger and incentivised (e.g. Through financial mechanisms)	Barcelona	short
Generating a sustainable urban inventory and sharing with public (social, economic, environmental data)	Istanbul	short
Creating a city information system	Istanbul	short
The city leaders are enlightened and share the post-carbon vision of the city	Litoměřice	short
More intensive involvement of citizens to the development and city planning - education, presentations, prints, media	Litoměřice	short
Obtain resources from EU projects	Zagreb	short
Co-financing and monitoring factors from environment	Zagreb	short
Transparency of low-carbon projects	Zagreb	short
A high level use of the EU funds	Zagreb	short
City offices to consult on new projects	Zagreb	short
City offices are constantly consulting about new projects	Zagreb	short

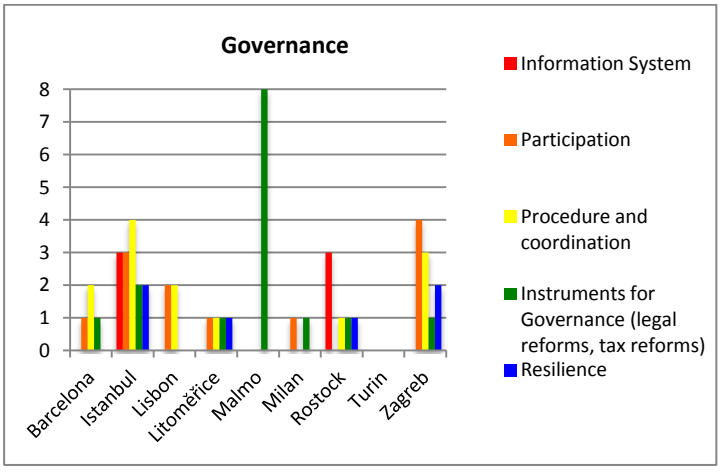
ACTIONS

The third largest group of actions is related to governance, with 52 actions having being suggested in this sector. Five sub-groups have been created. Actions in governance are related to:

1. The Information System. An example in Istanbul is creating real-time impact simulation systems.
2. Participation. An example in Litoměřice is engagement of citizens to cleaning, maintenance and local policies.
3. Procedures and coordination. An example in Barcelona is better coordination between services.
4. Instruments for governance, such as legal reforms or taxes. An example in Malmö is green tax reforms.
5. Resilience. An example in Rostock is climate protection planning, development and construction in cities.

The largest category of actions in governance is related to instruments, such as reforms and taxes, with 15 actions being produced in this group. Actions to increase participation and to improve procedure and coordination are the second and third largest groups.

Figure 16: Number of actions in the governance sector



All cities except for Turin proposed actions for governance. Istanbul proposed the most actions, 14, covering all 5 areas. Rostock was the only other city to address all 5 areas, while Malmö only proposed actions for governance instruments. The remaining cities identified a range of governance actions in 2 (Lisbon and Milan), 3 (Barcelona), or 4 (Rostock and Zagreb) of the areas.

ACTORS

Istanbul, Rostock, and Zagreb each identify several actors that are pertinent to the governance sector in the post-carbon transition. In Istanbul, these actors include public institutions, private sector, NGOs, and citizens. In Rostock the municipality is identified as a relevant actor. Actors in Zagreb include city offices, civil society organisations, and media.

V.II.XI FOOD PRODUCTION

OPPORTUNITIES

Cities identified several opportunities related to food production, transport, and the nourishment of citizens associated with the post-carbon transition. These have been further characterised by the specific aspect of the sector for which they are relevant. Opportunities supporting the post-carbon transition come primarily in the form of decreasing the input of resources, in terms of transport fuel, fertilisers and pesticides, and food and water for livestock.

Table 34: Areas of identified obstacles and opportunities in the food production sector

●=obstacle ○=opportunity

FOOD PRODUCTION	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Self-sufficiency / transport					○				○
Healthy eating/quality of food					○				○

Malmö and Zagreb identified only opportunities for food production. The other 6 cities noted neither obstacles nor opportunities for food production.

Opportunities for self-sufficiency and transport in Malmö and Zagreb include increased diversified local and regional food production. Opportunities in healthy eating and quality of food include organic agriculture, healthy food, and lower consumption of animal products in Malmö and Zagreb.

MILESTONES

Malmö identified milestones in the food sector, as this sector was considered important for the envisaged changes in consumption patterns. Milestones are classified as short- (up to 2025), mid- (2025-2035) or long-term (after 2035).

Two mid-term milestones have been named by Malmö with a mid-term time frame.

Table 35: Milestones in the food production sector

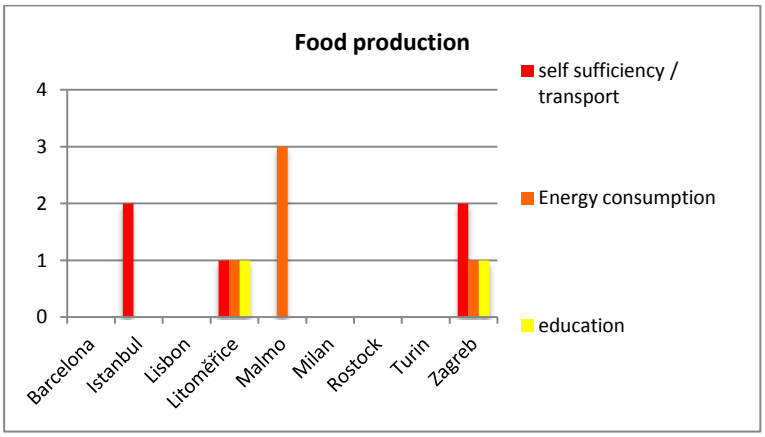
MILESTONE	CITY	TIMEFRAME
30% of the food consumed is produced within the city limits.	Malmö	mid
Climate impact of food consumption in Malmö is halved compared to 2015.	Malmö	mid

ACTIONS

Twelve actions refer to the food production sector, sub-divided into actions related to:

1. Self-sufficiency and transport. An example in Zagreb is increasing areas for food production.
2. Energy consumption. An example in Malmö is government subsidy of fossil-free and sustainable agriculture is introduced.
3. Education. An example in Litoměřice is establishing school and farm focusing on biological agriculture.

Figure 17: Number of actions in the food sector



Five actions were proposed in both the self-sufficiency and transport and energy consumption areas, with just 2 in education. Zagreb identified the most actions, covering all 3 areas. Litoměřice also identified actions in all areas. Istanbul proposed actions only for self-sufficiency and transport, and Malmö proposed actions regarding energy consumption.

V.II.XII CONSUMPTION & WASTE

OPPORTUNITIES

The amount of resources consumed and discarded by cities has a significant impact of the post-carbon transition, and stakeholders have identified opportunities that may present themselves in the consumption and waste sector during this period. These have been further characterised by the specific aspect of the sector for which they are relevant. Opportunities support a more mindful use of resources and consideration of what happens with discarded materials.

Table 36: Areas of identified obstacles and opportunities in the consumption and waste sector

●=obstacle ○=opportunity

CONSUMPTION & WASTE	BARCELONA	ISTANBUL	LISBON	LITOMĚŘICE	MALMÖ	MILAN	ROSTOCK	TURIN	ZAGREB
Waste reduction					○				○
Efficient use of resources			○		○		○		○
Closed cycle									

Lisbon, Malmö, Rostock, and Zagreb noted only opportunities for consumption and waste. The other 5 cities identified neither obstacles nor opportunities for consumption and waste.

Opportunities for waste reduction, noted in Malmö and Zagreb, include waste management, recycling areas, and using organic waste for biogas production. Lisbon, Malmö, Rostock, and Zagreb identified opportunities in the efficient use of resources, specifically growing awareness towards environmentally conscious consumption, local production and consumption, reduced resource use, smaller living spaces, and efficient control of resources.

MILESTONES & INTERIM PROJECTS

Barcelona, Litoměřice, Milan, Rostock, and Zagreb each identified milestones in the consumption and waste sector. Interim projects for Milan are also included herein. Milestones are classified as short- (up to 2025), mid- (2025-2035) or long-term (after 2035).

Stakeholders have identified 11 milestones, of which 7 are short-term, 1 is mid-term, and 3 are long-term. Zagreb has proposed the most milestones, while Istanbul, Lisbon, Malmö and Turin have not identified any.

Table 37: Milestones and interim projects in the consumption and waste sector

MILESTONE	CITY	TIMEFRAME
All waste treated and recycled	Barcelona	short
Terminating municipal waste landfill	Litoměřice	short
High percentage of waste reduced and high percentage of materials recycled	Milan	short
Effective waste management	Milan	short
Reducing electric/heating energy by 36% (compared to 2010 levels)	Rostock	long
Reducing electric/heating energy use per square meter	Rostock	long
Reducing electric energy use by 28% and heating energy by 10% in 2050 compared to 2010 levels	Rostock	long
Regulations about obligate sorting of waste	Zagreb	short
Waste management	Zagreb	short

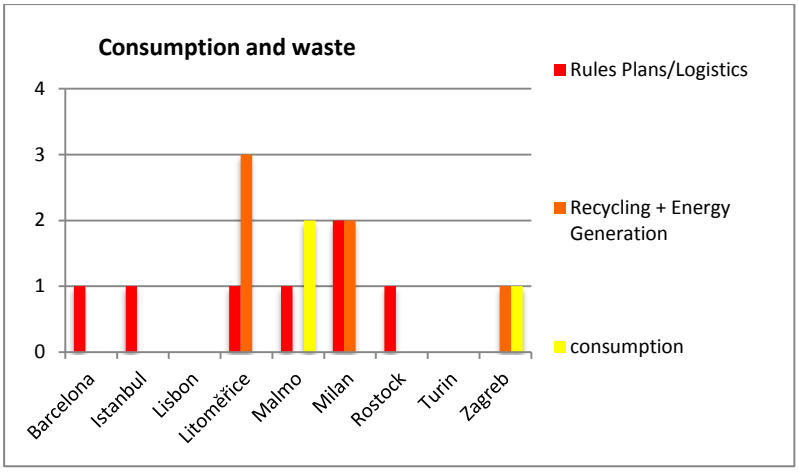
MILESTONE	CITY	TIMEFRAME
Production of high quality compost for the soil	Zagreb	mid
Construction and acceptance for sustainable waste management, areas, resources, processes	Zagreb	short

ACTIONS

As far as consumption and waste are concerned, 16 actions have been proposed in this sector. They are related to:

1. Rules, plans and Logistics. An example in Rostock is inspection of the technical facilities at the waste management company for options on energy optimisation, demonstrating energy saving potentials.
2. Recycling. An example in Milan is to make the separation of waste and recyclables more user-friendly and more efficient.
3. Consumption. An example in Malmö is to introduce a carbon tax on products.

Figure 18: Number of actions in the consumption and waste sector



Of the 16 actions, 7 are for rules and plans, 6 for recycling and energy generation, and 3 for consumption. Litoměřice and Milan both identified 4 actions in rules and recycling areas. Malmö proposed 3 actions in the rules and consumption areas. Zagreb identified 2 actions in the recycling and consumption areas. Barcelona, Istanbul, and Rostock each identified one action for creating rules and plans.

ACTORS

Actors relevant to consumption and waste in Rostock include businesses, service companies, housing companies, municipality, and the water supply company.

V.III BACKGROUND SOCIOECONOMIC SCENARIOS & ROBUSTNESS CHECK

Istanbul, Malmö, Turin, and Zagreb presented and discussed scenarios other than the Middle of the Road/ Business as Usual scenario. In Istanbul, the background scenarios were discussed after the backcasting exercise. When asked if the proposed actions make sense under any potential socioeconomic scenario, stakeholders determined that the actions are flexible enough to adapt to any conditions that might occur. In Malmö, the three scenarios were presented and the BAU scenario was chosen as the background scenario for the exercise. However, the robustness check was less pronounced and rather integrated in the work from the beginning. In Turin, sustainability and fragmentation scenarios were presented. Participants claimed that they found it difficult to identify the pathway to a 2050 post-carbon Turin on the background scenario, even more difficult was to take into account two alternative scenarios to test the robustness of the proposed actions. These difficulties were due to the present high incertitude about the future (as a consequence of economic crisis, climate change processes and so on), the long-time considered (35 years, from 2015 to 2050), the accelerating role of technological innovations (which are very hard to predict). Participants agreed that a real test of sensitivity was not possible. Nevertheless, they claimed that a general consideration was possible: in a “sustainability” low challenge scenario, all proposed actions could be implemented in a more radical and ambitious form; in a “fragmentation” high challenge scenario, a more selective approach should be necessary, in order to concentrate the poor resources on the best performing actions. In Zagreb, other scenarios were presented, but did not change results from backcasting

Lisbon, Litoměřice, Milan, and Turin considered only the Middle of the Road scenario. In Barcelona scenarios were not discussed, and backcasting was based on information from the initial assessment. In Rostock there was a common sense that more actions are necessary in order to actually achieve the 2050 vision. This is why the background scenarios were not discussed in order to check the robustness of the measures since they do not go far enough anyway. Stakeholders agreed that that the measures already listed are indeed feasible and further critical measures could not be added

VI JOINT CASE STUDY CITIES MILAN & TURIN

Both stakeholder workshops were held separately in Milan and Turin.

The results of the Initial assessment for Milan and Turin were presented and participants’ feedback was gathered. Data were agreed upon; some stakeholders suggested integrating them with further indicators about demographic trends (as they can have major impacts on carbon consumption and waste patterns), presence and investments of multination companies, and passenger journeys between Milan and Turin. In particular, as regards to the interaction between the two cities, some participants outlined that the new high-speed connection has had one main effect – it has reduced commuting times from Turin to Milan, but this effects has not generated further socioeconomic or territorial trends. Participants agreed that at the moment it is probably too soon to observe these trends, but in at least five to ten years it should be possible.

Generally, in Milan, stakeholders did not give much thought to the potential of the two cities sharing a common post-carbon future. When asked how this may be developed further, stakeholders noted the potential for the two cities to work together in the sector of technology and innovation, rather than on integration between housing and labour markets.

Similarly in Turin, participants did not consider a major integration of the two cities as an opportunity for the post-carbon vision, neither for promoting post-carbon policies, nor for improving the competitiveness of Turin. However, during the second workshop, stakeholders had to think over the appropriate territorial and institutional level to implement post-carbon policies and actions: they recognised that the city level is, in general, not sufficient (for example, for policies against pollution, waste etc.) and policies have to be thought at a wider level (for example, to develop the area between Turin and Milan). But this wider level does not necessarily correspond to the two cities: according to stakeholders, most of the post-carbon policies that cannot be implemented at the city level have to be proposed at a metropolitan or even at a regional level (for example, for the whole Piedmont region, or the whole Northwestern Italy), rather than through a cooperation between Milan and Turin. According to the stakeholders, this cooperation can turn out really effective only in the case of policies for R&D and tertiary education: Milan and Turin have universities which are important at the national level, but have to cooperate to compete in the global context; moreover, the two cities have different economic specialisations, that can be complementary for promoting technological research and development.

VII DISCUSSION & CONCLUSIONS

VII.I PARTICIPATORY STAKEHOLDER WORKSHOP PROCESS

The experiences with the participative scenario building processes show that there is a high level of interest among representatives in cities to participate in long-term and visioning exercises. Nevertheless, in some bigger cities like Barcelona or Copenhagen, which are highly visible for their climate policies, stakeholders may suffer from fatigue which hampers their involvement in activities that do not have a deliberative mandate. Whereas in smaller cities or cities less visible or advanced with regards to climate policies, the POCACITO initiative represented a novel and interesting approach that has the potential to inspire new policy initiatives in these cities as well as interest in learning from peers – the desire to exchange experiences with other case study cities was articulated during the workshops.

Most participants in the workshops were not used to dealing with the long time frames as required by the 2050 visions. This was particularly relevant for smaller cities, which may have more difficulties in embracing long-term perspectives, a fact that could explain why Litoměřice was more concerned with solutions for current problems as part of the city's vision.

VII.IIVISIONS & SCENARIOS

In addition to these issues, related mainly to procedural backcasting scenarios, the contents of the draft strategies as designed in the backcasting exercise differ largely in both detail and ambition among the case study cities. These range, as previously mentioned, from addressing some strategic sectors (energy production and transport were the most targeted sectors) to strategies detailing precise goals for a wide range of urban policy sectors. Interestingly, the urban form and quality of urban environment represented an important issue in many of the visions and was also seen as a tool for enhancing urban sustainability at large, addressing social (for example, accessibility of parts of the city), economic (innovation friendly and viable urban environments) and environmental (urban greening) issues.

As could be expected, a great deal of attention was paid to transport and energy generation in the urban areas, where many of the envisaged actions aimed at increasing the quality of public transport, decarbonising private transport, and increasing the share of non-motorised movements (walking and cycling). Related to this, some cities envision changes to urban form, implicitly relating the goal of more compact cities to the potential of increasing the economic efficiency of collective transport, and to the carbon impact of land use changes.

Goals and visions developed in relation to the energy sector are mainly directed at energy efficiency in buildings, although some visions acknowledged that the influence of these changes may be limited due to the fact that the potential for realising energy generating or zero-energy concepts in existing buildings may be somehow limited.

Beyond these two areas, the visions and scenarios attributed great importance to the economic development and technological innovation, seen mainly as a means of enhancing the (economic) competitiveness of urban areas. Issues like the circular economy were mentioned in some visions in

relation to waste generation and recycling, whereas de-carbonisation of industrial production or the services sector was not addressed at all, if not (in relation to the services sector) implicitly included in the consideration of de-carbonisation of heating and cooling of buildings.

On the contrary, aspects related to the quality of the urban environment were addressed either as part of sector-oriented strategies (increasing walkability and cycle paths in cities, conserving and enhancing biodiversity) or as an instrument for economic growth, as far as the increase of the tourism sector as an economic sector valorising urban spatial qualities is concerned.

Economic growth was addressed in some cities, making evident that priorities for future urban development need to address issues that go beyond the generation of high-quality urban spaces and decrease of carbon emissions. This is the case especially for the cities that are concerned with the consequences of the economic crisis (Lisbon, Turin) and meeting general development goals (Istanbul). Transition of urban economies to circular, more inclusive, socially and environmentally sustainable patterns was addressed only in one case (Malmö). Consumption patterns were addressed only in this context, aiming at a less globalised economy, starting from the localisation of food production. Technological innovation as an instrument for new energy generation was not seen as an important prospective; visions mainly pointed to existing technologies (smart technologies, electric and hybrid cars, etc.).

An interesting fact to be underlined is the great importance attributed to urban governance in many visions and strategies. The role of public policies for achieving the goals described in the post-carbon visions is seen as crucial by practically all visions. In some cases, this calls for the enforcement of strategies and their translation into real policies along with demands for larger spaces for public participation in decision making and in the design and management of urban (neighbourhood) spaces, as well as for social inclusion. In this case, the call for “education” was mainly understood as a tool for awareness raising and supporting more conscious behaviour of citizens (less free-riding), and, only in few cases, as an instrument of social justice by providing access to all forms of education for all.

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