POCACITO

european post-carbon cities of tomorrow

REPORT ON STAKEHOLDER WORKSHOPS

POST-CARBON VISIONS AND QUALITATIVE SCENARIOS FOR THE CASE STUDY CITIES

FEEM, ECOLOGIC, POLITO, INTELI, CEPS, IVL, ITÜ, UNDP, CUNI

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AUTHOR(S)
Margaretha Breil, Katie Johnson Fondazione Eni Enrico Mattei
Anne Jensen, Department of Environmental Sciences, AU
Patrizia Lombardi & Luca Staricco, Politecnico di Torino
Doris Knoblauch & Stefanie Albrecht, Ecologic Institute
Zoran Kordić, Robert Pašičko, Sandra Vlašić, UNDP Croatia
Hanna Ljungkvist, Elin Eriksson, Steve Harris IVL, Swedish ENvironmental research institute
Jorge Núñez Ferrer and Federico Infelise, CEPS
Catarina Selada, Gisela Mendes, Ana Luísa Almeida, INTELI
Hana Škopková, Miroslav Havránek Charles University Environment Center IVL
Project coordination and editing provided by Ecologic Institute.
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LIST OF ABBREVIATIONS

AB	Advisory Board
CA	Consortium Agreement
CC	Consortium Committee
DOW	Description of Work
GA	Grant Agreement
KPI	Key Performance indicator
PCG	Project Coordination Group
PO	Project Office
WP	Work Package

I EXECUTIVE SUMMARY

The aim of the POCACITO project is to facilitate the transition of European cities towards a post-carbon future by defining a roadmap for this 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: Barcelona, Malmö, Istanbul, Lisbon, Litoměřice, Milan/Turin, Rostock, and Zagreb. The purpose of these workshops was to bring together local stakeholders to define a common post-carbon vision for 2050, and to outline an action plan guiding the path towards achieving this vision.

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

Each report describes both procedural and content related experiences made during the workshops, providing insights in the participative character of the procedure, and describing central elements of the visions and the strategies for reaching them.

II INTRODUCTION

The aim of POCACITO is to facilitate the transition 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: Barcelona, Malmö, Istanbul, Lisbon, Litoměřice, Milan/Turin, 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 to define a roadmap or action plan, which can guide the path towards this 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 about city-specific strategies for reaching a post carbon city. The time horizon for these visions to be developed is 2050 - long enough to look beyond the day-to-day policies and to reflect on necessary structural changes.

The approach chosen for work in the case studies is based on the back casting approach. Different from other scenarios, the back casting approach does not aim at generating descriptions of futures that are likely to happen, but on how desireable futures can be attained. It is thus normative rather than explorative, "working backwards from a particular desired future end-point to the present in order to determine the physical feasibility of that future and what policy measures would be required to reach that point" (Robinson 1990, 283). The work in the case studies entailed thus two core elements, the building of a vision representing the normative endpoint, and the strategic or back casting scenario, which drafts the procedure for reaching the endpoint. The present deliverable collects the experiences reported by the project partners from the first case study workshops which aimed at designing a vision for the city and defining, in a back casting exercise, the strategy for reaching this vision in the specific context of the city, describing, possible actions and timelines for intermediate steps. The back casting exercise aimed furthermore at defining intermediate steps (milestones) and identifying possible obstacles the city might encounter during their efforts in realizing the post-carbon vision for their city.

The workshops that this deliverable refers to followed a common two steps procedure defined for the POCACITO Scenario building exercise. 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 back casting 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. Different 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].

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

The document reports on the experiences of and results obtained in the case study city workshops, following a common reporting structure proposed to all workshop organizers. Information on practical aspects of the workshop organization, and on the characterization of participants is included herein. With regards to the results obtained, each city reported elements of local visions, and the scenarios to reach those visions, including actions and milestones, as well as obstacles and opportunities. Reflections are provided, from some case study workshops, offering feedback from stakeholders on methodology, and the overall workshop experience.

This deliverable will be followed by a Synthesis Report (deliverable 4.3), which will identify key issues related to the visions and compare main characteristics of the visions and the strategies developed across the case studies, with the aim of identifying common traits useful for a common pathway to be developed for all European cities. The descriptions contained in this deliverable will be analyzed and synthesized, in order to identify common elements and distinctive conditions that describe different conditions for the development and application of local pathways toward urban low carbon futures throughout European cities.

III WORKSHOP REPORTS

III.I BARCELONA

WORKSHOP DATES AND LOCATIONS

The first workshop was held on 10th and 12th December 2015, in the premises of an innovative small-medium enterprise (SME) in Barcelona, specialized in organizing and hosting events, particularly for cultural and culinary meetings and courses. This is a dynamic company run by young entrepreneurs and embodies the dynamism of SMEs under difficult financial circumstances.

PARTICIPANTS

Participants were selected based on a list provided by the Urban Habitat office of the city of Barcelona, which is responsible for organizing the cities analytical studies, providing consultations, and organizing events on the future of Barcelona as a smart city. The list if invitees consisted of over twenty people including representative of citizens, SMEs and students. Fourteen accepted the invitation, but only seven were actually present at the first workshop, falling to four in the second. Three people attended both the workshop.

Based on the number of attendants and the lack of some key representatives of utilities and citizens, there was a lack of balance to perform a vision which reflects the concern of main parts of city sectors and interests. This is partly corrected by the participation of Anteverti and Urban Habitat, which have an overview of the situation in the cities.

WORKSHOP 1

Institution	Name and Surname
Responsible for the maintenance and of new projects in the public bus sector, Metropolitan Transports of Barcelona (TMB)	Josep ARIÑO
Consultant from Anteverti	Ana ALCANTAYUD
Head of Projects, Social and Economic Counsel of Barcelona (CESB)	Pascual BAYARRI VALCÁRCEL
Deputy Secretary General, Catalan Chamber of Commerce	Miguel DEVESA VILALATA
Director of Management and Relations, Urban	Teresa FRANQUESA I CODINACH

Habitat, Barcelona Municipality	
Head of the Department of Electric Engineering, Catalan Institute of Energy Research	Manel SANMARTI
Head of Section of local Energy Management, Technical Office of Climate Change and Sustainability, Barcelona County Council	Francesc DE SÁRRAGA MATEO

WORKSHOP2

Institution	**Name and Surname**
Consultant from Anteverti	Ana ALCANTAYUD
Director, Anteverti	Pilar CONESA
Head of Projects, Social and Economic Counsel of Barcelona (CESB)	Pascual BAYARRI VALCÁRCEL
Deputy Secretary General, Catalan Chamber of Commerce	Miguel DEVESA VILALATA

MODERATORS

Institution	**Name and Surname**
CEPS – case study leader	Jorge Núñez Ferrer
CEPS	Federico Infelise

III.I.I METHODOLOGY AND RESULTS FOR VISION BUILDING

METHODOLOGY FOR VISION WORKSHOPS

The first workshop was structured closely to the methodology presented in the training workshop at the partner meeting in Berlin on September 9 and resumed in the deliverable T4.2 *Case study workshop guidelines*.

AGENDA

13:00	14:00	Registration and lunch
14:00	14:05	Welcome
14:05	14:15	Introduction of the participants
14:15	14:35	Agenda and objectives of the workshop, description of the vision scenario process and

		the first workshops
14:35	14:45	Presentation: Barcelona in the global context – challenges until 2050
14:45	14:50	Presentation of the visualization exercise
14:50	16:00	Group activities visualization
16:00	16:30	Coffee break
16:30	17:00	Analysis of results- production of 'Mindmaps' A member of each group presents results
17:00	17:30	Creation of thematic groups – text creation with key points on each subject
17:30	18:00	Discussion of each list of points
18:00	18:15	Break
18:15	18:30	Conclusions – Presentation of the next meeting
18:30	20:00	Cocktail with tapas

The workshops started with a lunch meeting, which allowed for an informal social discussion and reduced the need for introductory interactions. After the lunch a more formal presentation of each person's professional background was done.

The case study leader presented the broader objectives of the POCACITO project, a short presentation of the situation in Barcelona (assessment) and the scope of the visioning workshop. The participants were then split in three groups to describe their vision for the city. Instead of asking the participants to draw pictures, the group was asked to write down their expectations, due to our own perception that participants were highly skeptical of the format of the meeting. This exercise worked and the participants took it seriously. The three groups rotated and expanded each other's lists. There was, however, one unexpected negative impact. When writing the participants focused on describing problems rather than presenting visions, which had a repercussion on the back casting exercise where this needed to be corrected. The participants were asked to create mindmaps from the information they provided. These were then summarized into one large common overview graph see section II.III.

MAIN SECTORS IDENTIFIED IN VISIONING A FUTURE FOR THE CITY

The discussion highlighted which are the major critical issues for the city of Barcelona:

- *Tourism management*; 8 million tourists each year in a city of 1.5 million inhabitants lead to the native depopulation and economic exclusion of the city center. This affects notably the quality of life in the most central neighborhoods developing new economic and social dynamics that tend to exclude local population. The preservation of traditional local markets (street markets) need to be a priority and particular attention should be paid to the effects of tourism on these realities. Tourism is an extremely important resource for the city but in order to conciliate it more with local population part of the resources derived from touristic activities should be visibly deployed in favor of the residents. A balance between tourism and the quality of life of the local population need to be pursued.

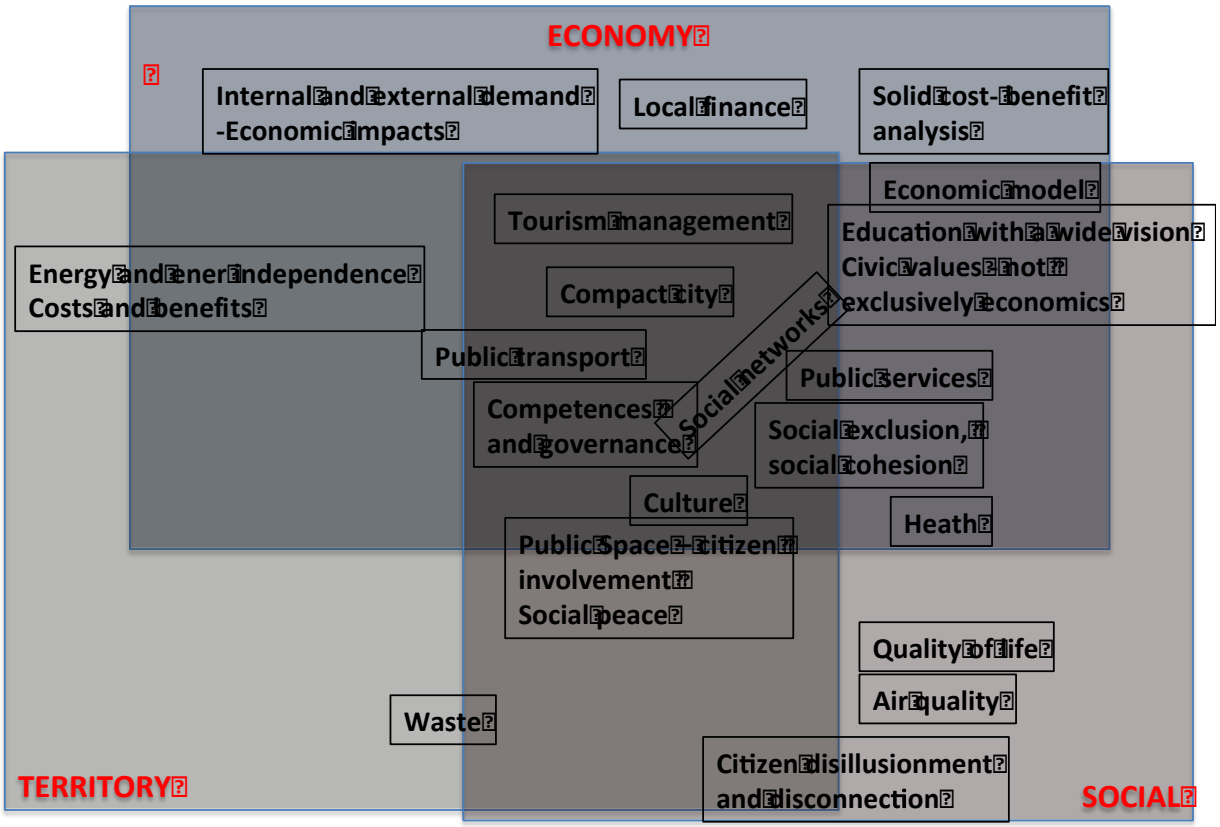
- *Public space management*; very much linked to the first point is the issue regarding the valorization for residents of the public spaces (including touristic areas). Barcelona's citizen need to feel the ownership of the public spaces of the city public space, in order to do that the characteristic, traditional and local features of the city need to preserved and taken into consideration in the development of new initiatives.
- *Renewable energy self-sufficiency*. This requires clarifying which energy models need to be put in place and which are the barriers (regulatory, financial, technological etc.) impeding their implementation. What is the economic impact of developing smart grids projects and of pursuing energy self-sufficiency?
- Need to develop reliable and consistent *tools to support public policy*. The effectiveness of decisions taken based upon findings of research reports or cost-benefits analysis of questionable accuracy was often mentioned; there is need to develop new tools able to take evaluate in a rigorous way both private and public interests.
- Effective urban planning needs to be supported by stable and *autonomous local financing*. In this view, the reform of legal barrier that are impeding an appropriate self-financing need to be reformed.
- The development of the city's *social networks* needs to be improved.
- Education, not only standard and business oriented, but also social.
- Innovation is needed – research focus of the city for the city
- *Public transport* needs to be efficient, accessible and clean.

THE 2050 POST-CARBON VISION BARCELONA

Based on the mindmaps generated in the visioning meeting, the moderators created a summary chart characterizing the vision to be used subsequently in the back casting exercise, which identified areas to address. This summary chart was presented in the second meeting.

Chart 1 below summarizes visually the main areas indicated as relevant for the vision. The issues to be addressed and the main objectives for the city were clustered into three focus areas for the vision: economy, planning and social. The challenges and objectives were associated with one or more of these three areas and then discussed. The debate developed into a heated debate at the end.

Figure 1: Areas identified an overlapping sectors



REFLECTIONS

The discussions on the future of the city showed that the city was facing not only a financial crisis, but also a crisis on how to move from single experiments and programmed to large changes while protecting the core qualities of the city.

The city is highly committed to changing the energy system and reducing carbon emissions. Economic sustainability is not considered at risk from a low carbon strategy, but seen as a means to economic development. The city authorities have a sense that some substantial but specific changes are needed in the city management and the legal framework. Substantial importance was placed on the social sustainability of the town. A short-medium vision was predominant, and stakeholders seemed to have a hard time imagining how the city should be 35 years later.

The stakeholders were uneasy with the methodology. Officials from the city have already perfumed other future oriented planning exercises and were skeptical on the value added of this project. They will expect something more advanced for the sensitivity workshop and there will be a need to link it to practice.

III.I.II METHODOLOGY AND RESULTS FOR BACK CASTING SCENARIOS

METHODOLOGY FOR BACK CASTING WORKSHOP

This meeting was disappointingly less attended than the first, only half in size. It is clear that attendants are concerned about the value added of such exercises. Future meetings need to reengage with the city authorities.

AGENDA		
13:00	14:00	Registration and lunch
14:00	14:05	Welcome
14:05	14:15	Introduction of new participants
14:15	14:35	Agenda and objectives of the back casting workshop
14:35	14:45	Presentation of the results of the previous day
14:45	15:00	Presentation of the back casting - exercise
15:00	16:00	Clarification of the visions by subject – significance in practice in the context of the city
16:00	16:30	Coffee break
16:30	17:15	Discussion: ***WHEN*** realizing objectives - MILESTONES
17:15	18:00	Discussion: ***HOW*** to reach objectives: actions and responsibilities – opportunities and barriers
18:00	18:30	Presentation de results and next activities of POCACITO
18:30	19:30	Cocktail

This meeting focused on the back casting exercise. Given the size of the group, the attendants worked together, pushed by the moderator to identify milestones and actions. To start, each message of the first day was highlighted and treated as follows:

- Make vision milestones from the outcome of the mindmap.
- Identify when to reach the milestone.
- Identify actions and when to start.
- Identify the body responsible.

KEY POINTS OF THE SCENARIO

The participants had to transform each of their problems and visions into milestones to achieve and actions to make them reality in a clear timeline.

Many of the milestones and actions were considered to be necessary in the short term. Many practical barriers require removing to be able to achieve longer-term goals.

TIME	MILESTONES	ACTIONS TO ACHIEVE MILESTONES	TIME ACTION
2017	Reform of urban management	Better impact analysis rules by the local authorities of projects, better coordination between services	2016-17
2017	Public transport is not only designed radially but in the form of a net	Reform of transport planning Coherence between national, regional and urban area transport authorities; infrastructure planning needs to be integrated	2015-2016
2018	Concentrate coordination powers in the AMB authority	Law reforming the responsibilities of the Barcelona Metropolitan area authorities (AMB)	2018
2022	EU Fiscal decentralization directive		
2025	Smart Grid	Legal reforms to allow RES integration and independent entities Smart grid with 80% renewables	2018 2040
2020	Reduce emissions from shipping in the port – ships no longer with motors on.	Change rules and build the energy connections	2016-2020
2023	Citizen involvement stronger and incentivized (e.g. through financial mechanisms)	Introduce new systems for citizen participation, ensure that citizens understand repercussions and costs of changes and demands	2020
2025	Young generations with better civic education	Education reform	2017
2025	All waste treated	New rules on waste and proper plans	2020

	and recycled		
2030	Reaching the 3% investment in R&D for region		
2035	No more fossil fuel transport in city	Law to ban fossil fuel transport and phasing in scheme	2025
2045	**All** buildings renovated and energy efficient	*Fiscal and legal reforms* to incentivize to building renovation	2022
2050	Having a large SME presence in the city – proximity shops and services preserved	Increase training for businesses - entrepreneurship	2015
		Maintain and expand local services	2020
		Legal and fiscal reforms to facilitate the creation of SMEs	2020
2050	Health system guaranteed for all	Reform health system	No specific date

Some interesting aspects were made clear in the workshop. First, the participants saw that what they expect for the future of Barcelona can be achieved in the short and medium-term. Second, they recognized that these changes must be initiated during the next years.

Crucial for achieving many of the milestones is a reform of the competences and the municipalities. The municipal borders are based on the historical city limits and the surrounding villages, today the urban area cannot be run under the present multi-municipal fragmentation of powers. There is a need to have an entity covering the metropolitan area with the appropriate coordination powers. The institution exists, but it lacks the necessary responsibilities and structures, the Area Metropolitana de Barcelona (AMB).

A strong concern is the loss of character of the city and the growing disengagement of citizens. The common feeling of the participants is that the city needs to find a better balance in catering to citizens and its economic goals by promoting tourism and industry. It seems that the pressure to increase foreign revenue may be causing negative effects – even on the tourism sector itself. A balance is needed.

BACKGROUND SCENARIOS

Participants were asked to identify opportunities and problems, milestones and actions based on the challenges described in the initial assessment of global trends and pressures. The scenarios were not discussed and this will be an issue left for the sensitivity analysis, but the participants felt that the challenges are achievable and that the city has a strong future. In fact, according to the data challenges faced by other cities, such as ageing population are less pronounced due to the strong immigration over the last decades.

REFLECTIONS

Stakeholders were able to identify a complex and articulated list of obstacles, opportunities, milestones and actions, and to order them along a timeline. However, the identification of actions was not easy and the need to specify them and fit them in a realistic timeline was not evident.

The program of the workshops and the apparent superficial nature of the visioning exercise does not attract sufficient participants or attention. The coordinator of the meeting found difficult to justify the time of the stakeholders present. For the next workshop there is a need to justify their participation and a real strategy to develop meaningful roadmaps is necessary if stakeholders are to be further engaged.

III.II COPENHAGEN

III.II.I INTRODUCTION

Copenhagen is the metropolitan capital area of Denmark as well as the City of Copenhagen is the largest local government in Denmark. Over the past decades, the city has built a history of addressing (with varying success) urban sustainability issues and has for the past decade included climate change among the prominent urban policy issues. This report addresses the objective of assessing the state of key sectors that influence the transition to a sustainable low- or post-carbon urban future for Copenhagen.

In the Copenhagen case study we conducted the initial assessment following the guidelines and key performance indicators develop in WP2 and WP3, and adapted to the context of the case. This report presents the initial assessment, based on the relevant key performance indicators as these are presented in D1.2.

III.II.II APPROACH AND METHODOLOGY

MODEL AND CONCEPT

In line with the overall WP3 approach as outlined in *Methodological Guide for the Initial Assessment* (Silva et al, 2014), the case study has followed the general guidelines and methodology of WP3. This means that the key performance indicators were assessed to determine the indicators that are most significant for the transition to post-carbon futures in Copenhagen. Furthermore, the data collection was adapted to context of the case city, including the history of working with visions in the strategic development of Copenhagen and the specific scope and periods for monitoring environmental sectors.

Copenhagen is the capitol of Denmark with a population of 1.7 mill inhabitants in Greater Copenhagen area, while the local government of Copenhagen covers the core city with just over 0.5 mill inhabitants. The remainder of the area is covered by 16-19 adjacent administrative units and local governments. This means that available data ideally would have been collected for 17-20 units of local government. Due to time restraints and different approaches to monitoring environmental key areas among the local governments (e.g. differing level of detail, differing regular measurements, differing time periods), the core area of Copenhagen as covered by Local government Copenhagen has been the focus of the case study.

Additionally, the city has for almost a decade had an urban vision addressing a post-carbon future as a key basis for urban strategic development and for sectoral and urban policies. Thus, the Pocacito vision workshop methodology was adapted to take advantage of the opportunity to examine a living lab 'experiment' of the inclusion of post-carbon objectives and future visions in urban development. This adaptation also affected the workshop method (see for further details below).

Moreover, due to a modification of the approach, the original time plan was postponed and the methodology was adapted to the context of the case study.

The sectors in focus in the Copenhagen case study cover: transport, energy, waste and climate adaptation, and the following key performance indicators were investigated to capture the potential capacity for transitioning current city to a post-carbon city (Silva et al, 2014).

It must moreover be noted that the data collected for Copenhagen may differ concerning the time period/years covered; and the precise indicator variable, due to local approaches to data collection.

Table 1: List of key performance indicators for Copenhagen

DIMENSION	SUB-DIMENSION	INDICATOR	UNIT	YEAR
SOCIAL	**Social Inclusion**	Variation rate of unemployment level by gender	Percentage	2003-2012
		Variation rate of income distribution *	Percentage	2003-2012
		Variation rate of tertiary education level by gender	Percentage	2003-2012
	Public services and Infrastructures	Variation rate of green space availability	Percentage	2003 2012
	Governance effectiveness	Existence of monitoring system for emissions reductions	Yes/No Description	2013
		Existence of sectoral strategies/policies that include/prioritize low-carbon or CO2 reduction objectives	Yes/No Description	
ENVIRONMENT	**Biodiversity**	Variation rate of ecosystem protected areas	Percentage	2012
	Energy	Energy intensity variation rate	Toe/euro Toe	2003 2012
		Variation rate of energy consumption by sectors	Percentage	2003 2012
	Climate and Air Quality	Variation rate of carbon emissions intensity	Ton CO_2/capita Ton CO_2	2003 2012
		Variation rate of carbon emissions by sector TRANSPORT	Ton CO_2	2003 2012

DIMENSION	SUB-DIMENSION	INDICATOR	UNIT	YEAR
		Exceedance rate of air quality limit values	NOx, No2, So2, PM2,5, PM10	2010 2012
	Transport and mobility	Variation share of sustainable transportation	Percentage	2001 2011
	Waste	Variation rate of urban waste generation	Kg/person/year	2007 2012
		Variation rate of urban waste recovery	Percentage	2007 2012
	Buildings and Land Use	Energy-efficient buildings variation rate	Percentage	2007 2012
		Urban building density variation rate	Nº/ km^2	2003 2012
ECONOMY	**Sustainable economic growth**	Level of wealth variation rate	eur/person	2003-2012
		Variation rate of GDP by sectors	Percentage	2003-2012
		Employment by sectors variation rate	Percentage	2003 2012
	Public Finances	Budget deficit variation rate	Percentage of city's GDP	2003-2012
		Indebtedness level variation rate	Percentage of city's GDP	2003-2012

*There no common way of measuring poverty in Danish statistics; rather inequality is in Copenhagen measured as the relative income gap. To indicate the general levels of income for the urban population in Copenhagen, the average level of income is furthermore included

The development of the KPIs was based on the approach that monitoring the sustainability profile of cities will promote the adjustment of urban policies accordingly and will stimulate adaptive (or flexible) policy processes (National Research Council, 2004). Jointly, monitoring the sustainability performance will thus in a medium and long term perspective enhance quality of life for urban citizens and sustainable growth of cities. Following the Brundtland definition of sustainability, the KPIs for the POCACITO city assessment was structured by three main dimensions; the social, environmental and economic dimensions (Silva et al, 2014). The assessment of the post-carbon potential and current state of urban sustainable development in Copenhagen has been conducted according to these. The following account of the dimensions follows the discussion provided in Silva et al, 2014.

The *social dimension* is concerned with equity that is expected for all citizens, both within the current generation and also between generations during the transition process to post-carbon cities. The benefits for inhabitants that come out of living in a reduced carbon city are highlighted, showing that these cities are places where it is pleasant to live, and values of equity and equality, diversity and social inclusion are present. Special attention has been given to standards of living related to essential aspects, such as education and health (for example, life expectancy and wellbeing). Unemployment rates and poverty are also issues to be addressed within the context of post-carbon cities. Mobility, in particular healthy, accessible, active and low carbon urban transport, is of special relevance for urban equality as well as for the wellbeing of citizens and coherence of urban space, and is included in the analysis. Public services and infrastructures that are available for citizens are analysed, as well as aspects of governance and civic society, promoting the positive sense of culture and community.

The *environmental dimension* investigates the sustainable profile of cities and assesses not only current impacts on the environment, but also during the transition processes, evaluating the environmental resilience of the cities. It is important to continuously adapt the strategies to follow in order to mitigate the negative impacts on the environment during the transition process. The environmental dimension covers the energy sector, in general, in order to promote not only energy efficiency, but also to address resources depletion associated with energy consumption. Post-carbon cities pay special attention to GHG and the contribution to climate change. Some energy intensive sectors are empathised, such as transportation/ mobility and the buildings stock. Biodiversity and air quality are critical themes that also belong to this dimension. The concerns regarding waste and water are also evaluated.

The economic dimension emphasises sustainable economic growth based on the wealth of cities and their inhabitants. It recognises that investments are crucial to promoting post-carbon cities, in particular those related to sustainable facilities. The labour market and the lifespan of companies are also taken into account to demonstrate the dynamics of a post-carbon economy in a green economy paradigm. Public finances are also analysed because the cities with a lower level of indebtedness are more prepared to face challenges during the transition process towards a post-carbon city. This dimension also includes the R&D expenditure because a city cannot become a post-carbon city without innovation.

DATA COLLECTION PROCESS

The data used in this assessment of KPIs covers the municipality that administratively cover the core Copenhagen, due to that this is the most urbanised area of the city and due to the practical constraints that a sample of 20 municipalities would constitute for the assessment of KPIs as well as for the analysis of urban visions and strategies in WP4. The City of Copenhagen, i.e. the municipality that covers the core area of Copenhagen, is thus used as the unit for data collection. The data for the assessment of the KPIs in Copenhagen was collected using the following sources:

- Statistics Denmark
- Statistics and number on Copenhagen
- GIS modelling (conducted by AU)
- Danish national air quality monitoring programme
- Danish nature Conservation Society

- On supplementary basis: Communication with city officials

The City of Copenhagen regularly – almost exclusively on annual or biannual basis – monitors a large quantity of parameters of significance for the city, covering the urban areas of residents, moving patterns, commuting, income, socio-economic status, housing, business and growth, employment, transport, climate and environment, urban life, education, health, safety, and public administration. Most of these statistics are publicly available and has been a valuable source of information for the KPIs included in this assessment.

III.II.III OVERVIEW OF THE CASE STUDY CITY

TERRITORY AND LOCATION

Copenhagen is composed of the core city, administratively covered by the City of Copenhagen (see figure 3), and Copenhagen Capitol Region which covers the effective city region and is administrated also by the adjacent municipalities (see Figure 2).

The core city – and the City of Copenhagen – is centred at the harbour area (see figure 2), with intensive development of the northern port area Nordhavn going on. It is composed of 10 urban communities. Due to historic reasons, Municipality of Frederiksberg constitutes an affluent enclave in the City of Copenhagen (shown as an empty area in Figure 3). The City of Copenhagen covers a geographical area of 86 sqkm (Statistics Denmark, 2015).

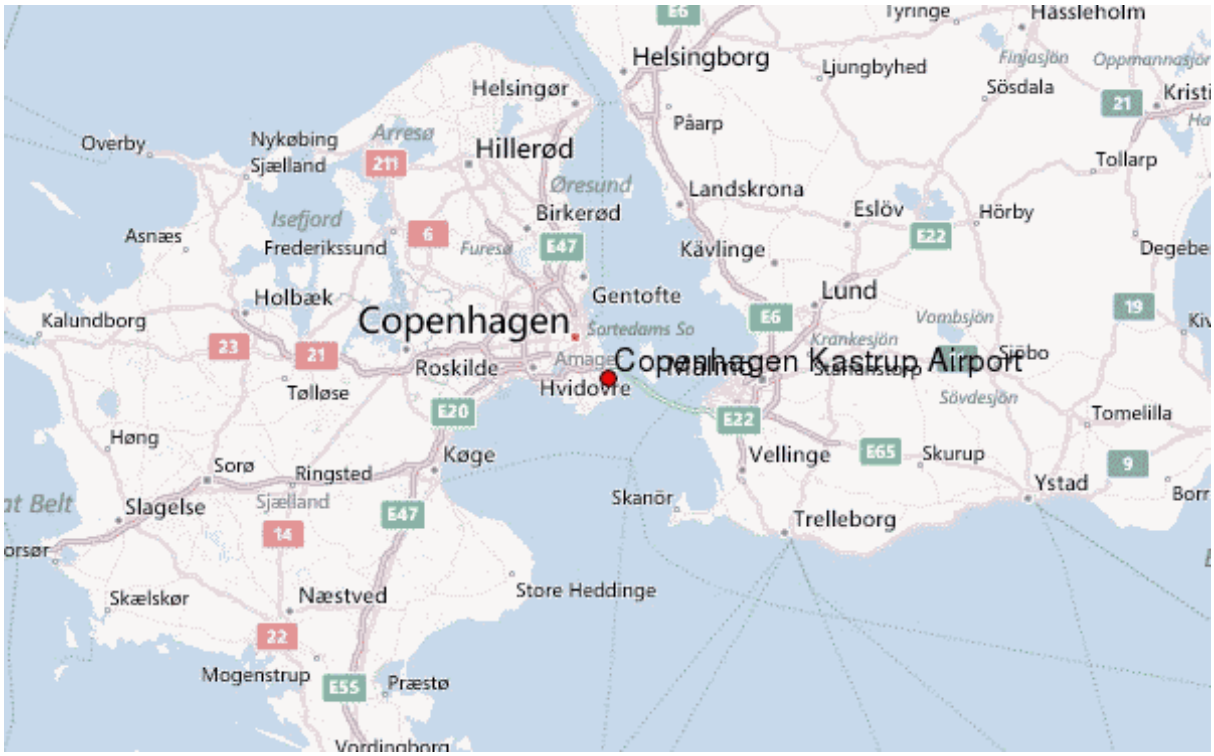
Figure 2: Map of the City of Copenhagen.

Located by the coast of Øresund, the Copenhagen is situated on the island of Zealand and the small island of Amager in the south-eastern part of Denmark. Copenhagen Capitol Region covers an area of 2,559 sqkm and stretches north and west of Amager and Øresund. The landscape is flat and the south of the city, especially the part located on the southern part of Amager lies below sea level.

Figure 3: Copenhagen in the Copenhagen Capitol Region

Copenhagen International Airport is located on the island of Amager, and from the island the Øresund Bridge connects Copenhagen to Malmø (see Figure 4).

Figure 4: Map of Copenhagen in the Øresund Region

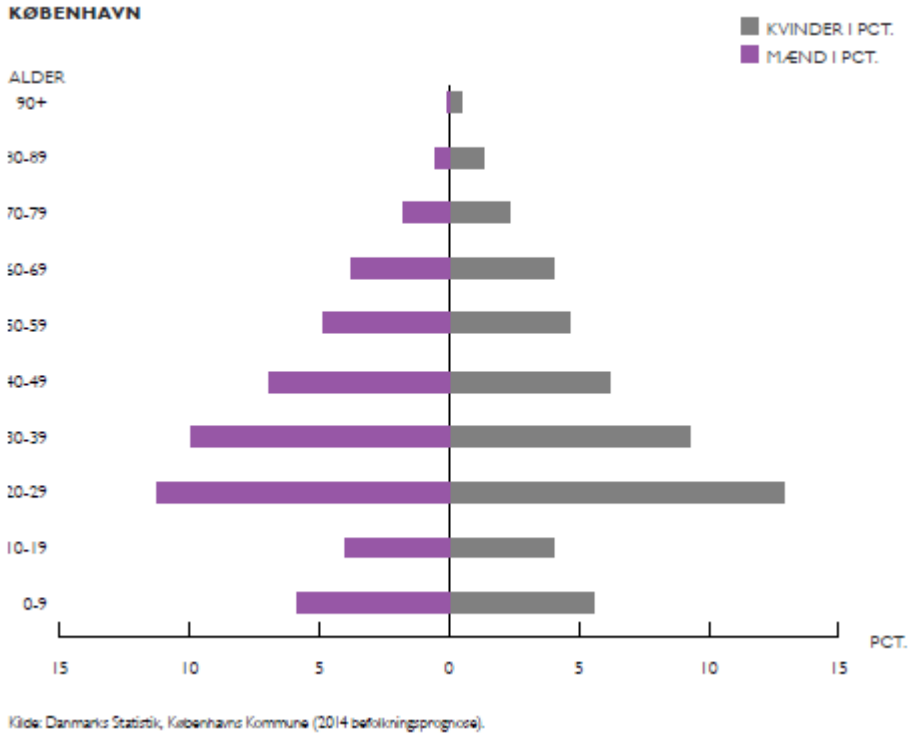


POPULATION

During the past 20 years, the population in the City of Copenhagen has increased 23 per cent from 471,300 inhabitants in 1995 to 581,000 in early 2015 (City of Copenhagen, 2015b). This reflects a present population increase in of app. 800-1000 new citizens per month.

Compared to the average demographic distribution for Denmark, Copenhagen has a young population, with a markedly higher rate of residents between 20-49 years than the national average. The majority of Copenhageners are less than 49 years old, and people moving into the city are young. This pattern is expected to continue, and the increase in population is expected to continue growing, in parallel with the other Scandinavian capitols (City of Copenhagen, 2015b).

Figure 5: The population and demographic distribution in Copenhagen per 1 January 2014



Kilde: Danmarks Statistik, Københavns Kommune (2014 befolkningsprognose).

Grey blocs denote the female population, purple blocks denote the male.

ECONOMY

In the period 2003-2013, the gross domestic product (GDP) for the City of Copenhagen (municipal level) increased from EURO 31,705 (DKK 236,201k) to EURO 45,685 (DKK 340,352k) while the increase in GDP for Copenhagen Capitol Region was a little less, EURO 69,508 (DKK 517,833k) in 2003 to EURO 97,809 (DKK 728,678k) in 2013. During the same period of time, the total disposable income rose from EURO 27,146 (DKK 202,240k) to EURO 39,386 (DKK 293,424k) in the City of Copenhagen.

Distributed per capita, City of Copenhagen had in 2013 a BDP per capita of EURO 63 (DKK 471k), while the Capitol had EURO 56 (DKK 419k). Disposable income for the City of Copenhagen was in 2013 EURO 54 (DKK 406k).

Table 2: GDP for Municipality and Copenhagen Capitol Region.

	2003 (1000 DKK)	2003 (EURO 1000)	2013 (1000 DKK)	2013 (EURO 1000)
Current prices, (mill. DKK.)				
Copenhagen Capitol Region				
Gross domestic product	517 833	69,508	728 678	97,809
Gross domestic product at factor cost	443 001	59,463	625 020	83,895
City of Copenhagen (Municipality level)				
Gross domestic product	236 201	31,705	340 352	45,685
Gross domestic product at factor cost	202 240	27,146	293 424	39,386
Pr. capita. Current prices, (1000 DKK.)				
Copenhagen Capitol Region				
Gross domestic product	318	43	419	56
Gross domestic product at factor cost	272	37	359	48
City of Copenhagen (Municipality level)				
Gross domestic product	366	49	471	63
Gross domestic product at factor cost	313	42	406	54

Source: Copenhagen Statistical Bank, 2015; Statistics Denmark, 2015

Table 3: Structure of employed per sector with residence in Copenhagen Municipality/other municipality 2013.

SECTOR	RECIDENCE IN THE CITY OF COPENHAGEN (NO EMPL)	RESIDENCE IN OTHER MUNICIPALITIES (NO EMPL)	TOTAL (NO EMPL)
1. Agriculture, forestry and fishery	47	234	**281**

2. Industry, resources and forsyningsvirksomhed	4.400	9.467	**13.867**
3. Building and construction	2.829	5.616	**8.445**
4. Trade	19.075	15.470	**34.545**
5. Transport	6.448	7.348	**13.796**
6. Hotels and restaurants	12.360	3.962	**16.322**
7. Publishing, tv and radio	8.414	1.761	**10.175**
8. Telecommunication	1.793	463	**2.256**
9. Data and information services (ICT)	6.027	3.364	**9.391**
10. Finance and insurance	6.980	4.210	**11.190**
11. Real estate and rent	3.104	1.578	**4.682**
12. consultancy	9.955	5.536	**15.491**
13. RTD	1.709	1.326	**3.035**
14. Advertising and other business services	5.748	1.098	**6.846**
15. Travel agencies, cleaning and other operational services	12.275	4.671	**16.946**
16. Public administration, military and police	12.798	6.134	**18.932**
17. Teaching	15.224	13.412	**28.636**
18. Health	10.602	8.041	**18.643**
19. Social services	23.482	11.992	**35.474**
20. Culture and recreation	5.957	2.696	**8.653**
21. Other services	7.934	2.241	**10.175**
22. Unspecified	1.974	3	**1.977**
Total	**179.135**	**110.623**	**289.758**

Source: Copenhagen Statistical Bank, 2015; Ministry of Economy and Home Affairs, 2015

III.II.IV KEY STRATEGIES AND PROJECTS

In 2007, the City of Copenhagen developed an overall urban vision, *The Eco-Metropolis* (City of Copenhagen, 2008a [2007]) that set a 20 per cent CO2 reduction target for 2015, and which was updated, specified and extended in the vision *Carbon neutral by 2025 – Climate Plan* Copenhagen Climate (City of Copenhagen, 2009b) that formulated the vision for Copenhagen to be CO2 neutral by 2025. Many of the following sector plans and strategies reflect and refers to one of these or both, and thus operate within the medium time horizon of 2025. Below, main plans, strategies and projects for Copenhagen are presented.

STRATEGIES AND ACTION PLANS

STRATEGY/ACTION PLAN FACTSHEET	
Title	III.II.IV.1.1.1.1 Vision - Eco-Metropolis. Our Vision for Copenhagen 2015
Dimension of KPIs	All, focus on social and environmental
Period	2007-2015
Strategy/Action Plan description	
Objective	To make Copenhagen the most sustainable capital in the world. To reduce CO2 emissions by 20 per cent relative to 2005 by 2015

Measures	4 areas at the centre that each have specified targets for 2015and each have star initiatives
	• Best Cycling City in the World:
	  ○ 50 per cent modal char for the bike for study and work related travels
	  ○ 80 per cent of the cyclist feel safe in urban traffic
	  ○ 50 per cent reduction in serious traffic accidents for cyclists, relative to 2007
	• The World Centre for Climate Policy:
	  ○ 20 percent reduction in CO2 emission by 2015, ref year 205
	  ○ Strong position in the world as climate capital
	• A Green and Blue Capital:
	  ○ all Copenhageners should be able to access green/blue spaces within 15 min walk
	  ○ Copenhageners use these twice as much in 2015 than in 2007
	• A Clean and Healthy City:
	  ○ noise levels reduced to below health threatening levels,
	  ○ AQ levels that does not harm the health of Copenhageners,
	  ○ organic food rate is 20 per cent for Copenhageners and 90 per cent for public institutions

Targets	City administration, citizens, business, outside world
Links and Contacts	
Promoter	City of Copenhagen, Technical and Environmental Department
Document/website	http://kk.sites.itera.dk/apps/kk_pub2/pdf/524_vkZwf2uL.pdf

Source: City of Copenhagen, 2008a

STRATEGY/ACTION PLAN FACTSHEET	
Title	Vision - Copenhagen as hydrogen city
Dimension of KPIs	Environment, energy
Period	2012-2018
Strategy/Action Plan description	
Objective	To make Copenhagen a leading city in use of hydrogen and fuel cells

Measures	• Greening the energy supply
	  • demonstration project Smart CPH2
	• Green mobility
	  • inclusion of 40 hydrogen cars in City's vehicle fleet;
	  • establishment of 3-5 new hydrogen fuelling stations in the city
	• Green mechanical working equipment in the City
	  • 2-4 sub-projects with public machines fuelled on hydrogen
	• Partnerships and communication
	  • Workshops for potential partners
	  • Regional collaborative network established with Copenhagen Clean-tech Cluster
	  • 2 proposed new projects per annum

Targets	Energy consumers, specifically in the transport sector
Links and Contacts	
Promoter	City of Copenhagen
Document/website	http://www.damvad.com/media/45031/k_benhavn_som_brintby_2012_-_2018.pdf

Source: City of Copenhagen, 2012b

STRATEGY/ACTION PLAN FACTSHEET	
Title	Climate Adaptation Plan
Dimension of KPIs	Environmental, climate, urban development

Period	2011 -
Strategy/Action Plan description	
Objective	To climate proof Copenhagen in situations with extreme weather events
Measures	• Clarification of responsibilities • Rules and recommendations for storm water projects • Classification of storm water and recipients • Reinforcement of dyke • Construction of 3 main city sewege water channels • Participation • Collaboration on funding schemes 3 overall measures: - Larger sewers, reservoirs, pumping stations - Local retention of rain water - To channel inevitable flooding to areas where flooding harm the least
Targets	The grey and green/blue infrastructures in the city; citizens; business
Links and Contacts	
Promoter	Copenhagen Municipality, water companies
Document/website	http://en.klimatilpasning.dk/media/568851/copenhagen_adaption_plan.pdf

Source: City of Copenhagen, 2011a

STRATEGY/ACTION PLAN FACTSHEET	
Title	Good, Better, Best. Copenhagen Bicycle Strategy 2011-2025
Dimension of KPIs	Transport, Environment, urban space
Period	2011-2025
Strategy/Action Plan description	
Objective	To make Copenhagen the World's best cycling city by
Measures	Measures in five areas: 1. Better urban spaces for cycling 2. Comfort forcyclists 3. Travel time

	4. Safety Specific measures include - Monitoring of progress and key statistics - Collaborative networks with adjecent municipalities on establishment of super cycle track - Well connnected cycling network - Cycling/pedestrian bridges where heavy traffic or lack of acces prevent smooth cycle mobility - 5 super cycle tracks connecting the City of Copenhagen tot he adjecent municipalities - Extension of green cycle track network - Air pumps along cycling lanes - High level of snow clearance - Wider cycle lanes - Green waves in traffic lights adjusted to cycling
Targets	Copenhagen citizens, commuters
Links and Contacts	
Promoter	City of Copenhagen
Document/website	http://kk.sites.itera.dk/apps/kk_pub2/pdf/818_YF8zF5k7Cr.pdf

Source: City of Copenhagen, 2011b

STRATEGY/ACTION PLAN FACTSEET	
Title	Carbon neutral by 2025 – Climate Plan Copenhagen
Dimension of KPIs	Environment/social/economic
Period	2015-2025
Strategy/Action Plan description	
Objective	For Copenhagen to become the first CO2 neutral capital in the world by 2025
Measures	• Reduction of CO2 emissions with 1.2 mio tonnes • Engagement of Copenhageners – create ownership

	• Engage business and investors • Engage knowledge insititutions • Green growth • Flexible and adaptive public policy and planning • Experiental urban planning projects, incuding in specified neighbourhoods • Enhance the framework conditions, e.g. legal frameworks and models for funding Specific target areas are: - Energy efficiency in buildings, low energy renoivations and low energy new buildings - Solar panesl on public buildings - Public buildings used for demonstration projects - Electricity and heat production based on bio fuels, wind energy, goethermal energy, and waste - Increase cycle mobility - New fuels in the transport sector - Enhance public transport - Implementation of smart transport manangement systems - Smart transport cokmunication systems - The City of Copenhagen as climate comapny -
Targets	Copenhagen citizens, business, global cities
Links and Contacts	
Promoter	City of Copenhagen
Document/ website	http://www.energycommunity.org/documents/copenhagen.pdf http://malmo.se/download/18.3744cbfb13a77097d8748de/1383643894338/Cykelprogram+f%C3%B6r+Malm%C3%B6+stad+2012-2019+2012-10-30.pdf

Source: City of Copenhagen, 2009b

KEY PROJECTS

This section presents examples of key project that are on-going, about to start or recently finished. The projects all connect to Copenhagen's vision of becoming carbon neutral by 2025, with 20 per cent CO2 reductions as mid-term target, or to sectoral visions/strategies/plans that implement the vision (City of Copenhagen, 2008b, 2009a, 2012a, 2012c, 2014b).

PROJECT FACTSHEET	
Title	Affordable and green housing
Dimension of KPIs	Buildings and Land-use
Area of implementation (city, neighbourhood, etc.)	Neighbourhood
Implementation period	completed
Project description (short description – max 15 lines for each sub-section)	
Aims	The aim is to build high-density, industrially manufactured townhouses and to keep operating expenses low.
Activities	Building 83 energy efficient townhouses, which have state-of-the-art insulation and heat exchangers. Exclusion of janitor services
Promoters/Beneficiaries; Partnership	KAB
Financing	KAB
Outcomes and impacts	People like living here, low moving rate among residents, and the estimates of low energy consumption have been accurate. Inspired the establishment of similar projects – 10 in Copenhagen and 1 in Aarhus
Links and Contacts	
Promoter	KAB, Municipality Copenhagen
Website	

PROJECT FACTSHEET	
Title	Nordhavn urban development project
Dimension of KPIs	Transport modal share
Area of implementation (city, neighbourhood, etc.)	Urban area
Implementation period	2005-2025
Project description (short description – max 15 lines for each sub-section)	
Aims	The aim is to develop the most ambitious, sustaianbel and climate proof urban development plan possible.
Activities	Nordhavn is a new urban neighbourhood constructed in the old industrial port and on islands erected in the harbour through the use of the soil excavated during the extensive construction of sub-surface metro lines in Copenhagen Private developers must comply with strict sustainability, energy

	efficiency and low carbon regulations in housing and urban planning projects. The green transport solution consists of a metro link, cycle super highway and excellent conditions for pedestrians, all integrated in a multimodal network. Buildings meet a bronze standard (aka DGNB; the DGNB standard is a German building standard that has been selected as the standard for sustainable areas and buildings in Denmark) which means that they are more energy efficient. Furthermore, the plan requires integration of climate adaption measures. For example by greening the roofs and by disconnecting rainwater from the sewage system. CPH City & Port Development reports its progress to maintain the certification.
Promoters/Beneficiaries; Partnership	City of Copenhagen, CPH City & Port Development A pilot project is led by the Danish Nature Agency and the Danish Green Building Council (DK-GBC)*
Financing	CPH City & Port Development, private developers, investors
Outcomes and impacts	Obtaining the gold certification for the green transport solutions, the use of rain water and the requirements for energy-efficient buildings.
Links and Contacts	
Promoter	City of Copenhagen, CPH City & Port Development
Website	

PROJECT FACTSHEET	
Title	Sustainable school at Dyvekie School Educating the new green generation
Dimension of KPIs	Building and construction. Social cohesion
Area of implementation (city, neighbourhood, etc.)	Building, community
Implementation period	2011-2014
Project description (short description – max 15 lines for each sub-section)	
Aims	The aim is to create an inspiring learning environment, renovate the learning environment of the school and give Dybeke School a new sustainable profile.
Activities	The roof and all the windows have been replaced with energy-efficient solutions. Solar cells have been installed on part of the roof. A new management system that controls the heating, ventilation and lighting has been installed to cut down 70 percent of the energy used

	before. Electric lights have been changed to LED and integrated with the natural lighting, so areas near windows receive less electric light than the areas away from natural light sources. Furthermore the school handles rainwater locally and the sustainable solutions have been integrated into classroom teaching. E.g. science and math.
Promoters/Beneficiaries; Partnership	The City of Copenhagen in cooperation with KANT design and consulting, Cowi engineers, Kragh & Bergludn landscape designers, Enemærke and Petersen entrepreneurs, Grontmij acoustics consultants and Ulla Kjærvang consultant.
Financing	City of Copenhagen
Outcomes and impacts	Now every classroom in the school consumes less energy. For example, electricity consumption on lighting per room is now less than 1/5 of the electricity used before. Furthermore there is an inspiring learning environment.
Links and Contacts	
Promoter	City of Copenhagen
Website	

PROJECT FACTSHEET	
Title	Wind turbines at Prøvestenen, Copenhagen
Dimension of KPIs	Energy
Area of implementation (city, neighbourhood, etc.)	City
Implementation period	2013-ongoing
Project description (short description – max 15 lines for each sub-section)	
Aims	The aim is for the wind turbines in Copenhagen were the key to a more flexible and CO2-neutral energy system.
Activities	Three new wind turbines have now been erected on an industrial area less than 5,000 meters from the city centre as a living proof of the future for green energy production in cities. The strategic location of the turbines, the public, companies and organizations in the area have been invited to purchase a 33 percent share in the wind turbines.
Promoters/Beneficiaries; Partnership	City of Copenhagen, HOFOR, CPH City & Port Development (By & Havn) and Copenhagen Malmø Port
Financing	
Outcomes and impacts	• 13,600 MWh: this is the amount of energy produced by the

	three wind turbines from end of December 2013 to beginning of November 2014. • 3,400: so many households' energy consumption can be covered by the electricity produced from the turbines so far. • The turbines are part of Copenhagen's goal to install 360 megawatt of the energy from 100 wind turbines by 2025. This makes wind turbines one of the largest contributors to achieving CO2 neutrality by 2025.
Links and Contacts	
Promoter	City of Copenhagen
Website	

PROJECT FACTSHEET	
Title	Plastic ZERO
Dimension of KPIs	Waste
Area of implementation (city, neighbourhood, etc.)	City
Implementation period	Finalised in August 2014*
Project description (short description – max 15 lines for each sub-section)	
Aims	The aim is to uncover new ways to get more value from waste plastics.
Activities	There has been focus on design for recycling and Copenhagen engaged major retailers to take part in developing a guideline for plastic packaging. The project also developed guidelines to prevent waste plastics through public procurement. Enage stakeholders in the value chain
Promoters/Beneficiaries; Partnership	The project was led by the City of Copenhagen and had six European partners: • City of Hamburg (Germany) • City of Malmö (Sweden) • Aalborg University • Amager Resource Center • The Latvian munipal waste company Liepajas RAS Ltd. • The Finnish company Tampere Regional Solid Waste Management Ltd.
Financing	City of Copenhagen, EU Life Programme

	The total budget of Plastic ZERO was 2 million euro.
Outcomes and impacts	
Links and Contacts	
Promoter	
Website	

PROJECT FACTSHEET	
Title	The Cycle Serpent
Dimension of KPIs	Transport
Area of implementation (city, neighbourhood, etc.)	City
Implementation period	2012-2014
Project description (short description – max 15 lines for each sub-section)	
Aims	The aim with The Cycle Serpent (Copenhagen's new elevated two-way bike lane) is to connect the road and the harbour bridge. The bridge contributes to Copenhagen's bicycle strategy by improving passability and comfort for cyclists as it leads cyclists away from the pedestrians, traffic and steps. Furthermore, Copenhagen is aiming to be the world's best city to bike in by the year 2025. The goal s are: • 50 percent of all trips to work and study to be by bike. • 90 percent of the cyclists to feel safe in traffic. • 15 percent of the travel time to be cut.
Activities	Construction of an elevated two-way bike lane for cyclist only, connecting the road and the harbour bridge.
Promoters/Beneficiaries; Partnership	DISSING+WEITLING architectures, Rambøll engineering, and MT Højgaard construction.*
Financing	City of Copenhagen Total cost: DKK 38 million (the Danish government has supported the project with DKK 6 million)
Outcomes and impacts	On the connecting bridge, Byggebroen, cycle traffic has increased by 23 percent compared to two years ago. Additionally every cyclist saves one minute using the Serpent instead of the stairs on their ride to work and study. Converted into working hours, this means society will save DKK 5 million a year.
Links and Contacts	
Promoter	City of Copenhagen
Website	

PROJECT FACTSHEET	
Title	Hydrogen cars: Joint Purchase and Fleet Management*
Dimension of KPIs	Transport
Area of implementation (city, neighbourhood, etc.)	City
Implementation period	2011/2012-2025
Project description (short description – max 15 lines for each sub-section)	
Aims	The aim is to have replaced 85 percent of the City of Copenhagen's small passenger cars with hydrogen or electric cars by 2015, and 100 percent by 2025. Additionally it is the aim to make the transition at the same or even lower costs.
Activities	• Establishing central data collection of the usage of cars in all departments. • Making it easier to use the full potential of the cars. • Other cities have been invited to join the procurement process, and this will ensure lower prices because of the advantage of large-scale purchases. In 2014 there were counted 14 public partners. • Converting all the city's own cars to alternative fuels before 2025. • The city is also investing in infrastructure for its electrical cars.
Promoters/Beneficiaries; Partnership	Contractor: The City of Copenhagen
Financing	City of Copenhagen
Outcomes and impacts	The City of Copenhagen has saved up to 30 percent of the full price through joint procurement of the new hydrogen and electric cars. Furthermore, the number of the city's green cars has more than doubled; from 2012 to 2013, the percentage of green cars increased from 15 percent to 43 percent.
Links and Contacts	
Promoter	
Website	

PROJECT FACTSHEET	
Title	Climate proofing Copenhagen
Dimension of KPIs	Climate adaptation

Area of implementation (city, neighbourhood, etc.)	City
Implementation period	2012-2032
Project description (short description – max 15 lines for each sub-section)	
Aims	The aim is to protect Copenhagen against heavy rainfall in the future.
Activities	The basis for more than 300 unique climate adaption projects across the capital and all the projects will take about 20 years to implement. A key part of the climate adaption plan is to build tree large pipes to deal with the everyday rainfall as well as storm water. There will also be build roads for storm water, pipes for storm water, roads for delaying rain, spaces for delaying the rain and green roads (these spaces such as parks or green roofs delay and store water locally).
Promoters/Beneficiaries; Partnership	The City of Copenhagen
Financing	City of Copenhagen The budget for the project is DKK 9.8 billion
Outcomes and impacts	Reduced risks for flooding
Links and Contacts	
Promoter	City of Copenhagen, Hofor
Website	

PROJECT FACTSHEET	
Title	St. Kjelds Neighbourhood
Dimension of KPIs	
Area of implementation (city, neighbourhood, etc.)	Neighbourhood
Implementation period	2011-2016
Project description (short description – max 15 lines for each sub-section)	
Aims	The aim is to demonstrate how green areas and public involvement can tacle the problem of increased rainwater and create an attractive urban space.
Activities	Tåsinge Plads, was launched as a symbol of the innovativeness of the climate adaption of the entire St. Kjeld's neighbourhood, and it has been sloped so that the lower part collects rainwater that then seeps into the ground. Solutions at street-level are being, and will continue to be, established to serve as attractive urban environments, which at the same time manage rainwater. Furthermore, St. Kjeld's neighbourhood is involved by the public.*

Promoters/Beneficiaries; Partnership	The City Planning Office, the Integrated Urban Renewal in St. Kjeld's, Greater Copenhagen Utility (HOFOR) and the Environmental Centre Østerbro.
Financing	The cost of the new climate-adapted Tåsinge Plads had a cost of DKK 16 million.
Outcomes and impacts	Surface water from a total area of about 6,400 sq m can now be managed without being flushed directly into the drains, but instead it is reused or it is allowed to leach into the groundwater or evaporate Understanding climate adaption processes as combination of bottom-up change management and top-down technical solutions is one of the important lessons learned from this project.
Links and Contacts	
Promoter	City of Copenhagen
Website	

III.II.V CASE STUDY CITY ASSESSMENT

In this chapter, we present the assessment of the state of the post-carbon KPIs in Copenhagen.

ENVIROMENTAL PERFORMANCE

The indicators on environmental performance were provided by representatives from the national and municipal statistics. Detailed sources are listed for each indicator. Most of the data are available only for some years, and not collected or reported regularly. Thus the variation rates of the indicators are not known.

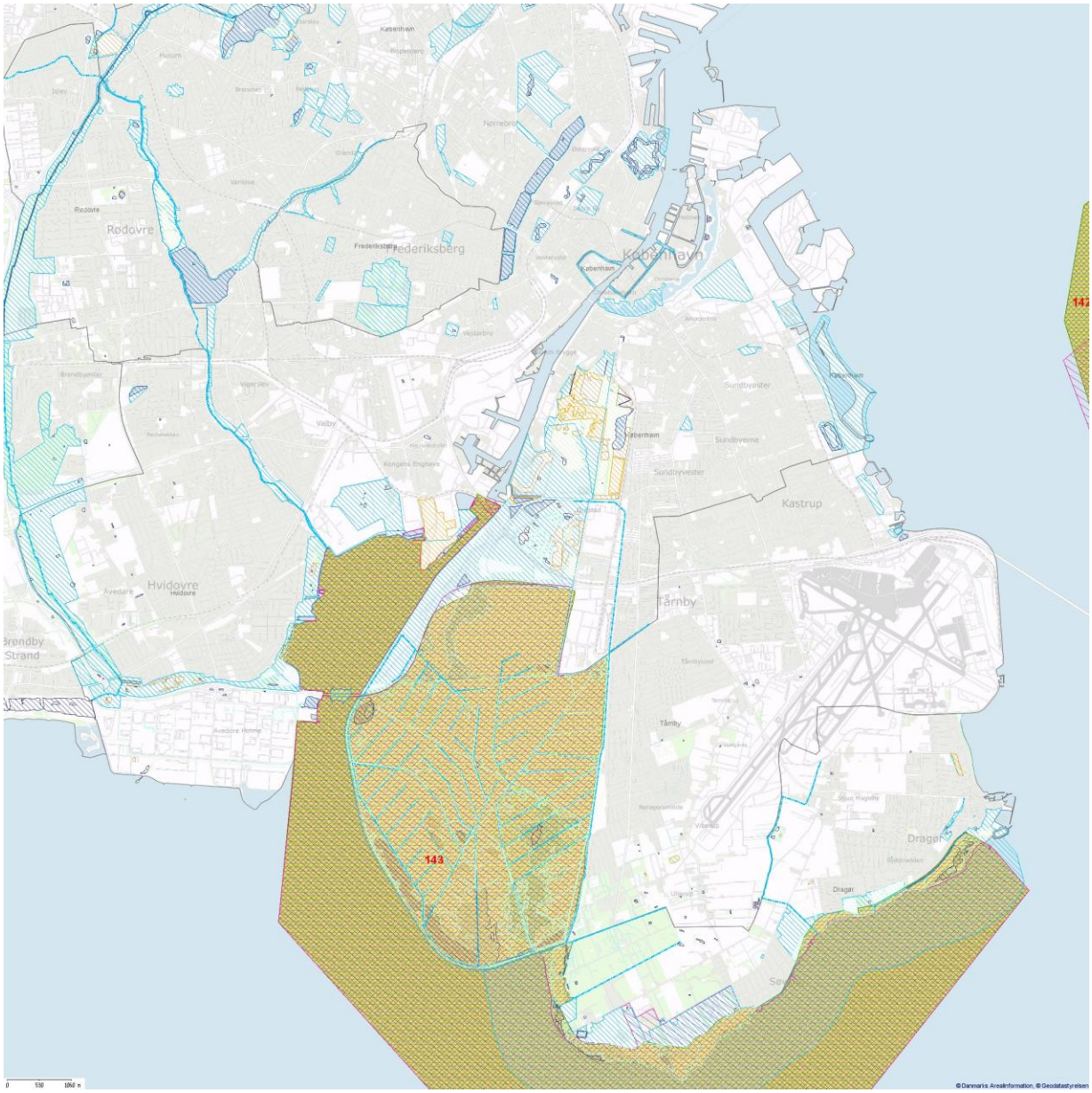
Table 4: Data collected for the KPIs in the environmental dimension and actual period covered

DIMENSION	SUB-DIMENSION	INDICATOR	UNIT	YEAR
ENVIRONMENT	**Biodiversity**	Variation rate of ecosystem protected areas	Area	2012
	Energy	Energy intensity variation rate	Toe/euro Toe	-
		Variation rate of energy consumption by sectors	Percentage	2008-2013
	Climate and Air Quality	Variation rate of carbon emissions intensity	Ton CO_2/euro Ton CO_2	2005-2013
		Variation rate of carbon emissions by sector	Ton CO_2	2005-2012
		Exceedance rate of air quality limit values	Nº	2009-2012
	Transport and mobility	Variation share of sustainable transportation	Percentage	2010-2012
	Waste	Variation rate of urban waste generation	Kg/person/year	2007-2010
		Variation rate of urban waste recovery	Percentage	2006-2012 2001-2010
	Buildings and Land Use	Energy-efficient buildings variation rate	Percentage	-
		Urban building density variation rate	Nº/ km^2	2010

ECOSYSTEM PROTECTED AREAS

Since 1996, the major parks in Copenhagen have been converted to protected areas (DN, 2014). Furthermore, there is a Habitat 2000 area to the south west of the municipality, see figure 5.

Figure 6: Share of ecosystem protected areas/Natura 2000 in Copenhagen in 2012



Source: Ministry of the Environment, 2015

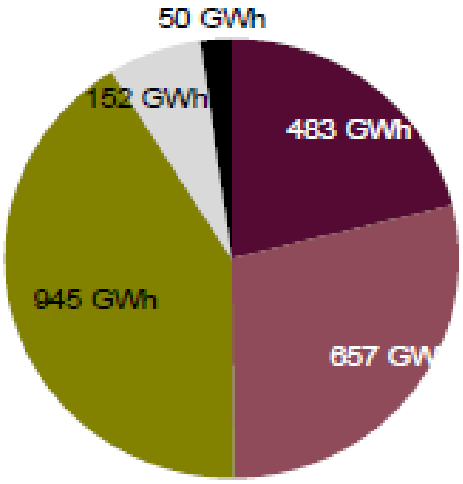
ENERGY INTENSITY VARIATION RATE

Data is not available.

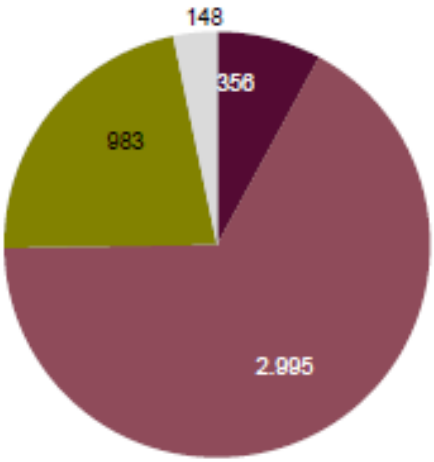
VARIATION RATE OF ENERGY CONSUMPTION BY SECTORS

Variation rate for energy consumption indicates sectors where potential significant reductions may be gained. This is reflected by the relative share of electricity consumption and of heating for sectors, shown in figure 6. Data for earlier years is not accessible.

Figure 7: Electricity and heating (GWH) consumption 2013 per sector.



Public institutions private households Trade and services Industry building and construction

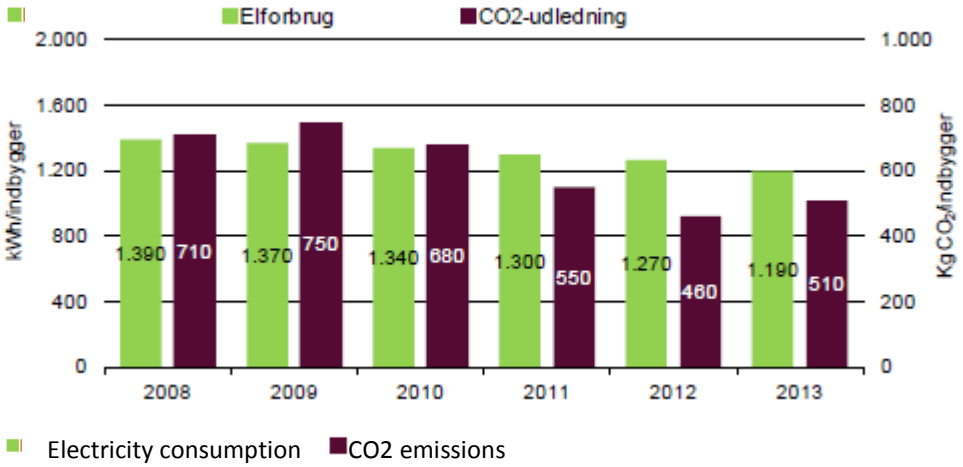


Public institutions private households Trade and services Industry

Source: City of Copenhagen, 2014c

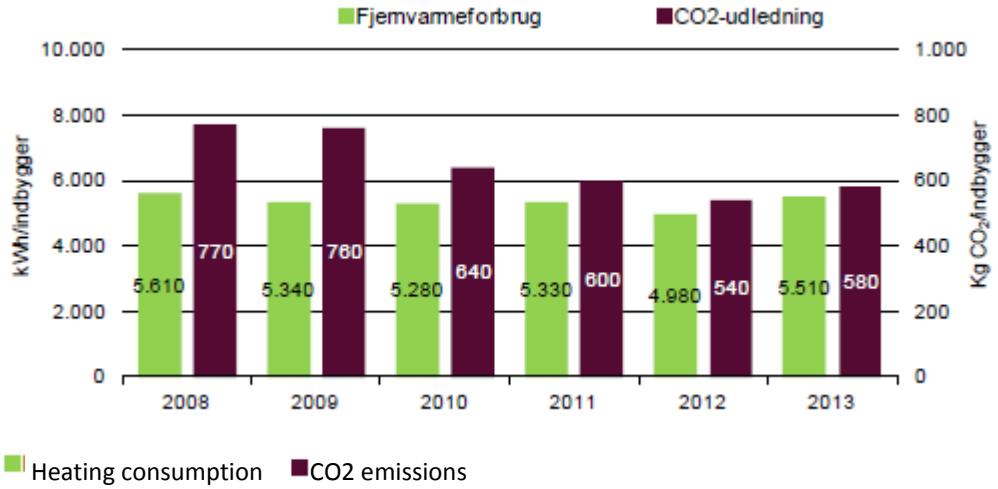
Households make up the majority of consumption of heating, mainly as district heating supplied by city's power plants. Almost no houses are heated by electricity. The variation rate for households' energy consumption thus also indicates the KPI, see figure 7 and 8.

Figure 8: Variation rate of electricity use and carbon emissions for households in Copenhagen 2008-2013



Source: City of Copenhagen, 2014c

Figure 9: Variation rate of heating consumption and carbon emissions in Copenhagen households



Source: City of Copenhagen, 2014c

VARIATION RATE OF CARBON EMISSIONS INTENSITY

The indicator of carbon emission intensity indicate the efficiency of initiatives to reduce the CO2 stemming from CO2 emitting urban sectors. In Copenhagen's monitoring programme, CO2 emissions are measured for categories of electricity production, district heating, transport and other activities.

Copenhagen uses 2005 as base year for CO2 reduction objectives, and the monitoring has been conducted consistently since then. Thus, the time period for this KPI covers 2005-2013.

By 2013, CO2 emissions were 1.9 tonnes, representing a 20 per cent decrease in emissions relative to 2005. This covers a short period with increasing emissions in 2012, due to poor wind conditions and subsequently more fossil fuels imported for energy production. At the same time, then the 20 percent decrease has taken place concomitantly with a 11.4 per cent increase of the population in Copenhagen, from 502,362 inhabitants in 2005 to 559,440 in 2013. This is reflected in the CO2 emissions per capita in table 5.

Table 5: Variation rate of carbon emissions intensity

Variation rate of carbon emissions intensity	2005	2013	Change
1000 tonnes CO2	2,358	1,874	-20 %
Per capita tonnes/cap	4.69	3.35	-29 %

Source: City of Copenhagen, 2014c

VARIATION RATE OF CARBON EMISSIONS BY SECTOR

This KPI of variation rate of carbon emissions by sector indicates the potential for further reductions and may also show which areas that have challenges with respect to meeting reduction targets. Copenhagen monitors the CO2 emissions as part of achieving its vision of reaching 20 per cent reduction by 2015 and becoming carbon neutral by 2025 and uses 2005 as base year, see table 6.

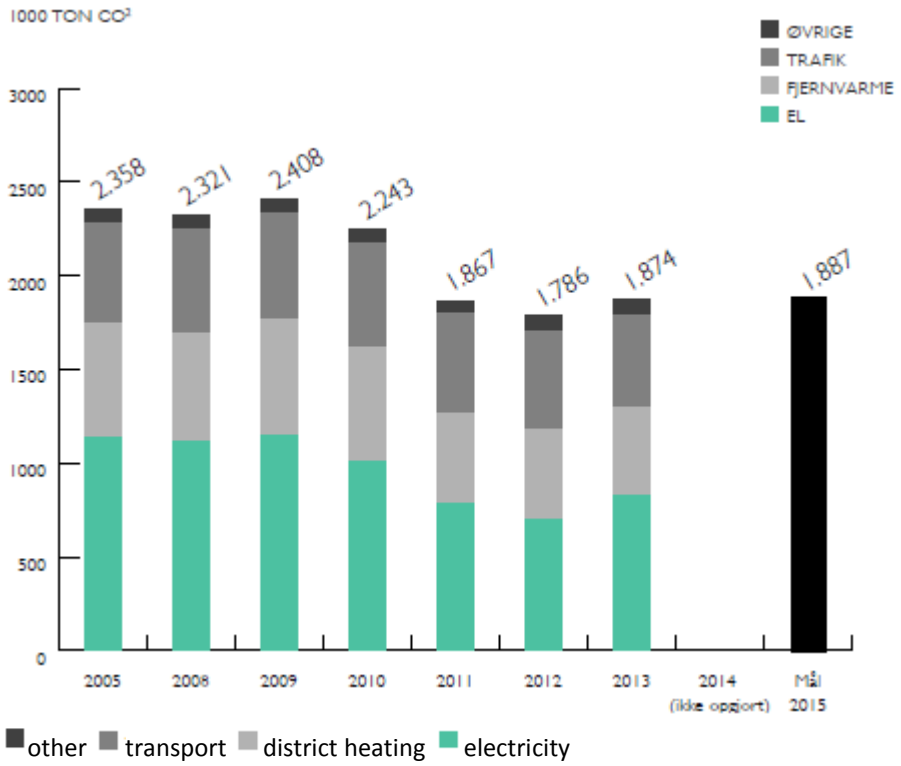
Table 6: Variation rate of carbon emissions per sector in Copenhagen 2005-2012

Year	2005	2012
Total (kton CO2)	2,358	1,874
Work machines and tools (kton CO2)	50,0	74,0
Industry and energy (kton CO2)	734,0	1158,4
Road transport (kton CO2)	489,0	348,4
Transport, other (kton CO2)	45,6	25,3

Source: City of Copenhagen, 2014c

The relative distribution of CO2 emissions by activity 2005-2013 is shown in figure 9.

Figure 10: Distribution of CO2 emissions by activity 2005-2013 in Copenhagen



Source: City of Copenhagen, 2015b

EXCEEDANCE RATE OF AIR QUALITY LIMIT VALUES

The indicator shows the variation in annually exceedances registered at street level in Copenhagen for for the following pollutants: Nitrogen Dioxide (NO2) and particles with a diameter of 10 microns or less (≤ PM10) and particles with a diameter of 2.5 microns or less (≤ PM2.5). it should be noted that there are large variation over the year, week and day and according to location within the city (Ellermann et al, 2015).

Table 7: Exceedance of air quality levels in Copenhagen 2009-2012

	2009	2010	2011	2012	
PM 2.5	18	17	19	15	25
PM10	30	28	35	31	40
NO2	50	56	54	55	40

Source: City of Copenhagen, 2015b Ellermann et al, 2015

VARIATION SHARE OF SUSTAINABLE TRANSPORTATION

The shares of different modes of urban transport show the general development in low carbon transport modes such as walking, cycling, hydrogen/electrical cars and busses, electrical trains fuelled by renewable energy. Furthermore, it indicates the extent to which Copenhagen at current is dependent on car transport. However, the statistics do not differ between hydrogen/electrical cars and energy efficient electrical trains, and thus the sustainable transport share only covers walking and cycling. See table 8 and the diagram to the right in figure 10.

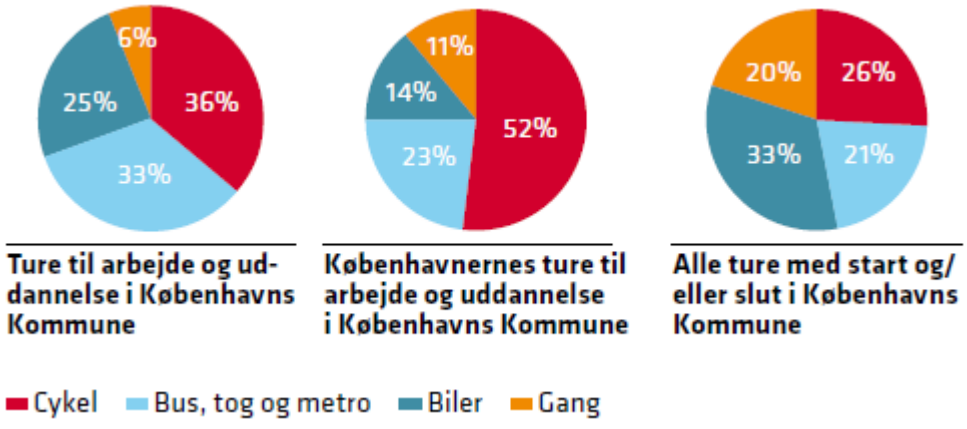
Table 8: Modal share of transportation

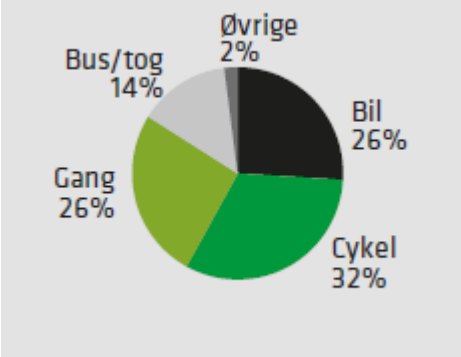
Cycle	32 %	36 %	26 %
Bus, train, metro	14 %	33 %	21 %
Cars	26 %	25 %	33 %
Walking	26 %	6 %	20 %
Others	2 %	-	-

Source: City of Copenhagen, 2012d, 2011d

The modal share differs for people with residence in Copenhagen and for all who work or study I n Copenhagen, see figure 10.

Figure 11: Modal share in 2012 for all study or work related trips, fora Copenhageners' study or work related trips, and for all trips starting or ending in Copenhagen, and modal share for all trips in 2010





Source: City of Copenhagen, 2012d, 2011d

URBAN SOLID WASTE GENERATION

The indicator of Variation rate of urban waste generation has been calculated for 2007 and 2010, as numbers for 2013 are unavailable. In 2007, City of Copenhagen had 502,954 inhabitants and generated 890,000 tonnes of waste, and in 2010 it had 527,045 inhabitants and generated 820,000 tonnes of waste. The per capita waste generation is calculated on the basis of this and stated in kg/person/year. The waste generated cover waste from private households, businesses and building and construction. The categorization of Copenhagen's urban solid waste covers the waste classes: paper, plastic, glass, metals, textiles, and organics.

Table 9: Total urban solid waste in Copenhagen and per capita

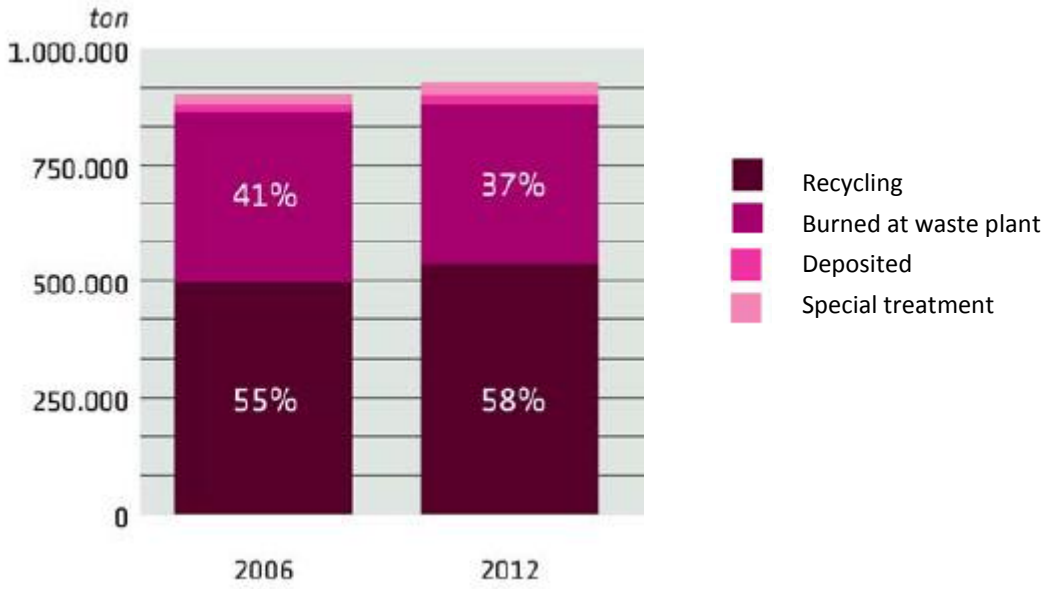
	2007	2010
Total urban solid waste (1000 tonnes)	890	820
Total urban solid waste per capita (kg/capita)	1,770	1,556

Source: City of Copenhagen, 2011c, Statistics Denmark, 2015

VARIATION RATE OF URBAN WASTE RECOVERY

This indicator is represented by the share of waste that was subject to recycling and is shown for 2006-2012 in figure 11 and for 2010 in table 10.

Figure 12: Recycling of waste in percent of total waste in Copenhagen 2006-2012



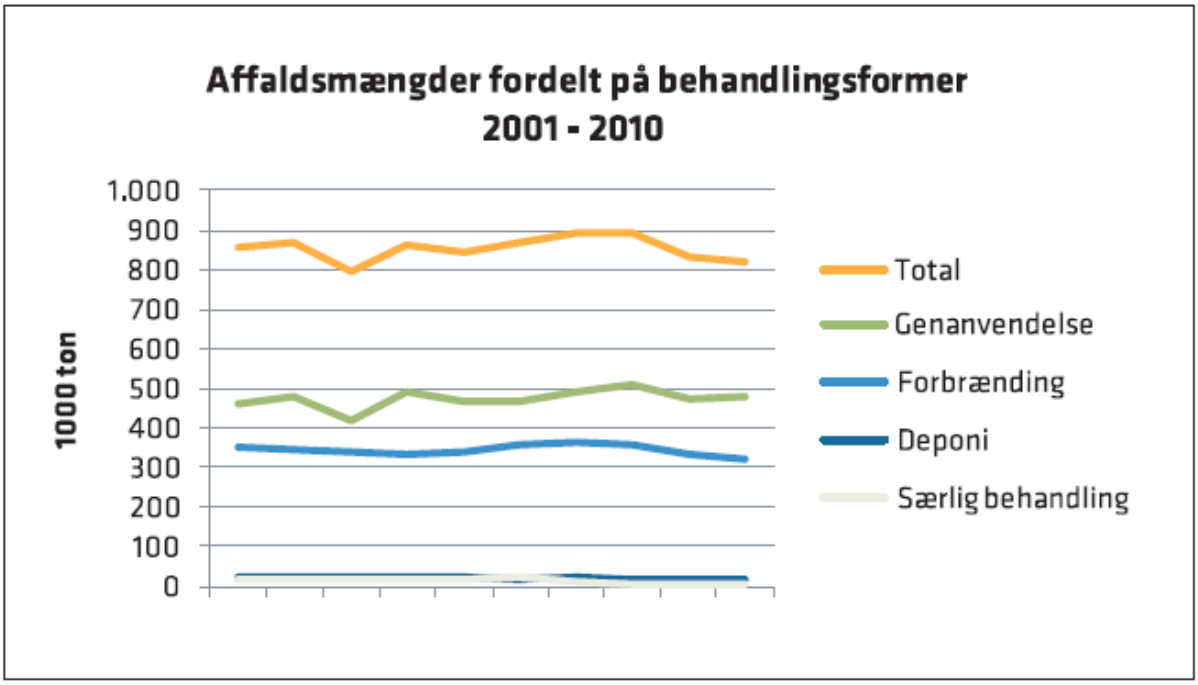
Source: City of Copenhagen, 2008c

Table 10: Recycling of waste in 1000 kg and as per cent of total urban solid waste in Copenhagen 2010

	2010
Total urban solid waste (1000 tonnes)	820
Total recycled waste (1000 tonnes)	476.6
Per cent recycled	58 %

Source: City of Copenhagen, 2011c; Statistics Denmark, 2015

Numbers for recycling were not available for 2007 while the graph below indicates very little variation in recycling. The green line represents recycling and the yellow total amount of waste.



ENERGY-EFFICIENT BUILDINGS VARIATION RATE

This indicator has not been collected due to lack of data.

URBAN BUILDING DENSITY VARIATION RATE

Table 11: Urban density in 2010

Registrered buildings	49 244
Total surface land area	156,9
Ratio (Number of/km2)	313,9

Source: AU modelling. No data available for previous years for this indicator.

SOCIAL PERFORMANCE

The overview of actual collected indicators representing the social performance of the city, their geographical coverage is listed in table 12. Each indicator is shown in more detail below.

Table 12: Data collected for indicators in the social dimension with actual period

SUB-DIMENSION	INDICATOR	UNIT	YEAR	GEOGR. COVER.
Social Inclusion	Variation rate of unemployment level by gender	Percentage	2007-2012	Municipality
	Variation rate of poverty level	Percentage	2000-2010 2012-2014	Municipality
	Variation rate of tertiary education level by gender	Percentage	2006-2012	Municipality
	Variation rate of average life expectancy	Average Nº	2004-2013	Municipality
Public services and Infrastructures	Variation rate of green space availability	Percentage	2013 2007-2013	Municipality
Governance effectiveness	Existence of monitoring system for emissions reductions	Yes/No Description	2007-2015	Municipality

VARIATION RATE OF UNEMPLOYMENT LEVEL BY GENDER

Table 13 shows number of unemployed by gender relative to the labour force and Copenhageners from the age of 16 and older. Data available is for 2007-2012 for the City of Copenhagen and represents number of unemployed in January in 2007-2012 in percentage of the total labour force. The table shows that while in 2007, women with 7.1 % had a higher rate of unemployment than men with 6.5 %, this had changed by 2012 where women with 7.1 % had a lower level of unemployment than men with 7.8 %. Moreover, the numbers cover a lower unemployment rate for both genders during the period, with 2009 as the year with lowest level of unemployment.

Table 13: Full time unemployed in % of the total labour force (age 16-) 2007-2012 and by gender

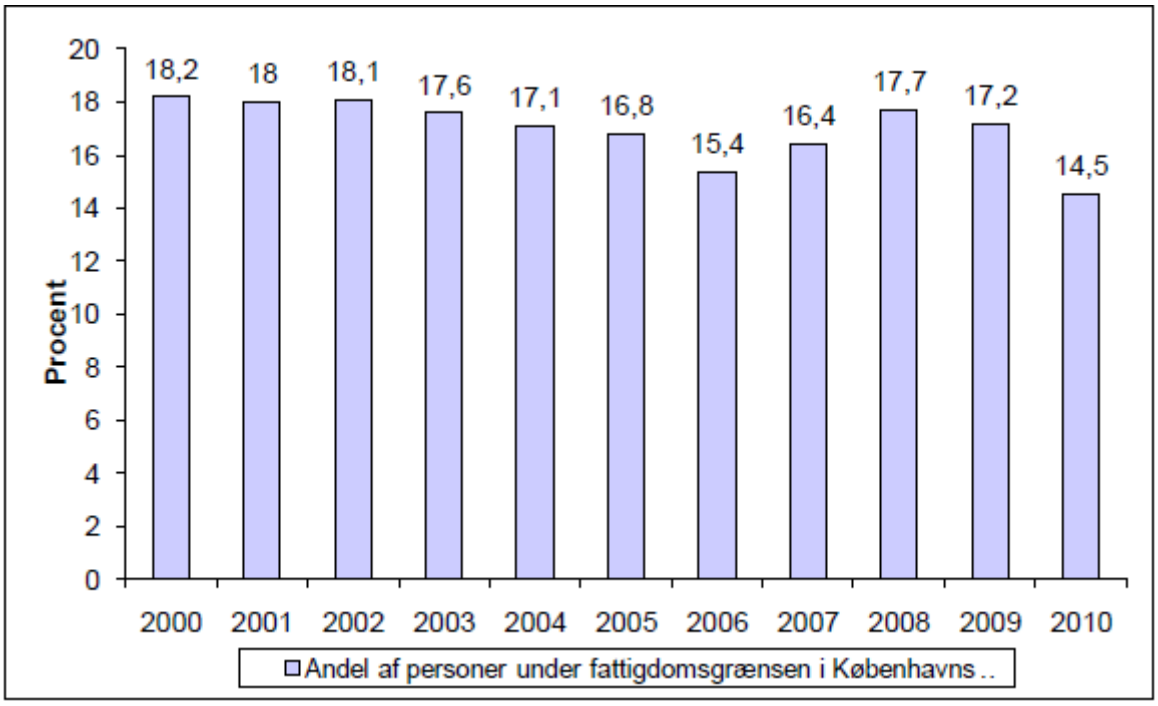
	Total	Men	Women
2007	6,8	6,5	7,1
2008	5,1	5	5,2
2009	5,1	5,5	4,6
2010	7,5	8,5	6,5
2011	7,8	8,6	7
2012	7,5	7,8	7,1

Source: Statistics Denmark, 2015

VARIATION RATE OF POVERTY LEVEL

The indicator sums up the number of persons who are at risk of poverty, severely materially deprived or living in households with very low income. Denmark does not have an official definition of poverty and the City of Copenhagen bases monitoring of poverty levels on a definition of relative poverty (City of Copenhagen, 2013a). Table 14 shows the development in poverty rates in Copenhagen 2000-2010.

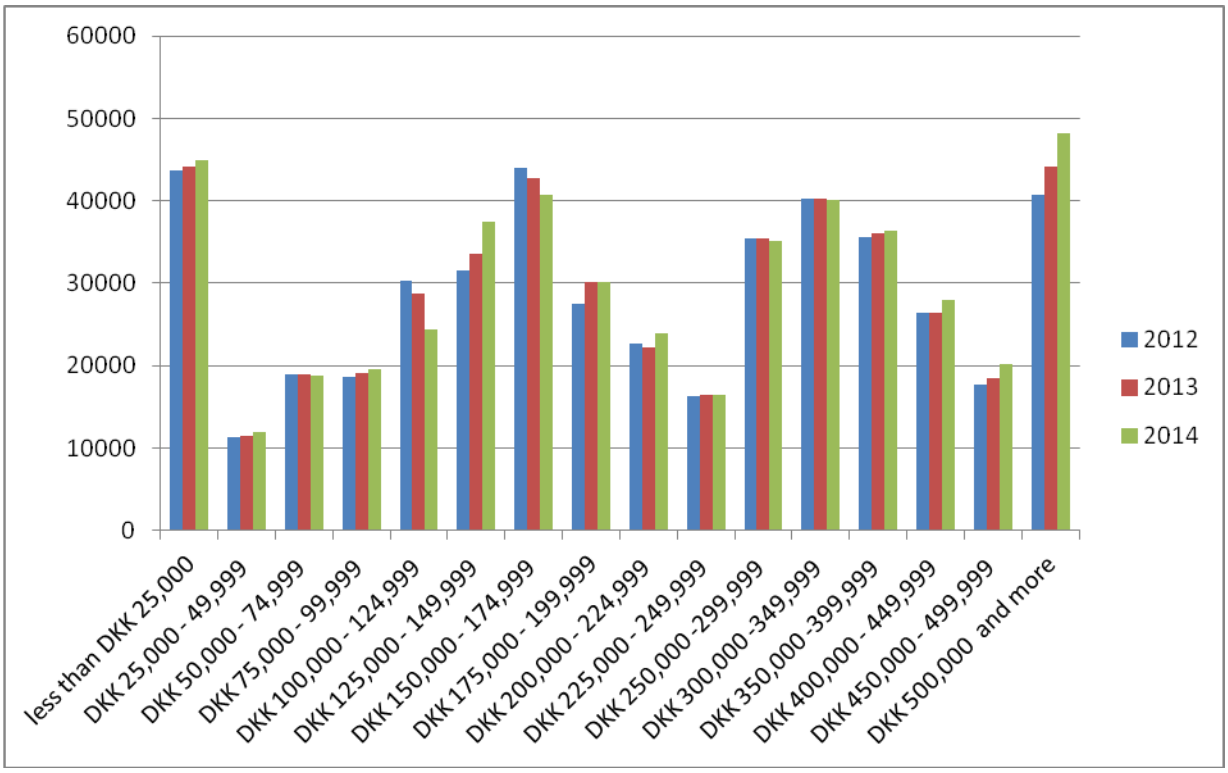
Table 14: Number of persons living below the poverty threshold in Copenhagen, relative to the population in Copenhagen 2000-2010



Source: City of Copenhagen, 2013a

The poverty level in Copenhagen is also indicated by the size of the income gap in Copenhagen, as shown in table 15. Data for the City of Copenhagen covers 2012-2014 and though it only covers a short period of time, it reflects the general trend of a widening income gap in the city (City of Copenhagen, 2013a) and in Denmark.

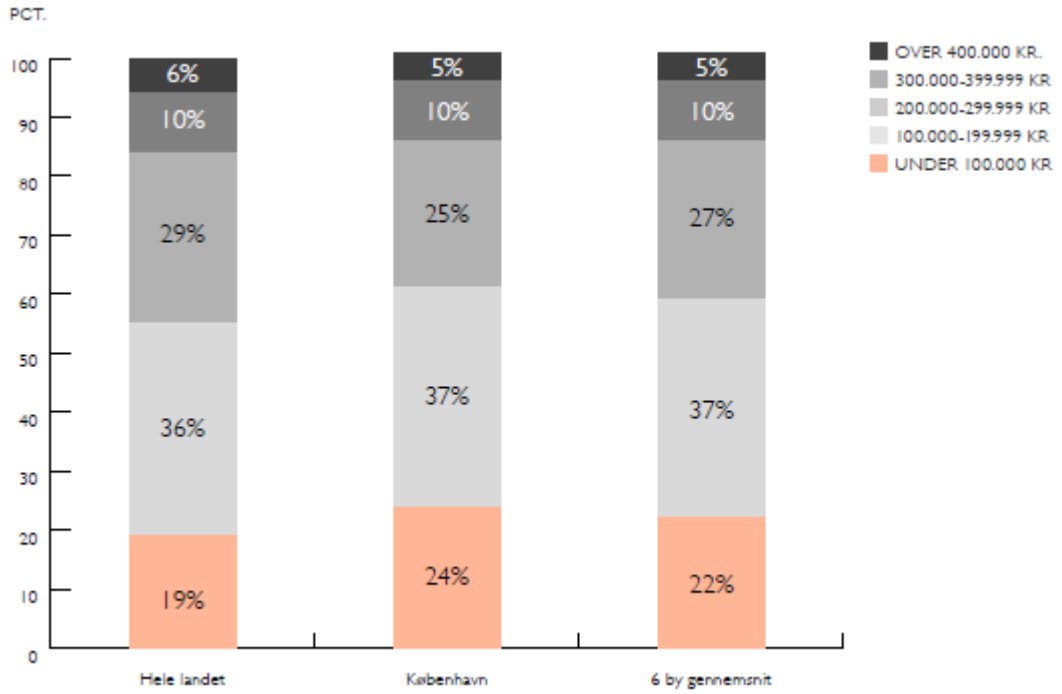
Table 15: Variation rate of income gap in Copenhagen 2012-2014



Source: Statistics Denmark, 2015

The widening gap is also reflected in the share of the population in the lowest income group, compared to the Danish average. Copenhagen has a relatively high share of the population in the low income group, as shown in figure 12. In the figure, the pink represents the lowest income, a maximum of EURO 13,423/DKK 100,000per year, and Copenhagen in the middle with national average to the left and the average in the largest Danish cities (minus Copenhagen) to the right.

Figure 13: Distribution of the population according to level of income for national average, Copenhagen and the average of the 6 largest cities (excl. Copenhagen)



Source: City of Copenhagen, 2015b

VARIATION RATE OF TERTIARY EDUCATION LEVEL BY GENDER

In Statistics Denmark, tertiary education covers short and medium tertiary educations, and bachelor, master and PhD educations. These are summarized for women age 16-69 living in Copenhagen and compared to total number of Copenhageners with tertiary education and to women in Copenhagen who have completed any education. Table 16 shows that the total number of women and men with tertiary education has increased from 2006 to 2012, and moreover that the increase is higher for women than men. Women in both years make up the majority of Copenhageners with completed tertiary education than men

Table 16: Variation rate of women in Copenhagen with tertiary education

	2006	2012	Increase, no.	Increase rate
Copenhageners with tertiary education	126154	160514	34360	27 %
Women in CPH with tertiary education	67312	87251	19939	30 %
Men in CPH with tertiary education	58842	73263	14421	25 %

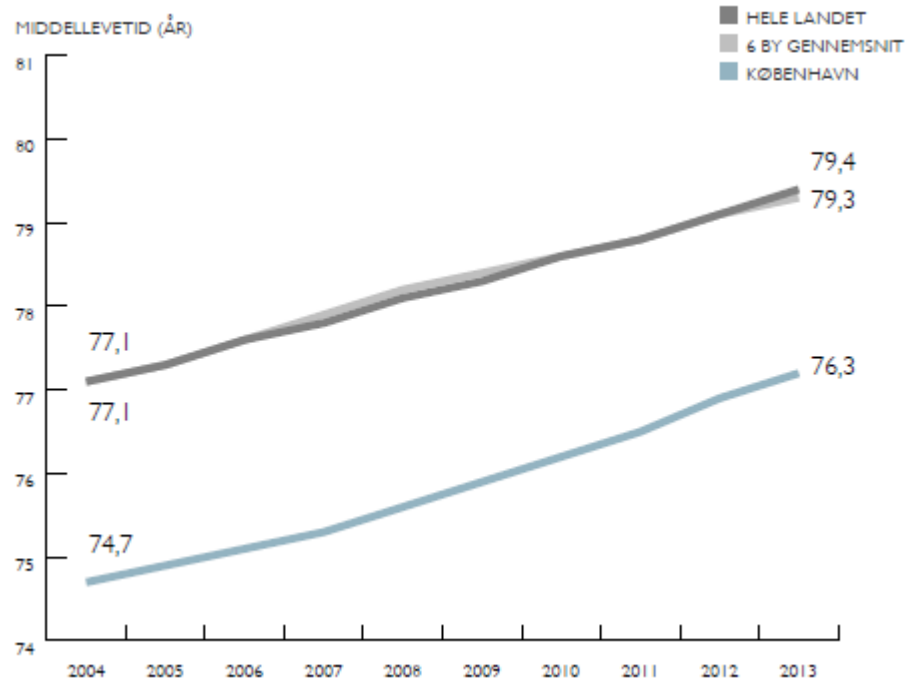
Rate of women in CPH with tertiary education of all Copenhageners with high education	53 %	54 %		
Rate of men in CPH with tertiary education of all Copenhageners with high education	47 %	46 %		
Rate of women in CPH with tertiary education of all women in CPH with any education	35 %	41 %		

Source: Statistics Denmark, 2015

VARIATION RATE OF AVERAGE LIFE EXPECTANCY

This KPI indicates the general health conditions and pictures the average length of life in Copenhagen. The graph in figure 13 also shows life expectancy in Copenhagen to be clearly below both the national average (dark grey line) and the 6 largest Danish cities (minus Copenhagen) (the light grey line).

Figure 143: Variation rate of average life expectancy



Source: City of Copenhagen, 2015b

VARIATION RATE OF GREEN SPACE AVAILABILITY

The indicator aims to assess the variation rate of green spaces, i.e. urban parks, forests, pocket parks and other forms of nature relative to total surface area (km2). Since the Second World War, the overall spatial development of Copenhagen and neighbouring areas has been structured according to an urban spatial plan The Finger Plan (Local Plan Office for Greater Copenhagen, 1947) outlining the city along the image of a hand, with the core city at the 'palm', main transport lines (rail, road, cycle paths) along the 'fingers' and green wedges between the 'fingers' stretching into the built urban area towards the core city at 'palm' of the 'hand' (Jensen et al, 2013). These wedges are still to a large extent preserved.

In managing the development of the core city, the City of Copenhagen works with urban green spaces within a range of urban policy areas, including climate adaptation, recreation, health, urban gardening, educational purposes, community building, urban nature and biodiversity (Zandersen et al, 2014). The City of Copenhagen includes a range of urban green spaces, including parks, pocket parks, green roofs, squares with green areas, and court yards with vegetation in public and private housing, and includes additionally blue spaces, i.e. lakes, ponds, streams and the harbour baths, in the approach to green spaces that this is based on (City of Copenhagen, 2009c, 2013d). The area of recreational spaces is thus used as proxy for green spaces, as shown in table 17. Data is not available for 2003.

Table 17: Ratio of green areas and recreational areas the City of Copenhagen and Copenhagen Capitol Area 2013

2013	Total area	Grean/blue area*		Recreational areas**	
	Km2	Km2	Proportion %	Km2	Proportion %
City of Copenhagen	89	20	22.2	15	16.5
Copenhagen Capital Area	2,791	1,020	36.6	532	19.1

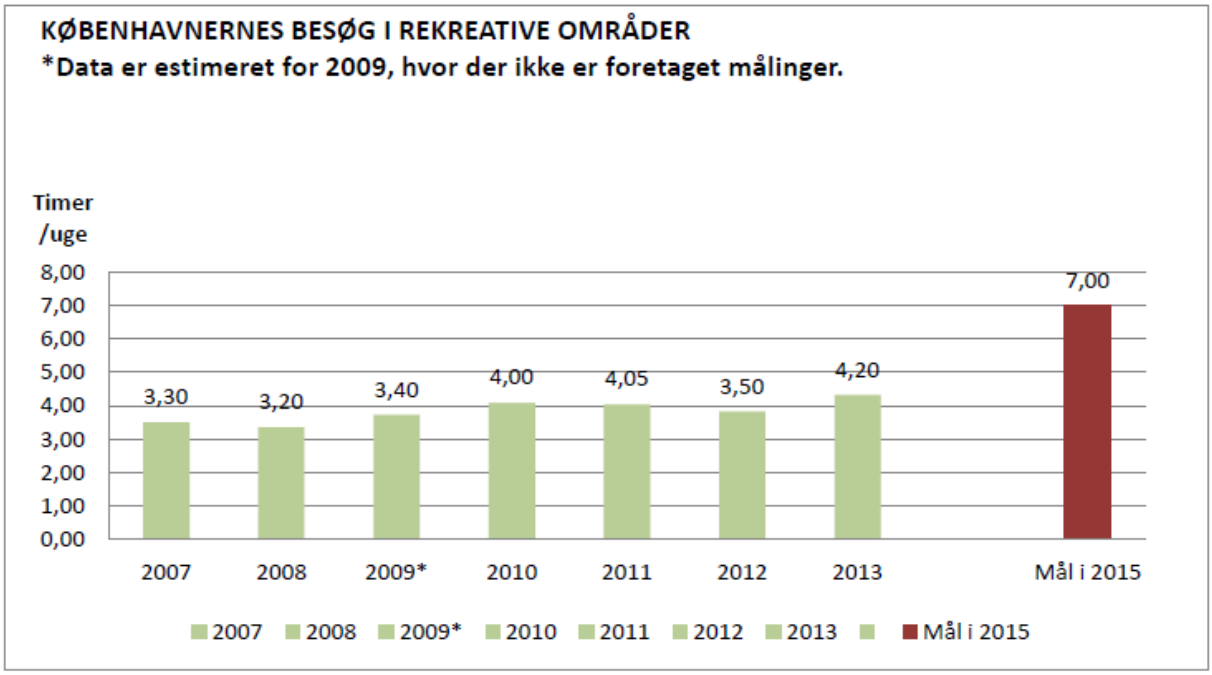
* Parks, forests, lakes, nature

** Recreational areas from DØRS

Source: AU modelling 2015

In addition to proportion of total area, accessibility to pubic urban green spaces also indicates the Green space availability. The City of Copenhagen has included the use of green spaces/recreational areas as a priority in the urban visions and urban development plans, measured in terms of average number of hours per week spend in green/recreational space. This is demonstrated in figure 14. Recreational areas are almost exclusively mixed with green spaces, e.g. skate tracks in urban parks or public squares with grass and trees, thus recreational areas indicate urban green areas. Use of recreational – green areas is shown in figure 14.

Figure 15: Copenhagener's use of recreational/ green spaces in Copenhagen 2013

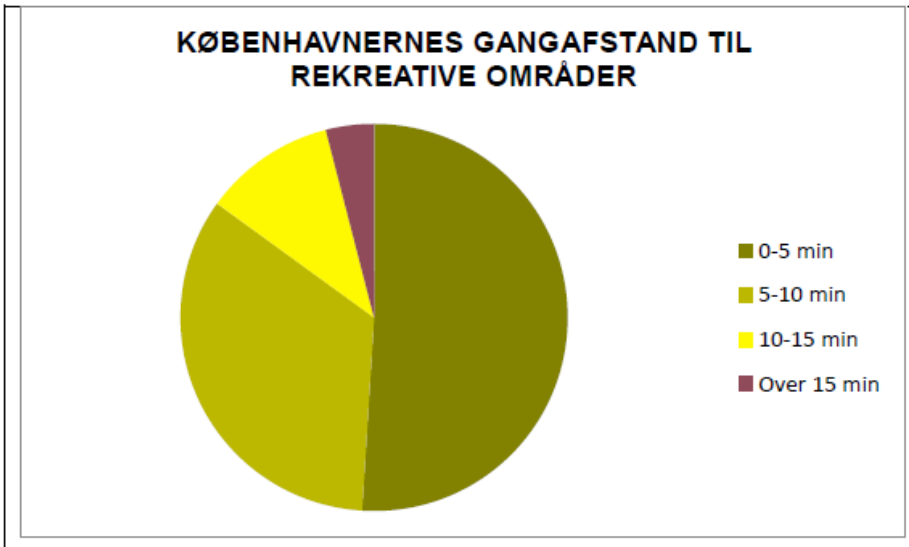


Source: City of Copenhagen, 2015b

In the diagram, the x-axis represents hour spent in recreational spaces per week. The burgundy pillar displays the target set in the 2007 vision *The Eco-Metropolis - Our Vision for Copenhagen 2015* (City of Copenhagen, 2008a [2007]).

Access and distance from residence to recreational areas constitutes another indicator that informs about green space availability. This is shown in figure 15. Furthermore, the figure illustrates the vast differences that exist within the city.

Figure 16: Distance for Copenhageners from place of residence to recreational area and amount of the area of recreational space per inhabitant 2013



BYDEL	Areal grønne områder (ha)	Indbyggere	m2 grønt pr. indbygger
Indre By	125,61	50.906	24,67
Østerbro	115,28	73.992	15,58
Nørrebro	46,01	76.715	6,00
Vesterbro/Kgs. Enghave	140,59	59.447	23,65
Valby	150,88	50.127	30,10
Vanløse	103,33	38.734	26,68
Brønshøj-Husum	190,81	42.441	44,96
Bispebjerg	153,30	51.764	29,62
Amager Øst	157,13	52.641	29,85
Amager Vest	836,47	62.361	134,13
I alt	2019,40	562.412 (inkl. 3.284 uden for fordeling)	35,91

Source: City of Copenhagen, 2015b

Copenhagen has formulated two overall urban visions and a number of sectoral plans and strategies where visions are also included and linked to the overall urban vision. Each of the visons has been followed by measurable target objectives in key areas and by measures. Annually or bi-annually, the progress (or lack of progress) within the target areas are monitored, and progress is evaluated with respect to achieving the targets of the visions, which includes the development in CO2 emissions specified for the target objectives. Also projects and measures launched as part of the climate initiatives are monitored and evaluated, though the level of detail in the evaluations varies.

The overall most recent urban vision has set a target of Copenhagen becoming carbon neutral by 2025. Difficulties in especially the transport sector is recognized and monitored extra closely.

Hence, yes, a monitoring system for emissions reductions exists in the City of Copenhagen.
(City of Copenhagen, 2008, 2012, 2013, 2015)

ECONOMIC PERFORMANCE

The overview of actual collected indicators representing the economic performance of the city, their geographical coverage and data source is listed in **Error! Reference source not found.**. Each indicator is shown in more detail below.

Table 18: Data collected for indicators of the economic dimension and actual years

SUB-DIMENSION	INDICATOR	UNIT	YEAR	GEOGR. COVER.
Sustainable economic growth	Level of wealth variation rate	eur/person	-	-
	Variation rate of GDP by sectors	Percentage	2009-2013	Municipal
	Employment by sectors variation rate	Percentage	2009-2013	Municipal
	Business survival variation rate	Percentage	-	-
Public Finances	Budget deficit variation rate	Percentage of city's GDP	2005-2014	Municipal
	Indebtedness level variation rate	Percentage of city's GDP	2005-2014	Municipal
Research & Innovation dynamics	R&D intensity variation rate	Percentage	-	-

LEVEL OF WEALTH VARIATION RATE

Data not available.

VARIATION RATE OF GDP BY SECTOR

Data not available.

EMPLOYMENT BY SECTORS VARIATION RATE

This indicator pictures employment by economic activity sector in per cent. The KPI indicates the movements in the labour market in Copenhagen and is in table 19 pictured in the period 2009-2013 for people in the City of Copenhagen and in other municipalities who work in Copenhagen.

Table 19: Employment by sectors variation rate

Sector	2009 Copenhagener with workplace in		Total 2009	2013 Copenhagener with workplace in		Total 2013	Variation	
	City of Copenhagen	Other municipalities		City of Copenhagen	Other municipalities		No.	%
Agriculture, forestry, fishery	50	220	**270**	47	234	**281**	+ 11	**+ 4,1**
Industry, resource extraction, resource distribution	4.990	10.216	**15.206**	4.400	9.467	**13.867**	- 1.339	**- 8.8**
Building and construction	3.553	6.369	**9.922**	2.829	5.616	**8.445**	- 1.477	**- 14.9**
Trade	19.754	15.025	**34.779**	19.075	15.470	**34.545**	- 234	**- 0.7**
Transport	8.116	7.760	**15.876**	6.448	7.348	**13.796**	- 2.080	**- 13.1**
Hotels and restaurants	9.866	3.556	**13.422**	12.360	3.962	**16.322**	+ 2.900	**21.6**
Publishing, tv and radio	7.462	2.228	**9.690**	8.414	1.761	**10.175**	+ 485	**+ 5.0**
Tele-communitation	1.937	563	**2.500**	1.793	463	**2.256**	- 244	**- 9.8**
ICT and information services	5.340	3.438	**8.778**	6.027	3.364	**9.391**	+ 613	**+ 7.0**
Finances and insurance	7.144	4.463	**11.607**	6.980	4.210	**11.190**	- 417	**- 3.6**
Real estate	3.395	1.305	**4.700**	3.104	1.578	**4.682**	- 18	**- 0.4**
Consultancy	8.884	5.296	**14.180**	9.955	5.536	**15.491**	+ 1.311	**+ 9.2**
Research and development	1.740	1.036	**2.776**	1.709	1.326	**3.035**	+ 259	**+ 9.3**
Advertising and other business services	5.685	1.296	**6.981**	5.748	1.098	**6.846**	- 135	**- 1.9**
Travel agencies, cleaning	11.658	4.853	**16.511**	12.275	4.671	**16.946**	+ 435	**+ 2.6**
Public administration, police and defense	13.845	4.769	**18.614**	12.798	6.134	**18.932**	+ 318	**+ 1.7**
Education	13.334	11.898	**25.232**	15.224	13.412	**28.636**	+ 3.404	**+13.5**
Health	9.627	7.179	**16.806**	10.602	8.041	**18.643**	- 163	**- 1.0**
Welfare institutions	21.271	12.436	**33.707**	23.482	11.992	**35.474**	+ 1.767	**+5.2**
Culture and leisure	6.053	2.500	**8.553**	5.957	2.696	**8.653**	+ 100	**+ 1.2**
Other services	7.651	2.089	**9.740**	7.934	2.241	**10.175**	+ 435	**+ 4.5**
Not specified	2.064	117	**2.181**	1.974	3	**1.977**	- 204	**- 9.4**
Total	**173.419**	**108.612**	**282.031**	**179.135**	**110.623**	**289.758**		

BUSINESS SURVIVAL VARIATION RATE

Data not available.

BUDGET DEFICIT VARIATION RATE

This indicator shows the balance of the budget in Copenhagen and indicates whether Copenhagen generates the necessary revenues to finance their activities, or if the city relies on other financial sources such as loans (indebtedness). Table 20 shows that the City of Copenhagen had a surplus, i.e. negative deficit, in the period from 2005-2014. The surplus on the balance grew from Euro 0.186 bill in 2005 to Euro 1.631 bill in 2014.

Table 20: Budget deficit, GDP and variation

Year	Budget deficit (bill euro)	Population	Budget deficit (€/cap)	GDP* (bill Euro)	GDP* (1000 Euro/cap)	Ratio (%)
2005	-0.186	502,362	- 371	30.83 (229.7 dkr)	61.5 (458 dkr)	- 0.6
2014	-1.631	570,171 (2014)	- 2,861	35.13 (261.7 dkr)	63.5 (473 dkr)	- 4.5
		559,050 (2012)				

* GDP for 2012

Source: City of Copenhagen, 2005, 2006, 2013b, 2013c, 2015a, 2015b

INDEBTEDNESS LEVEL VARIATION RATE

Cities with a lower level of indebtedness are more resilient to challenges in the context of a post-carbon transition process. The indebtedness, GDP per person and the final ratio indicates how strong the economy in Copenhagen. Following the national trend with New public management and privatization of public companies, a range of public services were privatized, with the City of Copenhagen as shareholder, during the 2000s. The level of debts relative to Copenhagen's GDP is shown in table 21.

Table 21: Indebtedness level, as per cent of GDP

Year	Debts (bill euro)	Debts including shares in public-private companies (bill euro)	GDP (bill Euro)	Ratio (%)
2005	1.02 (7.6 dkr)	-	30.83 (229.7 dkr)	3.3
2014	0.32 (2.4 dkr)	4.13 (30.8 dkr)	35.13 (261.7 dkr)	0.9

* GDP for 2012
Source: City of Copenhagen, 2005, 2006, 2012reg, 2013stat, 2015reg, 2015stat

R&D INTENSITY VARIATION RATE

Data is not available.

III.II.VI FINDINGS AND KEY CHALLENGES

Copenhagen has developed markedly over the past two decades and is as the capital and regional metropolitan area greatly diverse and complex. The population is growing and has been for the past decade, and average income per capita is rising, as is the number of people living in poverty. The city has shown a capacity to establish monitoring systems and a system of connected urban plans under the umbrella of an urban post-carbon vision.

Currently, the urban vision CPH2025 sets the overall and long term target for the city and specifies key urban policy and planning areas of priority and action. Within each of these, specific targets have been set and measures and initiatives are in operation. This includes specifically transport, energy, waste, climate adaptation and buildings, but places also green growth and a liveable city at the core of urban development.

Energy consumption has largely come under control and CO2 emissions have been reduced with 21 per cent by 2014 (base year 2005). Also the modal share of cycling has increasing, waste not recycled is reduced and the share of renewable energy production has increased. The indicators also suggest the areas where the policy has not been as successful as desired. This concerns specifically transport, air quality and rising income gap and poverty levels.

III.II.VII CONCLUSIONS

Copenhagen has over the past decade and a half developed an urban vision that has low/zero carbon futures as a crucial element. The findings in this case study report shows that for a range of the POCACITO KPIs, the city has taken notable steps toward realising the vision, including the

establishment of a system of sectoral sub-visions, strategies and action plans. Thus, the report suggests that working with visions can further not only significant CO2 reductions but also the hard and uncertain transition of urban government towards developing, enabling and implementing transition policies.

The actual transition may however be blocked by identifiable as well as still uncertain challenges. The main challenge in Copenhagen seems to be firstly, to maintain the trend towards reduced CO2 emissions. This includes efforts to maintain attention to innovate and implement CO2 reduction measures among the public and stakeholders, as well as across a large range of sections in the city administration. Secondly, for moving closer to realisation of the vision, it may prove to be straining to address the transport sector, as the level of Co2 emission from road transport does not decrease significantly. Thirdly, the city is challenged by a relatively high rate of low-income citizens and a widening income gap which may constitute challenges for urban policy that demands actions and attention in the future. Furthermore, to realise post-carbon city futures, not only low carbon targets must be met but also social and economic aspects.

Moreover, Copenhagen also runs into the difficulty of having achieved the 'easy' reductions, the low hanging fruits, and is now compelled to a large extent to focus on reduction measures that are far more challenging, and e.g. require innovative technological development, e.g. as with the hydrogen cars, ling term investments, e.g. in low energy buildings, or a long term change of behaviour, e.g. with transport.

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III.IIIISTANBUL

WORKSHOP DATES AND LOCATIONS

The vision building and back casting workshops were organized together in one day, 9th of March 2015 in Istanbul. In the morning session vision building workshop was completed and the vision for Istanbul was determined with city representatives. In the afternoon session back casting scenario workshop was carried out according to the vision determined in the morning session.

PARTICIPANTS

The participants were identified on the basis of the relevant institutions and municipality departments that work on the subjects defined in key performance indicators and initial assessment report. Within this perspective 25 relevant stakeholders were invited covering municipality departments, relevant public institutions, private enterprises and companies, NGO's. Against the invited 25 stakeholders, 18 stakeholders attended the workshops, however, in the afternoon session - back casting workshop- 2 participants had to leave early because of other meetings they have to attend and 16 stakeholders attended the back casting workshop (Table 1). The composition of the participants by institutions was as follows: 5 from Istanbul Metropolitan Municipality, 7 from other public institutions, 2 academics, 3 private company and 1 NGO representatives. In addition to the stakeholders from different institutions, 3 artists attended the workshops (Table 2) in order to draw sketches on the basis of the stakeholders' individual visions. During the workshops, coffee breaks and lunch break participants talked to the artists and described their visions about the city and the artists drew sketches to reflect the participants' dreams. The workshops were moderated by Prof. Dr. Tüzin Baycan and Res.Assist. Aysun Aygün (Table 3). With 18 stakeholders, 3 artists and 2 moderators, in total 23 participants attended the workshops.

Table 22: Stakeholders representation in the workshops

NAME - SURNAME	INSTITUTION/COMPANY	VISION BUILDING WORKSHOP	BACK CASTING WORKSHOP
Prof.Dr. Zerrin YILMAZ	Istanbul Technical University, Faculty of Architecture	ATTENDED	NO
Assoc.Prof. Hatice SÖZER	Istanbul Technical University, Energy Institute	ATTENDED	ATTENDED
Seda ÖZDEMİR	Istanbul Metropolitan Municipality, Environmental Protection Dept.	ATTENDED	ATTENDED
Ayşe GÖKBAYRAK	Istanbul Metropolitan Municipality,	ATTENDED	ATTENDED

	Urban Renewal Dept.		
Hilal ÜNDÜL	Istanbul Metropolitan Municipality, Urban Renewal Dept.	ATTENDED	ATTENDED
İpek GÜRSES	Istanbul Metropolitan Municipality, Urban Renewal Dept.	ATTENDED	ATTENDED
Hakan AKÇA	Istanbul Metropolitan Municipality, Transportation Planning Dept.	ATTENDED	ATTENDED
Gökhan CİNGÖZ	Istanbul Water and Sewage Administration	ATTENDED	ATTENDED
Şeyma CİNGÖZ	Istanbul Water and Sewage Administration	ATTENDED	ATTENDED
İhsan Mustafa DOĞAN	Istanbul Water and Sewage Administration	ATTENDED	ATTENDED
Erhan KAYAOĞLU	Istanbul Water and Sewage Administration	ATTENDED	ATTENDED
Onur MOR	Istanbul Water and Sewage Administration	ATTENDED	ATTENDED
Sıdıka LÖK	Housing Development Administration	ATTENDED	ATTENDED
Timuçin KURT	Housing Development Administration	ATTENDED	ATTENDED
Ulaş AKIN	Istanbul Metropolitan Planning Office	ATTENDED	ATTENDED
Eren ÖZDEN	Climate Change and Sustainable Services in Turkey	ATTENDED	NO
İrem YILMAZ	Istanbul Chamber of Commerce	ATTENDED	ATTENDED
Nesrin BEDELOĞLU	Istanbul Development Agency	ATTENDED	ATTENDED
TOTAL		18	16

Table 23: Artists in the workshops

Name - SURNAME	Institution/Company
Murat KOSİF	Mimar Sinan Fine Art University
Buse KÖKÇÜ	Mimar Sinan Fine Art University
Irmak BAYCAN	Erenköy Kız Anadolu Lisesi

Table 24: Moderators in the workshops

Name - SURNAME	Institution/Company
Prof. Dr. Tüzin BAYCAN	Istanbul Technical University
Res. Assist. Aysun AYGÜN	Istanbul Technical University

III.III.I METHODOLOGY AND RESULTS FOR VISION BUILDING

The vision building workshop started on 9th of March 2015 in the morning and took half a day. After welcoming words and opening, first all participants were introduced each other. Next, the Workshop program and the POCACITO Project presented to participants. The Initial Assessment Report was interpreted with its dimensions and indicators. Finally, moderators explained the methodology,

general framework, and steps of the vision and back casting workshop. Then, the vision building process started.

Table 25: Workshop program for vision building

Time	Activity
9.00 - 9.15	**Welcoming, Opening and Introducing I 15 min.** *Prof. Dr. Tüzin Baycan, POCACITO Project Turkey Coordinator*
9.15 - 9.30	**Presentation of the Program I 15 min.** *Prof. Dr. Tüzin Baycan, POCACITO Project Turkey Coordinator*
9.30 - 9.50	**Introducing POCACITO Project I 20 min.** *Explanation of the aim, context and methodology of POCACITO* *Prof. Dr. Tüzin Baycan, POCACITO Project Turkey Coordinator*
9.50 - 10.10	**Presentation of the Initial Assessment Report for Istanbul I 20 min.** *Prof. Dr. Tüzin Baycan, POCACITO Project Turkey Coordinator* *Res. Assist. Aysun Aygün, POCACITO Project Assistant*
10.10 - 10.30	**Explanation of Vision and Scenario Building Workshops I 20 min.** *Presentation of the context of workshop and the steps will be followed* *Prof. Dr. Tüzin Baycan, POCACITO Project Turkey Coordinator*
10.30 - 10.45	**COFFE BREAK I 15 min.**
10.45 - 11.30	**Vision Building (1) I 45 min. (3 Groups)** *"How would you like your city be in 2050?"* *In-Group discussion*
11.30 - 12.00	**Vision Building (2) I 30 min.** *Presentation of groups* *Inter-Group discussion*
12.00 - 12.30	**Vision Building (3) I 20 min.** *Common vision for Post-Carbon future of Istanbul in 2050* *Determining main topics*
12.30 - 13.30	**LUNCH I 60 min.**

Table 26: Workshop program for back casting scenarios

Time	Activity
13.30 - 13.45	**Summary of Vision Building Workshop Results I 15 min.**
13.45 - 14.30	**Scenario Building (1) Defining Endpoints I 45 min.** *"What are the desired endpoints for Istanbul?"*
14.30 - 15.15	**Scenario Building (2) Identification of Obstacles and Opportunities I 45 min.**

15.15 - 16.00	**Scenario Building (3) Identification of Milestones and Interim Objectives I 45 min.**
16.00 - 16.15	**COFFE BREAK I 15 min.**
16.15 - 17.00	**Scenario Building (4) Defining Actions I 45 min.** *"Which actions, when and by whom?"*
17.00 - 17.45	**Scenario Building (5) Robustness Check I 40 min.** *"Whether activities make only sense in very specific scenario contexts or if they are robust and would also make sense under different future scenarios?"*
17.45 - 18.00	**DISCUSSION OF RESULTS I 15 MIN.**
18.00	**CLOSING**

There were 18 stakeholders in the morning session of the workshop. These stakeholders were divided into three groups in order to be six persons in each group. In this division, distribution of different - public, private institutions, companies and NGO's- representatives in each group was taken into consideration. Also there were three artists working with the group to draw the participants' vision narratives. During the vision workshop, participants explained their visions individually to artists and three artists drew vision sketches. It was asked to participants to write down their ideas in keywords or alternatively to draw their dreams and visions. Since the participants may not be familiar with graphical representation of their ideas, it was thought to get artistic support from the young artists.

Figure 17: Vision building workshop – individual drawing phase with artists

First, it was asked "How would you like Istanbul to look like and to function in 2050?" Participants wrote down their ideas on a paper using keywords. In the meantime, they told their visions to artists to be drawn one by one. Next, they discussed their ideas in their groups. Each group created their common vision ideas and listed them on the flip charts. When all groups completed their in-group discussions, one representative from each group presented their group's ideas.

Figure 18: Vision building workshop – group discussions

Each group listened to the other groups' ideas and approaches. Then it was asked to each of the three groups to generate one vision of Post-Carbon Istanbul in 2050. After in-group discussions, three different visions were developed with its sub-components.

Table 27: Vision building workshop - visions and main topics for each group

GROUP 1	GROUP 2	GROUP 3
A city that protects natural and cultural heritage, offers high quality of life, uses innovative and clean technology, be sensitive to environment, able to adapt to climate change, uses renewable energy resources, has high level of global competitiveness, be safe and well governed.	*Self-sufficient, happy and dynamic Istanbul for all livings.*	*Having high quality of life, manageable and sustainable Istanbul*
GROUP 1	**GROUP 2**	**GROUP 3**
• **High Quality of Life** • **Environment** • **Global Competitiveness** • **Well Governance** • **Cultural Heritage**	• **Energy** • **Ecology** • **Quality of Life** • **Agriculture** • **Culture and Tourism**	• **High Quality of Life** • **Governance** • **Sustainability**

They presented their own visions to all participants. All visions and their sub-components were written down and common topics are highlighted. A discussion proceeded to determine the most important topics and components. As a result of this discussion one common vision and five main topics were defined for Post-Carbon Istanbul in 2050.

MAIN SECTORS IDENTIFIED IN VISIONING A FUTURE FOR THE CITY

Following sectors and areas were covered by the final common vision for 2050:

1. **Quality of Life:** Planning of the city development, transportation, and infrastructure affects positively the quality of life in the city. Moreover, renewable energy usage, energy efficient buildings are the factors that increase the quality. Citizenship, environmental concerns as well as safety are important.
2. **Governance:** Relationship between the local and the central government is an important factor. Transparency in decisions, participative and innovative governance is needed.
3. **Environment and Natural Resources:** Climate change is a threatening factor, which the city should be adaptable to the forecasting impacts. Efficient uses of natural resources, waste management, decreasing carbon emissions, using innovative and clean energy are important.
4. **Energy:** Sustainable, renewable energy resources, energy efficient buildings are important factors for this sector.
5. **Global Competitiveness:** Istanbul is a large city with its almost 16 million population and a metropolitan area with its economic, cultural, social activities. Istanbul should be able to compete with other world cities in terms of economic, cultural, social, environmental and technical aspects.

All groups emphasized quality of life since the urban development pattern, large population, traffic, and other urban problems of the city create a challenge on quality of life. The governance was the second most highlighted sector for Istanbul. Mega project decisions by central government, which is expected to affect the entire structure of the city as well as participation, transparency were described as the main challenges for the governance. Each group emphasized environment under different topics such as ecology, agriculture, and sustainability. At the end of the discussions those topics were compiled under environment and natural resources. All groups also emphasized energy under different topics. Only one group highlighted global competitiveness however, in the inter-group discussions participants agreed on the importance of this topic. Considering the dynamics of Istanbul, competitiveness was described as an important sector to be developed.

As mentioned previously, those topics were determined in inter-group discussions with participants. All groups presented all the visions and topics, common points were highlighted, differences were discussed and finally most important and comprehensive sectors and topics were determined at the end of the vision building workshop.

THE 2050 POST-CARBON VISION FOR ISTANBUL

The 2050 post-carbon vision for Istanbul has been described as follows:

Istanbul 2050: the city that able to compete at the global level with its dynamic, innovative, self-sufficient, sustainable aspects and high level of life quality and well governance.

High Quality of Life

- Accessible open public spaces
- Well-designed physical space, social and technical infrastructure
- Increased number of green buildings
- Usage of renewable energy resources
- Smart city design in satellite urban development
- Woman, child, elderly friendly
- Livable old city pattern
- Extensive urban transportation system
- CO2-free transportation modes and automobiles
- High air quality for the inner and outer space
- Widespread cultural and artistic activities
- Increased comfort for public transportation modes

Governance

- Interrelation between central and local governments
- Participative planning and decision making approach
- Transparency in decision making about the city
- Innovative R&D approaches for development

Environment and Natural Resources

- Efficient water management
- High adaptive capacity to climate change
- Usage of alternative energy resources
- High quality of sewage treatment and recovery of water
- Well organized waste management
- Protection of natural resources
- Integrated water and green lands

Energy

- Energy efficient urban development
- Self-production and consumption of energy in urban development
- Increased usage of clean energy considering the cost of energy in industry - cost should not be increased -
- Regulation of energy policies at city level
- Increased investments in clean energy
- Having a place in carbon market
- Competed calculations for emissions of housing and industry buildings

Global Competitiveness

- High investments in R&D and innovative activities
- New working and living style

- Productive city in service sector
- Not vulnerable economy
- Competitive with its economic activities, cultural and historical heritage, social activities, environmental attractiveness

Figure 19: Vision building workshop – sketches drawn by artists (1)

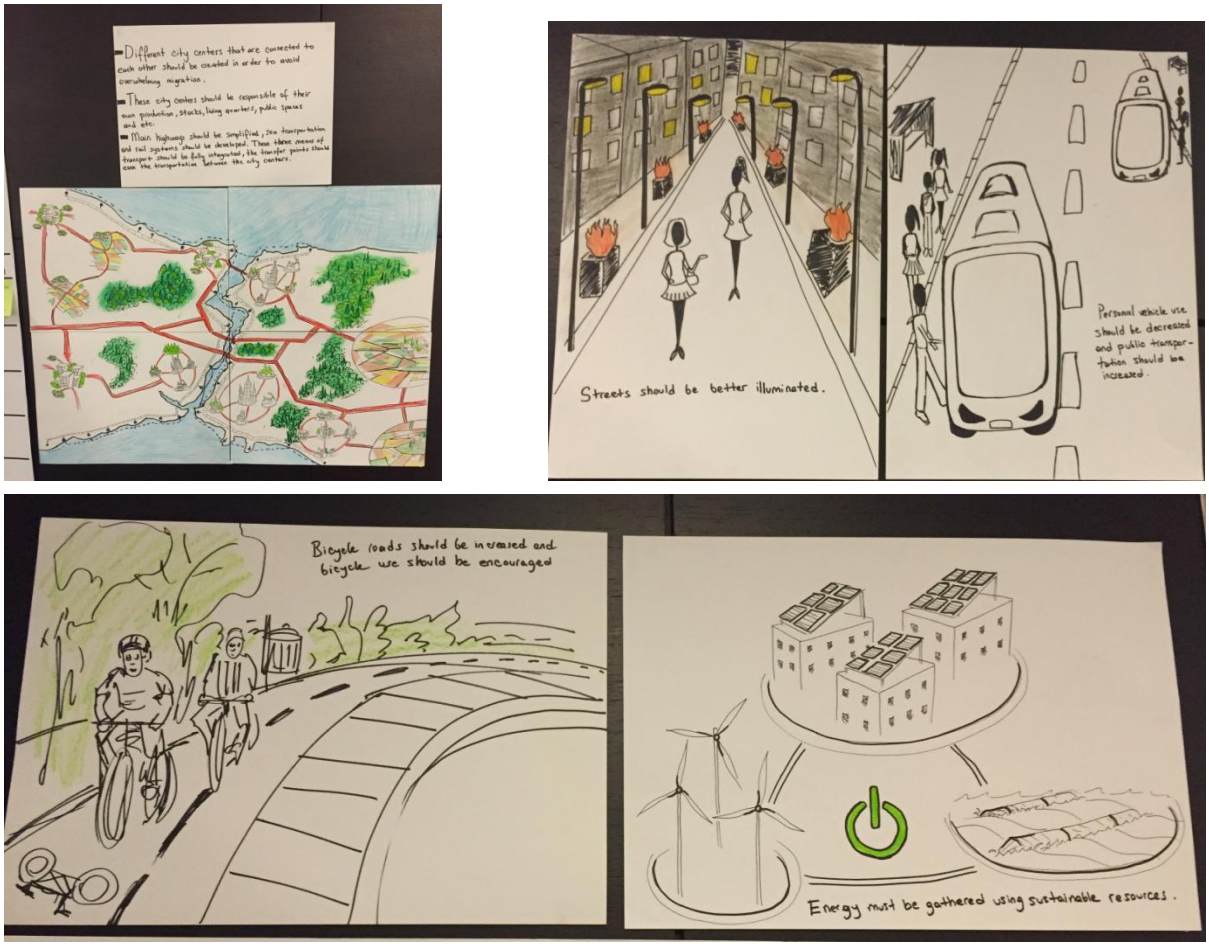
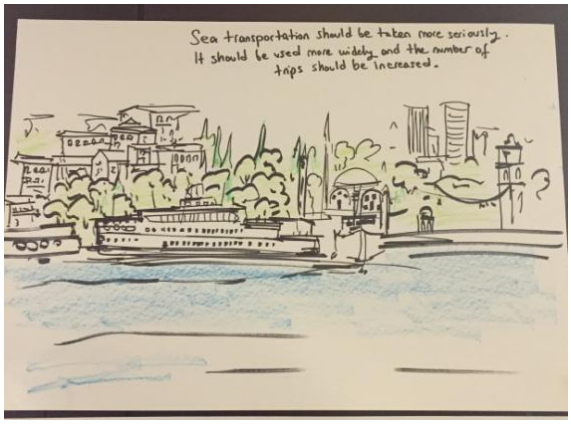


Figure 20: Vision building workshop – sketches drawn by artists (2)



OVERALL EVALUATION

An overall evaluation of the vision building results shows that the city representatives imagine Istanbul in 2050 as having today's problems solved and opportunities utilized. Therefore, they mentioned today's problems -quality of life, transportation, energy, protection of natural resources, sustainability, governance- and economic opportunities. The results mainly focused on physical issues in urban development and city life, which is directly connected to environmental aspects and protection.

The desired approach has been described as innovative, developing, controllable, economically strong as well as protective for environment.

III.III.II METHODOLOGY AND RESULTS FOR BACK CASTING SCENARIOS

The second session on back casting scenarios started after lunch. As the vision as well as the main topics had been determined already with participants in the first session, these were used in the successive portion of the workshop.

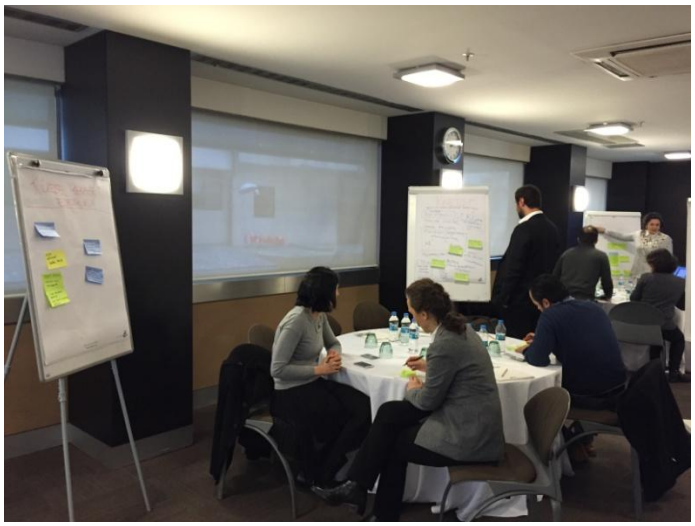
From eighteen participants in the morning session two of them had to leave and the afternoon session on back casting scenarios continued with sixteen participants.

METHODOLOGY FOR BACK CASTING WORKSHOP

As in the beginning of the workshops the methodology had been presented to stakeholders, in the second part of the workshop it was implemented step by step. All participants were agreed on the described vision and the 5 main thematic areas. The five steps of the back casting workshop; i) defining normative endpoints, ii) identifying obstacles and opportunities, iii) identifying milestones and interim objectives, iv) defining actions, measures and instruments, and v) robustness check was conducted step by step for all thematic areas.

First of all, 5 groups were organized by thematic area. Participants were distributed equally to those five groups. It was asked to them: "Try to formulate 'desired' endpoints you want to reach for your city". They wrote down their desired endpoints to related topics. Then, they rotated to other topics, read the written ideas and added their own ideas -if they have any different approach- in order to contribute everyone to all thematic areas. When all participants completed their study on each topic, moderators systematically wrote down the desired endpoints on a previously prepared chart.

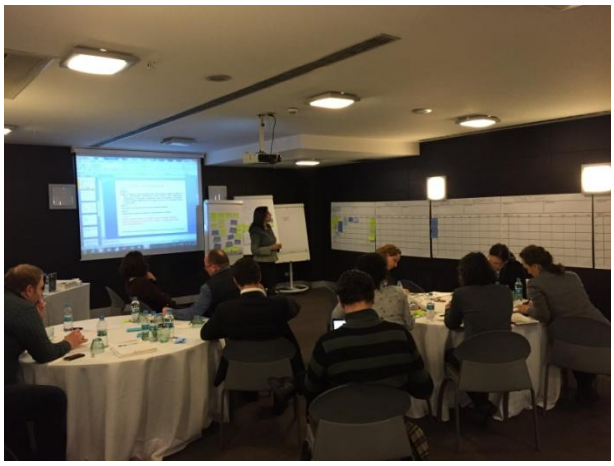
Figure 21: Back casting scenario workshop – discussions on thematic areas



In the second part of the back casting scenario workshop, it was asked to the participants: "What are the opportunities and obstacles that may occur on the way to reach your final goal?" Like the previous question, they wrote down their ideas for each topic by rotating the group. When all groups completed expressing their thoughts, the moderators wrote down all ideas on the chart again.

After that step, the second stage of scenario building was completed with all-together discussions. The whole group worked on charts covering also timetables -prepared previously by moderators- for each topic.

Figure 22: Back casting scenario workshop – all-together discussion on charts



In the next step, it was asked participants two questions: "Looking at the obstacles and opportunities, are there any milestones or interim objectives which have to be reached by certain time point?" and "What has to be targeted in order to reach the vision?" In order to orient the pathway towards vision, it was asked participants to write their ideas on a post-it and put it on the appropriate time period on the chart. In the meantime, they were asked to write down related actors with those actions defined.

After the milestones and interim objectives were placed on the time-line chart, it was asked participants: "What actions should be taken when and by whom?" Their ideas were placed on the time-line chart. They also wrote down related institutions and actors for each topic.

Figure 23: Back casting scenario workshop – discussions on time charts

At the end of the study, the results: desired endpoints, obstacles, opportunities, milestones, interim objectives and actions, actors, organized for each thematic area: quality of life, governance, environment and natural resources, energy, and global competitiveness, were read by moderators. The discussion was completed, all participants agreed on the final version of the results.

Finally, for robustness check, it was asked participants: "Whether activities make only sense in very specific scenario contexts or if they are robust and would also make sense under different future

scenarios?" In-depth discussion could not be made on the robustness because of time limits. However, stakeholders agreed on those defined activities cover all problems and they are flexible, able to adapt to any other condition. Therefore, general idea was those activities are robust and make sense under different future scenarios.

Figure 24: Back casting scenario workshop – outcomes of the workshop

KEY POINTS OF THE SCENARIO

All discussions were transferred into timeline graphs, after the workshop the results were clarified as seen on the following tables.

Table 28: Back casting scenario workshop outcomes - high quality of life

HIGH QUALITY OF LIFE	
DESIRED END-POINTS (2050)	• Safe streets at every hour of the day • Quality spaces for child, elder and woman • Planned urbanization • Physical spaces with well-organized social and technical infrastructure • Accessibility for disabled people
OPPORTUNITIES	• Urban renewal/transformation • Discussions on 'quality of life' concept in every platform • Increasing researches on quality of life
BARRIERS	• Uncontrolled physical space implementations • High investment and operation cost of transportation system • The lack of civic conscious and sense of belonging • Unequal income levels • Unplanned urbanization • Migration • Ineffective legislation • Current urbanization pattern

RELATED ACTORS	• Public-Private partnerships • Foreign investors
2015	• Creating urban design standards for Istanbul and controlling the implementations • Determining the standards for measuring the quality of life • Increasing civic conscious and concerns about environment • Making provisions for earthquake and any natural hazards • Increasing citizen participation in local government • Training citizens about civic conscious • Training citizens about earthquake
2020	• Lightening streets and public spaces all night for safer places • Easy accessibility to green areas, parks • Developing Istanbul's Logistic Master Plan and determining the logistic centers of the city • Decreasing car ownership, increasing pedestrian and cycle paths **MILESTONE:** Reorganizing the transportation system and managing **MILESTONE:** Expanding the public transportation network, implementation of planned railway system
2025	• Being among top 30 in international quality of life indexes • Expanding education service and making it accessible for everyone • Increasing health service and making it accessible for everyone • Accomplishing the effective and expanded public transit system • Having more active sea transit (boats) system
2030	• Implementation of some good examples in determined areas for easy accessibility
2035	• Using electric cars for transportation
2040	**MILESTONE:** Planning for accessible city and implementing the plan
2045	
2050	• Being among top 10 in international quality of life indexes • Decreasing the crime in the city to a minimum level • Waterfront planning and effective usage of waterfronts • Increasing the quality of inner and outer space

Table 29: Back casting scenario workshop outcomes - governance

GOVERNANCE	
DESIRED END-POINTS (2050)	• Transparency, participatory governance, accountability, measurability • Self-sufficient and self-governed society
OPPORTUNITIES	• EU adaptation process • Active actions of NGOs in rising awareness of citizens and tendency to transparency • Technological improvements (simulations, technical support systems etc.)
BARRIERS	• Current situation • The lack of work statement and confusion about the authority of public institutions • Inefficient relation between institutions and actors • The lack of awareness and conscious • Deficiency about sharing information
RELATED ACTORS	• Public institutions • Private sector • NGO • Citizens
2015	
2020	• Creating a central data and information system • Clarifying the spatial coordination between institutions (horizontal and vertical) **MILESTONE:** Generating a sustainable urban inventory and sharing with public (social, economic, environmental data) **MILESTONE:** Creating a city information system
2025	• Creating real-time impact simulation systems
2030	• Simultaneous usage of information and government systems
2035	
2040	
2045	
2050	• Increasing coordination between central and local governments • Participation of citizens in all processes • Determining current problems • Determining strategies focusing on solving problems

Table 30: Back casting scenario workshop outcomes - environment and natural resources

ENVIRONMENT AND NATURAL RESOURCES	
DESIRED END-POINTS (2050)	• Efficient water and sewage-waste management • Protecting existing green areas • Protecting and enhancing water resources • Protecting underground water resources
OPPORTUNITIES	• Urban renewal/transformation • EU environmental policies • Existing of various natural resources • Existing of related NGOs
BARRIERS	• Giving priority to economic development in economy-ecology contradicting situations • Harmful implementations and development decisions affect natural resources • 2-B decisions and implementations (selling the urban lands to private sector and extracting those areas out of forest status) • Pressure of population, migration and development on natural areas • Urban renewal • Development projects causing pressure on natural heritage (e.g.: Canal Istanbul) • Not having research based innovative studies and the lack of support for those kind of studies
RELATED ACTORS	• Public institutions • Private sector • NGOs • Citizens
2015	• Determining the natural carrying capacity of the city dynamically • Comprehensive climate hazard plan • Planning urban facilities in each scale and type
2020	• Determining Istanbul's natural resources and preparing master plan • Expanding the use of clean technology • Determining endemic species, developing new systems to protect and monitor those species • Developing plans for purifying water basins from urban development • Developing master plans for drinking water and sewage systems • Educating citizens about environmental values

2025	• Dominance of clean technology in production sector • Ranked at the highest level in international water loss performance indexes **MILESTONE**: Consensus of stakeholders on valuable natural resources
2030	• Diversity of urban facilities in every scale and type • Improving eco/agro agriculture in the frame of self-sufficient city • Implementing master plan about purifying the water basins from urban development • Implementing the master plan of drinking water and thus, ensuring the sufficient capacity of water for 50 years
2035	• Being a good example with water management studies • Marketing information and technology to neighbor cities/countries
2040	
2045	
2050	• Ecologic agriculture • Green buildings in city • Determined usable natural resources • Integration of build and natural environment • Protecting ecologically and biologically important areas • Giving the status of 'protection forest' to all forest areas in Istanbul • Sustainability in water supply and sewage management

Table 31: Back casting scenario workshop outcomes - energy

ENERGY	
DESIRED END-POINTS (2050)	• Efficient society producing energy from natural resources • Decrease in CO2 emissions
OPPORTUNITIES	• Urban renewal/transformation • Adequate institutional capacity • New policies and regulations • Existing implementations (good practices) • EU adaptation process (EU energy policies)
BARRIERS	• Missing data for previous years • Insufficient control and monitoring system • Insufficient public awareness about energy efficiency • Ineffective and untimely usage of public resources • High investment costs • Insufficient coordination between institutions • Problems related to practice of regulations • Undefined standards • The lack of qualified employees

RELATED ACTORS	• Public-Private partnership
2015	• Legislation suitability check • Extending good practices (private-public) • Sustaining EU energy adaptation policies targets
2020	• Energy master plan • Legal regulation about green buildings • Starting energy efficiency practices in public institutions • Increasing public awareness about energy efficiency **MILESTONE:** Developing energy master plan, increasing renewable energy resources and integrating them to the daily life
2025	• Developing lightening master plan • Planning for solar, wind, wave and kinetic energy **MILESTONE**: Determining of action plans and targets for energy master plan, developing framework for legal governmental regulations
2030	• Using clean energy in 70% of industry
2035	• Using electricity cars for transportation
2040	
2045	
2050	• Renewable technology for natural resources usage, transportation, buildings and industry • Energy efficient society - Zero CO2 emissions • Efficient usage of energy - electricity, water, gas - • Solar energy usage for buildings (photovoltaic systems) • Usage of electricity and hybrid cars in traffic • Buildings that produce self-energy using wind power • Clean energy usage and automatization in industry

Table 32: Back casting scenario workshop outcomes - global competitiveness

GLOBAL COMPETITIVENESS	
DESIRED END-POINTS (2050)	• Model city • Global focal city
OPPORTUNITIES	• Urban renewal/transformation • Having democracy and economic potential for its region • EU adaptation process • Young population and qualified employees

BARRIERS	• The lack of intermediate staff • Conflicts in the region • Instability • Global impression • Insufficient national fund and savings (vulnerable economy)
RELATED ACTORS	• Public-Private partnership • Foreign investments
2015	• Giving cultural heritage in Istanbul prominence • Increasing economic power • Determining tourism strategies • Determining energy production resources • Increasing infrastructure technologies
2020	• Determining competitive sectors and encouraging them • Supplying necessary funds for global competition and making site selection • Diversity in tourism (culture, health, religion, congress etc.) • Studies for increasing tourist stay • Increasing economic support for global economic competitiveness • Increasing and supporting partnerships of public-universities-NGOs **MILESTONE:** Preparing economic vision plan
2025	• Developing industry • Creating globally focal centers • Creating attractive conditions to attract qualified foreign employees to Istanbul • International level qualified R&D centers to increase global competitiveness
2030	• Completing physical, technical and social infrastructure • Urban renewal for previously determined important areas • Making Istanbul an international financial center
2035	• Having universities ranked among first 50 by international indexes

2040 **2045** **2050**	• New approaches center R&D • Unrivalled in global competition

BACKGROUND SCENARIOS

The background scenarios were discussed after the back casting studies and determination of obstacles, opportunities, actions, targets and milestones. The discussion was realized for each topic of the vision i) high quality of life ii) governance iii) environmental & natural resources iv) energy v) global competitiveness. For all areas Istanbul has many challenges and should develop strategies in a short term and take action immediately.

ROBUSTNESS OF ACTIONS

In-depth discussion on robustness of actions was rather limited because of time constraints. However, it was asked participants if those actions make sense in any scenario that could occur over time. They agreed that determined actions are flexible and able to adapt to any conditions that may occur. Therefore, participants evaluated the actions as robust.

FEASIBILITY

Feasibility could not be discussed at the workshop, as it was not possible to cover all topics in one day.

III.III.III GENERAL REMARKS

Participants were very satisfied by the workshops. They found the topic and discussions very interesting. They contributed a lot to the discussion by revealing their ideas. However, towards the end of the workshops, the attention was decreased. Visioning process was successful and attractive for participants. During back casting workshop they could easily identify obstacles, opportunities and targets. However, determining actions and milestones was complex and needed to be clarified.

III.IV LISBON

WORKSHOP DATES AND LOCATION

The vision building and back casting scenarios workshop was held during May (1-15) through the collection of information and direct interviews with the stakeholders. A final meeting was organized to share ideas and summarize the results.

The outputs of the assessment exercise and the analysis of strategic documents produced by the City Council were very important as inputs for the workshop.

PARTICIPANTS

Several stakeholders were contacted for direct interviews and/or for filling in a specific questionnaire, namely:

Table 33 Stakeholders involved

Stakeholder	Names
Lisbon City Council	Paulo Carvalho
Lisbon City Council	Teresa Almeida
CCDR-LVT – Regional Agency	Eduardo Henriques
Invest Lisboa	Diogo Ivo Cruz
APA – Portuguese Environment Agency	Nuno Lacasta
DGEG – General Direction of Energy and Geology	Carlos Almeida
LNEG - Portuguese National Laboratory for Energy and Geology	Helder Gonçalves
IMT – Institute for Transports and Mobility I.P.	João Carvalho
IN+ Centre for Innovation, Technology and Policy Research	Paulo Ferrão
AMB3E - Portuguese Association for Waste Management	Pedro Nazareth
ADENE - National Energy Agency	Luís Silva
APREN - Portuguese Association for Renewable Energies	Sá da Costa
Energy IN (cluster)	José Paulo Oliveira
Lisboa E-Nova (Municipal Energy Agency)	Miguel Águas
Start-up Lisboa (incubator)	João Vasconcelos

Fivepeople attended the meeting. It is worth noticing that the energy sector was highly represented, due to the importance of this area for the Lisbon case study. The transports sector was under represented, which was surpassed by the knowledge of INTELI staff in this area.

III.IV.I METHODOLOGY AND RESULTS FOR VISION BUILDING

METHODOLOGY

The methodology presented in the deliverable "Case Study Workshop Guidelines" was used in the vision building workshop but there was a need of its adaptation to the context of Lisbon, due to the following factors: economic and financial crisis; uncertain period associated to the change of the City Mayor; difficulty in motivating and mobilizing key stakeholders; parallel organization of similar meetings, workshops and seminars in the scope of Portugal2020 (framework program 2014-2020 under negotiation with the EC).

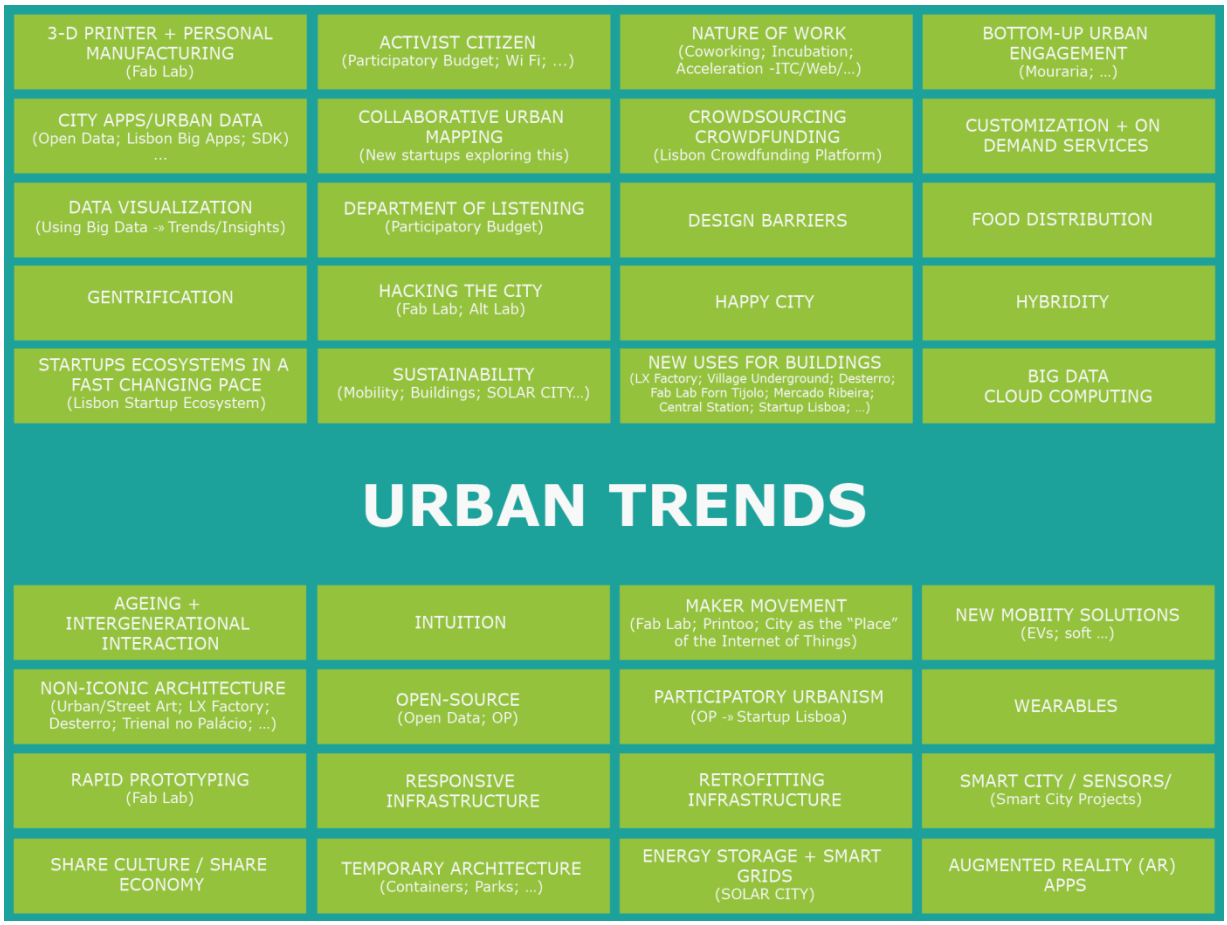
Thus, INTELI focused the process on making direct interviews with key stakeholders, in which important information on the vision was extracted. A final workshop was also organized to summarize results.

The main steps followed were:

- Presentation of the objective of the meeting;
- Overview of the POCACITO project;
- Brief presentation of the results of the initial assessment;
- Discussion of key challenges for the city;
- Presentation of the context scenario and some urban trends;
- Visioning exercise – Imagine the future of Lisbon in 2050 – Identification and discussion of key messages;
- Selection of one narrative of the vision 2050.

One interesting input for the discussion was the presentation of urban trends associated to mega trends at global level. Some initiatives and projects under developed or planned to Lisbon were associated to the presented urban trends.

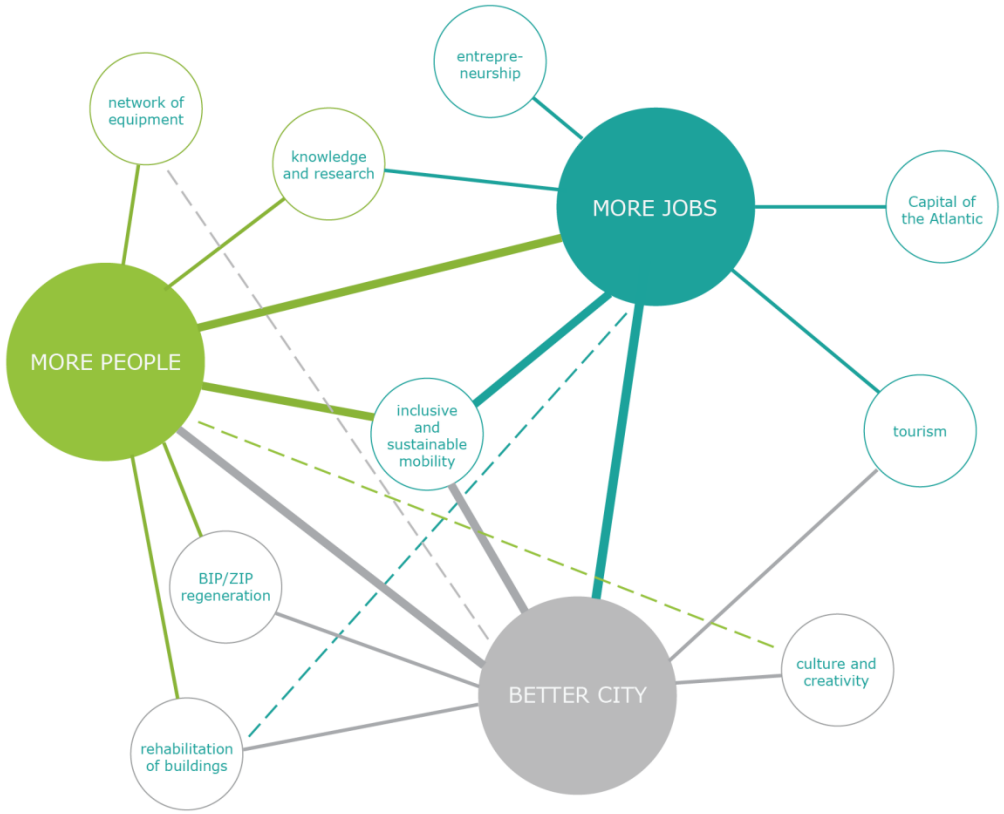
Figure 25: urban trends



MAIN SECTORS IDENTIFIED IN VISIONING A FUTURE FOR LISBON

As stipulated in the document "Lx_UEuropa 2020", the vision for Lisbon 2020 is: more people, more jobs and better city. The objective is to build a beautiful, diverse, cosmopolitan, attractive, healthy, creative, friendly and ambitious city.

Figure 26: Vision for Lisbon 2020



Within this context but having 2050 as time horizon, the main sectors identified in visioning a future for Lisbon were: **mobility, energy, climate change, urban regeneration, inclusion and attractiveness**.

MOBILITY

It is necessary to enhance sustainable mobility in Lisbon. Private car is still the main transport mode used by the population. The results of the assessment exercises are quite disappointing since the share of sustainable modes, i.e. walk, bus, company or school collective transportation, metro/ underground, train, bicycle and ship, have decreased from 59% in 2001 to 51% in 2011. Notice that in 2001, the car was responsible for 32% of the model share and in 2012 it was 34%. Moreover, the lack of synergies between transport modes is also a reality.

Several initiatives have been launched by the Lisbon City Council in the area of sustainable mobility (such as electric mobility, car-sharing, bicycle lanes, improvement of public transport, etc.), but without substantial impact in the urban life.

ENERGY

There is a need to increase energy efficiency and the use of renewables in Lisbon. The consumption of energy (electricity, fuel and natural gas) in 2008 in Lisbon was 828.751 toe and in 2012 was 927.389 toe, experiencing an increase of 12% during this period. The sector that contributes the most for the overall consumption is the transportation sector.

Moreover, Lisbon has a high solar potential that should be explored. It was one of the results of the "Lisbon Solar Potential Map" project, which has evaluated the potential solar installation of solar systems in the built heritage of Lisbon.

CLIMATE CHANGE

Lisbon is a coastal city suffering from some natural disasters, namely floods. It is also located in an earthquake zone, which is a danger to citizens and infrastructures.

The development of preventive and alert systems oriented to anticipate these events and make correct decisions is a priority. There are some technology-based emergency management systems that could be used in these situations.

It is worth of notice that Lisbon subscribed the Mayors Adapt initiative in 2013. Adaptation to climate change is the main objective of this platform with a view to adapting infrastructure and policies to climate impacts.

Air quality is also a problem in the city center. For this reason, Reduced Emissions Areas were launched, which are zones in which the circulation of more pollutant vehicles is forbidden, due to health reasons and compliance with national and European legislation.

URBAN REGENERATION

There are several buildings in Lisbon that need renovation, especially in terms of energy efficiency. Currently there are nearly 7,000 buildings in Lisbon holding an energy certification, of which about 1,000 are A or A+ energy efficient buildings. Although the number of energy efficient buildings is likely to grow, the number of buildings is a matter of concern, because 80% of world's energy is consumed by cities and buildings are responsible for 40% of energy use and 23% of GHG emissions. In this context, it makes more sense to intervene in the existing stock or in building renovation.

One interesting example is the project Eco-Neighborhood – Boavista Ambiente + which aimed the reconversion and qualification of public space, implementation of measures to improve the energy performance of buildings and remodeling of some equipment in the social neighborhood.

ATRACTIVENESS

Over a span of 30 years, the Lisbon has lost more than 200,000 of its residents, shrinking from 800,000 in 1980 to 550,000 today. Most of these people now live in the metropolitan region, reaching 2.8 million residents. Attracting people (students, talents, entrepreneurs, etc.) to live in the city center is a challenge for the city. Positioning Lisbon in global networks is also an imperative, with a view to attract investment and business.

Lisbon has also a privileged position in the Atlantic Area that should be explored, namely the relations with Portuguese speaking countries. The city easily allows access to 750 million consumers.

INCLUSION

Both poverty level and unemployment are rising up in Lisbon. These problems affect essentially young people, elderly people and other disadvantageous segments of the population. Regarding the level of poverty, the figures are very worrying because between 1989 and 2009 this indicator jumped by 80% in the region of Lisboa and Vale do Tejo (NUT II).

Ageing society is a challenge that Lisbon is also facing, in line with European trends.

THE 2050 POST-CARBON VISION FOR LISBON

The 2050 post-carbon vision for Lisbon is:

LISBON. A SMART CITY with more people, more jobs and better quality of life.

Concerning the identified key areas for intervention:

MOBILITY – PROMOTING SMART MOBILITY

- Historic city center without car traffic: In 2050 entering in the historic city center by car will be forbidden, in line with international trends. Actually, there are some limits imposed by the Reduced Emissions Areas policy, being the circulation of more pollutant vehicles not allowed.
- Predominance of soft modes (walking, cycling, etc.): The City Council will encourage walking, cycling and public transports as the privileged transport modes. Pedestrian areas and shared public spaces will be provided.
- City of shared mobility: In the scope of the trend towards sharing economy, car-sharing, car-pooling and bike-sharing systems will be increasingly used in comparison with other transport modes. Actually, Lisbon is the only European capital without a bike-sharing system, but plans have been already defined towards this objective.
- Use of eco-efficient vehicles: Electric mobility will be privileged, in order to maximize the potential of the 500 charging points installed in the city. Public incentives will be given to families, companies and municipalities. It is estimated that in 2020 40 million electric vehicles will be sold annually at global level (Frost & Sullivan).
- Integrated mobility systems: The creation of synergies between transport modes is essential. Therefore, a holist overview of urban development, including the metropolitan area should be addressed, taking into account the main residential and work areas.
- Operations Centre on Mobility: A Operations Centre on Mobility will be fully operational in 2030, providing real-time information on traffic to the city authority, services' operators and

citizens. This system will involve the installation of several sensors around the city and will be also associated to civil protection.

- Use of mobility apps: Mobility apps will be used by citizens and tourists to support their travel and parking decisions, based on open data.
- Virtual mobility: Use of virtual technologies to avoid traveling (artificial intelligence, etc.).

URBAN REGENERATION – PROMOTING INTEGRATED URBAN PLANNING

- Energy efficient buildings: Lisbon is committed to the ambitious target of NZEB – Nearly net zero energy buildings, a flagship area of the EC. A huge urban renewal program will be implemented in Lisbon with a specific focus on energy efficiency. Public buildings will be privileged in a first phase – "leading by the example".
- Smart buildings: Energy management systems will be installed in buildings, as well as other smart technologies and solutions (integration with electric vehicles, intelligent water and waste management, remote control of basic functions, etc.).
- Smart Neighborhoods: Several Lisbon neighborhoods will be transformed in smart and green neighborhoods, specifically the ones located in historic zones. The adaptation of smart technologies to these restricted areas is a challenge for the local authority and companies. Green roofs and facades will be implemented in some buildings.
- Compact city: Promoting mixed-use spaces (housing, commercial areas, learning spaces, leisure, etc.) and short distances, in order to avoid urban sprawl.
- 3D printing in urban planning: 3D printing will be increasingly used in architecture and urban planning. The 3D printing global market will increase from 1.1 million dollars to 7.1 million dollars till 2020.
- Tactical urbanism: Citizens will be increasingly involved in the life of the city, through the participation in urbanism actions (participatory urbanism). Small scale actions to transform public spaces will be developed with citizens' involvement. Temporary architecture and public art are relevant examples.

ENERGY – PROMOTING SUSTAINABLE ENERGY

- Solar city: Solar energy as well as other renewables will be intensively used. The number of PV panels will increase exponentially. In fact, sunshine hours are about 2,800 per year in Lisbon.
- Smart grids: EDP (national electric company) has plans to implement smart grids in all Portuguese municipalities. A pilot project was developed in the city of Évora in 2010. Lisbon will be included in the process, probably starting with an experimental zone, such as the historic center.
- Intelligent public lighting: Intelligent public lighting systems will be implemented in the city. Bulbs are already being replaced by more efficient devices such as LEDs. Remote control systems will be applied in order to reduce energy consumption and improve public safety.

- Urban agriculture: Urban gardens are increasingly popular in Lisbon and this trend will be intensified. In 2013-2014, urban gardens rose by 29.9 ha in the city.
- Lisbon, European Green Capital: The city will apply for the European Green Capital Award and will be the winner in 2025.

CLIMATE CHANGE – PROMOTING RESILIENCE

- Resilient city: A climate change adaptation plan is being produced and will be implemented. Green solutions to reduce the risk of flooding will be privileged. A drainage master plan will be designed and implemented.
- Safe city: Lisbon will be a city with reduced levels of crime. Public safety will be assured, for example through the use of video surveillance and drones.

INCLUSION – PROMOTING QUALITY OF LIFE FOR ALL

- Solidary city: Sharing economy will be a reality in different areas, such as working, housing and transports. Information and communication technologies and social networks will support this movement. Street food and other unregulated activities will also be present in urban life.
- Social economy: The contribution of social economy to GDP and employment will increase, and social and civic entrepreneurship will be supported.
- Healthy and ageing friendly city: The city will provide adequate facilities for elderly people, such as home care, telemedicine, etc. Public safety is also a challenge.
- Creative city: Lisbon would like to be one of the most creative cities of Europe. Making Lisbon a space open to the exploitation of new experiences, concepts and innovations is also an ambition.

ATTRACTIVENESS – PROMOTING INTERNATIONALISATION

- Lisbon as a European Capital City: Lisbon should be considered one of the most important capitals in Europe as an Atlantic Business Hub. It is a privileged platform to 500 million European consumers, having also a deep economic and cultural relation with Portuguese speaking emergent economies, like Angola and Mozambique.
- Global networks: Positioning Lisbon in global networks of production and value chains, and inserting the city in international projects and networks of cities. For example, the approbation of the lighthouse project submitted by London, Milan and Lisbon to Horizon 2020 (ACTIVE) would be a good opportunity.
- Attractive (and start-up) city: Lisbon will easily attract students, talents, entrepreneurs and business. Moreover, it can attract Competence and Research Centers of multinational

companies and shared services centers (high value). In fact, Lisbon can guarantee human resources with availability, qualifications, flexibility, creativity and multilingual skills.

- Key clusters: ICT, web and mobile, creative industries, maritime economy, tourism and health and wellbeing will be the anchor clusters in Lisbon. Support for entrepreneurship is being provided in these sectors, for example incubators, co-working spaces and fab labs. Probably, till 2050 a fab lab will be created in each city neighborhood.

REFLECTIONS

. The vision is general but we were able to identify some specific ideas about the future of Lisbon.

We feel that the visioning exercise is still very influenced by the current situation. We should think out-of-the-box about the evolution of technologies, behaviors, lifestyles and institutions.

III.IV.II METHODOLOGY AND RESULTS FOR BACK CASTING SCENARIOS

METHODOLOGY FOR BACK CASTING WORKSHOPS

The methodology presented in the deliverable "Case Study Workshop Guidelines" was used in the back casting workshop but there was a need of its adaptation to the context of Lisbon, due to the following factors: economic and financial crisis; uncertain period associated to the change of the City Mayor; difficulty in motivating and mobilizing key stakeholders; parallel organization of similar meetings, workshops and seminars in the scope of Portugal2020 (framework program 2014-2020 under negotiation with the EC).

Thus, INTELI focused the process on making direct interviews with key stakeholders, in which important information was extracted. A final workshop was also organized to summarize results.

The goal of this work was to create a qualitative scenario describing how the city can transition to reach the vision developed previously. The main steps were:

- Presentation of the objective of the meeting;
- Brief presentation and discussion of the vision (desirable "end point");
- Brief introduction to the "middle of the road" background scenario;
- Discussion on obstacles and opportunities in reaching the end point;
- Definition of interim objectives and milestones;
- Definition of concrete actions that must be taken to get to the end point.

KEY POINTS OF THE SCENARIO

After the presentation and discussion of the pre-defined vision, a final narrative was achieved:

LISBON. A CARBON NEUTRAL SMART CITY with more people, more jobs and better quality of life.

Considering the vision as the desirable normative endpoint, the six thematic areas identified in the visioning process were seen as the sectorial endpoints for the back casting exercise: **mobility, energy, climate change, urban regeneration, inclusion and attractiveness**. The timeline included the following interim points: **2020, 2030 and 2050** because the majority of the European strategic documents are focused on these years.

Then, the following obstacles (difficult the achievement of the vision) and opportunities (facilitate the achievement of the vision) were identified in generic terms:

OBSTACLES

- Financial and economic crisis;
- Austerity measures imposed by EC and IMF;
- Changes in the geopolitical position of Lisbon;
- Variation in fuel prices;
- Fuel companies lobbying;
- Low investments in urban regeneration;
- Resistance to change and risk aversion (local authorities and citizens);
- Lack of coordination among urban stakeholders;
- Lack of interaction among City Council departments (silos);
- Lack of coherent policies among the cities integrated in the Lisbon Metropolitan Area (Oeiras, Cascais, Almada, etc.) (for example in the area of mobility);
- Potential natural disasters (earthquake, floods, etc.);
- Reduced cyber security and personal privacy.

OPORTUNITIES

- Technology change towards clean energy technologies (for example, in the autonomy of electric vehicles batteries);
- Emergence and development of smart technologies: cloud computing, big data, 3D printing, robotics, etc.
- Public policies and incentives towards sustainable mobility (electric vehicles: fiscal incentives, parking advantages, exemption of some traffic restrictions, etc.);
- Public policies and incentives towards energy-efficient urban rehabilitation;
- European and national strict targets related to energy efficiency and the use of renewables;

- Reinforcement of sharing economy trend;
- Reinforcement of digital fabrication trend;
- Growing awareness of consumers towards more environmentally responsible consumption;
- Integration of mobility (and other) policies in the Lisbon Metropolitan Area (some experts postulate the need of a Metropolitan Mayor instead of several City Mayors);
- European funding programs 2014-2020.

BACKGROUND SCENARIOS

With the obstacles and opportunities in mind, some milestones and actions were defined. However, lack of time hampered the deep development of concrete measures.

MOBILITY – PROMOTING SMART MOBILITY

YEARS	ACTIONS & MILESTONES
2020	Increase of the bicycle lanes extension Creation of more pedestrian areas and shared public spaces Awareness campaigns towards the benefits of walking and cycling (soft modes) Launching of public incentives to the acquisition of electric vehicles and electric bicycles Modernization of the electric vehicles charging points according to European standards Launching a bike-sharing system with electric and non-electric modes Integration of electric cars in the car-sharing system (Mobcarsharing) Acquisition of electric vehicles to the municipal fleet (notice that in 2015 Lisbon City Council fleet has 106 electric vehicles)
2030	Tolls for entering in the city center Creation of the Operations Centre on Mobility 50% of the population using mobility apps
2050	Use of virtual technologies to avoid travel Use of autonomous cars (6 million autonomous cars in Europe in 2030)

URBAN REGENERATION – PROMOTING INTEGRATED URBAN PLANNING

YEARS	ACTIONS & MILESTONES
2020	Launching of a huge urban renewal program centered on energy efficiency Launching of a program for co-creation of urban furniture with strong citizens' involvement (with the help of 3D printing) Launching of participatory urbanism actions (ex. parklets)
2030	30% of buildings with green roofs/facades The historic center as a smart neighborhood
2050	100% of NZEB – Nearly net zero energy buildings

ENERGY – PROMOTING SUSTAINABLE ENERGY

YEARS	ACTIONS & MILESTONES
2020	20% reduction of GHG emissions 20% improvement in energy efficiency Raising the share of energy consumption produced from renewable resources 100% intelligent public lighting (LED, remote control) 30% increase in urban gardens Presentation of the application bid to European Green Capital
2030	Adoption of smart grids in the city through the intervention of EDP and City Council
2050	Solar panels in 90% of the buildings stock

CLIMATE CHANGE – PROMOTING RESILIENCE

YEARS	ACTIONS & MILESTONES
2020	Implementation of the Climate Change Adaptation Plan Implementation of the drainage master plan Launching preventive and alert systems oriented to anticipate natural disasters (technology-based emergency management systems)
2030	50% of the city with video surveillance
2050	Use of drones to ensure public safety

INCLUSION – PROMOTING QUALITY OF LIFE FOR ALL

YEARS	ACTIONS & MILESTONES
2020	Launching a support program for civic entrepreneurship Creation of interactive panels with cultural (and other relevant) information for citizens
2030	Expansion of telemedicine Launching of co-housing initiatives
2050	-

ATTRACTIVENESS – PROMOTING INTERNATIONALISATION

YEARS	ACTIONS & MILESTONES
2020	Expansion of the Lisbon Network of Incubators and Co-working Spaces Creation of a fab lab in each neighborhood Emergence of creative hubs in the city Approbation and implementation of the Lighthouse project ACTIVE (Horizon 2020)
2030	Attraction of two important international Research Centers to Lisbon Integration of Lisbon in relevant international networks (ex. C40) 20% increase in tourism
2050	-

ROBUSTNESS OF ACTIONS AND FEASIBILITY

The “middle of the road” background scenario was introduced to participants at the beginning of the back casting workshop. Only this scenario was tested.

III.IV.III GENERAL REMARKS

Case study leaders feel that the back casting exercise is still very influenced by the current situation.

It was more difficult to define concrete actions and milestones then to identify the vision, especially in the 2050 time horizon.

Stakeholders demonstrated some difficulties in thinking out-of-the-box and in a long-term time horizon (2050).

III.V LITOMĚŘICE

WORKSHOP DATES AND LOCATIONS

The first workshop on vision building was organized in Litoměřice on 4th November 2014 and the second workshop on back casting on 2nd December 2014. The methodology and results of the initial assessment were not presented at either of the workshops. Initial assessment is part of a separate meeting only with city representatives.

PARTICIPANTS

Together with the city representatives, relevant stakeholders were identified and contacted. We were able to identify about thirty stakeholders – ten city representatives, further four from city subsidized organizations and the remaining parties from non-governmental organizations, the major heating supplier, and some middle sized employers.

Altogether, ten stakeholders were present at the 1st workshop and eight stakeholders were present at the 2nd workshop. The interest of the two missing participants to attend the second workshop was expressed; however external conditions hindered their attendance. All ten stakeholders took part in the feedback discussions on both workshops. Unfortunately, we did not manage to get the representatives of private sphere to participate at either of the two workshops.

The table below summarizes the representation of the stakeholder groups.

Table 34: Stakeholders representation in workshops

	VISION BUILDING WORKSHOP	BACK CASTING WORKSHOP
Head of Environment department, city office	1	1
Head of Urban development department, city office	1	1
Head of Projects and strategies department, city office	1	1
Energy manager of the city, city office	1	1
Healthy city coordinator, city office	1	1
Director of the Center of tourism, contributory organization of Litoměřice	1	1
Marketing manager of the Center of tourism, contributory organization of Litoměřice	1	1
Coordinator of urban planning NGO platform “Litoměřice|||Leitmeritz”	1	0
Initiator of Urban planning NGO platform “Litoměřice|||Leitmeritz”	1	1
NGO “Kino klub Ostrov” - social and cultural events	1	0
Total	10	8

III.V.I METHODOLOGY AND RESULTS FOR VISION BUILDING

The visioning workshop was half day long and consisted of two blocks. After the introduction of POCACITO project and participants, the methodology and general framework of the visioning process was described. Then the visioning process followed.

We had ten stakeholders and three project team members present. We thus divided the people into three groups of four and one member of the project team moderated the workshop and led the participants through the individual steps of the process.

First, each participant drew his or her individual vision of "how would you like your city to look like and to function in 2050?" on a paper in front of him. The participants were seated by tables of four and after the first step, the tables twice switched to complement the pictures of the other groups. Although divided into groups, the drawing phase was individual work.

We allowed the participant to complement their drawing with describing text or keywords. This was important to simplify and facilitate the process also to those not so familiar and comfort with graphical representation of their ideas.

Figure 27: Vision building workshop – individual drawing phase

Based on our experience, we derive following suggestions:

1. Make sure that the number of people in the groups is the same. This is important when rotating to ensure that all participants will be included in the process.
2. Think carefully of the wording of the instruction to start the visioning process. It is important to explicitly stress that the picture should represent how the participant want the future to look like.
3. Allow participants and instruct them explicitly that it is possible to ad and incorporate text into their drawings. You prevent this way potential drawing blocks.

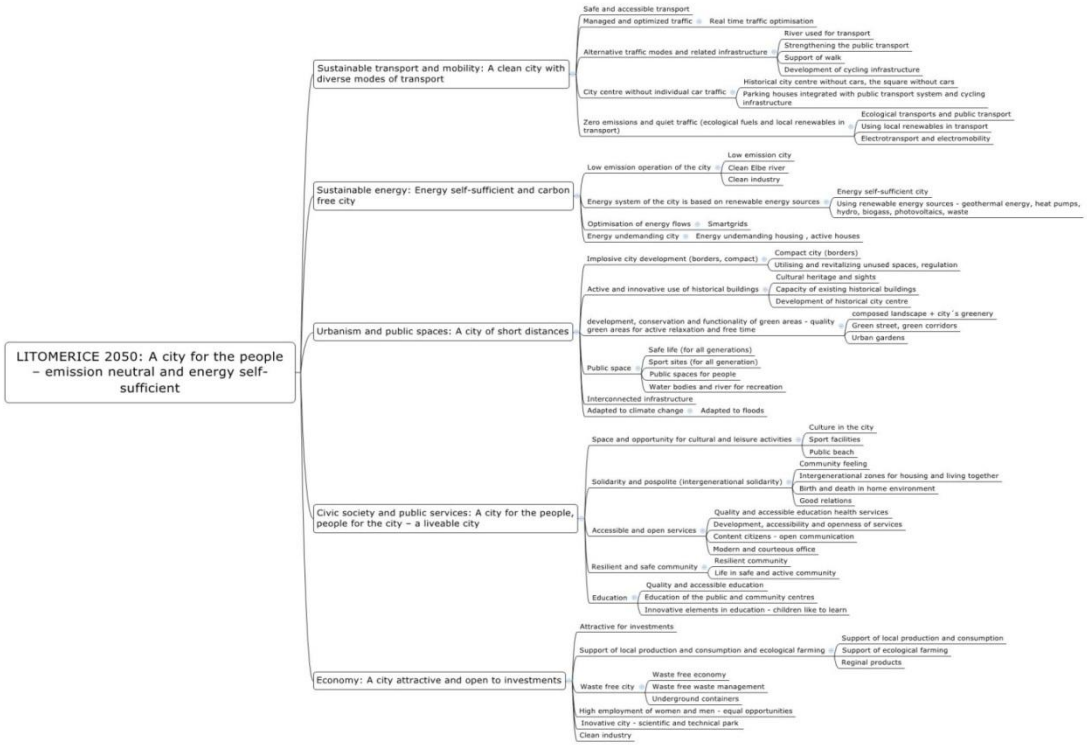
As a second step, the groups returned to their original tables and were asked to summarize what the drawings represent to keywords and phrases and to write these down on cards. The final step of the group work was then to categorize and place the keywords and phrases in a mind map scheme on flipcharts. Each of the group thus created their own structure and wording of the city vision.

Figure 28: Vision building workshop – work in groups and mutual presentations

The groups then presented their results to the other groups and discussed were their visions meet and in what aspects they differ. The overlapping areas were synthetized and written down. Not all topics were compiled during the workshop. The remaining ideas were summarized and compiled after the workshop by the POCACITO project partner responsible for the case study and the results were sent for feedback to the workshop participants.

We structured the keywords and phrases using the XMind software and ended up with five main areas that were subsequently described in a narrative representing the city vision.

Figure 29: Synthesis of groups' vision building process using the XMind software



MAIN SECTORS IDENTIFIED IN VISIONING A FUTURE FOR THE CITY

Following sectors and areas were covered by the final vision for 2050:

1. Transport and mobility
2. Energy
3. Urbanism and public spaces
4. Civic society and public services
5. Economy

Whereas all three groups specifically named transport and energy, the other categories had to be compiled together. Especially the final categories of civic society, urbanism and public services were difficult to distinguish. The contents of these categories were significantly overlapping and permeating.

Interlinkages between the sectors and topics were obvious, however not further discussed during the vision building workshop and were left to be analyzed during subsequent work.

None of the sector was given special attention during the vision building process. However, as mentioned above, transport and energy seemed to be included on first positions by all groups, whether this was caused by the stakeholders background or by the obvious link of energy and transport to CO_2 emissions and climate change and the concept of post-carbon city.

THE 2050 POST-CARBON VISION FOR LITOMĚŘICE

The narrative of the vision of Litoměřice in 2050 is following:

LITOMERICE 2050: A city for the people – emission neutral and energy self-sufficient

Sustainable transport and mobility: A clean city with diverse modes of transport

- Safe and accessible transport: Transport in Litoměřice city in 2050 will be first of all safe and accessible – financially, spatially and without barriers.
- City center without individual car traffic: Individual car traffic will be limited in the city center, where other modes of transport will be used primarily. Traffic at rest will be dealt with mainly outside the city center.
- Alternative traffic modes and related infrastructure: Walking, cycling and public transport will be encouraged. The transport infrastructure will be tailored to enable flexibility of choice of diverse transport modes. Motorized transport will be minimized, while ensuring sufficient level of mobility.
- Ecological fuels and local renewables: Vehicles will use primarily ecological fuels and energy from local renewables. Traffic noise will be minimized.
- Optimized traffic: Traffic will be automated and real time optimized.

Sustainable energy: Energy self-sufficient and carbon free city

- Energy self-sufficient: The city Litoměřice will be in 2050 energy self-sufficient. It will use local renewable energy sources. The most of its energy demand will be covered by a geothermal power plant in city´s ownership. The potential of decentralized energy production will be fully utilized.
- Energy undemanding: The demand for energy will be systematically lowered and the effectiveness of energy use will be increased. Especially the energy performance of buildings will be improved and the energy flows will be optimized.
- Maximum use of local renewable energy sources: The energy system of Litoměřice city will be based on local and renewable energy sources.
- Optimization of energy flows: Energy flows in the city (production as well as consumption) will be optimized and the energy surpluses will be sold.

Urbanism and public spaces: A city of short distances

- Compact city with clear borders: The city of Litoměřice will be a compact city in 2050; its development will be implosive.
- Spatially interconnected and intergenerational: The city will be spatially interconnected, creating opportunities and spaces for encounters and intergenerational cognition.
- A living historic city center: Litoměřice is a city with valuable historic city center. In 2050, the city center will not be conserved, but will be actively utilized with respect to current needs of citizens as well as the historical value of the architecture.
- Green city with enough functional green areas and corridors: Litoměřice will be a green city stressing the development, conservation and functionality of green areas and corridors with low energy intensity.
- Adapted to climate change: The city will be prepared to react on impacts of climate change, especially floods.

Civic society and public services: A city for the people, people for the city – a livable city

- Active, safe and resilient community: To live in Litoměřice in 2050 will mean to live in an active, safe and resilient community.
- Cultural and active: The city will provide sufficient space, facilities and background for cultural and leisure activities.
- Educated city: It will provide quality, accessible and innovative training and education.
- Solidary community: It will ensure a dignified life to all generations.
- Accessible and open public services: The public services provided by the city will be accessible to all. The city´s functioning will be transparent.

Economy: A city attractive and open to investments

- Attractive and open to investments: The city of Litoměřice will be open and attractive to investments.
- Local production and consumption, ecological agriculture: Local production and consumption will create the basis of the city´s economy: ecological agriculture will be supported.
- Waste-free city: Waste management will be handled in a closed cycle and the city will be "waste-free".
- Industry with minimized environmental impacts: Negative impacts on environment from industrial operations in the city will be minimized.
- Equal access to employment: There will be equal conditions in access to employment for women and men.
- Attractive for tourism: Tourism will constitute significant contribution to the local economy.
- Innovative city

REFLECTIONS

The representatives of the city were engaged and interested in the process. They perceive the work done as a contribution to their current strategic planning document. It prolongs their currently approved development plan from 2030 to 2050 and enriches the ideas specified in the document, which was elaborated mainly as deskwork. It also engages new stakeholder groups to the process. The subsequent back casting workshop should bring new elements to the existing city documents in elaborating and specifying concrete actions and measures to reach the visions.

The final vision encompasses five thematic areas of city´s life. There are sector specific topics – energy, transport and economy, but also crosscutting and horizontal areas like urban planning, civic society and public services. There are many interlinkages between the vision topics, which should be addressed and analyzed in the subsequent steps.

III.V.II METHODOLOGY AND RESULTS FOR BACK CASTING SCENARIOS

The goal of Workshop 2 was to create a qualitative scenario describing how the city can transition to reach the vision developed in Workshop 1. The qualitative scenario includes intermediate phases of future development, measures and strategies for urban management.

METHODOLOGY FOR BACK CASTING WORKSHOP

The back casting workshop partially followed the methodology presented in the joint training workshop conducted for the case study leaders. First the vision formulated in the first workshop was presented, discussed and final wording was agreed on. Then the methodology of the back casting consisting of the five steps (i) define normative endpoints, ii) identification of obstacles and opportunities from context scenarios, iii) identify milestones and interim objectives, iv) define actions, measures and instruments and v) validate the robustness of actions) was introduced.

The five thematic areas of the vision formulated at the previous workshop were considered to be the normative desired endpoints for the back casting exercise.

The SSP middle of the road background scenario and the impacts of its selected drivers on the city´s future development were presented.

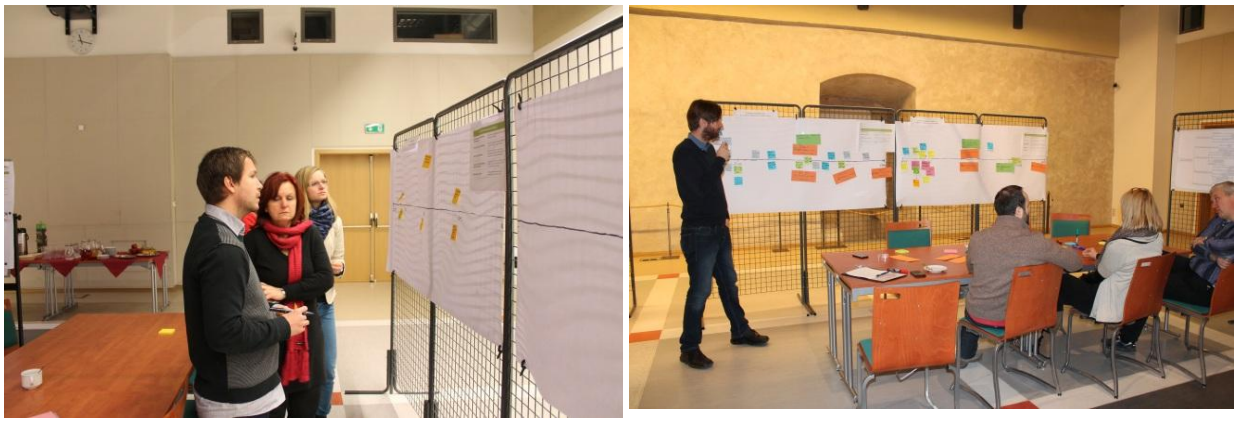
The participants were then asked to identify potential obstacles and opportunities that the presented global development may induce for the city. We first tried to identify these for each of the five vision topics – energy, transport etc., but this process turned out to be inapplicable. Most of the selected 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.

We thus abandoned the approach of identifying obstacles and opportunities given by the presented contextual scenario 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 SSP scenario.

As the next step, participants moved to another sector of the room, where five time axes were prepared – one for each of the vision topics with the vision wordings as endpoints. Post-its, paper blocks and markers were prepared on the tables. Participants were asked to first think about milestones and interim objectives and to mark these on the axes, then to think of actions and measures to reach the interim objectives and milestones. As we had eight participants and five axes and we did not want to select arbitrary which topics to omit, participants were asked to individually select the topics they want to elaborate and to add the measures. Each of the participants thus collaborated on more than one of the topics. At the end, each of the time axes was presented by one of the participants to the whole group and the group discussed together, whether the actions and milestones suggested as well as their timing can be agreed on.

There was no time left to discuss the robustness of the scenarios within different contextual development during the workshop.

Figure 30: Participant discussing back casting scenarios



KEY POINTS OF THE SCENARIO

First, external drivers of the city´s future development were identified. We discussed subsequently the individual vision topics and named the drivers specifically for each of them. Thus some of the drivers – i.e. national policies or laws may relate to more of the topics. Most of the identified drivers are related with policy measures, which may be given by the strong representation of municipality office among the workshop participants.

Following external drivers were identified:

Sustainable transport and mobility: A clean city with diverse modes of transport

- Fuel prices
- National conception or policy for transport
- Wealth of the society
- Technology accessibility - competition for resources
- Urban population dynamics
- Related aspects of construction law - urban planning, parking spaces
- Intercity transport infrastructure
- Tax policy of the state and EU - introduction of carbon tax
- Social norms, status perceptions, attitudes towards car ownership
- Subsidy policies - non-individual car transport modes

Sustainable energy: Energy self-sufficient and carbon free city

- Energy prices
- National and EU concept and policy of electricity distribution networks - support of insular grids
- Tax policy of the state and EU - introduction of carbon tax
- National energy policy - centralized vs. decentralized energy sources
- Energy and climate policy - national and EU
- Technology accessibility - competition for resources

Urbanism and public spaces: A city of short distances

- Availability and accessibility of land - price and scarcity
- Population dynamics and demographic changes
- Social norms and status perception - not having a big house becoming trendy
- Evolving social trends - i.e. sharing
- Law related to urban planning
- International cooperation of architects, improvements of architectural competitions
- Education of the public in formation and creation of the surrounding environment
- State climate adaptation strategy and measures related to floods in the region

Civic society and public services: A city for the people, people for the city – a livable city

- Blackouts caused by external factors (i.e. geomagnetic storm)
- City´s obligations given by the state - i.e. immigration

Economy: A city attractive and open to investments

- National budget allocation of taxes
- Economy crisis
- Global economic trends

Then the back casting scenarios were developed for each of the vision topics as described in the previous chapter. The actions and measures suggested vary from very concrete suggestion valid only in the city context to more general instruments applicable in other context as well. All the variables were subsequently attributed to the subtopics they mostly relate to.

All of the scenarios show similar tendency. Whereas the interim milestones and goals are distributed across the whole timespan, but mainly from 2030 and further off, most of the actions are concentrated in the first decade and up to 2030. After 2030 only few measures are indicated. The last decade from 2040 to 2050 consists only of targets.

BACK CASTING SCENARIOS BY VISION SECTORS

The tables below present the scenarios. Interim milestones and goals are in green boxes. At the end of the chapter, we thus list all the variables also chronologically in time periods.

Figure 31: Examples of the outcome of back casting exercise during the workshop

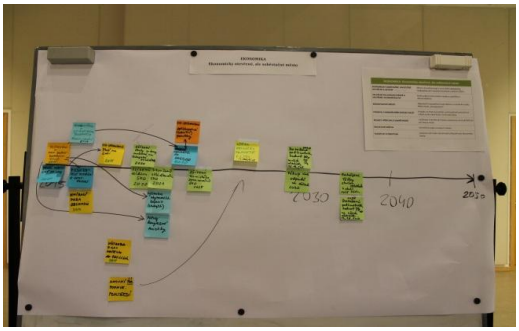


Table 35: Back casting scenario of vision topic Sustainable transport and mobility: a clean city with diverse modes of transport

VISION TARGET IN 2050	2015	2016	2017	2018	2020	2022	2025	2030	2035	2040	2050
		Sustainable Urban Mobility Plan									
Safe and accessible transport			Barrier free access to all street communications					30% of inhabitants use non-motorized transport for daily commuting to work and school			
								40% of inhabitants use city´s public transport			
City center without individual car traffic and parking					Restricted parking on the main square	Eastern bypass road is built					
					New parking house in the city center						
					Western bypass road is built						
Alternative traffic modes and related infrastructure	Cycling passageway throughout the city			New train stop by the hospital	Public charging stations network is finished (5 stations)			City´s public transport system covers 100% of the city			50% of households do not own a car
								Public transport is free of charge			
								Public transport emits zero emissions			
								Integration of railway into the public transport system			
								New train stations are built			
Ecological fuels and local renewables			City hall vehicles use alternative fuels (electricity or hydrogen)	The major drives an electric car - example to the public	New parking house Prokratice			30% of cars use ecological fuels (electric or hydrogen)	Construction of hydrogen filling car station	50% of cars uses ecological fuels (electric or hydrogen)	100% of individual motorized transport is emissions free
								Construction of hydrogen production station			
Optimized traffic							Central integrated traffic control and management system				

Table 36: Back casting scenario of vision topic Sustainable energy: energy self-sufficient and carbon free city

VISION TARGET IN 2050	2020	2022	2025	2030	2035	2040	2045	2050
	The city leaders are enlightened and share the post-carbon vision of the city							
	The energy conception of the city is updated							
Energy self-sufficient			The city buys the current central heating system - the network and the source	Water supply and sewerage are in the city´s ownership	80% of the overall city´s accessible consumers is connected to the central heating system	The whole city is 80% energy self-sufficient		90%-100% of the whole city is self-sufficient
				Independent local distribution system (off-grid operation) - fully in operation	The revitalisation of the central heating system is completed with losses below 3%			
Energy undemanding	All new constructions are done in passive to zero building standards			90%-100% of the city´s facilities are energy self-sufficient			80% of flats are in passive standard	
	Public lighting is renovated and system operated			100% of public buildings are in passive standard				
Maximum use of local renewable energy sources		The geothermal power plant project is finished (20 MWh)	Photovoltaics are on all public buildings		The urban forests cover 10% of central heating supply energy sources	Photovoltaics are installed on every roof		
			Small hydro power plant supplies the public lighting (low pressure sodium lamps)	Thermal accumulator installed in railway tunnel	Dwellings not connected to the central heating supply use 100% of renewables for heating			
Optimization of energy flows	Centralized system of energy distribution and operation			50% of the whole city is energy self-sufficient				
	Remote energy consumption metering is possible on all public (city managed) buildings							

Table 37: Back casting scenario of vision topic Urbanism and public spaces: a city of short distances

VISION TARGET IN 2050	2015	2016	2019	2020	2022	2023	2025	2026	2027	2030	2035	2037
Compact city with clear borders	Starting with complex revitalization of historical sights	Complete revision of urban spatial plan						Exploitation of unused buildings and spaces in the city			100% of brownfields is used for entrepreneurship, public services, housing etc.	Defining the city boundaries
Spatially interconnected and intergenerational			Revitalization of brewery on community center of encounter	Community gardens by block of flats housing estates (good practices examples)	Old army facilities "Radobýl" is revitalized to living center for housing and entrepreneurship		Revitalization of Jiřikova army facility		Revitalization of swimming pool	City parts are self-sufficient in services provision		
			Revitalization of Tyršovo square				Main square - place of encounters (events, performances, a living square)					
A living historic city center	Castle as the center of encounter		Entrance to sacred monuments is enabled	New restaurant with background facilities on the island		Building parking houses (possibly underground parking)	Cars are out of the city center					
Green city with enough functional green areas and corridors			Opening local ZOO in the Garden of Bohemia				Botanical garden in the Garden of Bohemia is connected to geothermal power plant	Exhibition of tropical plants connected to Garden of Bohemia				Greening the roofs
							Forest park on Mostná hill is interconnected with suburban landscape					
Adapted to climate change										Rainwater tanks on 50% of family houses		

Table 38: Back casting scenario of vision topic Civic society and public services: a city for the people, people for the city – a livable city

VISION TARGET IN 2050	2016	2017	2018	2020	2021	2022	2023	2025	2030
Active, safe and resilient community	Preventive programmed and measures of the city	Introduction of bonuses if health insurance services are not used	More intensive involvement of citizens to the development and city planning - education, presentations, prints, media	Central security system (cameras)	Service of neighbor security				Inhabitant's responsibility for own health - be yourself a doctor: first prevention, then health system services
	Engagement of citizens to cleaning, maintenance and local policies	Clean and transparent city - streets and green areas							Responsibility for one's life in general (education, services...)
Cultural and active		The garden of Bohemia - quality center for sports and leisure activities	Identifying appropriate location and financial resources to build and exhibition center of international importance	Planning cycling infrastructure	Infrastructure for parking bicycles is built			Complex network of cycling infrastructure	
Educated city	Utilization of people´s potential in the community		Equipment and multimedia centers to schools			Education center and technical park	Geothermal and geological research center	Branch of technical university in the city	
Solidary community	Centre of active senior citizens								
Accessible and open public services									

Table 39: Back casting scenario of vision topic Economy: a city attractive and open to investments

VISION TARGET IN 2050	2015	2016	2018	2020	2021	2025	2028	2030	2035
Attractive and open to investments		Analysis and strategy to support entrepreneurship	Active pro-business environment						
Attractive for tourism	Monitoring and maximum usage of the grant schemes	Entrepreneurs are welcoming the tourism	Building a new ****star hotel with capacity of up to 100 beds	Nomination of the city to UNESCO					
	Small tourist ship on Elbe river		City beach on the Elbe river side	Building appropriate accommodation capacities	Development of congress tourism				
Waste-free city				Establishing municipal waste sorting facility	Terminating municipal waste landfill	Establishing thermal municipal waste treatment		Buyout of all waste from citizens	Start with mining of old landfills in the vicinity
Clean air - industry with minimized environmental impacts								Below threshold values of NOx, CO, O3 are met in all periods 1day, 1hour, 1year	Below threshold values of PM10 are met in all periods 1day, 1hour, 1year
Local production and consumption, ecological agriculture				Establishing school and farm focusing on biological agriculture (agricultural school Lovosice)					
Equal access to employment							Most inhabitants work in Litoměřice		
Innovative city									

SCENARIOS MILESTONES AND ACTIONS IN CHRONOLOGICAL ORDER

Milestones 2015-2020

2015

- Castle as the center of encounter

2016

- Entrepreneurs are welcoming the tourism

2017

- Clean and transparent city - streets and green areas
- The garden of Bohemia - quality center for sports and leisure activities

2018

- Active pro-business environment
- More intensive involvement of citizens to the development and city planning - educating, presentations, prints, media

2020

- Nomination of the city to UNESCO
- The city leaders are enlightened and share the post-carbon vision of the city

Actions 2015-2020

2015

- Cycling passageway throughout the city
- Monitoring and maximum usage of the grant schemes (related to tourism)
- Small tourist ship on Elbe river
- Starting with complex revitalization of historical sights (ongoing since 2015)

2016

- Sustainable Urban Mobility Plan
- Analysis and strategy to support entrepreneurship
- Complete revision of urban spatial plan
- Preventive programmed and measures of the city
- Engagement of citizens to cleaning, maintenance and local policies
- Utilization of people's potential in the community (related to education)
- Centre of active senior citizens

2017

- Barrier free access to all street communications
- City hall vehicles use alternative fuels (electricity or hydrogen)
- Introduction of bonuses if health insurance services are not used

2018

- New train stop by the hospital
- The major drives an electric car - example to the public
- Identifying appropriate location and financial resources to build and exhibition center of international importance
- Equipment and multimedia centers to schools
- Building a new ****star hotel with capacity of up to 100 beds
- Opening city beach on the Elbe river side

2019

- Revitalization of brewery on community center of encounter
- Revitalization of Tyršovo square
- Entrance to sacred monuments is enabled
- Opening local ZOO in the Garden of Bohemia

2020

- Restricted parking on the main square
- New parking house in the city center
- Western bypass road is built
- Public charging stations network is finished (5 stations)
- New parking house Prokratice
- The energy conception of the city is updated
- All new constructions are done in passive to zero building standards
- Public lighting is renovated and system operated
- Centralized system of energy distribution and operation
- Remote energy consumption metering is possible on all public (city managed) buildings
- Community gardens by block of flats housing estates (good practices examples)
- New restaurant with background facilities on the island
- Central security system (cameras)
- Planning cycling infrastructure
- Building appropriate accommodation capacities
- Establishing a municipal waste sorting facility
- Establishing school and farm focusing on biological agriculture (agricultural school Lovosice)

Milestones 2021-2025

2021

- Development of congress tourism
- Terminating municipal waste landfill

2025

- Main Square - place of encounters (events, performances, a living square)
- Complex network of cycling infrastructure
- Cars are out of the city center

- Branch of technical university is in the city

Actions 2021-2025

2021

- Service of neighbor security
- Infrastructure for parking bicycles is built

2022

- Eastern bypass road is built
- The geothermal power plant project is finished (20 MWh)
- Old army facilities "Radobýl" is revitalized to a living center for housing and entrepreneurship
- Education center and technical park

2023

- Building parking houses (possibly underground parking)
- Geothermal and geological research center

2025

- Central integrated traffic control and management system
- The city buys the current central heating system - the network and the source
- Photovoltaics are on all public buildings
- Small hydro power plant supplies the public lighting (low pressure sodium lamps)
- Revitalization of Jiříkova army facility
- Botanical garden in the Garden of Bohemia is connected to geothermal power plant
- Forest park on Mostná hill is interconnected with suburban landscape
- Establishing a thermal municipal waste treatment program

Milestones 2026-2030

2028

- Most inhabitants work in Litoměřice

2030

- 30% of inhabitants use non-motorized transport for daily commuting to work and school
- 40% of inhabitants use city´s public transport
- City´s public transport system covers 100% of the city
- Public transport is free of charge
- Public transport emits zero emissions
- 30% of cars use ecological fuels (electric or hydrogen)
- 90%-100% of the city´s facilities are energy self-sufficient
- 100% of public buildings are in passive standard
- 50% of the whole city is energy self-sufficient
- City parts are self-sufficient in services provision

- Rainwater tanks are on 50% of family houses
- Inhabitant's responsibility for own health - be yourself a doctor: first prevention, then health system services
- Responsibility for one's life in general (education, services...)
- Below threshold values of NOx, CO, O3 are met in all periods 1day, 1hour, 1year

Actions 2026-2030

2026

- Exploitation of unused buildings and spaces in the city
- Exhibition of tropical plants connected to Garden of Bohemia

2027

- Revitalization of swimming pool

2030

- Integration of railway into the public transport system
- New train stations are built
- Construction of hydrogen production station
- Water supply and sewerage are in the city´s ownership
- Independent local distribution system (off-grid operation) - fully in operation
- Thermal accumulator installed in railway tunnel
- Buyout of all waste from citizens

Milestones 2031-2040

2035

- 80% of the overall city´s accessible consumers are connected to the central heating system
- The urban forests cover 10% of central heating supply energy sources
- Dwellings not connected to the central heating supply use 100% of renewables for heating
- 100% of brownfields is used for entrepreneurship, public services, housing etc.
- Below threshold values of PM10 are met in all periods 1day, 1hour, 1year

2040

- 50% of cars use ecological fuels (electric or hydrogen)
- The whole city is 80% energy self-sufficient

Actions 2031-2040

2035

- Construction of hydrogen filling station for hydrogen cars
- The revitalization of the central heating system is completed with losses below 3%
- Start with mining of old landfills in the vicinity

2037

- Defining the city boundaries

- Greening the roofs

2040

- Photovoltaics are installed on every roof

Milestones 2041-2050

2045

- 80% of flats are in passive standard

2050

- 50% of households do not own a car
- 100% of individual motorized transport is emissions free
- 90%-100% of the whole city is energy self-sufficient

BACKGROUND SCENARIOS

The middle of the road background scenario was introduced to participants at the beginning of the back casting workshop. Selected elements of the background scenario were presented in more detail, namely i) European context of governance, ii) social values, iii) technology development, iv) European climate goals, v) economic development and vi) demographic trends.

ROBUSTNESS OF ACTIONS

The robustness of suggested scenarios was not tested against the selected background scenario or any other contextual scenario. This was partially due to time constraint, but mainly because the scenarios as obtained during the stakeholder workshop are not comprehensive enough to cover all the vision topics coherently and in full. Furthermore, we believe that some level of preparation is needed to test or discuss the effect of the variables identified first during the same workshop.

The scenarios will be sent to the stakeholders and will be discussed with them further in email communication.

FEASIBILITY

It is not possible to cover all the topics in full in one workshop. A subsequent work is necessary to receive feedback from workshop participants and to fill in the gaps. However, majority of the actions and measures suggested during the workshop is in the competencies and powers of the municipality. Some of the suggested actions require additional external financial resources above the city budget.

The main assumption of the suggested scenarios lies in the sector of energy and is dependent on the success of the geothermal power plan project that is already under development, however strongly dependent on the availability of external financial resources.

Furthermore, the vision is not officially approved; neither was made any attempt for public acceptance and approval of the suggested topics and targets. The workshop stakeholders

representing the city office thus want to discuss the vision as well as the scenarios in a public city forum.

III.V.III GENERAL REMARKS

The overall impression of the workshops is satisfactory; however it is obvious that it is not possible to fully complete the back casting just in one workshop. Either subsequent workshops would be necessary or another form of cooperation with the stakeholders would be needed to get a feedback on the scenarios, to identify interlinkages or contradictions between the suggested scenario instruments and to add missing items.

The level of target specificity differs among the vision themes. Whereas the participants were able to set and specify the interim targets pretty well in the case of transport or energy, the milestones and goals are very generally described and specified for the areas related to urbanism, civic society and public services. This may present a challenge when transferring the results into quantitative terms.

III.VI MALMÖ

WORKSHOP DATES AND LOCATIONS

The vision workshop was held on November 21 2014 at MINC, Anckargripsgatan 3, in Malmö. The back casting workshop was held on November 26th at Media Evolution City, Stora varvsgatan 6a in Malmö.

PARTICIPANTS

The following participants joined the workshops:

NAME	ORGANISATION AND ROLE	1ST WS	2ND WS
Per-Arne Nilsson	Malmö city, Head of Environmental dep.	yes	yes
Kerstin Rubenson	Malmö city, Environmental dep.	yes	yes
Tor Fossum	Malmö city, Energy strategy	yes	yes
Jan Rosenlöf	City building council, city planning	yes	no
Mattias Zaunders	Sigma IT and management, Business manager	yes	yes
Johan Bergström	Sigma Civil AB, Head of department for planning, landscape and traffic	yes	no
Hans Söderling	NCC Construction Sverige AB, Project leader	yes	no
Annika Hansson	NCC Construction Sverige AB, Project leader	yes	no
Yuliya Voytenko	International Institute for Industrial Environmental Economics, Lund University, Postdoc PhD	yes	no
Boel Lagerwall	Pågen AB (bakery company), Communication manager	yes	no
Iris Rehnström	Skånetrafiken AB (public transport) Environment- and sustainability strategy	yes	no
Jeanette Green	IVL, Coordinator Malmö office	yes	yes
Hanna Ljungkvist	IVL, Workshop leader	yes	yes

- Reflection on stakeholder participants

The first workshop had diverse participation including city officials (energy, planning and environmental issues), a public transport company, a construction company, local university, IT companies and a large local employer; a bakery company. Missing groups were young and elderly citizens, immigrants, social scientists and economists, even though the University PhD came from the economic field. In the second workshop only city officials and an IT company was represented, but

they had all taken part of the first workshop and could build on the outcomes of that. The mix of men and women was very good in both workshops.

III.VI.I METHODOLOGY AND RESULTS FOR VISION BUILDING

We did not use the KPIs in the workshop, following recommendations from the city officials/representatives. The methodology from the training was followed and worked out quite well with the participants. Some were reluctant to start drawing, but this was overcome rather quickly. The methodology sparked a lot of discussions in the groups, especially when changing between drawings! It is important to remind participants about including all aspects of sustainability in their visioning, not just the environmental part. This worked well, with slightly less emphasis on the economic dimension in the resulting visions.

The work was carried out in three groups at three tables with one vision drawing on each table. The groups took turns at each table so that all groups contributed to all three drawings. At the end, one vision per group was formulated and presented in plenum to the other groups.

MAIN SECTORS IDENTIFIED IN VISIONING A FUTURE FOR THE CITY

The following sectors/topics were covered in the three visions, more or less to the same extent:

- Energy, with focus on renewables
- Transport sharing & smart logistics
- Food production
- Efficient, ecologic consumption
- Circular and sharing economy
- Green areas including city farming, green roofs and walls
- Social inclusion, safety and networking
- Dense city structure
- Quality of life, the value of time, outdoor activities and culture
- Smart technology and open grid solutions

THE 2050 POST-CARBON VISIONS FOR MALMÖ

Vision 1:

Sustainable Malmö 2050 is a dense, green, resilient and attractive city with around 500 000 inhabitants. In Malmö it is easy to live a long, happy and climate smart life. Important prerequisites for this are:

- Good mobility
- Efficient, smart and 100% renewable energy system
- Circular and shared consumption and economy
- A city where it is easy to lead a healthy life
- Food

- Social inclusion and security
- Diversified and creative business with a focus on service and culture
- Time to live and work during your whole life with increased flexibility

Figure 32: Presentation of visions in plenum.

Vision 2:

Malmö in 2050 has a balance between the three dimensions Greener city, denser city and networking. The three sustainability dimensions economy, ecology and social are integrated and all play an equal role in the city development. Development and implementation of smart technology are main pillars in building this city. It is also important that new economic models are allowed to develop.

A slight emphasis was seen towards the dimensions of greener city and networking rather than denser city. Maybe these two dimensions can be seen as extra important for Malmö.

Some important components to enable this Malmö are:

- Investments in social entrepreneurship
- Getting better at matching talent with opportunity
- A new mindset including circular economy
- Sustainable transport and energy supply

City gardening and farming in all forms is a common activity that encourages individuals, areas and the entire city!

Figure 33: The groups busy working on the visions

Vision 3:

”We are on our way home in Malmö, a city of networking and cooperation. We travel on our bike while a company using cluster logistic services is delivering dinner to our home. We have ordered pick up of our children with the “bicycle bus”, while the teenager uses the driverless taxi that picks up the ecological laundry at the local drycleaner.

Our new job as “Transformation coach” takes us to a common workshop with city actors in the democratic roofed outdoor meeting place.

We optimize the use of arable land by producing food in a resource efficient and large-scale manner outside the city and in small scale inside the city. This enhances green space in the city. The excess energy from large scale and resource efficient industrial production is taken care of and generates new services like greenhouse growing of energy demanding crops. Apart from farming, green plants have taken over roofs, walls and public spaces and help reduce noise in our quiet city.

The city is dense, green and diverse and used around the clock. There is reduced demand for individual travel and car ownership. Travels take place in driverless electric vehicles that are coordinated with transport of goods and take us to nodes for rail bound traffic. These station nodes have become the backbone of the city, enabling meeting places, investment in new housing and services. The biking lane network has a high priority and invites to biking for all citizens year round since the lanes are roofed.

By sharing our consumption and standardizing our products we have reduced the input of virgin resources. We use open grid solutions with standardized connections and input of renewable energy where all excess resources are used and recycled.

All this new development creates new jobs that are distributed equally among the citizens. We work less and hence have more time for meeting each other. The growing numbers of roofed outdoor meeting places improve social integration in all climates. They also encourage consumption and development of culture, which becomes the meaning of life in the new including social space. Everyone is friendly and encourages others to grow and develop."

REFLECTIONS

We are very satisfied with the results of the vision workshop. The visions, especially the third one, are diverse and rich in their description of the future, post carbon city. They include innovative solutions and take into account most of the important aspects of city development.

III.VI.II METHODOLOGY AND RESULTS FOR BACK CASTING SCENARIOS

The second workshop had fewer participants, but still achieved the goal of producing a scenario for Malmö in 2050. This was possible due to the fact that the participants had been involved in the first workshop and worked with the visions from that process in mind.

METHODOLOGY FOR BACK CASTING WORKSHOPS

The technique from the workshop training was followed, using a timeline on a large whiteboard. First, the background BAU scenario was presented to the participants. The normative endpoint/goal chosen for the back casting was:

"In 2050, the citizens of Malmö only emit 1-2 tons of carbon dioxide per person and year, including the carbon footprint of their consumption."

They then went on to identify and list obstacles and opportunities for reaching the goal. The interim milestones and actions were then described on post-it notes and put up along the timeline. The participants were very active and discussed with each other during the exercise. One drawback was the small number of participants, mainly representing the city of Malmö. More stakeholders may have resulted in more detailed and diverse actions. It was also a little difficult to separate what was meant to be milestones and what were actions among all the notes.

KEY POINTS OF THE SCENARIO

The following obstacles were identified:

- Difficult to influence the lifestyle of people:
  Some will not change without compensation since we are used to a lifestyle including travel and luxury consumption.
- The role models in society today often drive consumption.
- People collect information selectively and sometimes get too much information.
- There is an uneven economic distribution in society.
- We are depending on goods produced on a global market.
- We need more face-to-face meetings in society!
- We have free movement of people and goods within the EU.
- Malmö cannot influence energy prices.
- Logistic systems are not efficiently adapted.
- Lack of clear national policies/regulations.
- Difficult to replace natural gas in the energy system.
- Owning energy production and distribution systems is not profitable; who should pay for the systems?
- Who pays for spare electricity?
- High prices for electric vehicles and other alternative mobility.

Figure 34: Back casting workshop.

Opportunities identified:

- Improved walking- and cycling opportunities in the city.
- Declining prices of energy efficient technologies and energy storage.

- More circular economy.
- A dense city improves efficiency.
- More spare time!
- Policy incentives for reduced consumption.
- Positive life style role models.
- High status to live in the city center.
- Digitalized world.
- Increased industrial symbiosis.
- Smart grids (solar, wind and earth heat).
- “Steal with pride”: use existing proven solutions from others.
- Increased quality of life.
- Lower price for solar and wind; buy your solar cells at IKEA!
- Environmental awareness is becoming BAU.
- Fewer ruminants on the menu.
- Increased diversified local and regional food production.
- Organic waste is used for biogas production.
- Reduced resource use.
- Distributed small smart grid connectors.
- Economic crisis requires re-distribution.
- Longer life and more time.
- More shared consumption.
- The effects of a better lifestyle are starting to show.
- Possibility to travel without fossil fuels or an own car.
- Small-scale energy production.
- Smaller living space requires fewer products.
- Possibility for education.
- Nordic energy cooperation.
- Environmentally friendly flying.
- Work for more people in small, local businesses.

The following tables describe the actions identified for the Malmö scenario in the short, medium and long term. A list of actions can also be found in Appendix A.

Table 40: Short term actions for the Malmö scenario.

TOPIC AREA	SHORT TERM ACTIONS 2015-2025	MAIN ACTORS INVOLVED
Energy	Opportunity for all residents to connect locally produced energy into the grid. Large biogas plant inaugurated. Malmö's first fossil-free / sustainable tanker and service station is opened (the future gas-station). Municipal financing for energy efficiency is introduced; Type Revolving Fund. New energy strategy for Malmö! Thermal gasification plant in Malmö. Malmö's district heating system is fossil free by 2025. "Malmö smarter city" is a success.	Residents & energy companies Energy companies Energy companies Banks/ local policy (?) Local politicians Energy companies Local project (?)
Transport and logistics	Malmö ring inaugurated Trams inaugurated. Well-developed logistics of goods from central and local nodes. The first Sky Cab inaugurated Public transport covers the entire region around the clock. Most residents are part of a car or mobility pool. Subway Malmö-Copenhagen inaugurated.	Local policy & building companies Local politicians & transportation companies
Agriculture/food production	Large-scale cultivation of shrimp, algae and vegetables using residual heat in Malmö.	Local farmers with support from energy companies
Policy	Formulate the 2050 target for politicians. State/national decision on the future of biogas production. Government policy instruments for energy efficiency are introduced. Political decisions are made about the vision for 2050. National instruments introduced for climate	Local politicians National policy makers Local politicians National policy makers

	adaptation, all sectors. Communication and public relations strategy for Malmö 2050 adopted. Government subsidy of fossil-free and sustainable agriculture is introduced. Green tax reforms.	Local politicians National policy makers
Carbon footprint	Baseline carbon footprint for Malmö calculated (CO2 emissions in 2015). Malmö's city organization is climate neutral. “Sege Park” is the first area for "two tons living". Reporting of CO2 including consumption is introduced in Malmö.	Local politicians
Communication /marketing	Housing Exhibition “Solbo 18” in Malmö / Lund.	
Education and life style	Climate Education introduced into the school curriculum. Big campaigns are carried out for climate-smart lifestyle. 24 hour school / culture / hobby houses for all ages.	National and local policy makers
Housing	Buildings for shared accommodation are produced. Create a KPI for energy / m2 / year based on energy certification of buildings. The living area is 40% less than in 2015, but with more shared space. Buildings for shared accommodation are produced.	Building companies Local politicians Building companies
Waste & recycling	Large-scale logistics systems for recycling are established.	

Table 41: Medium term actions for the Malmö scenario.

Topic area	Medium term actions (2025-2035)	Main actors involved
Energy	30% solar energy. 80% energy efficiency of Malmö achieved. Industrial symbiosis agreement in place. 50% of households contribute energy to the smart	Energy companies & local policies

	grid. Offshore wind park inaugurated.	
Transport	Driverless vehicles used to transport people and goods within the city.	Transport companies
Agriculture/food production	30% of the food consumed is produced within the city limits. Fossil-free farming.	Local farmers
Policy	Carbon tax on products is introduced. Carbon dioxide tax is introduced per m2 of living space and person.	National policy
Carbon footprint	3.5 tons of CO2 per person per year achieved. Climate impact of food consumption in Malmö is halved compared to 2015.	Result of short term policies and follow up
Communication/ marketing	"Malmö in 2050 branding 'entered for all companies and businesses. United Nations holds its climate conference in Malmö.	Business & local policy makers UN
Other	400 000 inhabitants.	

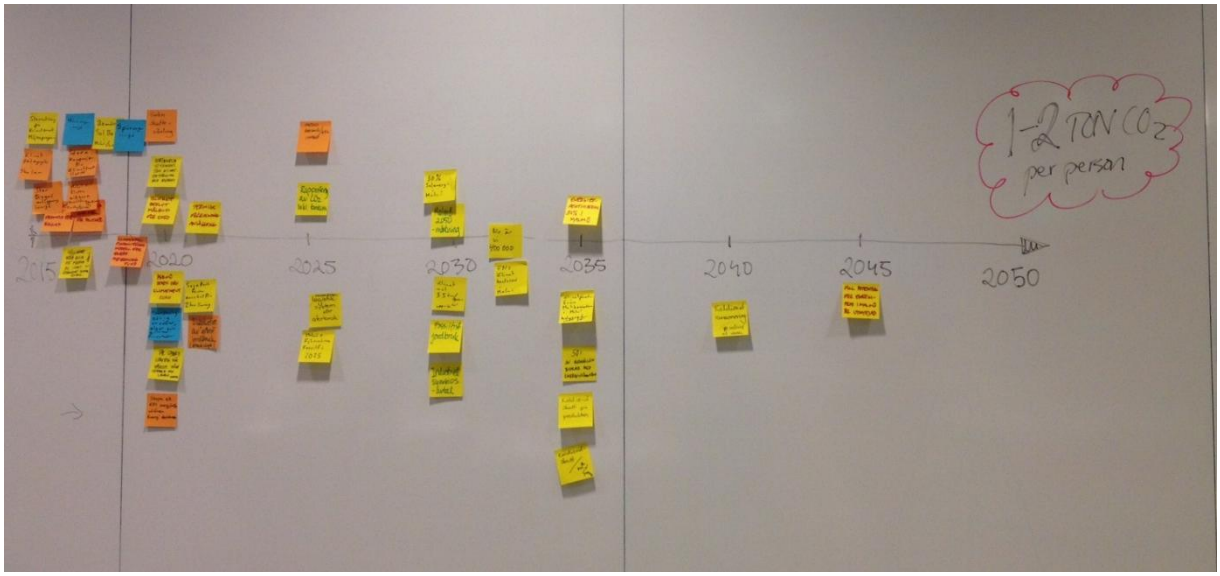
Table 42: Long term actions for the Malmö scenario.

Topic area	Long term actions (2035-2050)	Main actors involved
Energy	Full potential for energy production in Malmö is utilized.	Energy companies
Policy	Carbon Rationing introduced per person. KPI reporting and countdown in preparation for 2050.	National policy Local politicians
Carbon footprint	1-2 tons CO_2 per inhabitant achieved in 2050!	
Targets 2050	The population is 500,000 and has stopped increasing. The city's inhabitants are happiest and most climate smart in the country!	

BACKGROUND SCENARIOS

The three background scenarios were shortly presented at the beginning of the workshop. 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.

Figure 35: Timeline leading up to the vision of 1-2 tons of CO2 per citizen and year.



ROBUSTNESS OF ACTIONS

No changes were made to the scenario after completion. This may mean that the scenario is less robust, but it does not have to be, since many obstacles and opportunities were considered before developing the scenario.

FEASIBILITY

Many of the actions require national policy initiatives. It is difficult to say if all these initiatives are feasible under the BAU scenario or not. The actions also require that people change their behavior, but this is probably feasible if the political incentives, like new taxes etc., are implemented. So the main assumption is strong political will, both locally and nationally!

III.VI.III GENERAL REMARKS

The stakeholders seemed satisfied with the workshops, especially the vision workshop where there was better participation. The results of the vision workshop were sent to the participants after the event. Extra interest in the back casting process was noted from one participant (Lund University), who is involved in a similar project. We will try to keep in contact with that project.

For the next workshop and the future of the project, it is important that we present results and keep in contact with our stakeholders. We aim to summarize the outcomes of all workshops and possibly

also the roadmap in a nice graphical format, so that the city officials can use it in their work with stakeholders in the future.

III.VI.IV APPENDIX A: LIST OF ACTIONS FROM BACK CASTING WORKSHOP

The following actions were identified in the scenario:

2015-2020 (short term):

- Opportunity for all residents to connect locally produced energy into the grid.
- Major investment in climate smart environmental programs.
- Housing Exhibition “Solbo 18” in Malmö / Lund.
- State/national decision on the future of biogas production.
- Formulate the 2050 target for politicians.
- Baseline carbon footprint for Malmö calculated (CO2 emissions in 2015).
- Large biogas plant inaugurated.
- Climate Education introduced into the school curriculum.
- Malmö ring inaugurated (traffic).
- Big campaigns are carried out for climate-smart lifestyle.
- Malmö's first fossil-free / sustainable tanker and service station is opened (the future gas-station).
- 24 hour school / culture / hobby houses for all ages.
- Government policy instruments for energy efficiency are introduced.
- Municipal financing for energy efficiency is introduced; Type Revolving Fund.
- "Malmö smarter city" is a success.
- Trams inaugurated.
- New energy strategy for Malmö!

2020-2025 (short term):

- Well-developed logistics of goods from central and local nodes.
- Malmö's city organization is climate neutral.
- Sege Park is the first area for "two tons living".
- Political decisions are made about the vision for 2050.
- National instruments introduced for climate adaptation, all sectors.
- Thermal gasification plant in Malmö.
- Communication and public relations strategy for Malmö 2050 adopted.
- Government subsidy of fossil-free and sustainable agriculture is introduced.
- Large-scale cultivation of shrimp, algae and vegetables using residual heat in Malmö.

- Create a KPI for energy / m2 / year based on energy certification of buildings.
- Public transport covers the entire region around the clock.
- Higher energy prices.
- The living area is 40% less than in 2015, but with more shared space.
- Most residents are part of a car or mobility pool.
- Green tax reforms.
- The first Sky Cab inaugurated.
- Buildings for shared accommodation are produced.
- Malmö's district heating system is fossil-free by 2025.
- Large-scale logistics systems for recycling are established.
- Reporting of CO2 including consumption is introduced in Malmö.
- Subway Malmö-Copenhagen inaugurated.

2030- 2035 (medium term):

- 30% solar energy.
- "Malmö in 2050 branding 'entered for all companies and businesses.
- 3.5 tons of CO2 per person per year achieved.
- 80% energy efficiency of Malmö achieved.
- Fossil-free farming.
- Industrial symbiosis agreement in place.
- United Nations holds its climate conference in Malmö.
- 400 000 inhabitants.
- Climate impact of food consumption in Malmö is halved compared to 2015.
- 50% of households contribute energy to the smart grid.
- Carbon tax on products is introduced.
- Carbon dioxide tax is introduced per m2 of living space and person.
- Offshore wind park inaugurated.
- Driverless vehicles used to transport people and goods within the city.
- 30% of the food consumed is produced within the city limits.

2040- 2045 (long term):

- Carbon Rationing introduced per person.
- Full potential for energy production in Malmö is utilized.
- KPI reporting and countdown in preparation for 2050.

2050:

- The population is 500,000 and has stopped increasing.
- The city's inhabitants are happiest and most climate smart in the country!

III.VII MILAN

The two scenario workshops held in Milan were organized about 2 months apart. An attempt to reconvene the same stakeholders in both workshops was only partly successful; due to time constraints some participants did not show up to the second appointment.

Workshop 1 was successful in terms of gathering feedback on the Initial Assessment indicator data and data sources, and in developing a vision of a post-carbon Milan in 2050. Stakeholders in attendance represented the municipal environmental agency, an energy company, the national institute of urban planning, a transport consulting firm, a regional environmental organization, a financial development agency, and the chamber of architects. The 8 stakeholders from Milan were motivated to engage in discussion and contribute their expertise throughout the day.

The day's events did not strictly follow the timeframe set out in the agenda. We allowed this flexibility to take advantage of times when stakeholders were interested to pursue further discussion on a specific topic. This gave us, the POCACITO team members, the opportunity to gather information when stakeholders were most willing to offer their expertise and feedback.

Four stakeholders attended Workshop 2 although many more had agreed to come. For this reason, we did not follow the 5 steps in back casting, but instead had an open discussion. Only one of the four participants had attended the previous workshop, so the others took some time to understand the project, our objectives, and the vision created during the previous meeting. We spent some time talking about the vision in general, and how it becomes less relevant if the municipal decision makers do not support the work or if there is not funding for the actions that we propose to meet the vision. One of the participants reiterated that there is already an extensive catalogue of projects/actions that would support the shift to a post-carbon city, and that these should be considered for the POCACITO project[2]. During the open discussion, some ideas regarding actions, milestones, and obstacles emerged. Finally, based on our notes from the discussion, we were able to organize the ideas developed according to their role in meeting the vision in the short, mid and long term. Unfortunately, we were not able to arrive at a point where discussing the vision under different scenarios was possible. This step first requires a very clear and concise set of actions and milestones that could be considered under varying socio-economic and climate conditions. The information collected during Workshop 2 was later organized by the POCACITO team to fulfill the 5 step objectives of the Back casting exercise.

WORKSHOP DATES AND LOCATIONS

Workshop 1 was held on September 29, 2014 and Workshop 2 on November 27, 2014, both at FEEM's headquarters at Palazzo delle Stelline in Corso Magenta, Milan.

[2] This catalogue had already been taken into account by the POCACITO team during the initial assessment

PARTICIPANTS

Workshop organizers:

INSTITUTION	NAME AND SURNAME
Fondazione Eni Enrico Mattei (FEEM)	Margaretha Breil
FEEM	Cristina Cattaneo
FEEM	Andrea Bigano
FEEM	Katie Johnson

Stakeholders at Workshop 1:

INSTITUTION	NAME AND SURNAME
Agenzia Mobilità Ambiente Territorio (AMAT)	Maria Berrini
A2A Energia	Riccardo Fornaro
Istituto Nazionale di Urbanistica Lombardia (INU Lombardia)	Luca Imberti
TRT Trasporti e Territorio	Patrizia Malgieri
AMAT	Marta Papetti
Legambiente Lombardia	Damiano Di Simine
Finlombarda S.p.A., Direzione Energia	Dino De Simone
Ordine Degli Architetti: Pianificatori, Paesaggisti e Conservatori Della Provincia i Milano	Alessandro Trivelli

Stakeholders at Workshop 2:

INSTITUTION	NAME AND SURNAME
INU Lombardia	Luca Imberti
Fondazione Lombardia per l'Ambiente	Mita Lapi
IEFE Università Bocconi	Edoardo Croci
Politecnico-Milano	Stefano Caserini

Participating stakeholders at Workshop 1 represented the municipal environmental agency, an energy company, the national institute of urban planning, a transport consulting firm, a regional environmental organization, a financial development agency, and the chamber of architects.

Only 1 of the stakeholders from Workshop 1 (Luca Imberti of INU Lombardia) returned for Workshop 2, although many more had expressed interest in attending. Many confirmed, then cancelled at the last minute, or failed to show up without informing the organizers. The participating stakeholders at Workshop2 represented the national institute of urban planning, two Milan universities (one of the

university staff was a municipal deputy mayor for the environment in the previous local government), and a non-profit scientific organization.

III.VII.I METHODOLOGY AND RESULTS FOR VISION BUILDING

AGENDA	
9:30	Stakeholders arrive
9:45	Presentation of the POCACITO project and workshop objectives
10:00	Introduction round (participants introduce themselves by taking one thing from their wallets to reveal something personal)
10:15	Presentation of the Initial Assessment results for Milan and Turin with interactive discussion
11:15	Coffee break
11:30	Vision Building exercise – drawing, summarizing visions with key phrases on cards, organizing cards using mind map
1:30	Lunch
14:30	Writing the 2050 vision based on the mind map results
16:30	Conclusion and coffee break

The techniques presented in the training workshop were utilized in Workshop 1. First, we introduced the POCACITO project, and then had participants introduce themselves by taking one item out from their wallet to explain how it represents them. Using this method for introductions was effective in breaking down barriers and allowing everyone to connect on a personal level. We chose this method of introduction, rather than having the stakeholders present one another, as some of them already knew each whereas others did not.

Presentation of the Initial Assessment results proved to be very useful. Due to time constraints (the workshop date was initially intended only for the presentation of the Initial Assessment and then changes to also include Visioning Building) there had not been any interaction with data providers and stakeholders previous to the meeting. The data and our analysis of the data were discussed throughout the presentation and agreed upon by all participants. We allowed for reaction to the data and feedback on data sources, and we received offers to provide additional or updated data. We agreed to circulate the presentation of indicators via email following the workshop so that stakeholders will have another opportunity to reflect on the data and the data sources.

For the Vision Building exercise, stakeholders were divided into two groups of four, with one POCACITO team member in each group. The other two POCACITO team members took notes and photos, helped keep things organized, and prepared for the next step of the process. The Vision Building exercise followed a three step process: participants were asked to sketch their vision of Milan in 2050, to identify key words and phrases describing or captured by the drawing, and to structure them using mind maps.

All stakeholders were timid to begin drawing the 2050 vision of Milan, not sure what to design or

afraid of what other participants might think of their design. The presence of several architects in the group created a strong disequilibrium in terms of capacity of expression in design and some participants initially opted for verbal expression rather than on designing. It took about ten minutes for stakeholders to fall into a casual conversation amongst their group members and to then begin sketching. Once they began, they were full of ideas and excited to continue with the exercise. Many insightful discussions emerged within the groups especially during the drawing and interpretation of the drawings. Both of the stakeholder groups then structured their ideas using a mind map and presented their ideas to the entire group. The results of the three parts of the Vision Building exercise produced the main themes (people, mobility and transport, environment, land use, energy, and innovation and technology) and ideas of what Milan could potentially look like in 2050.

Lunch was held at a restaurant within the same building, but in a different room. As we had a group of 12, we were able to sit together around one big table to have lunch together. This atmosphere was very conducive to maintaining a focus on the workshop topics and objectives. Discussions relevant to the workshop objectives carried on throughout lunch.

Unfortunately, we lost most stakeholders after lunch. This was a minor problem as the mind maps had already been discussed before lunch while all participants were still in attendance. With the four POCACITO team members and remaining two stakeholders we were able to synthesize the results of Vision Building exercise and still include all of the views proposed throughout the earlier phases of the exercise. In several occasions we even decided to keep wording as preferred by one of participants that had already left.

Following Workshop 1, the Initial Assessment indicators and results of the Vision Building exercise were emailed to all stakeholders for their comments and review. Several replied with additional information on the indicators (i.e. the municipal environmental agency supplied updated figures on energy efficiency, emissions, transport, etc.). Additionally, with the permission of the stakeholders, we added the Workshop results and photos to the POCACITO website and provides the link to all participants, as well as interested parties who were unable to attend.

MAIN SECTORS IDENTIFIED IN VISIONING A FUTURE FOR THE CITY

The six primary sectors identified in the 2050 vision for Milan include social issues, mobility and transport, environment, land use, energy, and innovation and technology.

THE 2050 POST-CARBON VISION FOR MILAN

The 2050 post-carbon vision for Milan, as proposed by city stakeholders, covers a wide range of issues. Because of the long time frame, the vision is rather broad and general. Additionally, although stakeholders were asked to consider the relationship between Milan and Torino, they did not give much thought to the potential of the two cities sharing a common post-carbon future. A potential area for the two cities to work together was only explicitly stated in the sector of technology and innovation.

SOCIAL ISSUES

- Sensitive to environmental and energy issues, where citizens have reached a high awareness of their consumption and behavior
- Services nearby, with greater reach and usability
- Participative city society that is open to the world and thereby richer
- More livable city for all

MOBILITY AND TRANSPORT

- City of sharing, that makes services accessible even through alternative or complementary forms of private transport
- Pedestrian friendly city with shared spaces
- Accessible and usable without a car
- Integrated transport systems
- Carbon-free transport

ENVIRONMENT

- Reuse and recycling of materials
- Endowment of green space, which helps to create a micro-climate that reduces the heat island effect; green is integrated into the urban fabric and connects to the territory
- Rich in biodiversity

LAND USE

- Dense, spacious, and highly populated city
- More permeable surfaces

ENERGY

- Very high energy efficiency

- Energy needed for the city to function is produced from renewable sources
- Low energy buildings, in the direction of the passive house
- Many buildings able to produce energy feed it back into the system through the smart grid

INNOVATION AND TECHNOLOGY

- Integrated technology systems and networks that clearly and effectively support all aspects of daily life; promote telecommuting, access to services, and reduce the need to travel
- Milano / Torino drivers of innovation

III.VII.II METHODOLOGY AND RESULTS FOR BACK CASTING SCENARIOS

Workshop 2 did not follow the Back casting methodology as closely as Workshop 1 followed the Vision Building methodology. However, a rich discussion with stakeholders provided enough input to uncover some obstacles and opportunities, milestones and interim projects, and actions along the road for Milan to transition to a post-carbon city under a business as usual scenario.

METHODOLOGY FOR BACK CASTING WORKSHOPS

AGENDA	
10:00	Welcome
10:10	Introduction of participants
10:20	Presentation of the 2050 vision
10:40	Step 1: define normative end point
11:30	Coffee break
11:50	Step 2: consider obstacles and opportunities
12:45	Step 3: identify milestones and interim projects
13:20	Lunch
14:35	Step 4: identify actions that need to be taken
15:35	Step 5: validate the robustness of strategies
16:20	Conclusions and next steps
16:30	End

Because few stakeholders attended Workshop 2, we did not follow the 5-step back casting methodology, but instead had an open discussion. We spent a lot of time 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 we propose to meet the vision. During the open discussion, some ideas regarding actions, milestones, and obstacles emerged. Finally, based on our notes from the discussion, we were able to organize some of these ideas that would signify progress in meeting the vision in the short, mid and long term. Unfortunately, we were not able to arrive at a point where discussing the vision under different scenarios was possible.

KEY POINTS OF THE VISION

In the 2050 post-carbon vision for Milan, people will be sensitive to environmental issues and use accessible services with a low carbon footprint. The city will be dense, spacious, green, suitable for pedestrians, and use carbon-free transport. The energy sources will be renewable, with energy efficient technologies employed.

The six sectors identified in the Vision Building exercise (social issues, mobility and transport, environment, land use, energy, and innovation and technology) were focused into four policy fields in the Back casting exercise. The four policy fields are energy, waste, mobility and transport, and land use and environment. Several cross cutting issues were also identified as being relevant for each of the policy areas and the overall 2050 post-carbon vision.

The timeframes of actions were discussed only implicitly with stakeholders. Timeframes were then translated into approximate time horizons ex-post by FEEM's POCACITO team. Short-term actions might occur from present day up to 2020, mid-term from 2020 to 2035, and long-term actions anytime between 2035 and 2050.

CROSS CUTTING THEMES	
Milan as a post-carbon city, with a green economy, continuously enhancing economic, environmental, and social well-being. This includes a general "change in direction" from current patterns of consumption and emissions.	
Obstacles	In general, there are no plans for logistics associated with pursuing a 2050 or post-carbon vision. A long-term strategy of policy-makers is lacking for energy, waste, mobility and transport, and land use and environment.
	There is a lack of policy for science that could help foster the scientific inputs for innovation.
	In all cases, there is the question of who pays. (Although in the case of the municipality of Milan, access to alternative (international) funding might to some extent help overcome some of the financial shortcomings, there is a lack of municipal funds in smaller towns.)
	Local administrations might not have the capacity or skills to draw on existing innovative and/or financing tools.
Opportunities	Good projects can attract European funding. Additionally, international projects with strategic fundraising opportunities are available (i.e. initiatives for Smart cities and similar projects, some of which have already been accessed by Milan). Other modes of innovative finance exist. These opportunities are more easily ceased by big centers, whereas small towns have more difficulties in accessing international funding and setting up projects to be funded.
	The co-benefits of climate and other policies can be exploited. Climate policy can be "sold" along with other objectives, which produce more obvious benefits to citizens,

	to make it more attractive (e.g. air quality).
	The scientific community of Lombardy is well equipped to tackle the climate change. They are in a position to provide leadership and spur action. Science has the potential to drive policy.
	The theme of Milan EXPO 2015 is Feeding the Planet, Energy for Life. Therefore there is some attention given to the idea of sustainability, which links to climate change. This can be used to bring attention to the transition to a post-carbon city.
	National commitments on a new climate deal will likely come out of COP21 in Paris in 2015. Emissions reductions targets set at the country level will support plans for emissions reductions at the local level.
	Milan does not have a lobby pushing carbon.
	Sponsorship of EU funded projects.
	In 2015, the city approved the Sustainable Urban Mobility Plan (Piano Urbano della Mobilità Sostenibile – PUMS), which provides a path of participation open to the city and any interested institutional or non-institutional stakeholders. Guidelines for PUMS have been approved by the City Council and a ten-point[3] path has been laid out to build the Milan of the future. A Strategic Environmental Assessment process will work to integrate aspects of environmental sustainability during any updating of the Plan.
	In 2014, the city approved the guidelines for starting the process of drafting the Plan of Action for Sustainable Energy (Piano di Azione per l'Energia Sostenibile – PAES) and its strategic environmental assessment (SEA). PAES is the document planning and scheduling policies to reduce greenhouse gas emissions, which the City Council is preparing for the European Commission initiative called Covenant of Mayor[4].
	Participation in the Covenant of Mayors. The Covenant of Mayors is the mainstream European movement involving local and regional authorities, voluntarily committing to increasing energy efficiency and use of renewable energy sources. Covenant signatories aim to meet and exceed the European Union 20% CO2 reduction objective by 2020. Financial programs and incentives are available to signatories to help them develop Sustainable Energy Action Plans and help them meet their emissions reductions goals.
Milestones	Goals for emission reduction reached in time (PAES target: 20% by 2020, compared to the baseline year 2005).
	Citizens change their lifestyles and become more sensitive.

[3] See Mobility & Transport interim projects for ten-point plan.
[4] http://www.covenantofmayors.eu/about/covenant-of-mayors_en.html

Actions	It is best to work with small, short-term goals. Once one is achieved, move to the next. Start with existing projects and add small changes at lower costs.
	Short-term: • Promote already initiated actions, such as traffic limitations and better public transport, in order to create consensus and momentum for new further reaching policies, as public policies are highly visible. • Take advantage of financing tools and opportunities available through the affiliation with the Covenant of Mayors.

ENERGY	
District heating and cooling with renewable energy sources for all households	
Obstacles	Private investments in energy efficient heating/hot water systems now will discourage people from investing in a new technology once it is ready in several years. They will not want to spend more money on something they have already upgraded.
	Some existing regulations will hinder progress on alternative non-carbon energy projects, i.e. no solar panels on roofs in the historical center.
	The existing paradigm must change from making carbon use more efficient to zero-carbon oriented.
	Energy efficiency has small margins for improvement in the existing building stock.
Opportunities	The capacity to produce more electricity than is necessary (e.g. with solar panels) allows excess producers to feed energy back into the grid. Development of new technologically innovative applications in the future will likely increase energy efficiency and/or decrease energy consumption and open new efficient ways into renewable energy.
	A2a (the Milan multi-utility providing public services for energy, waste, water, etc.) is actually planning to invest in using industrial waste heat.
Milestones	EU targets for 2020: • 20% reduction in GHGs • 20% final consumption met with renewable sources (use electrical, thermal and transport) • 20% reduction in consumption of primary sources compared to the forecast trend, by increasing efficiency
	National targets for 2020:

	• 13% reduction in GHG emissions in non-ETS sectors compared to 2005 • 17% final consumption of energy through renewable sources • 10% transport consumption met by renewable energy
	Regional objective for 2020: • 11.3% final consumption of energy from renewable sources
	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).
	The number or percentage of households or the city connected to the district heating/cooling network can be used to measure progress.
	The city is using more renewable energy than carbon energy sources.
	One hundred percent of new buildings are zero energy or carbon neutral.
Interim projects	Create a co-generation (heat and electricity produced from same energy source) network to use excess heat from industry to heat residential/commercial properties through the district heating/cooling network.
	Create micro tri-generation (heating, cooling, and energy production) plants as pilot projects for big public and private energy users (hospitals, schools, etc.).
	Measures of energy recovery from the integrated water cycle using heat pumps to heat buildings near (or in) industrial wastewater treatment plants.
Actions	*Short-term:* • Promote and encourage the use of solar thermal, photovoltaics and geothermal heat pumps (PAES). • Identify regulatory measures, create incentives, and train citizens to reduce electricity consumption and emissions in public and private buildings (PAES). • Identify necessary regulations, incentives, and training in order to trigger actions for energy improvement and the reduction of electricity consumption and emissions in the business sector (PAES). • Create regulations for increasing energy efficiency for buildings taking into account characteristics of existing buildings. • Set electric energy standards. • Give incentives for carbon free energy production and consumption. • Power public lighting with lost energy consumption.

	• Reduce public switching time. • Communicate the economic benefits derived from equipment conversion toward district heating, heat pumps, and solar and thermal energy.
	Short to mid-term: • Develop smart infrastructure and buildings to consume less energy. • Build smart grids.
	Mid-term: • Create a network for district heating and cooling. • Develop decentralized system of power/heating/cooling plants.
	Mid to long-term: • Develop new technologically innovative applications that will support co-generation and tri-generation.

WASTE	
Circular economy	
Milestones	The percentage of waste reduction or percentage of materials recycled can be used to measure progress.
Interim projects	Effective waste management.
Actions	*Short-term:* • If waste cannot be prevented, it should be reused or prepared for reuse, recycled, incinerated with energy recovery, or disposed of in landfill, if no other option is available (Waste Framework Directive)). • Increase waste sorting (PAES). Make the separation of waste and recyclables more user-friendly and more efficient. • Increase the efficient energy recovery of residual waste (PAES). Make efficient use of the existing system, i.e. use incinerators to create energy and lower the amount of materials placed in landfills, and consider opportunity costs, i.e. in some cases there are high costs to recycle materials that also produce good energy (e.g. paper).

MOBILITY AND TRANSPORT	
Public transport services more convenient than private transport	
Obstacles	The attitude of the FS railway society hinders the convenience of taking the train due to regular delays and strikes.
	Lack of coordination between transport systems.
	Centralized outlay of the network – the circular line connecting periphery areas to each other is no longer in existence and is impossible to re-established because too much has been built upon.
Opportunities	Development of new technologically innovative applications will likely improve attractiveness of public transportation.
Milestones	Creation of an integrated public transport system.
	A more widespread network of public transport, including extension of the circular lines to connect outlying areas.
	Public transport becomes faster and less expensive than private transport.
Interim projects	Sustainable Urban Mobility Plan (PUMS): • Set a vision for the subway system. • Develop infrastructure for public transport. • Enhance rail service. • Make sustainable accessibility to new areas of urban transformation. • Raise levels of security, spreading pedestrian areas and environmental islands • Facilitate and support cycling. Create bike, also electric bike, sharing projects to provide alternative options to taking one's own car. • Rationalize the use of motor vehicles, i.e. Area C sharing systems and smart solutions. • Make the parking system more efficient. • Promote the development of a new urban freight logistics. • Overcome barriers and make the city more accessible for everyone.
	Urban Traffic Plan (Piano Urbano del Traffico – PUT): The PUT consists of a set of coordinated interventions for improving conditions of road traffic in the urban area, pedestrian access, public and private transport. Goals are achievable in the short

	term (i.e. 2 years), and do not require any changes to infrastructure. PUT aims to: improve traffic circulation; improve road safety, such as reduction of road accidents; reduce air and noise pollution; and save energy.
	Triennial Program of Local Public Transport Services (Programma Triennale dei Servizi di Trasporto Pubblico Locale – PTS): The objectives of PTS are to: improve the quality of the service offered, promote integration between services, promote exchanges with rail services, meet the demand and capacity, and promote the environment through encouragement of the use of the public transport and innovative technologies.
	Urban Car Park Program (Programma Urbano dei Parcheggi – PUP)
Actions	*Short-term:* • Strengthen and make public transport services more efficient, and encourage sustainable mobility (e.g. bicycle, electric, car sharing) (PAES). • Develop informatics infrastructure including smart stops and smart times for public transportation on busses, trains, and trams. • Extend road pricing to encourage use of public transport and discourage private car use. • Limit car use through extension of pedestrian areas, speed limit zones, parking payment. • Make preferential lanes for people who are carpooling. • Create park and ride parking lots.
Carbon free private and public transport	
Obstacles	There are currently few charging points for electric cars both within and outside of the city.
	Electric cars are only truly zero carbon if the method of generating energy is also zero carbon (not good if it is done using coal).
	Public resistance, lack of infrastructure, and rapid technology change inhibit transition to electric car use.
	Infrastructure requirements and options, especially in congested areas include on street versus off street charging points, standard/fast/rapid charging, and the source of green energy.
Opportunities	Awareness can be raised through the Electric Vehicles in Urban Europe project.

Milestones	All (or a certain percentage of) cars are electric.
	There are a sufficient number of electric car charging points inside and outside the city.
Interim projects	Increase number of charging points
	Create incentives for buying electric rather then gasoline-fueled vehicles.
	Create a new policy framework with incentives, parking and congestion implications, and modal shift.
Actions	*Short-term:* • Marketing and communication, and education and awareness raising on the benefits of electric vehicles.
	Short to mid-term: • Substitute municipal vehicle fleets with new ones that use clean technologies. • Add more electric car charging points (serviced by renewably produced energy).
Efficient distribution of goods within the city	
Obstacles	Private organization of transport.
Milestones	Electric transport used for the distribution of a certain percentage of goods throughout and within the city can be used to measure progress.
Interim projects	Organize and develop the logistics of the last mile for the distribution of goods in the city.
Actions	*Short-term:* • Enact road pricing to support more efficient distribution of goods within the city.

LAND USE AND ENVIRONMENT
More green and blue spaces

Obstacles	The creation of more green and blue areas is dependent on existing land use and development.
Opportunities	Rehabilitation of deprived or derelict areas can provide more green space within the city.
	Ecological zones can provide habitat for more biodiversity.
	Green areas can help provide a link to the surrounding suburbs.
	Expo 2015 is creating and transforming existing urban spaces.
Milestones	The number of parks opened, percentage of permeable surfaces, or waterways re-opened can be used to measure progress.
Interim projects	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.
	Create pedestrian areas in the periphery of the city, especially to link the center to surrounding suburbs (make sub-centers in the periphery more attractive). Create the "green mile".
Actions	Mid to long-term: • Increase the concentration of production/industrial areas and structures, as this allows for better organization of transport logistics. • Re-open some of the city's waterways.
Citizens are not only consumers but also guardians and custodians of the urban and peri-urban territory	
Obstacles	There is a low level of awareness of the citizens.
	There is a low level of awareness of the governing parties.
	Existing interests (real estate) support current trends.
	There is pressure on politicians to continue with current policies, not to invent new ones.
	Questions of responsibility and ownership with respect to public and derelict spaces
Opportunities	Initiatives for taking care of public spaces started by neighborhood initiatives
	Neighborhood initiatives fighting for improvements in their areas

Actions	*Short-term:* • Educate citizens on their role and responsibilities as members of the city. • Provide occasions for citizens to design and manage open spaces in their neighborhood
	Mid-term: • Rehabilitate deprived areas by creating eco-districts

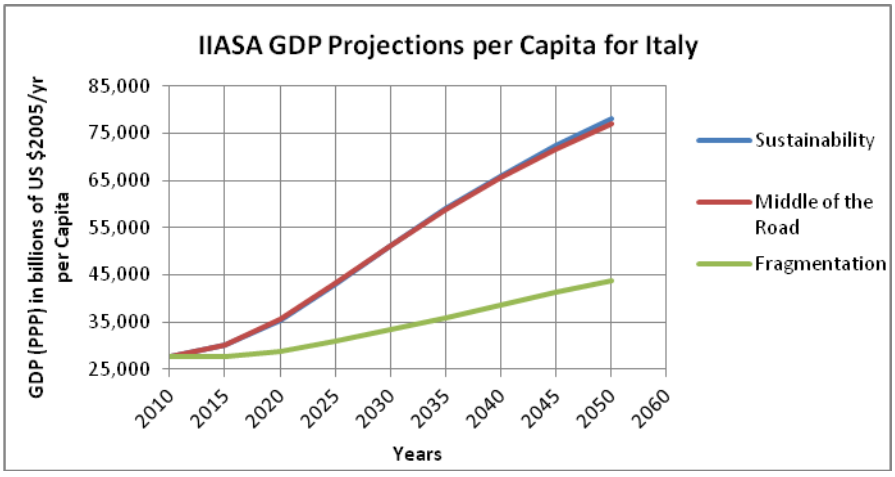
BACKGROUND SCENARIOS

Background scenarios were not explicitly discussed during the Back casting exercise; the idea that the future may unfold in a way other than business as usual was noted but not considered in detail. Instead, stakeholders focused on the future under a business as usual scenario. Although they were not presented, GDP, national population, and urban population projections were made for Milan under three socio-economic scenarios: sustainability, middle of the road, and fragmentation. Business as usual corresponds with the middle of the road scenario.

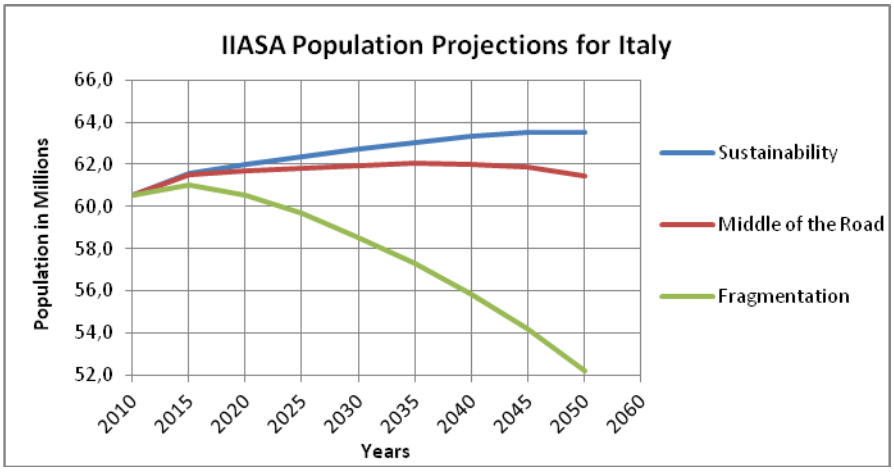
The Sustainability Narrative describes a world that aims at pursuing a sustainable development path to achieve development goals while reducing resource intensity and fossil fuel dependency. Environmental awareness is at a high level and technology is developing fast with strong economic growth, both in high and in low-income countries.

The Middle of the Road Narrative describes a "business-as-usual" world with the trends typical of recent decades continuing and some progress toward achieving development goals being made. Dependency on fossil fuels is slowly decreasing. Development of low-income countries proceeds unevenly.

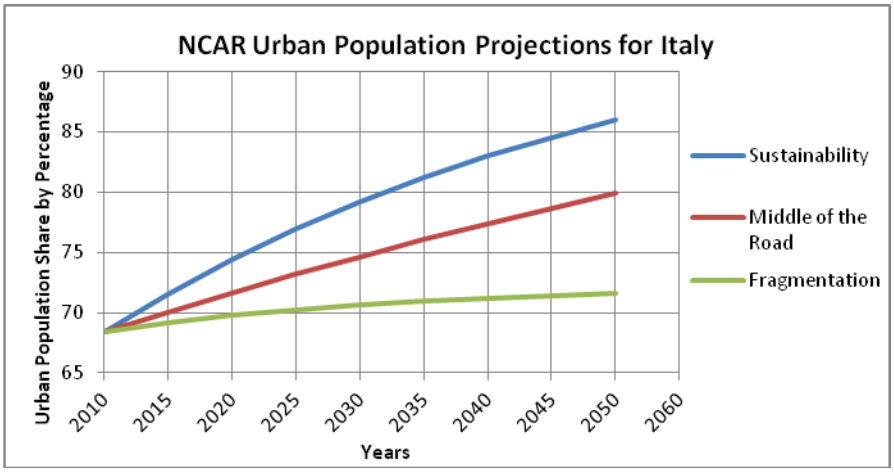
The Fragmentation Narrative describes a world that is separated into regions characterized by extreme poverty, pockets of moderate wealth and a large number of countries struggling to maintain living standards for a rapidly growing population.



This graph shows that GDP per capita is projected to greatly increase between now and 2050 in Italy under the Sustainability and Middle of the Road scenarios. For the Fragmentation scenario, the projected growth occurs at a lesser rate.



For the Sustainability scenario, the graph shows population increasing slightly until 2045, then decreased until 2050. Population increases slightly until 2040, then decreases until 2050 under the Middle of the Road scenario. For the Fragmentation scenario, the graph shows population decreasing between 2015 and 2050.



In all three scenarios, this graph shows urban population projections increasing between now and 2050. In the Fragmentation scenario, the increase is slight. The increase for the Sustainability scenario is greatest, and the Middle of the Road scenario is somewhere in between.

ROBUSTNESS OF ACTIONS

Due to constraints on the number of stakeholders present at Workshop 2 and the level of progress made during the Back casting exercise, we were not able to arrive at a point where discussing the 2050 post-carbon vision for Milan under different socio-economic scenarios was possible.

An ex-post analysis of the back casting results shows that financing opportunities, political support, and the citizens' consciousness of environmental issues would be the biggest differences under fragmentation or sustainability scenarios. In the sustainability scenario environmental awareness is

very high, technology is developing fast, and economic growth is strong. In the fragmentation scenario the opposite is true. Therefore the potential for Milan to transition to a post-carbon city is even stronger under a sustainability scenario than the business as usual or middle of the road scenario. It will be much more challenging under fragmentation, as awareness, technological support, and funding for a transition to a post-carbon economy will be very limited, and politicians will have other urgent social and economic issues to address.

FEASIBILITY

The feasibility of implementing the post-carbon vision depends greatly on the socio-economic scenario as well as climate change. The future of the economy, politics, technological innovation, and climate impacts are uncertain over a timeframe of 35 years. It is fair to say that the post-carbon vision for Milan is most feasible under the Sustainability scenario and least feasible under the Fragmentation scenario. Some actions, especially those already underway or planned in the short-term will be achievable under any scenario, but the practicality of those projects and actions planned further in the future will be more dependent on the socio-economic situation at that time.

III.VII.III GENERAL REMARKS

Overall, the Vision Building and Back casting workshops were successful in developing a 2050 post-carbon vision for Milan. The stakeholders were interested and involved in the exercises and discussions, especially in Workshop 1. They helped to define future goals towards becoming a post-carbon city in terms of social issues, mobility and transport, environment, land use, energy, and innovation and technology. These six sectors were focused into four policy fields: energy, waste, mobility and transport, and land use and environment. Stakeholders identified the obstacles and opportunities, milestones and interim projects, and actions towards achieving the vision in each policy field in the short, mid, and long-term under a business as usual scenario. While the robustness of the 2050 vision was not analyzed in depth, it is clear that vision is most feasible in a world where environmental awareness is very high, technology is developing fast, and economic growth is strong, and least feasible where awareness, technological support, and funding for a transition to a post-carbon economy are limited. The potential for growth and collaboration with Turin in achieving a post-carbon vision was considered, yet stakeholders were not fully convinced about the inter-linkages between the two cities, but suggested that the cities may be able to collaborate on technological innovation for energy efficiency in the future.

III.VIII ROSTOCK

WORKSHOP DATES AND LOCATIONS

The first workshop was held on 04 December 2014 in Rostock at the *Gästehaus Lütten Klein*, a typical East German "Plattenbau"[5], and consisted of a presentation and discussion of the initial assessment results as well as a vision-building exercise. The second workshop took place on 29 January 2015 at the *Hanse Messe Rostock*, a modern exhibition ground, and included a presentation of the city's existing climate protection plan ("Masterplan 100% Klimaschutz"), a prioritisation of the measures identified in the Master Plan as well as a back casting exercise for these measures.

PARTICIPANTS

The first workshop was attended by 19 out of the 20 invited stakeholders, with one leaving right after the start due to other commitments. In addition, the POCACITO team was represented by Ecologic Institute with Max Grünig as the POCACITO project coordinator, Doris Knoblauch as the workshop moderator, and Stefanie Albrecht as the note taker. Fourteen out of the 16 invited stakeholders as well as Doris Knoblauch and Stefanie Albrecht from Ecologic Institute attended the second workshop. Most participants from the first workshop also attended the second one. The stakeholders represented a wide range of decision-makers in Rostock. The main expertise was in the sector of energy, transport, city planning, engineering, waste management, and research. Environmental NGOs were somewhat underrepresented. Most participants knew each other from the "Energiebündnis" – an alliance that meets regularly to discuss energy issues. The following table gives an overview of the participants, their organisation, and attendance for each workshop:

Table 43: Workshop Participants

TITLE	LAST NAME	FIRST NAME	ORGANIZATION	WS 1	WS 2
	Albrecht	Stefanie	Ecologic Institute	x	x
	Arnim	Andrea	Environmental Agency Rostock	x	x
	Böhme	Steffen	Waste Disposal Rostock GmbH	x	x
	Brückner	Ralf	Craftsman Association - Kreishandwerkerschaft		x
	Czech	Thomas	Tenant Association - DMB Rostock e.V.	x	
	Dengler	Cindy	Engineering Consultancy GICON GmbH	x	
	Matthäus	Holger	Environment & Construction Senator	x	
	Grünig	Max	Ecologic Institute	x	
	Hübel	Moritz	Engine & Energy Research - FVTR GmbH / LTT, Uni Rostock	x	

[5] A building made with precast concrete slabs.

TITLE	LAST NAME	FIRST NAME	ORGANIZATION	WS 1	WS 2
	Kaufmann	Britta	Waste Disposal Company - EVG Entsorgungs- und Verwertungsgesellschaft mbH Rostock	x	x
	Knoblauch	Doris	Ecologic Institute	x	x
Dr.	Koziolek	Dagmar	Environmental Agency Rostock	x	
Dr.	Lembcke	Hinrich	City Planning Agency - Amt f. Stadtentwicklung, Stadtplanung und Wirtschaft		x
	Krase	Bernd	Public Utility Stadtwerke Rostock AG	x	
	Ludewig	Mario	Public Utility Stadtwerke Rostock AG	x	x
	Nispel	Hanno	Water Provider EURAWASSER Nord GmbH	x	
	Pfau	Rudolf	Pensioner Council Seniorenbeirat Rostock	x	x
Dr.	Preuß	Brigitte	Environmental Agency Rostock		
	Rath	Christian	Waste Disposal Company - EVG Entsorgungs- und Verwertungsgesellschaft mbH		x
	Retzlaff	Kai	Industry Association IHK zu Rostock	x	x
	Riedner	Klaus	Engineers' Association; Verein Deutscher Ingenieure BV M-V e.V.	x	x
	Schulmann	Peggy	Public Transport Rostocker Straßenbahn AG	x	x
	Schumacher	Susanne	Environmental NGO BUND M-V e.V.	x	
Dr.	Sielberbach	Karsten	Water provider EURAWASSER Nord GmbH		x
	Söffker	Ulrich	Energy NGO BUND-Projekte Energiewende	x	x
Prof. Dr.	Weber	Harald	Uni Rostock, Inst. f. Elektrische Energietechnik	x	
	Zander	Kerry	Environmental Agency Rostock	x	x

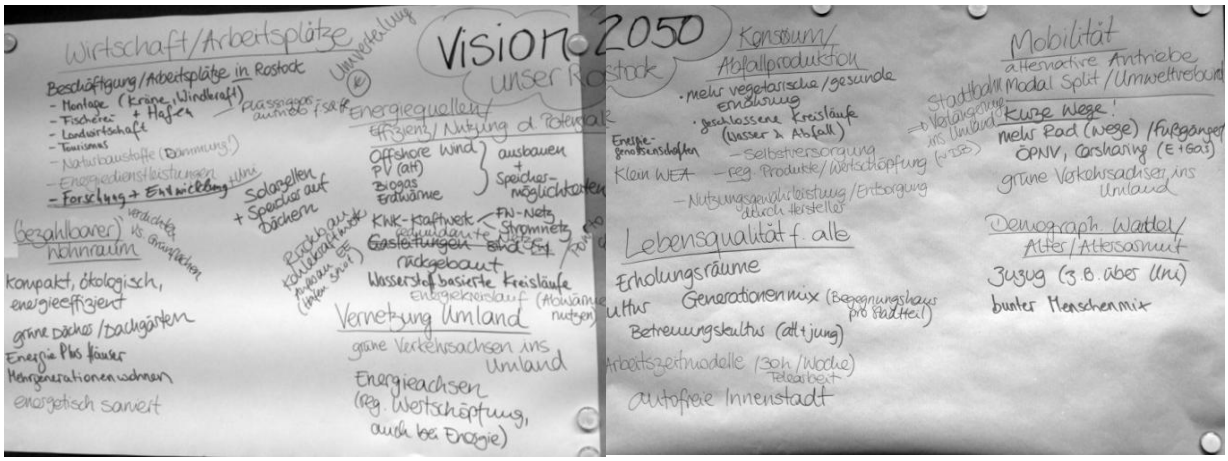
III.VIII.I METHODOLOGY AND RESULTS FOR VISION BUILDING

The first workshop started with Holger Matthäus, Senator for the Environment and Construction of Rostock, welcoming the participants and Ecologic Institute. Max Grünig and Doris Knoblauch thanked him and introduced Ecologic Institute, the POCACITO project, and gave an overview of the day. Doris Knoblauch, the workshop moderator, then initiated a discussion of the term *post-carbon* (in German "kohlenstofffrei"). It was discussed and rejected by the participants as it implies that "one has to stop breathing" and it was agreed that the term *post-fossile* was preferred.

Following the first round of discussions, Max Grünig presented an overview of the social, environmental, and economic indicators collected during the initial assessment of Rostock. These indicators were criticized as Rostock had already gone through relevant data and time-intensive discussions during the development of its *Masterplan 100% Klimaschutz* – a climate protection programmed to reduce CO_2 by 95% until 2050 compared to 1990 levels. We agreed that it is necessary to check this data again and update the Initial Assessment Report.

In a first step, critical challenges were identified that were kept in mind during the following vision-building exercise. For the vision-building exercise, stakeholders sat in groups around four tables by self-selection upon arrival. When encouraged, two people changed their spots before the drawing process. Each group was then asked to begin drawing their 2050 vision for Rostock. During the exercise, each group rotated four times. Staying in the same group constellation for most of the time, they discussed and continued the drawings on other tables. Two to three people drifted away from their groups or remained at tables when asked to rotate. Two POCACITO team members were nearby to answer questions, remind the groups of their initially identified eight themes, and motivate them to draw the vision. One POCACITO team member stayed more in the background and took notes and photos.

At the beginning, all stakeholders were too timid to draw their part of the 2050 vision. After an initial conversation and agreement on an idea within the group, one person would usually start the drawing on the table. The groups were of different sizes; the largest group engaged in much conversation whereas the smaller groups tended to focus on drawing. One expert found it too difficult to draw, but expressed his vision later verbally. Many ideas emerged and were discussed and some drawings were repeated on the next table. The interpretation of the drawings on each new table took some time. Finally, all four groups went back to their initial table, interpreted the drawing, and summarized it on a flip board paper (see below for a description of the outcome). Each group then presented their results. Lunch was held in the canteen of the same building. One POCACITO member stayed back and put together the four group visions on one larger paper. After lunch, each point was checked for completeness and consent in the vision synthesis. The final vision can be found in the subsequent section, The 2050 Post Carbon Vision for Rostock.



MAIN SECTORS IDENTIFIED IN VISIONING A FUTURE FOR THE CITY

After engaging in conversation, the group of experts identified eight areas of challenges and strengths

that were to be discussed for the 2050 vision:

- Economy/Employment,
- Mobility (Alternative Drives, Model Split/Public Transport Network),
- Consumption and Waste Management,
- Quality of Life for Everyone,
- Working with demographic change/old-age poverty,
- (Affordable) Living Space (vs. Increased Building Density/Green Spaces),
- Energy Sources/Energy Efficiency/Using the Potentials,
- Networking with the Region.

THE 2050 POST-CARBON VISION FOR ROSTOCK

ECONOMY/EMPLOYMENT

- Focus on and support the assembly sector (cranes, wind power).
- Fishery & harbor (liquid gas operation of ships).
- Agriculture & tourism as focal areas.
- Promote natural building material (insulation).
- Encourage energy services.
- Enhance research and development within the city and at university.

MOBILITY (alternative drives, model split/environmental associations)

- Short distances- more bike (way) s/pedestrians/public transport, Car sharing (E&Gas).
- Green transport axis into the region.
- City train – extension into the region (Deutsche Bahn).

CONSUMPTION/WASTE MANAGEMENT

- More vegetarian/healthy diets.
- Closing cycles (water, waste).

- Self-sufficiency.
- Regional products/value adding.
- Warranty on usage/recycling by producer.

GOOD QUALITY OF LIFE FOR ALL

- Rehabilitation spaces.
- Culture.
- Generational mix (meeting center per district).
- Supervision/care culture (old & young).
- Working time models (30h/week, home office).
- Car-free city center.

DEMOGRAPHIC CHANGE/AGE/POVERTY IN OLD AGE

- New arrivals (e.g., through the university).
- Heterogeneous people.

AFFORDABLE LIVING SPACE

- Compact, ecologic, energy efficient.
- Green roofs/roof gardens/solar panels on roofs.
- Energy-plus buildings.
- Multigenerational living.
- Energy refurbishment.

ENERGY SOURCES/EFFICIENCY/USING THE POTENTIALS

- Offshore Wind, PV (old), Bio gas, geothermal – further develop and increase storage capacities.
- Cogeneration plant (district heating grid, electricity grid) – dismantle redundant grids/Power to Gas.
- Dismantling the coal-fired plant, develop renewable energy (harbor 3 Mio. EUR).

- Hydrogen based cycles, energy cycles (utilize waste heat).
- Solar panels on roofs.
- Liquid gas operation of ships.
- Energy cooperatives.
- Small wind energy plants.

NETWORKING WITH THE REGION

- Green infrastructure axis into the region.
- Energy axis (regional value-adding, incl. energy).

REFLECTIONS

At the start of the first workshop, the atmosphere was a distant "wait-and-see" – criticism was openly expressed and some existing power structures between the participants hindered a fully open interaction. Due to Rostock's Master Plan, stakeholders were already thinking about concrete measures and the exercise to build a vision initially proved difficult as they felt past this process. However, the atmosphere became more relaxed throughout the workshop as participants were warming up to the project idea and very motivated to compile their 2050 vision. A variety of sectors were covered, with a focus on the energy sector, which included the most specific visions and measures. There was a consensus that the second workshop should to be more related to the Rostock Master Plan. Furthermore, the participants were curious to see what other POCACITO cities are doing.

Concerning the methodology, we followed the technique presented in the training workshop almost exactly, i.e., stakeholders were asked to draw a vision, summarize their drawings, and organize their ideas to form one city vision. However, the last step was not done using a mind map since stakeholders had the impression that everything was related to each other so they only made a summary. A mind map based on the vision will be created by the Ecologic Institute and presented to the stakeholders at the sensitivity model workshop. The vision building methodology worked quite well and although stakeholders were skeptical of the drawing exercise during the first workshop, during the second back casting workshop, they expressed appreciation that a vision-building exercise was previously performed (see below).

III.VIII.II METHODOLOGY AND RESULTS FOR BACK CASTING SCENARIOS

METHODOLOGY FOR BACK CASTING WORKSHOPS

The second workshop was adapted to the needs of the case study city and hence, the back casting methodology was modified. The objective was to therefore priorities 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 back casting exercise.

Prior to the workshop, the *Energiebündnis* (energy alliance) met for two hours at the same location. There was no desire by the *Energiebündnis* participants to share their discussion points. Some of them stayed for the workshop but the majority of workshop participants arrived independently from the energy alliance meeting. After a short break, Doris Knoblauch, Ecologic Institute, welcomed the participants and started an introduction round consisting of everyone presenting something personal, partly from their wallet. Afterwards, Kerry Zander, Environmental Agency Rostock, presented the Masterplan 100% Klimaschutz. Ms. Zander gave an overview of the goals, some exemplary measures, and the obstacles of this CO_2 reduction programmed. Stefanie Albrecht, Ecologic Institute, followed by summarizing the results of the vision-building exercise that took place during the first workshop as a basis for a renewed prioritization of the *Masterplan 100% Klimaschutz* and identification of additional measures necessary to reach the 2050 vision.

Afterwards, everyone 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. Analyzing the evaluation at a later stage, the following measures were rated as the top 10 priorities. Moreover, according to the Rostock Master Plan, the top three measures were further evaluated as economically efficient and potentially high CO_2 reducers (highlighted in bold below). The number in brackets refers to the *Masterplan 100% Klimaschutz* identification number.

- Strengthening the public transport system (V1),
- **Climate protection and construction planning (SV13),**
- **Implementation of energy management systems (GI5),**
- Conceptualization for the conversion of the heating and power plant “Marienehe” to renewable energy (EV3),
- **Increasing the share of long-distance heating for homes; 80% supply rate in apartment constructions (EV1),**
- Conceptualization of improved urban-rural transport linkages (V3),
- Obligation for municipal businesses to provide an energy report (SV15)
- Conceptualization of educational projects for energy efficiency in schools/ kindergartens (PH2),
- Establishment of energy cooperatives/ climate funds (EV6),
- Energy concept buildings (SV9).

During the back casting exercise that took place after lunch, all 44 measures were classified on a timeline and the milestones and further challenges were discussed.

KEY POINTS OF THE SCENARIO

The Rostock stakeholders were mainly focused on the years 2015 to 2020 and did not focus on a longer time frame due to uncertainties regarding the political and technical developments in the long term.

Some measures identified in the Master Plan have been completed and many are currently running or are to be finished by 2020. A few measures were added in order to reach the 2050 vision. The table below gives an overview of the measures, responsible actors, milestones, and deadlines as well as opportunities and obstacles.

TIMELINE	MASTER PLAN + ADDITIONAL MEASURES, BOLD = HIGH PRIORITY	ACTOR	MILESTONES, DEADLINE	OPPORTUNITIES, CHALLENGES
finished	Analysis of the potential of regenerative energy in Rostock	Municipality	2013	Low potential: Water (geographically unsuitable), wind and energy crops (no space). Medium potential: Geothermal (good usability; but undesirable inefficient competition with existing solutions may emerge); waste & grey water are already used as sources of energy. High Potential: Solarthermics for heating and photovoltaic for energy generation. Share of renewable in energy consumption: 4%.
	Consumer climate saving book	Private HH	2013	direct saving incentives through vouchers
	Online information platform for local energy supply options in Rostock	Municipality	since 2011	ongoing updates, promoting private investments for climate friendly energy options
	Waste company using LED-advertisement	Waste company	2013	energy savings
	Waste company driver training	Waste company	finished	incentives for eco-friendly driving, diesel savings
started	Energy-oriented housing refurbishment	Public transport company	to be finished by 2020	energy savings/sqm
running	Concept climate-neutral municipalities	Municipality	to be finished by 2020	energy savings, role model function
running	Implementation of the communication concept for the Master Plan	Municipality	ongoing	supporting climate protection actions, informing & motivating citizens
running	**In city climate protection planning, development & construction**	Municipality	ongoing	especially influential during the conceptual phase e.g., through guidelines; environmental reports; long-term CO2- reduction; difficulties in internal acceptance
running	**Obligation for municipal businesses to provide an energy report**	Municipality		support energy efficiency in municipal companies
running	**Conceptualization of educational projects for energy efficiency in schools/ kindergartens**	Private HH	yearly	support energy efficient behaviour
running	Information on independent individual energy advisory services for home owners / tenants	Private HH, energy alliance		spill-over effects in energy efficiency

TIMELINE	MASTER PLAN + ADDITIONAL MEASURES, BOLD = HIGH PRIORITY	ACTOR	MILESTONES, DEADLINE	OPPORTUNITIES, CHALLENGES
running	Public information and education events for energy efficiency in private households	Private HH, municipality, service companies	ongoing	spillover effects in energy efficiency
running	Executing thematic campaigns, e.g., city cycling, climate action day	Municipality Private HH	ongoing	spillover effects in energy efficiency; missing project carrier
running	Participating in a national energy saving project for low-income households	Private HH, NGOs, employment agency		spillover effects in energy efficiency
running	Including more businesses and industries into the energy alliance	Energy alliance, municipality	ongoing	strengthening energy alliance, improved data base
running	Information on funding for qualified individual energy consultation for businesses	Municipality		website, start now!, spillover effects in energy efficiency
running	Coordination of group projects for energy efficiency such as regular energy tables, ÖKOPROFIT	Municipality	ongoing, min. 100 businesses until 2020	energy alliance is exchanging on this, spillover effects in energy efficiency, average energy reduction of 1,5% p. a.
running	**Implementation of energy management systems in businesses**	Businesses, service companies	ongoing	financial incentives should turn this into a sure-fire success, SMEs probably have higher implementation barrier and should be supported
running	Influence user's behaviour; solar systems; extend storage systems; energy-oriented refurbishment; thermal pumps, optimizing heating surfaces, new concepts (plasma toilettes, grey water use)	Housing company	to be finished by 2050	reducing electric/heating energy by 36% (compared to 2010 levels)
running	Topic area heat (services, industry, commerce)	University Rostock	ongoing	reducing electric/heating energy use per sqm
running	Introducing a workplace mobility management scheme for the municipality incl. Fleet management, increasing bike and public transport use	Municipality		emission reduction, role model function

TIMELINE	MASTER PLAN + ADDITIONAL MEASURES, BOLD = HIGH PRIORITY	ACTOR	MILESTONES, DEADLINE	OPPORTUNITIES, CHALLENGES
running	**Increasing the share of long-distance heating for home's room heating, in apartment constructions 80% supply rate**	Public utility	objectives: by 2030: 70% of the housing market are covered and profitability is reached; until 2050: 53% of total heating demand covered by long-distance heating	other sources of energy can be fed into long-distance heating systems
running	Checking options on new wind energy parks (on/ offshore) close to Rostock with physical network into Rostock	Public utility and further actors	ongoing request	obstacle: connection of operators; shares are checked
running	Foundation of energy co-operations / climate funds	Private initiative, Agenda 21 group, initial support by municipality	ongoing	increase share of, acceptance and participation in renewables, one citizen coop exists, further should emerge; obstacles: commercial management missing
running	Staff training in energy and climate protection	Municipality	ongoing	new: extend training target group to politicians & city administration
running	National energy saving campaign	Municipality	to be finished by 2015	awareness raising and energy saving
running	Energy saving competition in schools	Municipality	to be finished by 2015	support energy saving action, reduce energy consumption
	Study on sewage sludge disintegration, heat usage & energy management systems	Water supply company	to be finished by 2020	reducing electric energy use by 28% and heating energy by 10% in 2050 compared to 2010 levels
2015	Master Plan data bank system + maintenance	Municipality	to be finished by 2015	long-term, efficient controlling
2015	Website + maintenance	Energy alliance, municipality, service provider	asap	efficient communication, obstacle: not possible on municipality website
2015	**Planning guide energy and construction / energy standards**	Municipality	to be finished by 2015	technical efficiency, minimum standards, role model function
2015	Municipal energy management	Municipality	ongoing, property management evaluation finished	project hangs between divisions

TIMELINE	MASTER PLAN + ADDITIONAL MEASURES, BOLD = HIGH PRIORITY	ACTOR	MILESTONES, DEADLINE	OPPORTUNITIES, CHALLENGES
2015	Energy concept for buildings	Municipality		identify energy efficiency potentials, have more concrete energy efficiency measures, using renewables
2015	Inspection of the technical facilities at the waste management company for options on energy optimization, demonstrating energy saving potentials	Waste company		reducing heating energy demand by 10%, increasing security at facility
2015	Feasibility of heating oil substitution in the compost plant	Waste company		saving 30.000l heating oil/year
2015	**Strengthening the public transport system (developing a future mobility plan)**	Municipality	mobility plan by end of 2015 and prior that: third public forum, commuter survey	the public utility and public transport company are working on a mobility strategy
2015	**Conceptualization of improved urban-rural transport linkages**	Municipality, regional municipal association		reducing individual motorized traffic
2015	Construction of solar system “Old Gasworks”, 1 Mwpeak	Public utility	land use plan is with city mayor, response pending	increase in share of renewables, electricity generation by 0.9 GWh/a
	Use of efficient technology (Green IT), improved user behaviour, space reduction, energy-oriented refurbishment	Municipal construction department	finished by 2020	reduce electric energy consumption by 5% and heating consumption by 15%
2016	Sustainable procurement catalogue	Municipality		improve energy efficiency, reduce negative environmental impact, role model function
2016	Continue energy efficient street lightening	Municipality, public utility		reducing energy use
2016	Development of a energy & climate protection concept for the industrial area	Municipality		obstacles: interested parties missing
2016	Develop a mobility management concept for improved rural-urban transport linkages in regards to a mobility central and a bicycle station at central station	Mobility coordinator, planning association, municipality, service providers		reducing individual motorized traffic

TIMELINE	MASTER PLAN + ADDITIONAL MEASURES, BOLD = HIGH PRIORITY	ACTOR	MILESTONES, DEADLINE	OPPORTUNITIES, CHALLENGES
from 2016 onwards	Energy-oriented city refurbishment & quarter management	Municipality	integrated city concept to begin in 2016	reducing energy consumption in historical buildings, using national funds
2018	Technical refurbishment of the heating & power plant Marienehe	Public utility		securing expansion potential of the long-distance heating system
2016/17	Green-IT in municipality	Municipality		energy reduction, role model function; obstacles: staff capacities
2030-2050	**Conceptualization for a conversion of the heating and power plant "Marienehe" to renewable energy**	Public utility	starting 2025	high CO_2-reductions; obstacles: technically difficult to assess and realize, last gas turbine change in 2014 leads to another 20 years of status quo run time - this investment pays off esp. if future focus is on Power2Gas
to be added	Roof-top solar systems			obstacles: housing companies have held back, for the cooperatives it is difficult for legal and tax reasons as energy production is not major operational field

The city's measures are mainly transport and energy related. The consumption and waste management part of the vision was discussed shortly through the concept of *sufficiency* where individuals question their wants and needs, asking what they really need, and hence reduce their resource and energy use. However, this proved to be too abstract for the participants to deduct measures. During the final discussion, the stakeholders highlighted the following main **opportunities:**

- The Master Plan should be considered by all decision makers in all sectors in Rostock or at least those responsible for implementing the measures, which is not yet the case,
- The energy alliance could host a showcase event where participants of the Master Plan present their implementation status, which would further strengthen the overall acceptance and understanding of the Master Plan,
- Focus could be placed on the prioritized Master Plan measures,
- Rostock has a lot of ambitious projects (see table of Master Plan measures above)

The following **challenges** were expressed:

- The city of Rostock will not be able to do this alone, financial support and expertise is needed.
- The implementation of measures may be disrupted by unforeseeable dynamics and technical developments,
- The concept of *sufficiency* is necessary, but difficult to mediate.
- Conflicts of interest exist: e.g., establishing or sustaining green space vs. building a compact city with high mobility and short distances (soil sealing)

BACKGROUND SCENARIOS, ROBUSTNESS OF ACTIONS, FEASIBILITY

Concerning the methodology, the technique presented during the training workshop was used only to a certain extent. This was due to the fact that the city of Rostock has gone through the process of developing a master plan in which they list measures to reduce the city's CO_2 emissions by 95% until 2050 and to raise energy efficiency by 50% compared to 1990 levels. As a result, the workshop had to include and build upon the measures listed in the Master Plan. This is why we started by listing and prioritizing the existing measures before applying the technique as presented during the training workshop, i.e., we put the actions on a timeline, discussed the obstacles and opportunities, and tried to add to the measures listed in the Master Plan.

However, although it was clear to the participating stakeholders that the measures listed on the timeline would not be sufficient to reach the 2050 vision, they were not ready to discuss measures beyond 2020 (with an exemption of two measures, see above). This was because of two reasons: On the one hand, participants could not imagine the world beyond 2020 and thus, could not think of any measures to be added for that time period. On the other hand, stakeholders did not want to make any commitments in the given context. The underlying background is that the majority of the participating stakeholders regularly meet in the framework of the *Energiebündnis* to discuss the

implementation of the measures listed in the Master Plan. Participants thus had the impression that they would commit to actually having to implement the measures if they would suggest them. Although it was highlighted by the moderator that the exercise was exactly about designing a theoretical future (as a first step), stakeholders refrained from making suggestions because, for the time being, they are busy implementing what they have already agreed upon earlier. This eventually led to the end of the discussion, although the atmosphere was still positive and constructive.

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. This is also the reason why no special check was done on feasibility: There was common sense that the measures already listed are indeed feasible and further critical measures could not be added.

III.VIII.III GENERAL REMARKS

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 expressed the following wishes or suggestions for the next workshop:

- 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 well planned for the next five years. However, participants did not identify the necessary measures for the years 2020 to 2050 due to the unforeseeable technical and political developments. More concrete milestones and indicators can therefore improve long-term planning and decision making.

III.IXTURIN

WORKSHOP DATES AND LOCATIONS

The first workshop was held on October 15th, 2014, at Castello del Valentino, one of the main locations of Politecnico di Torino. This workshop included both the presentation of the initial assessment results, and the definition of the 2050 post-carbon vision for Turin (in its relations with Milan).

The second workshop was held on December 3d, at the same location; it was focused on the back casting exercise.

PARTICIPANTS

Thirty people were invited to attend the first workshop; sixteen of them accepted the invitation, **fourteen** were actually present at the workshop. Thirty-eight people were invited to the second workshop; twelve of them accepted, **nine** were actually present at the workshop. Three people attended both workshops.

Different institutions were represented, so to cover most sectors:

- The Municipality by a member of the Transport Department, a member of the Urban planning Department and the coordinator of the Action plan for energy,
- Torino Strategica (the association which promotes strategic planning in the metropolitan area),
- Fondazione Torino Wireless (which coordinates and develops the ICT district in Piedmont region),
- Confindustria Piemonte and Collegio Costruttori Edili (the associations of the industrial and building entrepreneurs of the region),
- Three academic bodies (Politecnico di Milano, Università Bocconi and Alta Scuola Politecnica),
- SiTI (Higher Institute on Territorial Systems for Innovation),
- Dislivelli (an association for in regional planning in mountain areas),
- Agenzia per la Mobilità Metropolitana (which is responsible for public transport planning at the metropolitan level),
- RFI (the regional department of the national railway service),
- Car City Club (the local car sharing service) attended the workshop

As one can notice, the transport sector was highly represented as it is considered crucial for the integrated case study Milan-Turin (mainly focused on the opportunities offered by the high speed train connection between the two cities). On the other side, unfortunately, most of the invited experts of the environmental sector could not attend the workshops; as we will say, this has negatively influenced the building of the vision, but in the second workshop participants were able to identify milestones and actions also for the environmental dimension.

One member of FEEM (project partner of Pocacito in Milan) was also present; two participants (professors at Università Bocconi and Politecnico di Milano) were responsible in the last years of two researches about the relations between Milan and Turin.

Members of Politecnico di Torino coordinated the activities during the workshops and took part to the discussion.

The full list of names and institution for the two workshops is provided below.

First workshop

INSTITUTION	NAME AND SURNAME
Municipality – Department of Transport	Giuseppe Estivo
Torino Strategica	Riccardo Saraco
Fondazione Torino Wireless	Chiara Ferroni
Turin Action Plan for Energy	Gianfranco Presutti
Confindustria Piemonte	Cristina Manara
Collegio Costruttori Edili	Paolo Peris
SiTI	Chiara Casalino
Università Bocconi	Giuseppe Berta
Politecnico di Milano	Andrea Rolando
Alta Scuola Politecnica	Emilio Paolucci
Agenzia per la Mobilità Metropolitana	Andrea Stanghellini
RFI – Rete Ferroviaria Italiana	Natalia Picco
Car City Club	Tiziano Schiavon
FEEM	Andrea Bigano
Politecnico di Torino	Patrizia Lombardi
Politecnico di Torino	Stefania Guarini
Politecnico di Torino	Giulia Sonetti
Politecnico di Torino	Luca Staricco

Second workshop

Institution	Name and Surname
Municipality – Department of Urban Planning	Liliana Mazza
Torino Strategica	Riccardo Saraco
SiTI	Chiara Casalino

SiTI	Francesca Abastante
Alta Scuola Politecnica	Alberto Uberto
Agenzia per la Mobilità Metropolitana	Andrea Stanghellini
DIST - Politecnico di Torino	Luigi Buzzacchi
Associazione Dislivelli	Federica Corrado
FEEM	Cristina Cattaneo
Politecnico di Torino	Patrizia Lombardi
Politecnico di Torino	Stefania Guarini
Politecnico di Torino	Luca Staricco

III.IX.I METHODOLOGY AND RESULTS FOR VISION BUILDING

METHODOLOGY FOR VISION WORKSHOPS

The first workshop was structured according to the methodology presented in the training workshop at the partner meeting in Berlin on September 9 and resumed in the deliverable T4.2 *Case study workshop guidelines*.

First of all, the Pocacito project was illustrated to the participants by the team of Politecnico di Torino. After that, the agenda of the day and the objectives of the workshop were presented.

A quick introduction round was asked. Most of the participants turned out to already know each.

The results of the Initial assessment for Milan and Turin were illustrated through a Power Point and participants' feedbacks were gathered. Data were agreed; some stakeholders suggested integrating them with further indicators about demographic trends (as they can have major impacts on carbon consumption patterns), presence and investments of multination companies, and passenger journeys between Milan and Turin. In particular, as regards the interaction between the two cities, some participants outlined that – according to the researches realized until now - 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 socio-economic or territorial trends. Participants agreed that at the moment it is probably too soon to observe these trends, and at least five - ten years should be necessary.

The vision building exercise was implemented according to the three envisaged phases: 1) drawing, 2) identifying key words describing drawings, 3) structuring them in mental maps. Participants were split in three groups; each group was asked to turn around three tables so to interact with other groups' work. At the beginning, participants seemed quite embarrassed by the requested drawing tasks; but after a few minutes, they begun to discuss their vision inside each group and to graphically represent their ideas on the papers. The three groups showed different approach to the drawing task: one adopted mainly figurative drawings, another preferred more abstract and schematic representations,

the third one introduced synthetic verbal expressions; the integration of these methods in the final draft of the drawings turned out quite interesting.

Afterwards, each group tried to interpret and describe the three final drawings through key words; these key words were then structured in mental maps, according to main themes (described in the next paragraph) that were chosen by each group autonomously.

One member of each group orally illustrated to the others the vision schematized through the mental map, and the three visions were collectively discussed. Finally, the FEEM member illustrated the vision that emerged in the previous workshop 1 held in Milan.

During the whole workshop, the Politecnico members coordinated and helped the groups in their activities, took notes and photos of the results; two members joined directly the groups and contributed to the vision building process as if they were "external" experts.

The agenda of the workshop is provided below.

AGENDA	
13:00	Reception and registration
13:45	Presentation of the Pocacito project
14:00	Presentation of the workshop objectives
14:10	Introduction round (participants presenting themselves)
14:15	Presentation of the Initial assessment results for Milan and Turin and interactive discussion
14:45	Vision Building exercise - first part (drawing, key words)
16:00	Coffee break
16:15	Vision Building exercise - second part (mental maps)
17:00	Analysis and comment of the results
18:00	Conclusion

MAIN SECTORS IDENTIFIED IN VISIONING A FUTURE FOR THE CITY

As it has been said, the three groups were asked to organize their mental map of the vision according to axes and sectors that they could autonomously identify.

One group focused mainly on differentiation, as the frequency of the prefix multi- in the key words witnesses. For a former one-company town as Turin, differentiating economic sectors (but also transport modes, and so on) represents the key challenge. This process has already begun in the last fifteen years in the case of Turin, but must be systematically enhanced. At the same time, this differentiation must be "specialized": the sectors that have to be promoted and developed can be identified in the specific niches of specialization of the city. The group selected three main axes, specifying for each of them a few main issues:

MOBILITY

- Multimodality;
- Space as value (it is not sufficient to ease movement, it is necessary to improve the space through which people move)

ECONOMY AND EMPLOYMENT

- Multispecialization (in the sense of differentiation of the economy in many specialized niches);
- Tourism and mobility (as key economic sectors for the 2050 post-carbon Turin);
- Multiemployment (each person has to be ready to have different jobs in the subsequent phases – but also in the same phase – of her life);

SOCIETY

- High birth rates;
- Strong resilience;
- Social differentiation and, at the same time, integration;
- Quality of life;
- Strong identity, built on the historic and specific vocation of the territorial context

A second group saw in quality of life the key objective of the 2050 post- carbon Turin, to be pursued along two axes:

ECONOMY AND SOCIETY

- Sharing economy;
- Wealth redistribution;
- New jobs;
- More youth, more brains;
- Specialization of the territorial context.

TERRITORY AND INFRASTRUCTURES

- Strong territorial identity;
- Connections and networks;
- Territorial integration

- Smartness.

Finally, the third group identified in the dichotomy center / periphery (and particularly, in the relation between Milan and Turin, where the first is strongest than the second) the main problem to overcome. The answer will be represented by the smartness, mainly intended by the group as people connectivity through technology innovations that allow the sharing of services.

THE 2050 POST-CARBON VISION FOR YOUR CITY

Below there is an attempt to integrate the three "mental maps" elaborated by the groups. This picture of a possible 2050 post-carbon vision for Turin is built around the following three key concepts:

DIFFERENTIATION

- The economic base is structured in a few specialized sectors (for Turin, for example, automotive, tourism, ICT etc.); they represent the strengths that make the city competitive and more resilient to economic crisis;
- The mobility system at metropolitan level is organized to be multimodal; people (residents, tourists, businessmen) are less dependent on private motorization and can easily move by more sustainable modes.

IDENTITY

- Even if deeply differentiated, Turin will keep and enhance its identity thanks to strong social integration, high quality of life, promotion of young people initiatives and start ups;
- Spatial resources, cultural heritage and landscape are recognized and developed as a crucial value.

SMARTNESS

- Technology is systematically developed to connect people, both inside the city and between the city and the global world;
- Sharing is a new key paradigm, for granting services (first of all, mobility) but also as an opportunity for economic innovation and new business.

REFLECTIONS

As one can notice, the final vision described above is mainly focused on socioeconomic issues, while environmental aspects have been quite neglected. In particular, the workshop participants have not considered energy themes fundamental in building the vision of a *post-carbon* city. A short-medium

vision was predominant, and stakeholders seemed to have a hard time imagining how the city should be 35 years later.

III.IX.II METHODOLOGY AND RESULTS FOR BACK CASTING SCENARIOS

METHODOLOGY FOR BACK CASTING WORKSHOPS

The second workshop was organized according to the technique presented in the training workshop. First of all, the vision elaborated during the first workshop for a 2050 post carbon Turin was presented to the participants, as the normative desired end point.

The SSP scenarios were illustrated, with a main focus on the "middle of the road" SSP2 (which was chosen as the background reference scenario) and the two alternative scenarios (the "sustainability" SSP1 and the "fragmentation" SSP3) for the sensitivity analysis.

Participants were split in two groups, and asked to make a list of obstacles and opportunities till 2050 in achieving the vision. The members of the groups discussed their ideas and wrote them down on post-its; then, one member from each group described to the other group the proposed obstacles and opportunities, and placed them on a drawn timeline.

The same approach was used for milestones and actions: participants discussed them, wrote them down on post-its, and then pinned them on a timeline.

The final step was the robustness check: stakeholders were asked to assess if the proposed pathway would work – or need changes – also under the two alternative scenarios.

During the whole workshop, the Politecnico members coordinated and helped the groups in their activities, took notes and photos of the results.

The agenda of the workshop is provided below.

AGENDA	
9:00	Reception and registration
9:15	Presentation of the workshop objectives
9:30	Presentation of the vision from the first workshop
9:45	Presentation of the background scenarios
10:00	Identification of obstacles and opportunities
11:00	Coffee break
11:15	Identification of milestones and actions
12.30	Robustness check
13:00	Analysis and comment of the results
13:30	Conclusion

KEY POINTS OF THE SCENARIO

The stakeholders identified both short term (2015-2020) and long-term (2030-2040) obstacles.

The short-term obstacles were so described:

- The present global economic crisis is not contingent but structural, and entails lack of private investments.
- Italian public administration is weak, due to both debt load and lack of authority.
- Ecologic movements and policies are facing significant difficulties in these years, manly for lack of coordination.
- New models of governance/government are needed, also because of new institutional subjects (like the Metropolitan City, which has replaced the Province).

In the long term, obstacles to a post carbon transition could be represented by ageing process and lack of financial resources (e.g. venture capital).

Opportunities were instead grouped by the participants in short, mid and long term.

Between 2015 and 2020, advances in scientific knowledge and technological innovations (in particular, new apps for sharing services) could offer the possibility to reduce consumption of fossil fuels. A better integration could be achieved in public policies. Territories between Milan and Turin (in primis those which are better connected to their airports) can offer spaces and resources for new developments. The new institution of the Metropolitan City can be seen as a problem, as we have noticed, but also as the occasion for implementing more efficient policies. Finally, a new vision for Turin is now necessary, because the “Olympic city” one is finally out of date: the post carbon paradigm could be the core of this renovated vision.

In 2020-2030 period, new cultural models (as a consequence of the present economic crisis), new forms of collaboration between universities and local companies, and innovative smart technologies could emerge, opening major opportunities for post-carbon policies.

Also as a consequence of these mid term dynamics, stakeholder assumed that in the long term (2030-2040) the transport system (both for goods and passengers) in the city of Turin will be fully integrated and multimodal, and this will allow all economic sectors to work on more efficient and post-carbon standards.

Milestones and actions were identified for all the three dimensions of sustainability, and were aligned on the timeline in this way:

TIME	MILESTONES	ACTIONS

2020	Reduction of soil consumption	Preserve natural and agricultural soils
		Re-naturalize abandoned built areas
		Promote instruments for moving and concentrating building rights in the empty spaces inside the existing city
2020	Facing the ageing society	Enhance social housing
		Develop user-friendly technologies
		Improve welfare through ICT
2020	Turin as a touristic city	Create innovative offers and holiday packages for tourists
2025	20% reduction of emissions from buildings	Spread adoption of certifications of energy performance
		Adopt incentives to building renovation
2030	New jobs from green tech	Increase cooperation between universities and local companies
		Innovate financial tools for R&D and startups
		Promote renewable energy sources
		Enhance tertiary education in scientific issues
2035	50% reduction of emissions from transport	Introduce congestion charge
		Foster telecommuting
		Halve use of private cars through promotion of more sustainable mode of transport
2040	Turin as an inclusive and "shared" city	Define new models of education and training
		Innovate tools and resources for welfare

BACKGROUND SCENARIOS

Participants were asked to identify opportunities and problems, milestones and actions based on the "middle of the road" SSP2 scenario that was illustrated at the beginning of the workshop. As a last task, they were asked to evaluate the robustness of the proposed actions according to two alternative

background scenarios: the “sustainability” SSP1 and the “Fragmentation” SSP3, which respectively set low and high challenges (instead of the intermediate challenge of the SSP2 scenario) in reaching the 2050 post-carbon vision.

ROBUSTNESS OF ACTIONS AND FEASIBILITY

Participants claimed that they found not easy 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. But 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.

REFLECTIONS

Stakeholders were able to identify a complex and articulated list of obstacles, opportunities, milestones and actions, and to order them along a timeline.

Sometimes, distinction between milestones and actions was not so evident: some proposed actions seem objectives, rather than actual implementable policies.

In fact, 2040 is the final term actually considered in the pathway by stakeholders, which found too difficult to think about policies to be implemented in 35 years. Also the robustness check turned out to be too ambitious for this workshop.

III.IX.III GENERAL REMARKS

Stakeholders perceived the proposed activities in the two workshops quite challenging: 2050 turned out to be a very long term for defining a vision and a pathway to achieve it. The actual economic crisis has hit Turin hard: local actors are concentrated in searching an exit strategy in the short term, and seem to find difficult to have a long term perspective.

Another interesting issue is the weak importance of the environmental dimension in local visions and strategies: actors working in economic and social sector scarcely consider post-carbon policies as a real opportunity for improving quality of life and increasing economic competiveness.

So, the two workshops have had this main positive impact: they stimulated local actors to adopt a long term, strategic approach, and to recognize that a post-carbon vision can represent a key issue in the local agenda.

III.X ZAGREB

WORKSHOP DATES AND LOCATIONS

November 19, 2014 – Initial Assessment and Vision Building Workshop

December 2, 2014 – Back casting Workshop

The location for both workshops was Impact HUB Zagreb in Vlaška Street, close to city center.

PARTICIPANTS

25 stakeholders from Zagreb came motivated to engage in discussion and contribute their expertise throughout the Workshop 1 and 2. Participants were coming from diverse institutions and fields: Nongovernmental Organizations, Institute of Social Science, Political Foundation, National Energy Institute, Social enterprise, Energy company, Faculty of mechanical engineering and naval architecture, Faculty of architecture, Association of architects of city, Media representatives, Health public institute, Ethical bank, City office for strategic development.

Full list of the participants:

NAME OF THE PARTICIPANT	AFFILIATION	PRESENCE AT WORKSHOP 1	PRESENCE AT WORKSHOP 2
Valerija Kelemen Pepeonik	City Office for Strategic Planning and Development of the City	YES	YES
Vladimir Lay	Institute of Social Sciences Ivo Pilar	YES	no
Jelena Puđak	Institute of Social Sciences Ivo Pilar	YES	YES
Tomislav Tomašević	Heinreich Boell Stiftung	YES	no
Tena Petrović	Zagreb Society of Architects (DAZ)	YES	YES
Lidija Srnec	Croatian Meteorological and Hydrological Service	YES	YES
Željka Fištrek	Energy Institute Hrvoje Požar	YES	no
Željko Jurić	Energy Institute Hrvoje	no	YES

	Požar		
Gordana Dragičević	NGO Parkticipacija	YES	YES
Vladimir Halgota	NGO Cyclists Union	YES	no
Vera Đokaj	Cluster for Eco-Social Innovation and Development CEDRA	YES	YES
Edo Jerkić	Energy Cooperative ZEZ	YES	YES
Maja Božičević	Society for Sustainable Development Design (DOOR)	YES	YES
Žana Barišić	Political Party ZA GRAD	YES	no
Lin Herenčić	Energy and Environmental Protection Institute	YES	YES
Kata Marunica	Zagreb Society of Architects (DAZ)	YES	no
Matijana Jergović	Health public institute	YES	YES
Goran Krajačić	Faculty of mechanical engineering and naval architecture	YES	YES
Ivan Kardum	Ethical Bank	YES	no
Rene Lisac	Faculty of architecture	no	YES
Kristina Careva	Faculty of architecture	no	YES
Cvijeta Biščević	NGO Parkticipacija	no	YES
Marina Kelava	Association for Independent Media Culture	YES	YES
Neven Višić	NGO e-Student	no	YES
Robert Pašičko	UNDP Croatia	YES	YES
Sandra Vlašić	UNDP Croatia	YES	YES
Zoran Kordić	UNDP Croatia	YES	YES

The participants more less equally represented all sectors. Each important sector was covered by stakeholders who are working in that area. Even before the workshops, list of potential participants was prepared on the way that each of participants has their substitute in case he/she cannot participate in both of the workshops. This way, it was escaped to have different number of participants during the workshops.

III.X.I METHODOLOGY AND RESULTS FOR VISION BUILDING

The technique presented in the training workshop was followed. The process started with the stakeholders drawing their visions after which they summarize the drawings and organize it in the form of mind map. Stakeholders accepted the proposed process methodology. Drawings phase ensured relaxed atmosphere among participants so they were able to free their mind and express their ideas.

MAIN SECTORS IDENTIFIED IN VISIONING A FUTURE FOR THE CITY

Sectors that got most of the attention were urban planning, energy, agriculture (food production), transport and sociology.

THE 2050 POST-CARBON VISION FOR THE CITY

During the group work participants discussed internally about the narratives of the vision with the following results:

- The city that produces zero waste and pollution, every by-product is raw material or energy product for other activities. At the same time, the economy is largely localized, with a neutral ecological footprint or better. Looking at maximisation of use of certain resources, and minimizing the number of mediator between producers and consumers.
- The city, which is planned in an integrated way, intended with the aim of activation public spaces, with a decentralization of activities and development of polycentricism and all that through the civil participation.
- The city that is compact, planned in accordance with demographic predictions, which recycles its spaces, encourages multi-functional and energy efficient construction connected with quality infrastructure that, among other things, allows sustainable mobility.
- The city that keeps its natural environment and natural resources encourages the symbiosis of urban and rural areas inside the preserved green zone.
- The city that is a leading healthy city with happy and long-lived citizens with available healthy adequate water for drinking highly standardized organic food, good air quality, and a waste management system.
- The city in which long-life, free, critical, creative and holistic education is available for everybody, produces active citizens.

The final vision was shaped in the group discussion and is as following: *Healthy city of circular economy and neutral environmental footprint.*

REFLECTIONS

The results of the narratives are encouraging. Participants take the whole process seriously and during the group work they produced very solid basement for the vision. It was interesting to see the influence they had on each other which helps to create interdisciplinary in the vision narratives. The narratives of the vision were not too specific and not too broad so the goal of the vision workshop was achieved.

III.X.II METHODOLOGY AND RESULTS FOR BACK CASTING SCENARIOS

The workshop was huge success in terms of shaping the final narrative for the vision and by creating the roadmap with identified strategic goals and measures. The back casting method, which was used to define steps towards the vision, proved to be successful and well accepted by participants.

METHODOLOGY FOR BACK CASTING WORKSHOPS

The technique presented in the training workshop was followed. The transition timeline was posted on the wall. It was showing a line running from 2015 to 2050 with four main areas representing years 2015, 2020, 2030 and 2050. Participants were invited to write down opportunities, challenges, milestones and objectives on post-its and post it on the transition timeline. At times participants were a bit confused with the terms (e.g. differences between milestones and goals) at the timeline so additional explanation was needed.

KEY POINTS OF THE SCENARIO

Participants mostly focus on until 2020 period. They were also more creative when discussing about near future. However, they were asked to post same number of post-is for each timeline period so each category was equally filled at the end.

Results from the timeline for each year are:

YEAR 2015

Opportunities: EU funds, economic crisis, a clean environment, transport, waste management, education, mild climate, strengthening multidisciplinary teams of citizens

Threats: corruption, migration, politicians without vision, wars, increasing poverty, growth of the motorized vehicles, dysfunctional system, dissatisfaction due to the reduction of spending possibility, social apathy about climate changes

Milestones: a high level use of the EU funds, bicycles paths, city offices to consult on new projects, construction and acceptance for sustainable waste management, areas, resources, processes; city offices are constantly consulting about new projects

Goals: education-the new subject on the topic about sustainability, an availability of healthy adequate water, air quality for a minimum 75% of population, intersectoral collaboration at projects, a local

decentralized biogas production, media reporting on low-carbon projects, sustainable management of the city

Measures: a good election of politicians, encouraging construction of hydroelectric power station, food production in kindergartens and schools, monitoring greenhouse gases, establishing inter-sector working group, encouraging local initiatives

YEAR 2020

Opportunities: democracy, growing percentage of the highly educated, social innovations, 100% organic agriculture, consequences of economic crisis, recycling areas, climate changes, local production and consumption, transport, using biogas, EU funds

Threats: bureaucracy, society without solidarity, corruption, not including citizens in the policy of the city

Milestones: objectively informing the public, obtain resources from EU projects, co-financing and monitoring factors from environment, regulations about obligate sorting of waste, transparency of low-carbon projects, waste management, awareness about green technology

Goals: stations for sorting waste, network of bicycle path, a new form of education, biogas and compost production from organic waste, decreasing number of motorized traffic for 25%, ecological agriculture, economic and social community, „green jobs“, educated and activate citizens, decreasing carbon emission, investment in local and renewable sources of energy and energy efficiency, increasing bio capacity of green areas, increasing biodiversity

Measures: penalties for contempt regulations, using renewable energy for constructions of buildings, professional training of teachers, energy reconstruction of the buildings, priority measures for development of the low-carbon city, decreasing greenhouse gases, activism, tax relief for „green jobs“, using agro ecology in the management of public green areas,

YEAR 2030

Opportunities: green jobs, awareness about climate changes, green technology, healthy food, sustainable management, changes in consciousness about sustainability and conservation of resources

Threats: greed, corruption, limitation in freedom of action (cultivation, production) in the case of incomplete monitoring

Milestones: climate changes, monitoring the quality of environment and health, the city at the river Sava (4 hydroelectric power station, green urban areas, new traffic path), localization and circular system, production of high quality compost for the soil, increase bio capacity and resistance of flora and fauna, increasing number of bicycle users, possible energy production in the household, use of low carbon technology

Goals: education, the city produce 40% their own food, green technology, circular economy, 50% use of renewable energy

Measures: agro ecology, increasing areas for food production, urban gardens, local composting, increasing energy consumption for 70%, education, and monitoring the quality of environment

YEAR 2050

Opportunities: energy efficiency, agriculture, land management, increasing level of the knowledge, export knowledge

Threats: climate changes, absence of resources, nuclear energy, oil, spending EU funds, enable centralized heating system

Milestones: storage CO2 in soil, management of public green areas, public transport

Goals: neutral ecological footprint, circular economy, zero waste, 95% food and energy production, clean air, happy citizens, green areas, new technology

Measures: adaptation measures to climate changes, construction of infrastructure for public transport, production owned by the user

Strategic goals are:

C1) Circular economy

C2) A participative management of public services and public spaces

C3) Healthy and solidarity community

The related measures are (the number is associated to the number of strategy):

M1) Comprehensive schools and kindergartens with practical-skills learning

M1) Promoting social entrepreneurship

M1) Conversion of existing unused urban spaces for start up business

M1) Breaking the monopoly and creating the conditions for socio-green businesses

M1) Survey of available local resources and new technologies for circular economy

M2) Optimization and planning of space usage in accordance with the needs of the community

M2) Education as a basis for the involvement of citizens

M2) Co-decision and participation budget decision making

M2) Development of walking and cycling trails

M2) Transparent public administration and informed citizens

M3) Implementation of the Climate Change Adaptation Plan

M3) Expansion of existing measures for air quality monitoring and implementation of measures for reducing greenhouse gas emissions

M3) Broad implementation of measures for preventive medicine and increasing the number of healthy workers

M3) Establishment of incentives for craftsmen jobs

M3) Promoting horizontal and vertical communication of civil society, with themselves and others

M3) Promoting of incentive measures for formal and informal education

The related actors are (the number is associated to the number of strategy):

A1) Relevant city offices

A1) Civil society organizations

A1) Small and medium enterprises

A2) Relevant city offices

A2) Civil society organizations

A2) Media

A3) Relevant city offices

A3) Department of public health, city of Zagreb

A3) Civil society organizations

BACKGROUND SCENARIOS

Middle of the road scenario was used as a background scenario. Three areas were highlighted and visible on the transition timeline: demographic trends, expected rise of GDP and share of urban population in Croatia.

ROBUSTNESS OF ACTIONS

Only middle of the road scenario was tested. Other scenarios were presented but they did not influence the results from back casting workshop.

FEASIBILITY

Reaching the 2050 post-carbon vision was tested only under middle of the road scenario.

III.X.III GENERAL REMARKS

The stakeholders expressed their satisfaction in participating at the workshops. However, they pointed that they expect from this process some tangible results. In that regards, it is of huge importance that City Office for Strategic Development is engaged in the whole process so that any final outcome of the process can be transferred to City Development strategies. Also, informing participants on project progress or anything related to the issue is critical to keep them engaged in the process, because otherwise they might feel “exploited”. In addition, it would be great to have joint online platform for case studies so that each case study leader can exchange their experiences with other case studies leader. This way, participants from different cities can also access this platform and meet participants from other cities thus creating large network of “transition movement”.

IV JOINT CASE STUDY CITIES

IV.I.I MILAN

Workshops for Turin and Milan were held separately. During the Milan workshops no member of the POLITO team was able to participate. Although the presentation of indicators included data for both cities, stakeholders tended to limit all discussion to Milan during both the Initial Assessment presentation and the Vision Building exercise. When explicitly asked to comment on the relationship between the two cities, stakeholders suggested that both cities might collaborate on the platforms of technology and innovation in the future, rather than on integration between housing and labor markets as initially assumed on the basis of acceleration of railway connections. However, the difference in their industrial pasts (i.e. Torino as an automobile industry hub) sets them apart significantly, and the physical distance (i.e. the fast train is not so fast) is far enough to keep the two cities separate in many ways. The integration between the two cities was implicitly described as a strategy brought forward by Turin, which is undergoing a heavy deindustrialization process, and is experiencing problems with collapsing real estate and labor markets, and might thus have a greater interest in increasing integration with Milan, especially with regards to the labor market. Milan stakeholders recognized that Turin might have a better capacity for supporting technological innovation for energy efficiency than Milan, yet a Milan stakeholder who resides in Turin contested this.

IV.I.II TURIN

A member of FEEM attended both workshops in Turin and presented the results of the workshops organized in Milan. Stakeholders from two universities in Milan (Politecnico and Università Bocconi) attended the workshops in Turin.

During the first workshop in Turin, although explicitly asked and stimulated to keep in mind the relation between Milan and Turin, participants tended to focus on Turin as a separate territorial object. In particular, participants did not consider a major integration of the two cities as an opportunity for the vision, neither for promoting post-carbon policies, nor for improving the competitiveness of Turin.

During the second workshop, stakeholders had to think over the right territorial and institutional level to implement post-carbon policies and actions: they recognized 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 national level, but have to cooperate in order to be able to compete in the global context; moreover,

the two cities have different economic specializations which can be complementary for promoting technological research and development.

IV.I.III MALMÖ/COPENHAGEN

Due to the positon of visions in strategies and policies in Copenhagen, and the subsequent change of method for examining visions in urban transitions to post-carbon futures that we made, the case studies in Copenhagen and in Malmø have followed divergent tracks and been conducted in different ways. Moreover, it has been very difficult to coordinate time and facilities across the two cities.

Copenhagen is significantly larger than Malmø and is the capitol and the centre of the regional metropolitan urban where Malmø is included. In the Copenhagen visions, strategies and polices, Malmø is therefor included as a significant for creating a strong and solid labour market. For example, the growth strategies build on the Øresund Region as a coherent labour market, and the Action plan for green mobility is based on increase transport across the sound. Thus, in developing the visions for Copenhagen, policy makers have focussed on Copenhagen rather than Copenhagen-Malmø, though a closer integration between the adjacent cities is mentioned.

V CONCLUSIONS

The form of stakeholder workshops was chosen in the POCACITO project in order to create participated visions for urban post-carbon futures in the case study cities. It assumed that a real life policy process could be simulated or even initiated by this activity in the case study cities, and that these workshops could represent an arena for exchange and negotiations of different interests and stakes with regards to a vision for the future of the urban area. In reality, engaging different kinds of stakeholders was not such an easy task in many cases. The reports from the workshops do not reveal traces of conflicting views on the future visions or on actions to be undertaken, so it can be assumed that, despite the apparent variety of stakeholders (representatives from public administrations, NGOs, and the private sector are prevailing), the reports do not reflect on conflicting views inside the workshop groups.

Despite this finding, the workshops have yielded a rich variety of interesting and relevant results from the different case study cities. In all cases, the local knowledge and information on policy conditions and prospectives of socio-economic development have granted a credible mix of well-founded elements, and the necessary visionary elements that are needed for obtaining a low-carbon future.

Differences in the results obtained depend on the different socio-economic situations characterizing the case study cities. These differences have obviously influenced their ambitions and priorities for future development determined in the individual case study cities (for a further analysis of the visions, refer to deliverable 4.3).

Furthermore, variations in how the common POCACITO methodology has been applied have generated some diversity in the output. The design of the workshops aimed at favoring the participated definition of a vision, using techniques which were, as far as possible, able to allow participants to think “out of the box” by fostering a creative and collaborative atmosphere. The means of expression proposed – drawings rather than words – represented an important element for creating a disruption from predefined day-to day discourses. Nevertheless, this technique turned out to not be applicable in all contexts, due to different policy and communication cultures and/or to different availability of stakeholders. For this reason, in some cases, interviews instead of interactive workshops had to be conducted, and in workshops verbal expressions were used instead of drawings. In one case, artists were engaged for visualizing the verbal discourses.

Results emerging from the workshop reports differ slightly, especially with regards to the capacity of the workshop participants to imagine a different future. In the case of Lisbon, the vision and the back casting scenario were built on the basis of interviews and a final validation workshop. This choice reflects on the scarce ambition of the vision obtained, as opposed to reclaiming a stronger attention towards novel elements, which have not been provided within the vision for this city. In cases as Malmö and Litoměřice, the creative elements of the approach have been implemented, and results reported show highly ambitious and creative visions for the cities. Also for other cities, positive feedback from participants with regards to the workshop design is reported. Different reports mention that the initial irritation from being constrained to use drawings rather than words for representation the vision was quickly overcome, and the report on Rostock mentions the

stakeholders expressing satisfaction with regards to the added value provided by the workshops. The workshops helped establish, according to this feedback, "*a shared mental model of the vision for Rostock*". It concluded with an appreciation of added value that a vision building exercise can provide in the context of policy making: "*with dreams reality begins*".