

# **Visions of UNaLab Follower Cities**

D6.5 Joint Vision Report 24/05/2019

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#### Note

This report is designed in A3 landscape format to provide sufficient space for important visuals and to fit tables and figures properly.

#### About UNaLab

The UNaLab project is contributing to the development of smarter, more inclusive, more resilient and more sustainable urban communities through the implementation of nature-based solutions (NBS) co-created with and for local stakeholders and citizens. Each of the UNaLab project's three Front-Runner Cities - Eindhoven (NL), Genova (IT) and Tampere (FI) – has a strong commitment to smart, citizen-driven solutions for sustainable urban development. The establishment of Urban Living Lab (ULL) innovation spaces in Eindhoven, Genova and Tampere supports on-going co-creation, demonstration, experimentation and evaluation of a range of different NBS targeting climate change mitigation and adaptation along with the sustainable management of water resources. The Front-Runner Cities actively promote knowledge- and capacity-building in the use of NBS to enhance urban climate and water resilience within a network of committed partner cities, including seven Follower Cities - Stavanger, Prague, Castellón, Cannes, Başakşehir, Hong Kong and Buenos Aires - and the Observers, Guangzhou and the Brazilian Network of Smart Cities. Collaborative knowledge production among this wide network of cities enables UNaLab project results to reflect diverse urban socio-economic realities, along with differences in the size and density of urban populations, local ecosystem characteristics and climate conditions. Evidence of NBS effectiveness to combat the negative impacts of climate change and urbanisation will be captured through a comprehensive monitoring and impact assessment framework. Further replication and up-scaling of NBS is supported by development of an ULL model and associated tools tailored to the co-creation of NBS to address climate- and water-related challenges, a range of applicable business and financing models, as well as governance-related structures and processes to support NBS uptake. The results of the project will be a robust evidence base and go-to-market environment for innovative, replicable, and locally-attuned NBS.



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# **Section I — Introduction**



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#### **1.1.** Purpose and target group

The main objective of WP 6 is to develop an NBS Replication Framework for the replication of NBS in follower and front-runner cities in the context of an integrated urban ecological approach. The approach integrates four pillars to maximise impact with nature-based solutions for climate and water resilience: Replication, Exploitation, Dissemination and Communication. WP6 - Exploitation, Replication and Roadmapping focuses on the Replication pillar.

WP6 addresses issues related to NBS implementation. These include barriers to NBS implementation as well as strategies, models, and frameworks for use by municipalities to overcome these barriers. A dedicated set of activities delivers tools including investment strategies, as well as governance and business models directed at different target groups focusing on the exploitation and replication or scaling-up of the solutions. The focus is on matching demand and availability. The follower cities work together with the front runners in a specifically designed set of activities, including training sessions, workshops, meetings and staff exchange. The activities focus on the cities' individual NBS roadmaps, with the aim of creating a further toolbox for local governments that want to use this methodology to create more inclusive nature-based strategies.

This report is one of the deliverables of work package 6 of the UNaLab project and focuses on vision development. It presents the system analysis, ambitions, and visions of the follower cities. But it also contains the Drivers for Change for climate resilient cities that can be used by other cities to develop their own vision.

The target group of this report consist of (among others):

- Cities that are interested in addressing their climate and water resilience with nature-based solutions;
- Knowledge institutes that perform research on climate and water resilience in cities;
- Stakeholders in cities that are concerned about and/or involved in projects to improve climate and water resilience.

### **1.2.** Approach and methodology

The EU follower cities Başakşehir, Cannes, Castellón, Prague and Stavanger, and the non-EU replication stakeholders Buenos Aires and Hong Kong are selected to represent differences in culture, urban structure, governance organisation and climate. They are widely geographically distributed. Their commitment to the UNaLab project ensures a widespread dissemination of project outcomes, translation of project deliverables to diverse social and cultural contexts and the

• Companies that offer nature-based solutions and related services;

potential for widespread transformative actions utilising NBS to enhance urban climate and water resilience.

The approach is characterised by four main elements:

- Backwards planning the project starts with the development of a shared vision as a starting point for the creation of a well developed path to achieve the vision.
- Inclusive workshops in the cities a cooperative process to engage key stakeholders (companies, citizens, public and private organisations and knowledge institutes) within the region in co-creating a clear and well-designed implementation plan with a stronger commitment to the joint effort in the realisation phase.
- Expert knowledge is sourced in a practical and usable form during the vision development and roadmapping processes.
- A visual language is used to easily connect people and share insights.

WP6 relies heavily on the involvement of local stakeholders. They are involved at a much earlier stage, and with a more far-reaching involvement than in other widely used strategy development processes. These stakeholders include not only those who benefit from the naturebased solutions such as citizens themselves, but also relevant research and industry partners. Workshops are held in UNaLab follower cities to support each step of the roadmapping process. This facilitates the establishment of a local/regional community of practice, engaging key stakeholders in the development of clearly defined, comprehensive urban strategies for each municipality. Stakeholder participation is essential for a lasting commitment to long-term cooperation and shared of responsibility throughout the implementation of co-developed plans.

At the end of the roadmapping activities each UNaLab follower city has a sustainable urban strategy. This consists of a future image scenario, a roadmap and a handbook describing individual and joint projects to support the implementation of co-developed policies and measures to achieve an innovative NBS.

The UNaLab follows a 5-step approach (see figure on page 10), including:

- 1. Systems Analysis
- 2. Ambition Setting
- 3. Vision Development
- 4. Replication framework
- 5. Roadmapping

This report covers step 1, 2 and 3. The upcoming report D6.7 (due mid 2020) will cover all 5 steps.

The activities and results of systems analysis, ambition setting and vision development are described in more depth in the following sections.

#### **1.2.1.** Introduction to the follower cities

Section II of this report describes the situation in the cities today. This includes brief introduction to the city, the challenges they are facing for climate and water resilience and the projects and activities that are already started to increase resilience and implement nature based solutions.

#### 1.2.2. Systems analysis

Section III presents the results of the Systems Analysis.

For the purpose of understanding the status quo as a point of departure toward achieving the desired future vision a systems assessment is conducted in five EU Follower Cities. The approach utilises and builds on the Morgenstadt Systems Assessment Tool, which has been applied to assess sustainability performance and support the development of projects to strengthen sustainability in a range of European cities. For the purpose of the project, the tool has been enhanced and configured to focus more specifically on the topics of climate change adaptation and nature-based solutions. Three layers of assessment are taken into account analysing (I) social, economic and environmental pressures on a city (II) technical and organisational responses to the perceived challenges and (III) the local context-specific enablers, barriers and opportunities that must be taken into consideration when fostering the development of NBSrelated projects. The analysis also serves to map potential stakeholders to help support the road-mapping development process, as well as identify potential sites for NBS implementation. A detailed description of the methodology can be found in section III.

#### **1.2.3.** Ambition setting

Section IV presents the results of the Ambition Setting step.

Ambition workshops are held in each EU follower city which include several sessions with policy makers, strategy department and internal and external stakeholders. These aim to obtain a thorough understanding of the ambitions and specific context of each city. Local stakeholders are invited to ambition setting workshops using the network of the follower cities. The result of the ambition workshop is a set of strategic ambitions, reported in a similar format for each follower city to facilitate learning between the cities. The Joint Ambition Workshop with all the UNaLab EU cities is used to present the follower cities' strategic ambitions, providing an opportunity for the cities to learn from each other and to identify shared and specific ambitions.

#### **1.2.4.** Vision development

Section V presents the results of the Vision Development step.

To develop the ambitions of the UNaLab follower cities into specific desired future scenarios, input is collected from two perspectives: · Future Telling interviews are held with thought leaders on climate and water resilience. The results were presented at the Joint Ambition Workshop held in Eindhoven in May 2018. Follower cities use this information to select the most relevant Drivers for Change for their

- ambitions.

Inspiration from front-runner ULLs, results of the Future Telling interviews and defined ambitions is used to create future visions for the follower cities. Scenario workshops are held in each EU follower city. These include several sessions with internal and external stakeholders to define and visualise the desired future for the city. The result of each scenario workshops is a poster with the desired future scenario (containing a visual and brief explanatory text).

The desired future scenario's will be used together with the results of the systems analysis and replication framework to create roadmaps. This will be reported in D6.7.





• For inspiration regarding visions on climate resilience and potential solutions, the follower cities visit the ULL of the front-runner cities.

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# **Section II — Introduction to the follower cities**



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# **UNaLab Follower Cities**



## **Stavanger Kommune**

- Population: 130.000 (1867 inhabitants/km<sup>2</sup>)
- Area: approx. 70 km², of which 66 km² land and 4 km² water



## Hlavni mesto Praha

- Population: 1.270.000 (2.416 inhabitants/km<sup>2</sup>)
- Area: approx. 496 km<sup>2</sup>



- Area: approx. 109 km<sup>2</sup>



## **Commune de Cannes**

- Population: 75.000 inhabitants and 2.000.000 visitors each year
- Area: approx. 20 km<sup>2</sup>, with a shoreline of about 16 km



## **TC Başakşehir Belediyesi**

- Population: 350.000 growing to 800.000 by 2020
- Area: approx. 105 km<sup>2</sup>

## **UNaLab Replication Stakeholders**



## Ayuntamiento Castellón de la Plana

• Population: 171.000 (1569 inhabitants/km<sup>2</sup>)

### **Buenos Aires**

- Population: 3.091.000 (15.226 inhabitants/km<sup>2</sup>)
- Area: approx. 202 km<sup>2</sup>

## **Hong Kong**

- Population: 7.191.000 (6.514 inhabitants/km<sup>2</sup>) •
- Area: approx. 1.104 km<sup>2</sup>

### **2. PRESENTING THE FOLLOWER CITIES**

#### 2.1. Introduction

The EU follower cities Başakşehir, Cannes, Castellón, Prague and Stavanger, and the non-EU replication stakeholders Buenos Aires and Hong Kong are selected to represent differences in culture, urban structure, governance organisation and climate. They are widely geographically distributed.

In this chapter each of the follower cities are presented with a general introduction to the city, the climate related challenges and previous projects.

In each of the follower cities also discussions were held with the local stakeholders to get insight in the reality of the cities today. This resulted in a description of achievements, challenges, barriers and opportunities for each of the cities.

#### 2.1.1. How to read this chapter

This chapter introduces the follower cities Stavanger, Prague, Castellón, Cannes and Başakşehir, and presents the results of the discussions related to today's reality in the cities.

At the end of this chapter the observer cities Buenos Aires and Hong Kong are briefly introduced.





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Stavanger, Norway's densest populated municipality



The city centre with the harbour 'Vågen', the main square and the historic centre on the right





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*'Vågen' with historic wood buildings / boat houses along the harbour (now restaurants & pubs)* 

Old town, a popular tourist area and beautiful living area

#### 2.2. Stavanger

#### **2.2.1.** Introduction to the city

The coastal city of Stavanger is the administrative, economic and cultural centre of Rogaland county and seat for the University of Stavanger, the county governor, county administration and several national and international businesses. Stavanger is the fourth largest city of Norway and Norway's densest populated municipality with 133 000 inhabitants. Together with surrounding municipalities Sandnes, Sola and Randaberg, Stavanger represents the country's third largest urban area with around 300 000 inhabitants.

The Stavanger region is well known as the energy capital of Europe, but is today challenged to change towards a greener and more sustainable outlook. For example: Nordic Edge Smart City Innovation Cluster, the official Norwegian Innovation cluster on Smart Cities and Communities; The Norwegian Smart Care Cluster on welfare technology and the Norwegian Tunnel Safety cluster are located in Stavanger. Since 2009 the city is a member of Covenant of Mayors Agreement, and since 2013 an associated member of the Eurocities' environment and knowledge forums, and coordinates its environmental and sustainable actions accordingly.

The strategy of Stavanger is based on long-term development with respect to environmental issues, diversity, public health and societal security and a long tradition of citizens involvement. Green solutions are important factors in the urban planning in Stavanger and green belts throughout the city are important both for recreation purposes, as well as for water and air management.

#### 2.2.2. Climate related challenges

Stavanger is located on the south-west coast of Norway and has a coastal climate with approx. 170 days of rainfall per year. Due to climate change, experts foresee an increase in rainfall, putting an increased pressure on storm water management to prevent flooding. Furthermore, the expected sea level rise is likely to have consequences for Stavanger on a long term. The city is already putting an increased emphasis on alternative solutions to storm water management and climate change adaptation through the use of blue-green infrastructure. However, these measures need to be further developed as part of the NBS concept.

#### 2.2.3. Relevant previous projects

#### ROBÆR

In the project ROBÆR project (Resilient and sustainable local communities), local storm water management combined with blue and green initiatives are part of the solution. Stavanger is establishing two demonstration plants related to surface water: a dam and area adjustment in Emmaus recreational area, and an installation for local surface water management to prevent flooding against residential areas at Hinnaberget. Our partner in the project, NIBIO, runs a demonstration project on green roofs. http://www.nibio.no/prosjekter/ robuste-og-brekraftige-lokalsamfunn

• Triangulum

Stavanger is a partner in the Horizon 2020 project Triangulum. The three point project Triangulum is one of the three European Smart Cities and Communities Lighthouse Projects, set to demonstrate, disseminate and replicate solutions and frameworks for Europe's future smart cites. The flagships cities Manchester (UK), Eindhoven (NL) and Stavanger (NO) will serve as a testbed for innovative projects focusing on sustainable mobility, energy, ICT and business opportunities. The project consortium combines interdisciplinary experience and expertise of 22 partners from industry, research and municipalities who share the same objective and commitment to develop and implement smart solutions in order to replicate them in the three follower cities Leipzig (D), Prague (CZ) and Sabadell (ESP). The overall budget of Triangulum is 30 million Euros (2015-2020). The European Commission funding (Horizon 2020) accounts to 25 million Euros. The project is coordinated by Fraunhofer IAO in Stuttgart and supported by the Steinbeis-Europa-Zentrum.

• Green urban development

Madla – Revheim is a new housing area located 5 km outside of the city centre of Stavanger. The master plan contains 4000 new housing units, a new school, nursing home and kindergartens, in addition to an existing school. In the centre of the area, with arms stretching out to the surrounding green structure, lies «the green heart», a large sporting field and blue/green structure that will provide the new residents recreational and activity areas. The blue-green structure contains open water-solutions, and as a part of the storm-water management- and biodiversity-plan, a closed stream will be opened and lead the water to Hafrsfjord.

European Commission

- ANYWHERE with regards to sea level rise.
- Stavanger Smart city



The Horizon 2020 programme ANYWHERE takes on the task of enhancing emergency management and response to extreme weather and climate events. As part of the project, a model for early storm surge warning has been developed and adapted to the Stavanger region. This adds to several initiatives the municipality is working on

Stavanger is the first municipality in Norway with its own Smart City Office. Based on Stavanger's smart city roadmap, the Smart City Office is a facilitator for new projects and encourages the cooperation and cocreation across municipal departments, industries, knowledge institutions and citizens. The following five topics have been selected as priority areas in Stavanger's smart city work over the years to come: Health and welfare, Education and knowledge, Energy, climate and environment, Urban art and Governance and democracy. Opportunities for broad cooperation in industrial and commercial development and international commercialisation, climate and environment are given great emphasis in all priority"



Stavanger presented their achievements and challenges in the training session - some illustrative images are shown on this page. During the ambition workshop from 6 to 8 December 2017 the achievements and challenges were further discussed together with opportunities and barriers.



An overview of the city landscape: near the sea, several lakes and well-established green structure



The city centre harbour during a storm



Flooding of the underpass during heavy rainfalls at Jåttåvågen





Master plan for city centre, including green belts

Blue-green structure at Madla - Revheim is part of the main concept for the development



Flood route mapping and simulation for climate adaptation

#### 2.2.4. Today's reality

During the Ambition Workshops of 6-8 December 2017 in Stavanger the participants - including policy makers, strategy development, internal and external stakeholders – described today's situation related to nature based solutions and climate resilience in the city. In the last day of the Ambition Workshop the project team clustered the results of the various sessions and defined the top five in each category:

• Achievements:

What has been achieved in the city already regarding climate resilience, what is the city most proud of?

• Challenges:

What needs improvement, what problems need to be solved?

• **Opportunities**:

What would be concrete opportunities for implementation of nature based solutions?

**Barriers**: •

What is hampering the realisation of nature based solutions?

The results are shown in the figure on the right.

## **Achievements**

What achievements in climate resilience the city is most proud of?

- Blue-green projects: blue-green projects are already established to handle/maintain more rain and increase liveability / quality of life / biodiversity.
- "The worlds best green structure": a very well established green grid through the city, incl. a number of lakes that allows for:
- easy access for people to be active; - for development of blue-green solutions.
- Policies and strategies are established: the city has several plans and policies as a tool to demand blue-green solutions in projects.
- The city has established flood way maps for the whole city, as a basis for city planning and development.
  - The Stavanger region has a strong position in Storm water management in Norway, with leading national companies within green infrastructure and Storm water management. A national conference on climate adaptation is hosted in the region annually.

## **Opportunities**

What would be concrete opportunities for NBS implementation?

- Use transformation projects as well as new development projects as a tool to communicate, educate and build knowledge on the effect and importance of NBS.
- Using UNaLab to introduce NBS as an opportunity to meet the challenges the city is facing due to climate changes – what can be done in the areas already developed?
- Using UNaLab as an opportunity to increase awareness of the importance of climate adaptation within the municipality and amongst policy makers.
- Explore new ways of public-private-partnerships, to involve strategic partners in early stages of projects.
  - Explore how the knowledge and technology from the oil industry can be applied to develop NBS-solutions.

- ideas within NBS.

Today's reality regarding nature based solutions for climate resilience in Stavanger

> What is hampering the realisation of NBS?

Difficulty to achieve/maintain trans-disciplinary cooperation between the different actors and stakeholders (silo-thinking):

- resources to succeed.
- - higher cost/controversy.





## **Challenges**

What needs improvement, what problems need to be solved?

• Risk-taking: we need a stronger innovation mindset, with willingness, organization and culture to act upon innovative

• Lack of knowledge: too little knowledge on the effect of NBS compared to traditional solutions for climate adaptation. • Silo-thinking & acting: plans and projects are developed within organisational departments without cooperation and co-creation • More extreme weather events: we experience more heavy rains, sea level rise and floods (+ storms and strong winds).

• Perceived costs: NBS is considered more expensive than traditional solutions (by developers), and therefore traditional solutions appear to be preferred.

## **Barriers**

- lack of commitment to the process due to unclear goals; - people/organisations are stuck in their old boxes/mindset and are unwilling to move forward with something new.

• Economy: sustainable solutions require both financial and human

• Politics: lack of political leadership within climate adaptation gives weak commitment to the needed shift in approach.

 Lack of space for NBS: implementing NBS requires that enough physical space is set aside for blue-green solutions. When space is limited, implementation of NBS is followed by







Prague city centre

View from Střelecký Island to Charles Bridge



Lesser Town Square





Imperial Island



Green axes in Prague

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#### 2.3. Prague

#### **2.3.1.** Introduction to the city

Prague City Hall is the local and regional government authority for Prague. The City of Prague has a population of around 1.27 million people. Another 300,000-400,000 people commute to Prague every day for work, studies, treatment or tourism. Prague concentrates approximately 12% of the Czech population and the territory of the city generates approximately a quarter of the national gross domestic product. About 80% of the total workforce in Prague is employed in the tertiary economic sector, which generates 80% of added value. Major universities and a number of research institutes (2/3 of public research institutions) are to be found in Prague, as well as the majority of businesses active in research and development. Prague is the recipient of 33% of the total national expenditure in research and development.

The City Hall will be the main implementation body of the UNaLab Roadmap. The Prague City Hall is a signatory to the Mayors Adapt, an initiative of the European Commission's Directorate General Climate Action, launched in the context of the EU Adaptation Strategy, and is implemented within the Covenant of Mayors. Twinning city in this initiative is Munich. Prague has prepared the adaptation strategy to climate change and the UNaLab project helps with quality preparation of the concrete implementation plan based on real implementation knowhow of lighthouse cities.

#### 2.3.2. Climate related challenges

The city is facing numerous climate and water related urban challenges, such as heat islands, densification, biodiversity loss, flooding and pollution. Primary concerns in Prague are stormwater management and urban air quality, which the city aims to address using NBS to enhance the number and extend of green spaces and improve water infiltration.

#### 2.3.3. Relevant previous projects

- Preparation of Prague adaptation strategy to climate change
- Mayors Adapt
- UrbanAdapt: nature based solutions for cities
- Morgenstadt
- UHI: mitigating the effects of the heat island
- Smart Prague
- Triangulum
- Preparation of SUMP

- Integrated Territorial investment of Prague Metropolitan Area The Strategic plan of Prague: the umbrella project which puts forward a framework of the strategic integrated development of the city of Prague to the year 2030.
- The project Streams for Life: Project aims at bringing the biodiversity of the city by the means of revitalization technically modified (concreted, piped etc.) basins in natural areas is an important step in protecting and improving the environment, especially in urban agglomerations.
- Concept of green infrastructure: Aims to create a comprehensive system combining natural and semi-natural, domestic or urban landscape structure in a unified whole, which contributes to the conservation of biological diversity, the company provides cost-effective and sustainable service. Green infrastructure is a suitable tool for connecting built-up area with open landscape and one of the effective means to improve microclimate conditions and adaptation to climate change.
- Geoportal Praha: Geoportal is primarily used for viewing maps and information retrieval on the territory of Prague. The site offers more than thirty maps Prague from aerial images from different years, despite the noise map to map the most photographed places in Prague. Website: http://www.geoportalpraha.cz/
- Opendata Praha portal: The portal gathers the dataset of open data of the major public institutions in Prague and puts them forward. Currently there are 168 data-sets from 13 city organizations. It represents the Open data approach, but also the predisposition for data driven decision-making and planning. Web portal website: http://opendata.praha.eu/
- The project Triangulum: The first horizon 2020 for a municipality in the Czech Republic. The project is focusing on the agenda of Smart Cities. The project is cross-sectorial oriented and pushes forward to establish working processes, absorbing good practice and anchoring the Smart City principles.
- Morgenstadt City Lab: Morgenstadt City Lab, project done in coordination with the German research organization Fraunhofer. The aim of the project is the development and implementation of sociotechnical innovations and projects in order to ensure sustainable development in cities. A thorough analysis of the current situation was undertaken, not only in the development and management of cities, but also in terms of energy sustainability, mobility and ICT.
- Additional pending projects: Currently IPR Praha together with the City Hall of Prague have submitted two Interreg Central Europe proposals that focus on regional development and environmental theme among others strongly pushes for a regional cooperation and the sharing of good practice with other cities large cities in the region.





# PRA HA PRA GUE PRA GA PRA G





Flooding of the river Vitava



Planting of Trees on Vinohradská Street



Total reconstruction of the Stromovka park



Analysis and modelling of average annual temperatures and number of tropical days and nights



Design manual for public space

🖂 info@UNaLab.eu | 💻 www.UNaLab.eu

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#### otlivých částí a prvků veřejných prostranství

#### 2.3.4. Today's reality

During the Ambition Workshops of 10-12 January 2018 in Prague the participants - including policy makers, strategy development, internal and external stakeholders – described today's situation related to nature based solutions and climate resilience in the city. In the last day of the Ambition Workshop the project team clustered the results of the various sessions and defined the top five in each category:

• Achievements:

What has been achieved in the city already regarding climate resilience, what is the city most proud of?

Challenges:

What needs improvement, what problems need to be solved?

• **Opportunities**:

What would be concrete opportunities for implementation of nature based solutions?

**Barriers**: •

What is hampering the realisation of nature based solutions?

The results are shown in the figure on the right.

## **Achievements**

What achievements in climate resilience the city is most proud of?

- Prague has increased collaboration within the city governance and increased public awareness about climate and environmental challenges and new projects.
- Prague has a good water quality and it is a better place to live. The city has well developed public transportation systems and has increased number of green places and trees in public space.
- Prague has been revitalising small water courses, ponds, orchards and • parks and has begun new pilot projects of urban and peri-urban parks with involvement of variety of stakeholders.
- · Prague has large historical protected areas and many protected natural parks and monuments. Flood protection of the urbanised areas is state of the art in European context.
  - Prague has developed number of new strategic documents such as: new strategic plan, adaptation strategy, public space manual and river front concept. the city has started to work on e-mobility strategy, green infrastructure strategy and has been collecting various spatial and environmental data and analyses.

**Today's reality** regarding nature based solutions for climate resilience in Prague

## **Opportunities**

What would be concrete opportunities for NBS implementation?

- Learn about how front-runner cities set up NBS solutions (process).
- To present NBS in Landscape Festival Prague 2018 and further landscape conferences.
- Present UNaLab in action plan group on climate adaptation.
- Increase awareness of the concept NBS. Many projects are in progress already: use the terminology.
- Promote UNaLab (workshop results to workshop participants) and learning process in and from abroad + promote front-runners NBS.
- Develop value model for Prague's ecosystem services (with support of UNaLab knowledge and Petr).

There is a low engagement with the public caused by lack of communication and results of low public awareness of climate change.

- results in bad political decisions.
- solving only one problem.
- resources.





## **Challenges**

What needs improvement, what problems need to be solved?

• Prague faces a main challenges in adapting to flooding in urban areas. Besides this a challenge is how to improve the air quality.

• The lack of awareness about climate change and its effect and how citizens can contribute to climate adaptation. A more sustainable lifestyle and improved education is missing.

• To create and preserve functional system of open and green spaces, considering the climate change challenges. Effective control of urban development necessary by land-use planning.

• To do multidisciplinary and integrated planning in practice by e.g. usage of (innovative) NBS, plus how to negotiate and balance expectations and interests in planning processes with involved stakeholder.

How to renew and change existing infrastructure and building rules and how to set up a better framework to implement NBS. Political willingness to change priority where to invest.

### **Barriers**

What is hampering the realisation of NBS?

• The political decision process is not sufficiently transparent and effective. Combined with the low public engagement levels this

• Administration of the city is fragmented and complicated with many stakeholders. Lack of economical approach is hindering sustainable urban development. Sectoral thinking create solutions focused on

Implementation of NBS requires sufficient allocation of financial







Edificio Moruno



Plaça Major





A Playas Castellón Hoy



Teatro Principal



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#### 2.4. Castellón

#### 2.4.1. Introduction to the city

The Castellón City Council is a public body that represents a municipality of almost 200.000 inhabitants. Castellón is engaged in such an important European objective as reducing energy dependence by introducing efficiency criteria, while maintaining the quality of life and future opportunities in our City. In the last years, Castellón City Council has committed to the transition towards a low carbon economy, through participating in lots of activities in order to reduce the CO2 emissions of the municipality. The municipality aims to be a living lab of new and innovative technologies, and promote any activity to achieve the low carbon economy objectives.

Castellón is working hard to reduce its energy bills and to create a liveable city. The municipality is focusing its efforts on promoting systemic changes in the organization of buildings, energy networks and transport and showing the importance of the engagement of all relevant stakeholders in these processes, along with the on-going involvement of citizens. The City Council has a low carbon reduction commitment, focused on reducing the energy consumption in buildings, adapting their energy networks to integrate renewable energy production, developing urban energy storage systems and promoting more sustainable low-carbon transport systems.

#### 2.4.2. Climate related challenges

The city of Castellón is tackling several climate and water related challenges, such as water scarcity, heat stress, pollution and densification.

Castellón aims to employ a range of NBS in planned landscape-scale integrated urban water management using the UNaLab roadmap.

#### 2.4.3. Relevant previous projects

• CoSuDS, Collaborative transition towards sustainable urban drainage: making it happen at district scale. This project starts in June 2016 and finishes in December. The CoSuDS project aims at promoting the transition towards smart stormwater management from a collaborative perspective, bridging the gap between pilot implementation to longterm city strategy. The project will co-develop a "CoSuDS Toolbox" to be used for defining transition pathways in cities, being applied at district level for a city in Spain and integrating multiple actors in the process through collaborative charrettes. The pilot district will become a reference example for further upscaling and replicability in Europe. Labs are living laboratories: real-life buildings of home or work environments, not simulations. They are used for testing energy efficiency and sustainability. These labs are set up as real homes where research participants use new products and systems for a short or long period of time. They provide an ideal environment for testing new products, systems and processes. Participant feedback is collected and objective data is analysed.

http://bta.climate-kic.org/

- PIONEER CITIES: Pioneer Cities brought together cities from across the Continent to consider solutions for the transition to a low carbon society. The project has been led by the city authorities themselves, as they are responsible for managing buildings, energy and mobility systems within their respective areas. The city authorities were also able to engage with a range of other stakeholders and actors to identify current schemes and initiatives that are operating. http://www.climate-kic.org/projects/pioneer-cities/
- TRANSITION CITIES: Transition Cities, funded by the Europe's Climate-KIC initiative, aims to bridge the findings of low carbon projects with wider European policy on climate change. Three key areas of activity, in energy, buildings and mobility, have been identified as areas where consolidating learning could really enable the change required to make significant emissions reductions within cities. The Transition Cities project will undertake pilots and experiments in relation to the these priority areas; promote new start-ups; leverage in other EU funds; enable cities to explore new institutional and business models in order to maximise impact on carbon reduction; and disseminate its findings widely across major European networks. The innovativeness of this project comes through methodology and new ways of working, as well as product development. It is hoped that its findings will influence public policy and procurement across European cities and stimulate the transition to the low carbon society. http://www.transition-cities.net/
- CERURUBIS: The main objective of the project is to encourage and promote the use of ceramics in urban areas through joint actions of ceramic clusters in SUDOE area, impregnating the ceramic with sophistication by integrating technology. Other objectives are to create products, methodologies and innovative services with high added value, which could be immediately transferred to the rest of the industrial sector. These services put together Competitive Intelligence studies and strategic analysis methodologies, searching as a result an efficient innovation, targeting the tastes and needs of the users and the social and technological trends.

http://www.cerurbis.eu/en/

• BUILDING TECHNOLOGIES ACCELERATOR, The BTA Living











Proposed spatial distribution of sustainable urban drainage systems (SuDS) in the pilot district



*Example of proposed SuDS solution in the pilot district: infiltration area (before)* 



*Example of proposed SuDS solution in the pilot district: permeable pavement (before)* 



Spatial distribution of SuDS solution in a selected zone of the pilot district



Example of proposed SuDS solution in the pilot district: infiltration area (after)



Example of proposed SuDS solution in the pilot district: permeable pavement (after)

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#### 2.4.4. Today's reality

During the Ambition Workshops of 12-14 February 2018 in Castellón the participants - including policy makers, strategy development, internal and external stakeholders – described today's situation related to nature based solutions and climate resilience in the city. In the last day of the Ambition Workshop the project team clustered the results of the various sessions and defined the top five in each category:

• Achievements:

What has been achieved in the city already regarding climate resilience, what is the city most proud of?

Challenges:

What needs improvement, what problems need to be solved?

• **Opportunities**:

What would be concrete opportunities for implementation of nature based solutions?

**Barriers**: •

What is hampering the realisation of nature based solutions?

The results are shown in the figure on the right.

## **Achievements**

What achievements in climate resilience the city is most proud of?

 Water management: Castellón has identified the real problem with water and is starting to implement solutions to re-use water for public services and intelligent irrigation of green areas systems. The city is aware of new technologies and testing pilots to improve sustainable drainage and water management.

- Urban planning: Castellón has defined a structural urban plan based on the existing and future green infrastructure. The plan has objectives to be achieved in 2037 and many projects are being defined. The city is studying plans to protect wet-lands.
- Mobility: The city centre has become pedestrian, lively and friendly compared to 20 years ago. The mobility patterns have changed. New technologies are being implemented to use roads for carbon sinks.
  - Awareness: Awareness on water is growing. Many educational programmes are being promoted by the municipality in order to increase people commitment.
    - Green city: Actions to increase:
      - biodiversity green economy
        - blue economy
        - circular economy

- need to be promoted and put in place.
- trees to improve air quality.

Today's reality regarding nature based solutions for climate resilience in Castellón

## **Opportunities**

What would be concrete opportunities for NBS implementation?

- European funds (H2020, LIFE, UIA structural funds): to expand the network, training opportunities, new consortia, funds; promote new solutions in wet-lands
- Innovative green procurement: use municipal bids to include NBS implementation.
- The general plan is an opportunity to include new activities regarding NBS and plan the new green infrastructure.
- 'Parque de los niños' (children park) as an opportunity to create a thematic park to increase awareness.
- Expand the network of recycling water. There is already a first phase: idea would be to connect the green areas and create a green/blue ring.

What is hampering the realisation of NBS?

Insufficient budget for developing sustainable environmental policies, based on a social economy linked to technological trends. Lack of awareness that need new education, training and dissemination

- strategies.
- water cycle.
- and absence of channels for local distribution.





## **Challenges**

What needs improvement, what problems need to be solved?

• Lack of educational programs to raise awareness towards the use of natural resources. Need to adapt legislation and internal processes to promote behavioural change (e.g. water re-use) and the protection of nature. Incl. prices, promotional research, education programs, funding.

 Need to invest to improve water network and infrastructure to increase water quality and allow the re-utilisation. Recycling systems for waste and water

 Castellón is part of a specific weather system which is difficult to influence at a local scale. Lack of measures an programs to mitigate the climate change effects (flooding, rising sea level, heavy rains, ...).

• Lack of green areas for reducing the heat island effect and improve air quality, increase shadows to create a pleasant atmosphere. Need to reduce the impermeability of the soil in urban areas and plant more

## **Barriers**

Insufficient or inadequate infrastructure for the management of the integral

Low profit of agricultural products, low promotion of the agricultural activity

• Perception of insufficient political engagement, bureaucracy and lack of coordination among different departments and institutions when planning, regulating, managing and promoting environmental policies that are needed.





© Ville de Cannes

© Ville de Cannes



Overall planning of climate resilience strategies © Ville de Cannes





La Croisette © Hervé Fabre - Palais des festivals et des congrès

#### 2.5. Cannes

#### **2.5.1.** Introduction to the city

Cannes is a city of 75,000 inhabitants in the south of France, which triple its population in summer or during major events such as the international film festival. The Municipality of Cannes has for many years an active policy in the fields of sustainable development and environment, as demonstrated by its Agenda 21 adopted in 2008 and renewed in 2015. The Municipality launched its Sustainable Energy Actions Plan in 2012 and was recognized in 2015 as "Positive Energy Territory for a Green Growth" by the French Ministry of Ecology.

Although international focus is the essence of the city, the Municipality of Cannes, however, has little part in European projects so far. Under the leadership of its new executive elected in 2014, the Municipality wishes to reflect international issues in the actions undertaken by its services, and to sustain participation in European projects, in line with its strategic priorities. During the first series of calls to 2014-2020 ALCOTRA and MARITTIMO, the Municipality of Cannes was winner as a partner in two projects.

#### 2.5.2. Climate related challenges

Cannes is a town particularly exposed to natural hazards: flooding due to overflowing rivers, urban runoff, coastal flooding, forest fires, withdrawal / swelling clay and landslide. These risks are numerous, and unfortunately occur quite frequently. In a large urban development context, nature-based solutions (NBS) seem to be the best solution to prevent the devastating effects of these risks, and allow the city to become more resilient.

Integrated storm-water management solutions and community rooftop gardens are some of the key elements of Cannes' current strategy to improve urban living.

#### 2.5.3. Relevant previous projects

- ALCOTRA / JARDIVAL project, developing the small gardens of the French and Italian Riviera, total budget 1.822 k€, 9 partners.
- MARITTIMO / ISOS project, developing sustainable small island in Mediterranean Sea, total budget 1.495 k€, 9 partners.











Farm for local production

The dry river - Vallon de la Foux - impasse legoff



The dry river - Vallon de la Foux - Rue Merle



Transforming the coast way to reduce car traffic and increase space for pedestrians and cyclists





Protecting the coast from erosion



The flood of 3 October 2015 (©Gerwin Wimpers on Twitter)

#### 2.5.4. Today's reality

During the Ambition Workshops of 7-9 March 2018 in Cannes the participants – including policy makers, strategy development, internal and external stakeholders - described today's situation related to nature based solutions and climate resilience in the city. In the last day of the Ambition Workshop the project team clustered the results of the various sessions and defined the top five in each category:

• Achievements:

What has been achieved in the city already regarding climate resilience, what is the city most proud of?

Challenges:

What needs improvement, what problems need to be solved?

• **Opportunities**:

What would be concrete opportunities for implementation of nature based solutions?

**Barriers**: •

What is hampering the realisation of nature based solutions?

The results are shown in the figure on the right.

## **Achievements**

What achievements in climate resilience the city is most proud of?

• Cannes, the 2nd well-known French city in the world, is strong from its heritage (small provincial fishermen's village) and its developments in business tourism (Festival de Cannes, B2B congress) and mass tourism. The preserved environments, the 'walkable' city and the temperate climate are the main advantages that make Cannes a 'global village'.

• Since the flood event of October 2015, the city of Cannes is building a global vision and monitoring tool to prevent and react on several risks (floods, coastal erosion and submersion, forest fire, snow, terrorism, traffic accidents). A risk awareness has emerged and innovate solutions are in process.

The new urban plan requires new buildings to take into account flooding risk (by reducing waterproof surfaces), environment protection (green surfaces compulsory) and better isolation. The new urban plan preserves the natural and historical districts of the city (no new buildings allowed there) and develop the density in other districts (La Bocca and La Republique) to support their re-qualification.

The city of Cannes preserves and develops local agriculture and reflects on how to save water resources (to stop soil waterproofing and promote local food) for the future by reducing consumption and re-use of cleaned water.

> Mobility facilities are crucial for a world-opened city like Cannes. The municipality therefore developed an efficient public transport network and has re-gualified the central railway station.

## **Opportunities**

What would be concrete opportunities for NBS implementation?

- · There is a lot of public work happening now and already planned. We have to look for the possibility in every situation to integrate soil permeability to take climate change into account.
- We have to look for the possibility in the urban plan that is created at this moment, to create green roofs and walks. The mayor wants to preserve tiled roofs, but perhaps on flat roofs, such as the market place, greenery is a possibility.
- For the implementation of green roofs and facades we need external expertise to develop an affordable solution for maintenance in the summer with 3 months of dry period, before starting experiments to see what is a working solution.
- The 'Basse Vallée de la Siagne', seen until now as a 'lost area' can become an opportunity to actively use it to stop and evacuate the water and use the platform to understand its functionality. In this way we will start learning about water re-use (including thinking about a water land).
- An information document about risk is being finalised. The publication of this document is a good opportunity to also address the climate issues and NBS of UNaLab.

- facilities and lead the people to awareness.
- investment on environmental topics.
  - with this particularity.

Today's reality regarding nature based solutions for climate resilience in Cannes

The lack of money could reduce the ambition and/or capacity of the city to take into account environmental stakes on urban projects.

- mass tourism, increase the difficulties to implement NBS.
- anticipate the climate change.

European

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Commission Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions



## **Challenges**

What needs improvement, what problems need to be solved?

• We have to preserve safety and guality of life for the inhabitants and visitors of Cannes to maintain its attractiveness. The NBS solutions implemented should respond to risk challenges and at the same time visually respect the historical glamour aspect of the city.

Cannes is facing plenty of risks that will be increasing due to climate change. We (inhabitants and visitors) have to live with them. The city should therefore adapt its

 Cannes must increase the implementation of risk stakes by integrating operational rules and recommendations in urban planning, taking into account specific topography and climate of the town. It is often difficult to define a return-on-

The topography and the way the city was developed has lead to a particularity of 'dry rivers', sometimes covered by buildings. The flood management has to deal

• Water management has to evolve in the city (agriculture,

permeable soils, consumption, re-use) to ensure guality and

quantity of water and reduce the impact of flood events.

## **Barriers**

#### What is hampering the realisation of NBS?

 The excessive regulation (especially on national level, but sometimes also on local level) slows down innovative solutions, such as NBS to transform the city. • We (elected people, technicians and inhabitants) need to change the way we think and work, taking into account emerging risks which require innovative solutions. The lack of space (land availability) and the pressure from real estate developers and

The climate is changing too fast for the city to adapt itself quickly enough to







Water Valley Park



Sazlidere Dam



Underground garbage container and collection truck



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#### 2.6. Başakşehir

**2.6.1.** Introduction to the city

Başakşehir is one of 39 second-level districts of Istanbul, founded in 2008. The population was 342,422 in 2014 and is estimated to increase to 800,000 by 2020. Başakşehir Municipality is the local government of the Başakşehir District, established after the local government elections in 2009. Başakşehir Municipality has 19 departments to handle city issues, including sanity services, social aids, municipal police services, IT infrastructure, education, cultural activities, urbanization, and so on.

The Başakşehir Municipality has a great budget reserved for IT investments, which amounts to about €4,000,000 per year. Between 2009 and 2015, many IT projects managed by the municipality have been completed. The main tasks for the Başakşehir Municipality are to (i) provide the highest quality of public services to the citizens, (ii) improve the life quality of citizens through implementing the most effective and efficient technologies and projects (iii) enable citizens to participate in the testing and development of new value added products and services that are for the benefit of the public at large.

#### 2.6.2. Climate related challenges

Başakşehir is facing numerous challenges, due to climate change and the fast population growth, such as heat stress, pollution, biodiversity loss and water scarcity. To tackle these challenges, Başakşehir aims at implementing several nature-based solutions. The city's vision for 2050 is to be a green city, with trees along paths, green river beds and connected green and blue areas, which people can enjoy and which make walking and cycling an attractive option. The aim for the city is also to have zero waste water in 2050, but instead focus on storing, recycling and treating the water so that it can be used multiple times.

Başakşehir primary focus is on the implementation of public green spaces and similar NBS to reduce energy consumption and  $CO_2$  emissions, and mitigate climate change effects in the city.

#### 2.6.3. Relevant previous projects

- Başakşehir Innovation and Technology Building (LEED Certification at Gold Level).
- Şamlar Natural Park.
- Smart Garbage Collection System
- Başakşehir- Bahçeşehir Artificial Lake and Recreation Area
- Başakşehir Water Valley



- Waste Water Purification System
- Solar Powered Lighting

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River bed reclamation and artificial lake park



Artificial lake



River bed reclamation

Sazlidere Dam





Artificial lake

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#### 2.6.4. Today's reality

During the Ambition Workshops of 11-13 April 2018 in Başakşehir the participants - including policy makers, strategy development, internal and external stakeholders - described today's situation related to nature based solutions and climate resilience in the city. In the last day of the Ambition Workshop the project team clustered the results of the various sessions and defined the top five in each category:

• Achievements:

What has been achieved in the city already regarding climate resilience, what is the city most proud of?

Challenges:

What needs improvement, what problems need to be solved?

• **Opportunities**:

What would be concrete opportunities for implementation of nature based solutions?

**Barriers**: •

What is hampering the realisation of nature based solutions?

The results are shown in the figure on the right.

## **Achievements**

What achievements in climate resilience the city is most proud of?

- A green city: a) 20m<sup>2</sup>/person (above EU standards), b) policy in strategy document to maintain 20m<sup>2</sup>, c) planned 5 river bed recreation projects, d) rules established for minimum green in housing sites.
- Smart waste collection system, a) that i) reduces carbon emissions and fuel usage, ii) enables efficient routing through remote monitoring, iii) provides a clean environment for citizens, iv) enables monitoring rubbish data for future planning, b) policy is to have a smart collector for every 100 flats and it is in rules for construction, 2) the plan is to collect 100% of rubbish through smart collection system. Presently 50% is collected in this system
- Water treatment: a) reuse of treated and rain water in parks, b) policy of grey water treatment in high standard construction projects, c) availability of technology companies working/ manufacturing water treatment & saving products + water museum, d) in industrial district it is mandatory for companies to have water treatment facilities and most of them have treatment.
- Reduced CO2 emission: a) use of natural gas transforming of infrastructure in poor region with natural gas pipeline, b) metro project - several subway lines are under construction within the Başakşehir city, c) climate action plan is ready - by Istanbul Metropolitan
- Municipality. • Pro-activeness in energy efficiency: a) policy and rule for putting heat insulation on buildings, b) policy and rule for having centralised heating systems for housing sites, which minimises energy loss, c) policy and recommendations for constructions to maximise use of solar and wind energy as well as rain water, d) project that has started to replace standard street lighting poles with 'energy efficient' led light poles. e) Construction of a new energy efficient, smart and environmental new Municipality Building

## **Opportunities**

What would be concrete opportunities for NBS implementation?

- Construction permits to be adapted to integrated the rules and regulations for waste and water solutions (NBS) for new constructions, and create incentives for construction companies
- Motivate people through advice and incentives to leave their individual cars and make use of the (extended) metro, so car traffic is reduced and air becomes cleaner.
- There is already a policy to ensure green and trees are planted to compensate for usage of space for constructions to keep at the level of 20m2 pp green, but enforcement and compliance for the longer term needs to be improved.
- To include a big park in every district in the city plans, big enough to be able to wander around in nature. Ensure collaboration with, and commitment of government for non-municipal owned areas in and around the city.
- Increase knowledge on climate changes and impact, also to parents and entrepreneurs through education programs. Use the smart lighting poles not only for energy saving, but also to collect data (through sensors) and data analysis, also as input for education programs.

- separation.
- regulations
- pollution industry, c) toxic waste creating industry.
  - models, e) establishing funding mechanism.

Today's reality regarding nature based solutions for climate resilience in Başakşehir

> What is hampering the realisation of NBS?

incentive models.

- Lack of knowledge
- between institutions regarding same issue.
- branding of being BIG.



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## **Challenges**

What needs improvement, what problems need to be solved?

• Involving positive participation of private sector in implementing NBS solutions: a) construction companies in real estate, b) company owners in manufacturing industry. For i) water treatment, ii) use of rainwater, and iii) solid waste collection &

Implementing effective control, penalty and reward mechanisms to ensure well-being: a) separation of authority for controlling, penalizing and rewarding, b) especially in the industrial district and private construction audits, c) enforcement of policy through rules and

• Removing polluting establishments from the city, especially: a) air polluting industry, b) water

Funding & implementing '0'-waste policy: a) creating public and private awareness, b) developing strategies together with companies and organisations that will apply the strategies, c) putting rules in regulatory document/permits, d) establishing incentive

Approving of city plans for 2050: a) can we include all stakeholders in 2050 city plans for a happy city, b) planning of construction and green sites considering flooding, heat islands, green, c) mobilisation plans for cleaner and slow city, d) infrastructure plans that include smart city, smart data analysis, e) education plans.

## **Barriers**

Money: a) how do we fund, b) profit (quick) oriented mentality, c) lack of

• Lack of rules & regulations: a) treatment regulations, b) construction regulations, c) implementation control of rules and regulations, d) authority separation and coordination

Prioritisation and policies: a) Turkish mentality of short term benefits (i.e. elections, profits etc.), b) lack of having policies and targets in institutions 4/5 year strategy plans, c) hence how priority for R&D, infrastructure, education and regulation development.

Willingness to grow population, due to: a) economic benefits rather than other benefits, b)





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#### 2.7. Hong Kong

#### 2.7.1. Introduction

Hong Kong is an autonomous territory on the eastern side of the Pearl River estuary in South China. With over 7.4 million people in a territory of 1,104 square kilometres, Hong Kong is the fourth-most densely populated region in the world. Hong Kong is the world's seventh-largest trading entity in both exports and imports and is also the world's largest transshipment centre. The territory's economy is dominated by the services sector, as services alone constitute 92.7 per cent of the economic output.

Hong Kong has the most skyscrapers in the world and the city centre forms a very dense urban region. The city is tackling seasonal air pollution that originates from neighbouring industrial areas of mainland China, which has resulted in a high level of atmospheric particulates in winter. The air pollution is further compounded by Hong Kong's geography and tall buildings. Hong Kong is tackling numerous other climate challenges than air pollution and densification, such as water scarcity, flooding, biodiversity loss and climate driven health issues.

Despite Hong Kong's intense urbanisation, it has tried to promote a green environment. The city has ambitions to implement nature-based solutions like stormwater retention ponds, green spaces, permeable pavements and green facades. Hong Kong is a densely populated urban area, and it is located among clusters of mega cities in the Pearl River Delta Region in China.

The Hong Kong Polytechnic University (PolyU) is one of the major public universities in Hong Kong. The Faculty of Construction and Environment at PolyU is the largest higher education provider of professionals for the construction industry in Hong Kong. The Faculty has a local and international reputation of performing cutting-edge research in areas related to construction and built environment. In the latest (2016) QS World University Rankings by subject, PolyU ranked 12th in the world for the subject area of Architecture/ Built Environment, and 11th globally for the subject area of Civil and Environmental Engineering. A large number of studies performed by the Faculty of Construction and Environment at PolyU aims at promoting sustainable urban development through smarter building and infrastructure solutions. Examples of research topics involve green building technologies, energy efficiency, eco-friendly technologies and management practices in urban areas, the use of recycled materials, and the application of ICT. The research activities have been intensely funded by local industries, governments, and international organizations. Many of the studies are cross-disciplinary in nature, providing systematic solutions to the challenges faced by

#### today's cities.

PolyU is a partner in UNaLab on behalf of the city of Hong Kong.

#### 2.7.2. Climate related challenges

Hong Kong's recent focus has been on the integration of permeable pavement systems to improve urban drainage and storm-water harvesting to allay seasonal water shortages.

#### 2.7.3. Relevant previous projects

Previous projects of the Hong Kong Polytechnic University:

- Analysing stakeholder-organization relationships in mega construction projects: a social network approach, Research Grants Council Hong Kong-General Research Fund, 20012/13, HK\$700,000, Ref: PolyU 5246/12E
- The effect of using group support systems on virtual value management workshops for major construction projects, Research Grants Council Hong Kong-General Research Fund, 2009/10, HK\$644,700 Ref: PolyU 5294/09E
- Incorporation of Flood Effect into Flexible Pavement Performance Modeling in Subtropical Coastal Environment Hong Kong PolyU: Central Research Grant, Contract Amount: HK\$ 105,000
- · Improvement of Porous Pavement for Effective Stormwater Management, funded by U.S. Green Building Council. Contract Amount: U.S.\$ 222,014. 2008-2011
- Sustainable Development Planning of Hengshui Lake Wetland, funded by the World Bank. Contract Amount: RMB 690,000. 2004-2007







Ecological enhancement works in river channels









Ma Wat River

Lam Tsuen River



Lam Tsuen River

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#### 2.7.4. Today's reality

Hong Kong made an analysis of today's reality regarding nature based solutions describing their:

• Achievements:

What has been achieved in the city already regarding climate resilience, what is the city most proud of?

Challenges:

What needs improvement, what problems need to be solved?

• **Opportunities**:

What would be concrete opportunities for implementation of nature based solutions?

**Barriers**: •

What is hampering the realisation of nature based solutions?

The results are shown in the figure on the right.

### **Achievements**

What achievements in climate resilience the city is most proud of?

- A planning vision for the future: the city has established a policy framework "Climate Action Plan 2030+" as a guideline to mitigate carbon consumption and to increase adaptation of the city in era of climate change.
- Blue-green projects: blue-green infrastructures are consecutively built and implemented in order to improve the liveability as well as the biodiversity of the city.
- The concept of revitalising water bodies in large-scale drainage improvement works is highly advocated with experimental ecological enhancement works conducted in selected sites such as the Lam Tsuen River and Kai Tak River.
- Hong Kong has strong ambition to become a global example of a sponge city in the adaptation to climate change. Current and ongoing projects including underground storm water storage scheme and inter-reservoir transfer scheme are being carried out in order to improvise the storm water management in the area.

- ideas from NBS.

Today's reality regarding nature based solutions for climate resilience in Hong Kong

### **Opportunities**

What would be concrete opportunities for NBS implementation?

- The introduction of UNaLab can be seen as an opportunity to learn innovative NBS approaches in terms of technical and governance aspects from leading cities and apply the skills and techniques into the future planning of Hong Kong.
- UNaLab can act as a medium to treat challenges as opportunities to meet the uprising problems brought by climate change - how and what can we do to enhance the areas that have already been developed?
- Using UNaLab to build knowledge and to demonstrate on the effects of NBS.
- Using UNaLab as a platform to raise the awareness of the importance of climate adaptation and resilience among the policymakers.
- Explore innovative approaches in dealing with smart storm water management in terms of storm water inception, flood storage and flooding hazards.

The introduction of UNaLab can be seen as an opportunity to learn innovative NBS approaches in terms of technical and governance aspects from leading cities and apply the skills and techniques into the future planning of Hong Kong.





### Challenges

#### What needs improvement, what problems need to be solved?

• Risk averse: stakeholders need to be more open-minded to embrace the new culture and organisation in the adoption of the innovative

• Not seen as a priority in adopting NBS: urban development focus remains on economic growth while less attention is given to urban green.

An increase in extreme weather events: with the worsening of global climate change, Hong Kong has experienced more extreme torrential rains and storm surges. Recently, Hong Kong was hit by super typhoon Mangkhut which is recorded as one of the most devastating typhoon of the decade.

• Silo-thinking and acting: plans and projects tend to be developed within organisational department without cooperation and co-creation across governance levels and between departments.

Lack of knowledge in the implementation and potential benefits of NBS: there is a lack of capacity and tools to collect meaningful data in determining the success of NBS.

### **Barriers**

What is hampering the realisation of NBS?

UNaLab can act as a medium to treat challenges as opportunities to meet the uprising problems brought by climate change - how and what can we do to enhance the areas that have already been developed?

Using UNaLab to build knowledge and to demonstrate on the effects of NBS.

Using UNaLab as a platform to raise the awareness of the importance of climate adaptation and resilience among the policymakers.

• Explore innovative approaches in dealing with smart storm water management in terms of storm water inception, flood storage and flooding hazards.





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#### 2.8. Buenos Aires

#### 2.8.1. Introduction

Buenos Aires is the capital and most populous city of Argentina. The city is located on the western shore of the estuary of the Río de la Plata, on the South American continent's southeastern coast. Buenos Aires is the second-most visited city in Latin America and constitutes a large economy among the world's cities.

The city is the financial, industrial, and commercial hub of Argentina. The city's services sector is diversified and well-developed by international standards, and accounts for 76% of its economy, with advertising, real-estate and financial services being the largest. Manufacturing is also still prominent in the city's economy and benefits as much from high local purchasing power and a large local supply of skilled labor, as it does from its relationship to massive agriculture and industry just outside the city limits.

Buenos Aires is tackling several challenges due to climate change and urbanisation. The city has less than 2 m2 of green space per person, which is below the recommended standard. Biodiversity loss, pollution, densification and flooding are some of the problems that the city is facing. However, Buenos Aires is hoping to implement several nature-based solutions to tackle these challenges, such as green spaces, green facades, permeable pavements and street trees.

UBATEC S.A. is a unit of technological association and transfer formed by the University of Buenos Aires, the Government of the City of Buenos Aires, the Argentine Industrial Union (Unión Industrial Argentina), and the General Confederation of Industry (Confederación General de la Industria). It was founded in 1991, inspired by the concept of the "Triángulo de Sábato" (Sábato's Triangle), a triad in which the university, the government and the productive sector interact in promoting innovation, thus contributing to the economic and social development of the country. UBATEC provides services for technological innovation management, technology transfer, technical assistance, program and project management, third-party fund administration, project assessment for the productive and private sectors, reports drafting, and consultancy for public - and, sometimes, multilateral - national and international bodies.

UBATEC has a Business Advisory Council made up of more than thirty national technology-based companies. Their CEOs participate in decision-making related to project development and partner search in the private and public sectors for the processes of investment and technology transfer. One of the key features of UBATEC is its power for integrating multidisciplinary teams that bring together top level professionals. It has the capacity to make use of human resources and infrastructure of the University of Buenos Aires (UBA) - the biggest in the country -, and other national and international academic institutions with which UBATEC cooperates on an ongoing basis. These are, in particular, the University of Sao Paulo and the Autonomous University of Mexico. The three integrate the UNIVERSIA network. It is worth noting that UBACTEC's legal status allows it to provide a quick response to the requirements of organizations and companies. It has access to several bidding processes to provide consulting services to different companies, as well as public institutions, and multilateral bodies.

UBATEC is a partner in UNaLab on behalf of the city of Buenos Aires.

#### 2.8.2. Climate related challenges

Buenos Aires' climate and water issues centre on flood control and stormwater management due to the city's location in a low-lying pampas region with year-round rainfall.

#### 2.8.3. Relevant previous projects

Previous projects of UBATEC:

- Water sanitation. Innovative strategies for the CONVERSION of waste in products for remediation of the environment and CO2 capture
- PICT 2012-2188 BONELLI, Paul RICARDO. Design of a system of detection of the viral contamination applicable to the control of the viral diseases transmitted by food.
- PICT 2012-2679 MBAYED, VIVIANA herbicide glyphosate and its interaction with other anthropogenic environmental change agents: impact on freshwater
- PICT 2014 1586 PIZARRO HAYDEE NORMA Dispersion of pollutants dissolved in flows with material particulate 2013-02584.
- Home treatment of arsenical waters. PIDDEF 028/2012 YONNI, FERNANDO. Arsenic in rural environments. Techniques of monitoring and 2012-00759 – IRIEL, Analia
- Energy: Dynamic models of agricultural sustainability: flows of useful energy and provision services ecosystem at different scales, 2013 -1599 FERRARO DIEGO OMAR Computational study from materials based on oxides for your employment in the generation sustainable power 2011 - 01312
- IRIGOYEN, Beatrice (finished the 12/03/16) catalytic processes for the sustainable production of microalgae 2011-02746





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UNaLab • Visions of UNaLab Follower Cities

# Section III — System Analysis



European This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Commission **Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions** 



### Actionfield Assessment

The Actionfields are assessed based on a series of Yes/No questions building on research related to good practices related to the themes under observation. The approach provides a rough assessment of the degree to which different initiatives have already been implemented and/or the suitability of specific interventions for the particular city context. Responses from the city partners are used to structure the interviews during the Onsite Assessment and the Actionfield Assessment is reviewed after all the interviews have been conducted.

The intension of the assessment is not for comparison or performance assessment, but to narrow down the scope of potential interventions the city might want to implement. The given responses are visualised in the individual system assessment chapters for each Follower City.



#### **Inclusive Urban Development**

- 41. Establish a "just green enough approach"
- 42. Creating and maintaining a socially equitable rent level
- 43. Linking green infrastructure development with socio-economic development practices

#### **Organisation and Structure**

- 7. Definition of long term vision and goals (supported by a performance management system) for the sustainable development of the city
- 8. Development of a Biodiversity and/or Green structure strategy and action Plan
- 9. Development of resilience strategy and planning
- 10. Establishment of sustainability advisory boards (or equivalent)
- 11. Systematic long-term planning of the city structure
- 12. Negotiated / Voluntary agreements for higher social and environmental standards

#### ICT and Data Governance

- 37. Development of an Urban Data Platform
- 38. E-tools for the participatory governance of green spaces and ecosystem services
- 39. Effectively using social media to achieve sustainability objectives
- 40. Effective data management between municipal departments and agencies

#### Blue and Green Infrastructure

- 44. Flood mitigation through integrated stormwater management
- 45. Water body daylighting and renaturation of rivers
- 47. Pollution control and enhancement of urban water and air quality
- 48. Increasing local resource generation and use
- 50. Supporting biodiversity in urban areas
- 51. Reducing heat stress and improving health issues
- 52. Active implementation of green infrastructure component

#### **Finance and Procurement**

- 13. Application of a holistic cost-benefit scheme for larger municipal investments 14. Mapping and evaluation of ecosystem services
- 15. Alignment of budgets with sustainability / nature-based solutions
- fees. etc.)
- 18. Co-financing: public-private partnership (PPP)
- 19. Innovation/sustainability-based procurement
- 20. Alternative criteria and procurement procedures for real-estate-property.

#### Sustainable mobility schemes supporting NBS

- 55. Road Management

#### **Municipal Strategy and Planning**

- 1. Definition of long term vision and goals (supported by a performance management system) for the sustainable development of the city 2. Development of a Biodiversity and/or Green structure strategy and action
- Plan
- 4. Establishment of sustainability advisory boards (or equivalent)
- standards

#### Participation and Stakeholder Engagement

- 21. Experimental governance and multi-stakeholder approaches to urban development projects
- 23. Participatory budgeting
- or similar
- infrastructure
- 28. Creation and administration of platforms for citizen participation

#### 



29. Application of a holistic cost-benefit scheme for larger municipal investments

36. Alternative criteria and procurement procedures for real-estate-property.

32. Non-tax own-source municipal instruments (fees, charges, utility charges and fees,

31. Alignment of budgets with sustainability / nature-based solutions

30. Mapping and evaluation of ecosystem services

34. Co-financing: public-private partnership (PPP)

35. Innovation/sustainability-based procurement

33. Green municipal financial instruments

etc.)

- 46. Urban regeneration through the greening of urban space
- 49. Supporting community-based urban agriculture

- 16. Non-tax own-source municipal instruments (fees, charges, utility charges and
- 17. Green municipal financial instruments
- 53. Promoting soft mobility modes and public transport 54. Implementing traffic calming measures
- 3. Development of resilience strategy and planning
- 5. Systematic long-term planning of the city structure
- 6. Negotiated / Voluntary agreements for higher social and environmental
- 22. Development of Visions / goals together with civil society
- 24. Awareness campaigns targeting local stakeholders (including citizens) for NBS
- 25. Green barters and other partnerships between city & private sector for public space management (PPPs)
- 26. Application of community managed approaches for green and blue
- 27. Innovative bottom up housing concepts

#### 3. **FOLLOWER SYSTEM ANALYSIS**

#### 3.1. Introduction

In order to take the first steps toward reaching the defined vision and ambitions in the follower cities, the establishment of a detailed understanding of where the city currently finds itself is imperative. Climate change adaptation is a cross sectoral concept that requires a systemic understanding of urban systems to identify the specific challenges and opportunities present. This is the aim of the UNaLab urban systems analysis: to understand the baseline upon which the city can start working toward its desired vision.

#### **3.2.** Assessment framework

The methodology of the urban systems analysis, builds on the Morgenstadt Framework, an urban systems assessment tool that has been applied to analyse the state of urban systems in a range of previous projects. The framework can be broken down into three levels of assessment:

#### 3.2.1. Indicator level

In order to develop an objective understanding of the current state of urban systems, 74 indicators covering a range of sectors, relevant to the challenges related to NBS, along with other important barriers and enablers to effective implementation of the concept are collected.



Overview of the assessment Framework



Commission

These collected values are benchmarked to establish an evidence base for targeting specific urban challenges (e.g. urban heat island, air quality, flooding, etc.) while highlighting other important challenges faced by the city when conceptualising the development of NBS (e.g. population dynamics, budgetary constraints, links to other sectors, etc.).

#### 3.2.2. Action field level

This level seeks to identify the areas in which cities have already acted to improve the resilience of the city at large and to highlight potentially "low-hanging fruit": innovations that have successfully been rolled out in other cities that might be suitable for the city in question. This level of assessment has seven lenses through which the city is analysed:



Themes of the Actionfield assessment (for a detailed list of elements see page 42)

#### 3.2.3. Impact factor level

No two cities are the same. This level incorporates the local contextspecific aspects into the analysis through the identification of unique opportunities and barriers that are present in the city in question. Unlike the previous two levels that are more quantitative in terms of data collection, this level is purely qualitative. During an on-site assessment, interviews are conducted with a range of identified key stakeholders related to the topic of climate resilience in each of the cities. In insights generated through the interviews are organised and assessed according to the themes explored on the "Actionfield" level and integrated throughout the report.

#### 3.3. Onsite assessment

A central element of the systems assessment is a one-week visit to each follower city where a range of interviews, site visits and workshops are conducted.

The onsite assessment serves as an important preparation for the roadmapping workshops and has the following objectives:

- Identification of the impact factors

#### 3.3.1. Interviews

With the goal of gathering different perspectives on the urban system, approximately 25 semi-structured interviews are conducted. The selection of interview partners is approached in a quadruple-helix approach ranging from representatives from municipal departments, to local companies, research institutes, local NGOs and civil society organisations. Data collected through the interviews supports the development of the stakeholder analysis, identification of the impact factors, potential NBS sites and rough project ideas.

#### 3.3.2. Workshop

As a direct iteration with the local stakeholders, a workshop is conducted on the final day of the on-site. This occasion is used to present, confirm and elaborate upon the findings of the week, and to take the first steps toward concrete project development, based on the systems assessment and the vision development process. The initial project development methodology includes the development of "hypotheses" for project ideas throughout the week through the input from the interview partners. These hypotheses can reflect organisational or spatial interventions in response to the onsite findings, and serve as a basis for discussion in groups during the workshop. Throughout the week, typically between 10 and 20 hypotheses are collected. From these, a final eight are selected to be presented during the workshop. Though voting by the workshop participants, this number is narrowed down to a final four to be elaborated in two respective sessions. The outputs of the workshop give cities the opportunity to already start initial brainstorming and planning on some priority NBS interventions and represent an important starting point for the roadmapping workshops that follow.



- Identification of potential sites for NBS implementation
- Identification of initial NBS project ideas



### Key findings: Stavanger

#### Green and Blue Infrastructure

- Stavanger's location at the sea side make sea-level rise a climate-related priority challenge for the future.
- Many little underground streams exist and river daylighting / renaturing seems to be a shared desire between the departments
- The urban-rural collaboration and integration should be enhanced, especially in green space planning and water management.

#### Finance and procurement

- Several small cross-departmental budgets are available, e.g. for smart city development (0.1 %) and resilience (0.015% of the total city budget)
- Innovative procurement schemes, early involvement of local stakeholders and PPPs could be enhanced in NBS projects

#### Inclusive Urban Development

- The city has mapped socio-economic conditions in the city but use of this data is limited
- The "1000 Trees" project is one example of NBS being mobilised to address social issues in specific target areas

#### Organisation and Structure

- Effective cross-departmental networks in place
- Good ownership of the topic on a managerial level
- •NBS seen largely as a technical issue and would benefit from a broader acceptance and ownership between municipal departments
- Cooperation with neighbouring municipalities on the topic could be improved



#### ICT and Data Governance

- Availability a range of tools with great potential to support the roll-out of NBS.
- Municipality should better link supply and demand in terms of tools available and tools required in the other departments.

#### **Regulations and incentives**

- Several well-functioning instruments in place
- •Often local land- and building-related policies are insufficient for developers to go beyond national standards and minimum legal requirements
- Until now, water is not seen as a resource and there is limited incentive to collect or reuse rainwater.

### Municipal Strategy and Planning

- Most development plans share climate resilience as common goal • The Blue Green factor holds large potential to be more widely used
- Daily planning lacks competences in future scenario development

## Engagement

- on-site developments
- processes
- experts

#### Links with other sectors

- Green infrastructure often competes with other infrastructure components.
- A more diverse and intermodal transport
- system might lever large spatial gains which could be greened
- Change in the mobility system holds potential for healthier lifestyles
- Large path dependencies in car
- infrastructures will keep up the dominance of car ownership in the mid-term
- •General gap between what transport planners think and what citizens want

- Highly privatized real estate market on the
- detailed planning level makes it hard for
- municipal planners to intervene

#### Participation and Stakeholder

- Innovative Co-Creation processes are already
- being tested within the municipality as well as
- There is an increasing willingness of
- Stavanger's citizens to participate in planning

• The benefits of complex city interventions, such as NBS are hard to communicate to non-

Lack of clear visions on the municipal level

#### 3.4. Stavanger

	Indicator	value
Goography	Annual Increase in Population	0.14%
Geography	Urban Population Density	3000
	(Inhabitants per km2 of urbanised Area)	
Environment	Flood Damages on dwellings	< 1%
	Public Transportation Share in Modal Split	10%
Mobility	Bicycle Share in Modal Split	9%
	Personal Vehicle Share in Modal Split	57%
	Number of registered Vehicles (Passenger Vehicles per 1000 City Inhabitant)	495
Waste and Resources	Tap Water Quality (Samples that comply with national quality standards in %)	100%
	Losses in drinking Water distribution Network	37%

#### **3.4.1.** Municipal strategy and planning

The majority of Stavanger's development plans share climate resilience as common goal for upcoming projects, bringing the topic to the agenda of most planning departments in the municipality. This has led to a higher awareness of NBS and their potential effect on the urban sphere, but implementation still lacks sufficient funding.

There is limited motivation for the private sector to go beyond what is already required by the national law, making NBS a nice add-on that is not necessarily seen as a benefit for the investor. An upgrade of the existing Blue Green Factor (see box) could potentially change this. Besides regulatory requirements, there is also a need to build up further knowledge on future scenario development that is set apart from the shortterm planning processes.

Hence, visions and scenarios could be generated in order to deliver a common ground for discussions in stakeholder engagement, as mentioned in 1.4.4, as well as more certainty for investors in adjusting their plans to the upcoming strategies of the municipality.

Establishing further testing grounds while introducing more flexible authorization processes could even facilitate the private sectors technological advancements and financial resources to place NBS in Stavanger.

Furthermore, the importance of integrating NBS and green infrastructure planning in other sectors, especially in road planning and design, was highlighted. This would be necessary to ensure holistic and interconnected strategies to achieve Stavanger's long-term goals. In terms of scale, such

approaches could for example enable enhanced green space connectivity in the region, an improved cycling infrastructure between the neighboring municipalities and collaborative water management between urban and rural areas.

#### 3.4.2. Finance and procurement

Stavanger has been very successful in securing funding for innovative and sustainable urban development. Up until now, many projects have been implemented with financial support of the National Research Council or the European Commission.

Internally, about 2.2 % of the city budget is allocated to green space management. It does also have an own resilience budget, which is still rather small but could be enhanced in the future. Other opportunities that have been identified are the Climate and Environment fund which is currently under development, and the smart city budget. Even though having slightly different focusses, they could be used to support projects and initiatives around NBS which promise major ecological benefits or link to smart city developments. The city has successfully been engaging in supporting social entrepreneurship and innovation in this area via Beredskap.

An important aspect enabling Stavanger's position is its good access to municipal resources due in part to the water department having access to revenues raised through water fees, as well as good economic performance more generally. Generally, the departments work well together and don't perceive joint financing as major barrier.

For the future, enhancing and strengthening innovative procurement in the NBS area and the early involvement of solution providers and developers could offer new opportunities. Furthermore, engaging in Public Private Partnerships and activating more stakeholders in joint NBS project implementation and financing could be more thoroughly explored.

#### 3.4.3. Regulations and incentives

The city of Stavanger already has a set of well-functioning policies in place which ensure green space connectivity and accessibility as well as mandatory compensation for sealing new surfaces. Furthermore, the BREEAM certificate is used to account for sustainability aspects in development projects, which is perceived as very helpful by municipal workers, companies, and citizens alike. Additionally, two main opportunities to incentivize NBS implementation in future projects have been identified - firstly, the Blue Green Factor (see box) and secondly, the potential split of runoff and sewage fees. This would allow for new incentive structures around NBS implementation on private plots. Being of the year.

Future challenges mentioned were that local policies need to pay more attention towards biodiversity, pollinator protection and pollution issues - as air and water quality are quite high (no air pollutant thresholds exceeded and 100% of tab water drinkable), not much is being done in the latter. Additionally, the abundance of water in the area and the resulting cheap water prices are seen as major barrier, as there is a lack of incentive to see water as a resource (0 % of the city-wide water consumption stems from rain- or greywater recycling).

Tensions between different stakeholders were discovered in the development sector. This mainly relates to the perception that certain regulations are too rigid and hard to adjust to special circumstances and actual project conditions, inducing a lack of incentives for developers to go beyond prescribed national legislations. On this matter, all stakeholders have expressed the desire of clearer communication and the involvement in discussions around local policies.

#### The Blue Green Factor (BGF)

As one of few municipalities in the world, Stavanger has been promoting the BGF as mechanism to quantify the performance of planned developments in relation to water infiltration and storage capacity. Limits identified were that, reportedly, the BGF as a tool only was not sufficient to encourage stakeholders to integrate NBS into their developments and it's purpose and relevance were not widely known. It would thus be important to institutionalize the application of the BGF involving more concrete regulation and incentive structures around it, thus also ensuring that the planned BGF will be maintained throughout the lifecycle of the development. Moreover, significant potential was seen in upgrading the BGF to also take other blue and green qualities into account (i.e. the inclusion of local plant species, supporting pollinators and biodiversity, etc.) or making it dynamic to account for site-specific needs. Such developments could open the chance to make NBS part of the regulatory framework whilst communicating its benefits and competitive advantage over other development projects, which could enhance attractiveness for investors as well as Stavanger's position in applying climate resilient planning practices. The BGF would then unfold the potential to be more widely used similar to building certification, such as BREEAM and LEED.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Commission Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions



#### an issue on national level, decisions on this matter are expected by the end

#### 3.4.4. Organisation and structure

An effective horizontal (cross-departmental) network is in its early stages of development. There is ownership and collaboration on the topic on both the managerial level-through exchange between departments heads, and on the working level-through the organisation of municipal workers between departments. These actors cooperate well and will be located in same building in the coming years, which will help ongoing cooperation. Furthermore, the municipality has facilitated exchange between departments on this topic through the organisation of seminars and get-togethers between departments, which have been important platforms for exchange. The topic, however, is firmly placed within a few technical departments. NBS is seen to a large extent as a "water and green space issue" and the network could benefit from moving beyond the limited technical scope and integrating other departments and external stakeholders. Understanding and communicating the potential benefits of NBS in other key departments would support this process. The key elements of an effective NBS ecosystem - a smart city office, a co-creation and participation officer, and communications department, as well as various local companies interested in the topic – are already present in the city. This presents a great opportunity for the municipality to tap into these importance resources to develop a more holistic and integrated approach to climate resilience. The city is on a mission to break down silos. The development of NBS will be strongly supported by these activities, but the city can also utilise NBS as a concept to support this strategy.

The vertical organisation with regional and national strategies is also well established. The regional Rogaland Council is currently developing a resilience strategy where NBS could play an important role. Some surrounding municipalities are more susceptible to the effects of climate change and the development of NBS in these areas is more advanced. This presents an opportunity for improved cooperation and learning between Stavanger and the surrounding municipalities.

#### 3.4.5. ICT and data governance

Stavanger is on a good path to becoming "smart". Previous projects have created an important dynamic relating to this topic. The city has a range of great tools (such as drones, visualisation tools, virtual reality technology, citizen dashboards, open data and sensors) which also bear great potential to support the roll-out of NBS.

The challenge that the municipality faces is linking the demand from other departments with the supply of the available tools. Other departments are not aware what "smart" can deliver and "smart" does not have sufficient information about the challenges for which it should be developing tools to address. Therefore, it is necessary for the municipality to make efforts to link supply and demand in this context.

#### 3.4.6. Participation and stakeholder engagement

Participation is embedded in Norwegian national law, which has been an important driver of an effective participation in the traditional sense. In addition, a variety of initiatives show the increasing use of co-creation formats within the municipality, such as the green breakfast with research institutions as well as on-site testing grounds like the City Impact district in Stavanger. The rise in participation events goes hand in hand with the citizens' growing interest in influencing local development plans, which gives them the ability to have an impact on their urban environment and future living spaces. Nonetheless, the sheer complexity of plans and used technological terms are seen as challenge in making participation a common part of planning processes. Hence, breaking terms down in order to make them accessible to the wider public is seen as an essential part of upcoming communication and further enhancement of the existing participation processes.

Already existing living labs can be used to facilitate and test further participation formats, which could help to build up knowhow that is necessary in making stakeholder engagement a powerful tool for planners. Complemented by clear future visions and design guidelines for private developers, the gap between the municipal plans and private district developments can be bridged and adapted to the local context of the construction site.

Finally, support for NBS seems to be shared between both public and private actors. Therefore, NBS could be used as common ground to foster an exchange between private investors and the citizens' interests, which could significantly speed up climate adaptation projects in Stavanger's urban structure.

#### 3.4.7. Green and blue infrastructure

The existing green and blue infrastructure (GBI) of the city is wellreceived and actively used. Different parks, meeting points and walking trails invite people to spend more time outdoors and in the public. Several successful renaturing and requalifying projects have taken place and enhanced the social and ecological value of public space, e.g. in the *Emmaus* wetland area. Furthermore, scientific demonstration projects are being carried out close by, such as at the *Nibio* green roof demonstration facility. The immediate presence of major NBS and GBI providers in the area has shown to be a great strength of the region.

In future, the presence of many small (underground) streams and lakesides

could be used to enhance and enrich the GBI of the city. Additionally, the comparatively mild climate would allow for urban farming initiatives and community gardens to be established. Such alternative uses of land and NBS projects could for example be explored along the coastline, where the threat of rising sea levels has to be taken into account in future planning and development.

Generally, more attention should be payed to existing natural features and their functions when planning new interventions (building on what is there instead of designing something completely new). Furthermore, the ambition of enhancing GBI and NBS in the built environment and contemporary architecture was expressed. A barrier for the development of new solutions in this area, is the lack of testbeds for pilot projects and innovative NBS and GBI elements.

#### 3.4.8. Link to other sectors

There are several important interlinkages with other urban sectors, mostly related to effects arising in the field of mobility and health. For instance, growing demand for electric mobility and steadily increasing investments in new rail- and bus-lines have created more alternatives to the car. People are generally encouraged to walk and cycle more, which could finally lead to healthier lifestyles while more space is retained, e.g. from abandoned parking, for other uses. Former single-use environments could be transformed to meeting points for social exchange or green and blue pockets and strips along streets and sidewalks. At the same time, NBS present an opportunity to improve the appeal of soft modes, representing a potential positive feedback effect.



Introducing such a change in the urban design is nonetheless highly dependent on the existing infrastructure and the competition between different modes of transportation. As seen in Stavanger, there are still high path dependencies in terms of street infrastructures that e.g. connect remote areas around the city centre which cannot be changed in the short-term. Investments in public transit can thus be accompanied by temporary interventions for reclaiming the street for low-carbon modes of transportation, which will be necessary in overcoming the current dominance of the private car. Shifting the modal split towards low carbon mobility will consequently have significant effects on the availability of space and its use for raising Stavanger's overall liveability.

#### 3.4.9. Potential NBS pilot sites

A range of sites were identified by the interview partners as potential areas for NBS implementation.

*Buoy, Byfordparken, New Hospital in University area, Forus Business Park*: Key development areas in the city, where NBS could be integrated to address a range of urban challenges and promote resilience.

*Main square*: Due to high exposure to wind and being very grey, this space is particularly underutilised considering its central location. NBS could be utilised to improve its appeal as a meeting place for citizens.

*Skolebekken, Vannassen, Revheimskanalen, Karnik, Forus* Canal: Potential sites for river renaturing or daylighting to make the city more resilient against flooding, while improving biodiversity and general liveability.

*Hillevaag and Mariero*: Face a range of social issues which could be addressed though NBS. These could be potential sites for the upscaling of the 1000 Trees programme.

*Coast line*: the city and region at large faces a significant challenge related to see level rise. Local stakeholders wish to explore the potential of NBS to help address this issue.











Working groups during the workshop



Internal working session



Project idea templates



Site Visit: Dam og Treningspark Emmaus



Site Visit: Nibio Green Roof Demonstration Facilities

#### 3.4.10. Project idea workshop

Over the course of the week, 16 project ideas were brought together and out of these, 10 project ideas were chosen to be pitched to the workshop group. Four of these were selected by the workshop participants to be further elaborated upon.

Hypothesis: Children should become one of our main target group in NBS development, education and dissemination.

## Hypothesis: The city should develop a map to show the NBS potential and the BGF of the city

Hypothesis: We should involve citizens in mapping and monitoring of current green infrastructure and local species and in identifying ecosystem values and potentials

Hypothesis: Stavanger should undergo a process of systematically converting (unnecessary) transport infrastructure for other uses using NBS

Hypothesis: The city should use visualisation tools to co-create the future public spaces in the city

Hypothesis: The city should establish NBS living labs for the interdisciplinary co-creation of plans and the initiation of testing grounds.

Producer and		
Background Even though historical waterways have not been mapped so far, there are many hidden little	Goals	<ul> <li>Enhance runoff capacity of the waterways</li> <li>Requalify areas and habitats (increasing biodiversity and livability in public space)</li> <li>Strengthen the image of Stavanger as "water city"</li> </ul>
streams in the city. Parts of these should be brought back to the surface.	Potential elements	<ul> <li>Connecting Vannassen to the sea</li> <li>Daylighting Skolebekken – creating a connected waterway between Mosvatnet, Breiavatnet and the sea</li> <li>Revheimskanalen, Kernivik</li> </ul>
Hypothesis: Stavanger should social cohesion and other soci	mobil ial issu	ise NBS explicitly for the purpose of achieving es
Background NBS is very much a "water issue" in Stavanger. A more holistic	Goals	<ul> <li>Targeting NBS to achieve social development goals;</li> <li>widen the umbrella:taking NBS beyond water management</li> </ul>
perspective on the concept is necessary to maximise its potential. NBS for social cohesion has been tried an tested (1000 Trees). A similar approach should be rolled out to target other areas.	Potential elements	<ul> <li>Hillevaag and/or Kvernevik as target areas</li> <li>financing through social entrepreneurship fund (Beredskap)</li> <li>integration of the community gardens</li> <li>expansion of 1000 trees project</li> </ul>
Hypothesis: Stavanger should effect on the liveability of pub	have t olic urk	testing grounds for showcasing NBS and their ban spaces
Hypothesis: Stavanger should effect on the liveability of pub Background Many streets in Stavanger appear to be solely grey, lacking green and blue infrastructures such as	have to blic urb	<ul> <li>testing grounds for showcasing NBS and their ban spaces</li> <li>Enhance biodiversity</li> <li>Social cohesion</li> <li>Positive publicity</li> <li>Increased run-Off capacity</li> </ul>
Hypothesis: Stavanger should effect on the liveability of pub Background Many streets in Stavanger appear to be solely grey, lacking green and blue infrastructures such as trees and water elements. Built for the purpose of driving cars, the inflexibility of such spaces causes single-use environments without social exchange.	Potential Goals and dements	<ul> <li>testing grounds for showcasing NBS and their oan spaces</li> <li>Enhance biodiversity</li> <li>Social cohesion</li> <li>Positive publicity</li> <li>Increased run-Off capacity</li> <li>Hillevag</li> <li>Storhaug Nymansveien</li> <li>Olav Kyrres Gate</li> <li>Pilot streets with rain gardens</li> </ul>
Hypothesis: Stavanger should effect on the liveability of pub Background Many streets in Stavanger appear to be solely grey, lacking green and blue infrastructures such as trees and water elements. Built for the purpose of driving cars, the inflexibility of such spaces causes single-use environments without social exchange. Hypothesis: The blue green fact to the local context of constru	Potential Goals elements B) total Ctor (B)	<ul> <li>testing grounds for showcasing NBS and their ban spaces</li> <li>Enhance biodiversity</li> <li>Social cohesion</li> <li>Positive publicity</li> <li>Increased run-Off capacity</li> <li>Hillevag</li> <li>Storhaug Nymansveien</li> <li>Olav Kyrres Gate</li> <li>Pilot streets with rain gardens</li> </ul>

water management (e.g. biodiversity, social

Coupling to incentive structures or regulations

A green factor spatial map that shows the most

relevant indicators and elements at each given site

Goals

Potential elements cohesion)

European Commissi mechanism to capture the wider

effects NBS could have, e.g. on

biodiversity and social cohesion.



**hop Summary:** Identified core values of these interventions o improve runoff capacity whilst at the same time enhance and biodiversity in public space. Health, liveability, iveness and history are some of the named drivers. Desired hts were waterfalls, connectivity to open waters and the of water in the city. It is expected that a large range of olders would benefit from such interventions. Opening of should therefore be made a requirement or explicit goal in cal plans and the overall masterplan. Additionally, first ility studies should be carried out in high potential locations.

**hop Summary:** Workshop participants identified significant in the idea from intergenerational exchange to improved health. The importance of co-creation and citizen ement to ensure ownership on the part of public space was highlighted. The municipality is to play the role of the tor allowing for citizens to design and manage their own spaces. There is significant potential to build on existing ts. This topic has potential to broaden the understanding of nee to include aspects such as social capital and community, proadening the understanding of NBS beyond being a water tement issue.

**hop Summary:** Making NBS pilot projects accessible to a group of citizens was a major concern of the participants ed, with the overarching question of how to place such ts in the existing infrastructure. The apparent risk aversion of unicipality has often caused delays in realising pilots and re their potential impact on the quality of life. Public private rships were seen as a measure to overcome such barriers ster a development towards more joint approaches to NBS entions in the city centre of Stavanger. There were still many ons concerning the responsible persons that should initiate and how NBS could be added to ongoing projects.

**Workshop Summary:** This project should establish the BGF as accepted "cool planning tool" which can be used to communicate account for different benefits of NBS in planning and design. Further elements to be included could i.e. be the use of native, biodiverse, edible and pollinator-friendly species but clear goals need to be jointly defined. Further more continuous improvement mechanisms and KPIs should be developed and a suitable name has to be found. The project ownership lies within the planning department but involves many different stakeholders in rework, implementation and application phase. Thus a cross-sectoral working group should be assembled to start the project. As knowledge on the new BGF amongst users and politicians is crucial, its inclusion in the new masterplan is necessary which is why the project has to start as soon as possible.

### Key findings: Prague

#### Green and Blue Infrastructure

- 52 % of the whole city surface is green
- New flood management for rural flooding
- Vltava river flooding protection is now state-ofart
- Flash floods due to extreme rainfall remain under estimated
- The confluence of the Vlatva River and Berounka river is a highly vulnerable flooding area
- Water supply for Greenfields in dry seasons represents a challenge
- Green and blue infrastructure is not from high importance in road maintenance measures

#### Finance and procurement

- Significant financial reserves, caused by an investment deficit (estimated at €1.8 billion)
- Need to analyse the opportunity costs of not investing into NBS
- Negative externalities need to be guantified in financial terms
- Projects that have allocated budgets, where NBS could be a integrated and piloted (Karlovo náměstí, Confluence of Berounka and Vltava Rivers, Troja)
- Innovation procurement is used, but not a standard practice
- Solid S&P AA- credit rating, enabling the city to borrow at very low rates
- Debt-based instruments such as bonds have been used in the past to fund a variety of projects (mainly infrastructure)

#### Inclusive Urban regeneration

- Insufficient link between the environmental and social objectives
- Dramatic increased rents in previous years: gentrification a challenge
- Lower socio economic ar eas of the city a potential target areas for r egener ation
- Lack of social housing

#### **Organisation and Structure**

- Highly fragmented structure (57 bor oughs)
- Prague is both a region and capital, which causes inefficiencies in planning. economic development, staffing and coor dination
- Overlap of responsibilities and general competition for resources and power
- Scope of control is guite narrow, and highly hier archical, this prevents innovative ideas from spreading across silos (other departments)

#### ICT and Data Governance

- Sharing of data, information, analytical knowledge between actors is currently insufficient
- Some highly important data is still missing and needs to be collected (local economic activity, energy consumption of city-owned buildings in real time, qualitative data should also be systematically collected)
- More sensors should be utilised in the city to understand new patterns and especially the way people move around the city

#### **Regulations and incentives**

- Fragmented structure makes it hard to implement binding regulations on a local level
- Focus on flooding regulation, other aspects (e.g. urban heat) island require additional attention
- Several grant programs are in place to support environmental NGO activities
- New metropolitan plan employs an index of ecological stability for built and unbuilt envir onment

#### Links with other sectors

- Strong links especially with promoting soft mobility modes - especially cycling and cycle paths
- •No low-emission zones lack of support for their implementation
- Expanding green areas by planting trees, refurbishing parks and introducing green investments within some infrastructural projects, usually linked to upgrading some key tram lines
- •Strong link with the Cultural Heritage sector. Climate adaptation measures often differ from Heritage goals.

#### **Municipal Strategy and Planning**

- Existence of accepted strategic documents that are a pre-requisite to drive change (implementation plans are being drafted)
- Strategic plan 2030, Climate Adaptation Strategy, Sustainable Mobility plan, Participation Manual, Public space design manual
- Participation process to collect input for the new land-Use Plan (Metropolitan plan) currently under way

#### Participation and Stakeholder Engagement

 A Participation Manual is in place and use. It emphasises participatory planning methods and an easy-to-use handbook. Offering participation training programs that lead representatives of the municipality step-by-step through a participation process: from analysing the projects initial context to the preparation of a concrete participation plan.

#### 3.5. Prague

#### 3.5.1. Municipal strategy and planning

The City of Prague developed several strategic development plans and documents that focus on climate adaptation measures. These are a prerequisite to drive the change needed for a paradigm shift towards an eco-friendly and sustainable planning and organisation of urban space.

Besides the Strategic Plan 2030, the city developed a Climate Adaptation Strategy, a Sustainable Mobility Plan, a Public Space Design and a Participation Manual with important actions and incentives to bring the topic to the agenda of planning departments within the municipality. The new land-use Plan (Metropolitan plan) is going through a participatoryapproval process. This has already led to higher awareness of NBS and their potential effect on the urban space not only within the administration, but also within the public. The implementation plans for the above-mentioned plans and documents are being drafted, but implementation lacks tools of funding and effective project management.

There is limited motivation for the private sector to go beyond what is already required by the national law, making NBS a "nice add-on" that is not necessarily seen as a benefit for the investor. Besides regulatory requirements, there is also a need to build up further knowledge on future scenario development that is set apart from the short-term planning processes and to develop an integrated digital planning tool that helps to simulate the effects and benefits of climate adaptation measures over the life cycle of the built environment.

This would help to deliver a common ground for discussions in public and stakeholder engagement and the strategic integration of NBS in future urban developments, as well as more certainty for investors in adjusting their plans to the upcoming strategies of the municipality. Establishing further testing grounds while introducing more flexible authorisation processes could even facilitate the private sectors technological advancements and financial resources to place NBS in Prague.

#### 3.5.2. Finance and procurement

Prague has mainly used traditional funding methods and mechanisms to finance its urban development; these include mainly national tax transfer, revenues from fees and levies and importantly from selling its real estate property. The municipality also has extensive experience with issuing bonds (debt-based financial instruments).

When it comes to funding for NBS, the City of Prague is still in the process of internalising the topic. However, urban green areas, water

management and other UNaLab-relevant intervention areas have seen intensive investment (not only in recent years). These investments are done through a variety of different departments, stakeholders and other entities. For example the department of strategic investments (OSI) is one of the key actors responsible for allocating investments to strategically significant projects.

Prague has a number of different projects (revitalisation of urban areas, waterways and others), where NBS should be relatively easy to integrate.

Innovative procurement is being piloted on a couple of projects in the city of Prague, however, it is not widely utilised as a norm. There is a strong belief that putting more emphasis on the quality of a particular solution, should be given more priority than just the lowest price of a bid. Procurement should be given more attention, as NBS will require a more comprehensive approach to defining procurement criteria.

#### 3.5.3. Regulations and incentives

Prague's highly fragmented government structure makes it difficult to implement binding regulations on the very local level. Every decision, regulation or incentive depends on the consent of the mayors of the 57 boroughs. One of the main findings was that there is not a highintensity exchange across the different boroughs. Furthermore, some of the boroughs have differing by-laws and regulations, hindering a crossborough approach to NBS deployment. Also, as each borough has its own mayor, political agendas vary drastically and finding a multi-borough collaboration consensus is virtually impossible. This means that Prague is plagued by a fragmented urban development that prevents efficient project realization.

NBS or associated measures against the urban heat island, for example, are not seen as priority measures of urban development by every borough. There are some boroughs that are very progressive in dealing with the heat island effect, such as Prague 6. Unfortunately, this is a borough-specific approach, not found in all parts of the city.

Prague is one of the largest UNESCO protection areas. As such, there are very strict regulations on the visual and aesthetic elements within the city. In essence, this means that NBS such as green facades and other interventions would be more challenging to implement within the historical core of the city.

A good example for the success of climate adaption measures are the flooding regulations. In this field, the city of Prague managed to develop a strategic plan that was accepted and carried out by all relevant boroughs.

In addition, the city of Prague launched several regulations and incentives

that will draw the focus on these areas as a prerequisite to drive the change needed to implement climate adaptation measures in planning processes. Besides several grant programs to support environmental NGO activities, there are also specific programs to support single such as green roof subsidies.

The new Metropolitan Plan of Prague will employ an Index of ecological stability for the unbuilt environment. The challenge will be to shift the focus to areas where the demand for NBS is not yet seen as a priority because the effects of implementing them (or not) will show in the medium to long term (for example urban heat island). The key for that is raising awareness and developing digital planning and decision models that help to simulate the effects of the implementation of NBS (as opposed to business-as-usual) in the urban fabric.

#### 3.5.4. Organisation and structure

Prague has one of the most fragmented administrative systems in the EU. The city is divided into 57 different self-governing units. These boroughs also have budgets and are capable of allocating resources to locally-important investments such as parks, urban infrastructure, and other areas that require attention. Working closely with these will be one of the enablers of a successful shift towards increase in local NBS.

Prague is considered both a region and a capital city. This means that there are two different levels of administration acting within the magistrate (main city hall). For example the public monuments and heritage department together with the urban planning department represent the national level of government, while the department for environment and protection is on a city-level. This dissonance within the structure adds to the complex organisational structure of the city. This is also coupled with the fact that there are overlaps between different departments and their responsibilities, oftentimes causing friction and a subsequent low level of project ownership.

Prague is also unique in its separation of administrative and political branches. The head of the magistrate is the de facto and de jure head of the civil servants, while the mayor leads the political employees of the organisation. This separation works very well in theory, but in practice, it is yet another area where responsibilities and transparency should be better emphasised and enforced.

There are a number of organisations within Prague that stand out in the sense that they are well positioned to drive NBS and accelerate their takeup in the coming months and years. These include: the Prague Institute of Planning and Development (city-owned organization), the Department of Protection of the Environment and Prague ICT Operator (OICT Prague).





When aligned, these organisations could be pushing from the bottomup new innovative approaches to NBS. UNaLab is facilitating this collaboration between the City hall and IPR Prague and already the on-site workshops have proven useful to establishing bridges of communication and trust.

#### 3.5.5. Participation and stakeholder engagement

Participation and Stakeholder Engagement has become one of the key elements of new planning processes and urban regeneration. The Participation office of IPR Prague established a Participation Manual in form of an easy-to-use handbook that includes participatory planning methods. Besides that, the office of participation also offers participation training programs that lead representatives of the municipality and city boroughs step-by-step through a participation process: starting with analysing the projects initial context to the preparation of a participation plan. In addition IPR Prague published on its website videos which teach about participatory planning. This reflects an important starting point for improved participation and stakeholder engagement. There is a challenge, though, to further embed participatory approaches to the planning process in order to drive more buy-in and citizen engagement, especially in the planning phase.

There are two lighthouse projects that combine participation and NBS in the projects Imperial Island revitalisation and Confluence Peri-urban Park *"Soutok"*. The *Soutok* projekt focusses on the confluence area of the *Berounka* and *Vlatava* River. The territory covers an area over 1000 ha including 6 municipalities. In a bottom-up approach the development of the peri-urban park was discussed and planned.

#### 3.5.6. Green and blue infrastructure

Prague has a very high portion of green space. 52 % of the whole city surface is green and provides different forms of green infrastructure: wild green fields, forests, parks and meadows. One of the main challenge is to provide all of them with sufficient water. That is especially a main problem in the dry season.

After a large flood in 2002 the city of Prague developed a new flood management for rural flooding with the result that *Vltava* River flooding protection is now state-of-art and designed to protect the city. Still in need of more concrete and better-designed measures is the confluence of *Vltava* and *Berounka* as well as flash floods due to extreme rainfall.

For integrating more green and blue infrastructure, the maintenance and reconstruction of roads could be a good opportunity that is until now not utilized.

In green and blue infrastructure projects, effective management tools are missing to be able to steer these integrated projects. In addition more interdisciplinary collaboration has to be established as an applied planning principle.

#### 3.5.7. Link to other sectors.

Climate adaptation measures and NBS solutions have in general strong and important interlinkages with other urban sectors, mostly related to effects arising in the field of mobility and health. For instance, growing demand for electric mobility and steadily increasing investments in new rail- and bus-lines have created more alternatives to the car. People are generally encouraged to walk and cycle more, which could finally lead to healthier lifestyles while more space is retained, e.g. from abandoned parking, for other uses. Former single-use environments could be transformed to meeting points for social exchange or green and blue pockets and strips along streets and sidewalks. At the same time, NBS present an opportunity to improve the appeal of soft modes, representing a potential positive feedback effect.

Introducing such a change in the urban design is nonetheless highly dependent on the existing infrastructure and the competition between different modes of transportation. As seen in Prague, there are still strong path dependencies in terms of street infrastructures that e.g. connect remote areas around the city centre, which cannot be changed in the shortterm. Investments in public transit and cycling infrastructure can thus be accompanied by temporary interventions and experiments for reclaiming the street for low-carbon modes of transportation, which will be necessary in overcoming the current dominance of the private car. Shifting the modal split towards softer modes will consequently have significant effects on the availability of space and its use for raising Prague's overall liveability and climate resilience.

In the ongoing NBS implementation process in Prague there is a strong link with the cultural heritage sector. The city of Prague has great stock of heritage sites and buildings, which makes it hard to implement NBS solutions which often differ with the regulations for the cultural heritage. Therefore, a targeted strategy with special measures to link these sectors in order to integrate NBS on the whole city fabric is necessary.

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#### **Potential NBS pilot sites**

A range of sites were identified by the interview partners and throughout the workshops as potential areas for NBS implementation.

Potential Intervention Areas (O=On-going, F=Future planned, D=Done/ Completed):

- *Pražský okruh* (Prague highway circle) (F)
- City circle (ring roads) (F) •
- *Emauzy* Monastery gardens (IPR) (O)
- Confluence periurban park; (Confluence of Vlatava & Berounka) (O) •
- *Rokytka* revitalization (O)

- Palmovka, Rohansky peninsula (F)
- *Libensky* island masterplan (F)
- Street projects: Vinohradska, Letna (D)
- Prague 14 Vybiralka Housing estates (F/O)
- City centre
- *Karlovo namesti* (F/O)
- Vaclavske Square (F/O)
- Cisarsky Ostrov Troja (O) •
- Novy Smichov (Brownfield) (F/O)
- Sporilovska spojka (Bypass) (F)
- Čakovice Dolní Chabry Ďáblice Vinoi Suchdol PRAHA 18 PRAHA 19 Satalice PRAHA 8 Nehušice PRAHA 20 PRAHA 9 PRAHA 14 PRAHA 7 PRAHA 6 Klánovice Dolní PRAHA 3 PRAHA 1 Počernice Běchovice amesti 🗲 PRAHA 21 PI AHA 2 PRAHA 17 nastry Gardens Dubeč Koloděje Dolní Zličín **Novy Smichov** Měcho PRAHA 5 PRAHA 13 PRAHA 15 PRAHA 4 PRAHA 22 Královice PRAHA 11 Řeporyje Újezd Nedvěz Slivenec Kunratice Velká Kolovraty Chuchle Lochkov PRAHA 12 PRAHA 16 Zbrasla Lipence



- Zelivka (water reservoir) (F)
- Cycling paths (F)







Vision Workshop



UNaLab Team



Defining Intervention Areas



Working Session

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#### 3.5.8. Project idea workshop

Over the course of the week, 17 ideas for projects were c the internal workshop at the end of the week, the particip three votes and used these to pick the top 3 most promispotential NBS projects.

Hypothesis: Prague should showcase the benefits of offices at Emauzy monastery garden

#### Hypothesis: Prague should use NBS as a driver for projects such as the confluence park of Vltava and

Hypothesis: NBS should be included in the master-p of the Libensky Island in Prague

Hypothesis: NBS should integrated into the street projects of Vinohradska and Letna

Hypothesis: The Prague 14 pilot project, which ai the public space in the area of an housing estate degeneration of the area), should promote its plan integral part of the new design of public space.

Hypothesis: Prague should focus on future-proofing through NBS when revitalising Karlovo Namesti - the largest square in central Europe

European

Hypothesis: Novy Smichov brownfield redevelopment should encourage the uptake of NBS while including private investors in the project

Hypothesis: Zelivka water reservoir revitalisation project should include NBS as a sustainable method of purifying water

#### This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Commission Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions

ected. During	Intervention Area: Raising a scale living lab at the Centr	awareness of NBS and their impacts through a small- e for Architecture and Metropolitan Planning (CAMP)	V v
each had deas for	Background NBS are to some an abstract concept. The living-lab at	<ul> <li>Demonstrator of positive effects of NBS</li> <li>Space for Education and &amp; Interaction with NBS</li> </ul>	iu ito "N
S at the IPR	the IPR will display some of the main examples of NBS that are being utilised within some of the projects in Prague at the moment.	<ul> <li>Sustainable energy system (including photovoltaics)</li> <li>Refurbishment of an area within a UNESCO site</li> <li>Green facades</li> <li>Community garden (produce will be used in the local coffee shop at IPR)</li> </ul>	in b o A
	Intervention Area: Collabo large-scale real estate deve	ration with a private investor while integrating NBS in a lopment	V h
ier-value unka rivers	Background NBS are a "heat-island" issue am others in Prague. The current	<ul> <li>Targeting NBS to achieve sustainable development goals;</li> <li>Decreasing heat-island effect in the city centre</li> </ul>	is w a a
ing process	investor and developer are open introduce green spaces to the ne district that will be developed in specified brownfield.	<ul> <li>Andel / Novy Smichov as target areas</li> <li>Funded by private capital</li> <li>Expansion of green spaces and making these accessible to the local community</li> </ul>	c e T N
	Intervention Area: Integrat historic city centre, while t departments	ion of NBS in a main square redevelopment within the esting the ability to work across a variety of	V I
talisation	Background Karlovo Namesti (Charles square is part of the historic city centre and is surrounded by a main transport axis. Therefore the	<ul> <li>Improving the vital function of the park and converting it to an even better recreation site by implementing NBS</li> <li>Sustainable water management / Water retention</li> <li>Improving park reputation</li> </ul>	e t i p s
o improve	accessibility of the park, it's quality of stay and especially it's air quality remains big issue. However, due to it's location and size the park has potential for a	<ul> <li>Historical park with UNESCO heritage → revitalization is inevitable but stands in contrast with the UNESCO standards</li> <li>High concentration of different interests</li> </ul>	s p T w

shop summary: NBS are a highly underestimated topic amongst: parts of the population and important decision makers. To build ore awareness workshop participants came up with the idea ate a small-scale living lab at the Centre for Architecture and politan Planning (CAMP). The idea behind the living-lab is by ng the positive effects of NBS the topic of NBS will become a: central part on the debate about urban development. This will nieved by providing space for interaction with and education BS, for example through integrating a community garden. next step to push this more forward the CAMP can set up a ng group to draw up those ideas and building a framework.



hop Summary: One of the main challenges in Prague are urban slands. A key potential to address those by integrating more NBS ownfield development. During the interviews and during the hop the development of Novy Smichov (Prague 5) was identified y promising target area. This area is mainly privately funded but onal costs that could come up by integrating more NBS could be ed by the public sector. First ideas for NBS in this area were for le integrating a central park, green roofs and more trees.

R will take the collected ideas to discuss it with the developer of Smichov. This project can be another showcase project for how an be a central part in redeveloping projects.

hop Summary: Karlovo namesti is a central square and park d in the city centre close to the IPR. The public reputation of this has been in decline in previous years, mainly because the nely busy roads surrounding it. Since the process of redeveloping quare has already started the discussion on how NBS can be ated carries a high potential. During the workshop, the ipants emphasised the importance of NBS for revitalising this to improve it's vital function. A sustainable water management was mentioned as a key and very promising element for this

ey challenge is to combine the interests of the heritage office he visions of the revitalisation of this space. The next steps will ining a steering committee



### Key findings: Castellón

#### Green and Blue Infrastructure

- Current project to recover the wetlands
- low ecological connectivity between green areas
- Large portions of the agricultural areas degraded and could be restored
- Irrigation ditches and canals closed and in need of restoration
- Water resource Management can be improved (unnecessary use of fresh water; waste of treated, pluvial and wetland waters, saline intrusion in wetlands due to excessive pumping)

#### Finance and procurement

- Most projects are planned with budgetary resources (local or other); likely additional resources are FEDER funds
- Possible inclusion of NBS projects and concepts in infrastructure projects from the General Plan and EDUSI with allocated budget
- The procurement processes allow, but do not promote, the inclusion of "green" requirements and gradually take sustainability criteria into account

#### Inclusive Urban regeneration

- Strategic objective of "social integration and poverty reduction" with a line of action to rehabilitate degraded urban areas
- Potential to alleviate poverty, create jobs, provide affordable healthy food and diversify the local economy through urban agriculture and rural revitalization
- Identification in EDUSI of 11 degraded areas suitable for strategic, green projects

#### **Organisation and Structure**

- Openness for the adoption of NBS concepts in planned projects
- Insufficient cross-departmental communication within the local administration (e.g. energy-mobility)
- Communication between public administrations, local utilities and service providers is not always efficient
- Limited powers of local government on some topics



#### ICT and Data Governance

- Development potential of a "Citizen Card", allowing citizens access to several public services
- Within "Smart Environment", development focuses on environmental quality, energy efficiency and waste management
- A governance system is to be set up to monitor sustainability strategies

#### **Regulations and incentives**

- Current norms do not fully enforce the involvement of NBS in the implementation of infrastructure projects
- There are no incentives such as tax relief for green measures (e.g. roof greening and rainwater storage)
- Existing incentives and subsidies for organic agriculture can be improved

#### Participation and Stakeholder Engagement

- and engagement

#### Links with other sectors

Important synergies between NBS projects and environmental education and awareness Reduction of air pollutants due to increased use of non-motorised and public transport is likely to improve public health

 Potential conversion of the traditional transport infrastructure in the city center to green areas

 Possible improvement of infrastructure for public transport and non-motorised mobility, e.g. via green spaces

#### Municipal Strategy and Planning

 Availability of plans and strategic, territorial studies, addressing diverse subjects and areas of the city in which NBS should be involved in the future

 Availability of a sustainability-oriented smart city strategy and priority projects

Development by EDUSI: City SWOT, strategic objectives, expected results, geographical scope, implementation plan, financial plan Upcoming publication of a general structural plan, updating the territorial ordinance with a strong environmental sustainability perspective

 Urban sustainability planning at municipal and provincial levels is supported by a local group from the social and economic sectors Many activities in stakeholder participation

 Frequency of external consultations is considered insufficient

 Cooperation between the municipality and private sector can be improved

#### 3.6. Castellón

Category	Indicator	Value
Geography	Annual increase in population (average of last 3 years)	-0,80%
	(Net) urban population density	86,77 per km2
Economy	GDP per capita	€ 23.071
Land use and urban structure	Natural protected Areas	0,49%
Env. Impact and Quality	GHG Emissions per capita (CO2)	2,17 t/per capita
	Airborne pollutants (PM10)	36,3 μg/m3
Energy system	Renewable energy in total energy generation	20%
Mobility	Public transportation modal split	6,84%
	Personal Vehicle (including private vans, excluding motorcycles and trucks) modal split	34,80%
	Pedestrian modal split	53,36%
	Cycling Infrastructure	30,83km per 100.000 inh
	Minimum monthly income/ monthly ticket	24,53
Waste and resources	Total amount of solid waste sent to land fill per capita	525 kg per capita
	Municipal water consumption per INDUSTRY	90%

#### 3.6.1. Municipal strategy and planning

At Valencian Community level, Law 5/2014 of Territory Ordination, Urbanism and Landscape (LOTUP) is the most important and encompassing piece of legislation on urban and territorial planning. This law instructed the elaboration of the Territorial Strategy of the Valencian Community 2010-2030, which establishes the objective of "developing the full metropolitan potential of Castellón's urban area". Within these definitions, two strategic documents were developed and set the strategy at municipal level:

- Strategy for Urban, Sustainable and Integrated Development of Castellón de la Plana's Urban Area;
- Strategic Environmental and Territorial Study of Castellón de la Plana's General Plan.

The Strategic Environmental and Territorial Study of Castellón de la Plana's General Plan is a study that supports the elaboration of the General Structural Plan, yet to be published. The Plan will comprise a General Structural Plan (to be approved at Valencian Community's level) and a Detailed Management Plan, to be approved by the Municipality.

Its objective will be to "guarantee the adequate environmental protection and promote the sustainable development in its territory", integrating environmental and territorial aspects in the elaboration of the General Plan, proposing preventive, corrective and compensatory measures and delineating the development of a monitoring system.

The specific objectives include rational land use, environmental

protection, prevention of natural and induced risks, sustainable use and protection of water resources, integration of green infrastructure, planning and use of urban facilities and equipment, among others.

The document presents a baseline scenario plus three alternative proposals out of which one will be chosen as reference for the General Plan. These alternatives vary in terms of how sustainability-oriented they are, ranging between urban growth-oriented and conservation-oriented. The plan also presents a set of criteria to select one of the alternatives, but does not inform what the current status is.

The planning logic and conceptual reference of the Strategy for Urban, Sustainable and Integrated Development (EDUSI) of Castellón de la Plana's Urban Area comes from the European Regional Development Fund (FEDER). This document identifies urban problems and challenges, performs an integral analysis of the urban area (physical, environment and climate, energy, economy, demography, society, IT capacity etc.), defines strategic objectives, expected results, and establishes an implementation plan with seven lines of action with specific objectives, scope, timeframe, budget, indicators etc. Its strategic objectives are:

- Define an active, integrated and shared territorial model;
- Support the transition towards a low carbon society;
- Convert the urban area into an area of innovation and quality of life;
- Promote social inclusion, fight poverty and discrimination

#### 3.6.2. Finance and procurement

Although EDUSI has been developed according to the FEDER guidelines, the implementation of its projects is in principle expected to be done mainly through the city's own budgetary resources, possibly counting with additional sources from Valencian Community, national and European levels (including FEDER resources). Participation of private actors, whenever possible, is also permitted. Projects related to the General Structural Plan, on the other hand, are expected to be financially sustainable, meaning returns on investment must be equal or superior to the invested value.

Procurement today has not yet fully incorporated sustainability criteria, with price still being the determinant factor in the selection of public projects. However, there are no legal obstacles hindering the adoption of such criteria, and even bidding notices already published in some cases can be supplemented by additional sustainability requirements. There is therefore a positive set of circumstances for public works and purchases to incorporate NBS-related concepts and technologies.

#### 3.6.3. Regulations and incentives

There is a complex network of laws, plans and regulations related to urban planning and sustainability shaping Castellón de la Plana's urbanism and territorial management at Community and municipal levels. The principles of territorial, landscape and urban planning are mostly given at Valencian Community level, with additional specific plans in place on flooding risk prevention, coast and coastal green infrastructure, climate change, infrastructure corridors and forests. Castellón de la Plana holds autonomy to approve the detailing of territorial plans and development of urbanised areas. There is particular concern in the city regarding, on the one hand, the risk of flooding and, on the other hand, the protection, functional and ecological integration of the green infrastructure of special significance.

The current planning seems not to use incentive mechanisms for other actors to support the development of policies, objectives etc. too often. The only relevant mention to the use of incentives found, indicates that private resources might be sought after to contribute to fund the implementation of EDUSI in cases where there is synergy of interests between private actors and the municipality.

#### 3.6.4. Organisation and structure

In general, Castellón's municipality has good supervision and control over the monitoring, planning and execution of projects related to its territorial management. Coordination with the Valencian Community on topics such as coastal management, flood prevention and forestry also seems to work satisfactorily. Although the concept of NBS has not yet been formally internalised in policy-making, there is an openness to the topic and the approaches it brings to deal with local sustainability challenges, including procurement.

It has been identified, however, that insufficient communication exists within the public administration and with external actors, with actors often unaware of projects and initiatives taking place in related areas (e.g. energy-mobility). Although planning documents such as EDUSI and the General Plan explicitly address the topic of participation, in practice there lacks cross-sectional institutional structures to facilitate communication and coordination between offices and fields. Management of the industrial and rural areas are clear examples of areas in which better institutional tools would significantly improve the governance.

#### 3.6.5. ICT and data governance

EDUSI establishes as one of its lines of action (2.1) "Promotion of electronic administration and ICT for the management of municipal





services and promoting the Open Government - Castellón Smart City", with a budget of  $\notin$  2,1 million and a time frame of 2015-2019. To develop its implementation, its "Smart City Plan" presents a selection of priority projects, structured around six smart-related "verticals": economy, people, governance, mobility, environment, and living.

- Smart economy: strengthening the city's economic dynamics with an emphasis on commerce and tourism. Focus on technological innovation and entrepreneurship as potential leverages.
- Smart governance: technological modernization of equipment, services, infrastructures and the public administration. GIS tools are considered to be underutilized. Data governance policies in place today are considered insufficient.
- Smart mobility: Opportunities for improvement through adoption of ICT in mobility planning and management, access to information and increasing the adoption of non-polluting public transportation.
- Smart environment: environmental and climatic concerns in the city could be supported by smart projects on environmental quality (e.g. air and acoustic pollution), energy efficiency, and waste management.

#### 3.6.6. Participation and stakeholder engagement

Participation is embedded in Spanish national law, as well as at Community and municipal level. "Participation of citizens and affected institutions" is one of the main guidelines of the General Structural Plan's environmental study, which also establishes among its objectives to increase the number of participatory activities and the share of the local population taking part.

Participatory activities were conducted before the publication of its preliminary version, while others are planned to be held after the publication of the preliminary and definitive versions. Citizens and several institutional stakeholders have already contributed in the identification of priorities (green infrastructure, urban retrofit, protection of natural and cultural heritage, creation of a green belt around the city etc.).

After the publication of the preliminary version, sessions with the general public and formal consultations with institutional stakeholders will be held, including public entities within, around and above Castellón. Once operational, the monitoring of the Plan will be open to public access.

Participation and stakeholder engagement in EDUSI's was supported by a Local Support Group, comprised of members of the local administration, academia and innovation sectors, local associations, environmentalists and "Castellón's Urbanism in the 21st Century Forums", open to citizen participation and subdivided in topics such as infrastructure, economy, sustainability etc. EDUSI also establishes that its participatory governance

extends to operation and monitoring.

#### 3.6.7. Green and blue infrastructure

The General Structural Plan is the document that more explicitly deals with green and blue infrastructure, and classifies them in Castellón as in zones to be protected due to special environmental, cultural and visual relevance; risk zones, ecological connectors and functional connectors. It also establishes a monitoring system which observes its functionality, shortcomings and the level of integration of ecological and hydrological processes within the urban area.

Castellón and the Valencian Community have developed a concept for its green and blue infrastructure that, while not yet entirely in implementation, delineates a vision of the future for the city. At metropolitan level, the overarching idea presented by the Valencian Territorial Strategy is to create a contiguous green grid which will shape the development of further urban developments. It comprises a green arch around the urbanised areas within this perimeter including protected areas (*Desert de les Palmes* and *Serra d'Espadà* Natural Parks), the coastal area and its wetlands (*Nules-Borriana y el Clot de la Mare de Déu Marjales*). This territory would be crossed by ecological green corridors connecting the different ecosystems between the coast and the mountains inland, a function also performed by the rivers that cross it and the agricultural lands.

Water management is considered by local stakeholders to be a highly important environmental issue. The region is characterised by a very irregular rain distribution throughout the year and, during the rainy season (August to October), intense storms precipitate over the city, often causing severe floods. Due to the geographic conditions of the territory, which sits on a soft slope from the mountains to the sea with an aquifer beneath it, the wetlands (*la Marjalería*) located between the city centre and the coast are particularly susceptible to flooding throughout the year. This is caused by the proximity of the groundwater table to the surface and by the running of rainwater from higher areas. As a result, this area needs constant draining by hydraulic pumps, which often deregulates the hydric balance of the system, leading to saline intrusion by the seawater nearby.

The recovery of abandoned agricultural areas (especially of citric fruits) and the development of ecological corridors crossing highly urbanised areas (city centre, industrial areas) are also considered priority activities to strengthen Castellón's green infrastructure.

As for the urban and coastal areas within the metropolitan perimeter, the green infrastructure would serve the purpose of regenerating and requalifying a list of already identified degraded areas

#### 3.6.8. Inclusive urban development

Socioeconomic inequality is spatially and structurally represented by the unequal distribution of urban infrastructure and services in different regions of the city. The recovery and development of Castellón's urban infrastructure with a focus on addressing such socioeconomic inequalities and improving the environmental resiliency of the city is considered an important topic by local actors. One of EDUSI's strategic objectives is of promoting "social inclusion and fight against poverty", with an action line focused on rehabilitation of degraded urban spaces. It also identifies 11 degraded areas suitable for strategic, green projects, where currently urban infrastructure and access to services is deficient and social problems are more accentuated.

Several of the potential intervention areas developed with local stakeholders may contribute to promote inclusive urban regeneration. Investments in public and non-motorised transport, for example, would have a positive impact on the mobility and related financial costs of residents of poor areas, as well as an incentive to attract economic opportunities to these regions. The reconversion of traditional transport infrastructure in the city into green areas has positive impacts of public health, air and noise pollution, permeability to rainwater and readiness against floods, ecological connectivity, and tourism among others.

#### 3.6.9. Link to other sectors

The implementation of an NBS vision in Castellón has the potential to provide benefits to several other relevant sectors. Firstly, the issue of quality of life has been identified as a priority for citizens and local government alike. The outputs of the ambition workshops indicate that this implies significantly greening within and around the city, removing spaces from private vehicles (with a greater emphasis in public transportation, walking and cycling) and converting part of them into green areas. The infrastructure dedicated to water management, one of the most pressing issues in the city today, would serve as an axis to partially redesign the city, addressing simultaneously the issues of water scarcity, floods and the management and recovery of the marsh lands (Marjalería). The territorial planning along the coast, and its connection to Castellón's urban core would also be significantly transformed, with a greater focus on coastal environmental quality and sustainable mobility connecting these areas. These transformations would have repercussions in areas such as public health (with reduction of automotive pollution and citizens more physically active), public security and disaster prevention (specially flood prevention).

Among the economic implications, Castellón has an underexplored touristic potential, and the opening and recovery of natural areas in and

around the city is expected to have important repercussions for this economic sector.

The development of distributed residential renewable energy generation and the water treatment brings economic benefits to citizens by reducing costs with such services. The recovery of agricultural areas around the city has also the potential to generate local jobs and reduce costs and carbon emissions related to food transport.

Finally, the envisioned transformations offer new economic opportunities for "green" economic sectors, especially in the industry and services. The expansion of the solar market, for example, creates opportunities for companies who provide installation and maintenance of these structures. The local industry sector would also be transformed, since the results of the ambition workshops indicate that the city expects the adoption of circular economy concepts, integrating the productive chains and leftovers, thus reducing industrial waste and optimizing processes.

The water management sector would also be affected, having to develop more sophisticated technologies to treat and distribute waste water according to the requirements of purity needed by different users (industry, agriculture, irrigation of urban green areas etc.). All this, on its turn, requires a system of regulations, incentives, technical training which will require articulation and facilitation of public actors.

#### 3.6.10. Potential NBS sites

*Serrallo Polygon, Ciudad del Trasporte*: Re-naturalization of industrial areas and creation of (more) sustainable clusters

*City center:* rehabilitation reduce local pollution, heat islands noise, and generally improve the quality of life of citizens

*Creation of green themed corridors in Castellón* which are easy to integrate in the General Plan and could be implemented in:

- 1. Sports Corridor
- 2. Agricultural park Corridor (*ermitas*), thereby revitalization of Castellón agricultural park
- 3. Water Corridor
- 4. Maritime Corridor
- 5. Grau's Civic Corridor
- 6. Cultural Corridor
- 7. Ceramic Corridor
- 8. Acquis Corridor













El Rio Sico: Dry River

Working groups during the workshop

Depuradora: water treatment plant



Presentation of results during workshop

La Marjalería

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#### 3.6.11. Project idea workshop

Over the course of the week, 15 intervention areas were defined and, out of these, four were selected by the workshop participants to be further elaborated upon.

Hypothesis: Castellón should revitalise the Castellón agricultural park to improve water management

Hypothesis: Urban gardens in the city should be reactivated, expanded and strengthened

Hypothesis: The city should re-naturalize the industrial areas and create (more) sustainable clusters

Hypothesis: Castellón should promote the consumption of its tap water

Hypothesis: The city should promote an increase of the sustainable and intelligent use of drinking water in homes and public institutions

Hypothesis: The city should promote the reuse of treated water for parks and agricultural irrigation and sanitation

Hypothesis: Castellón should promote develop new regulations for the implementation of Nature Based Solutions

Hypothesis: The city should create new green and public areas integrating NBS concepts

Hypothesis: Castellón should adapt the tendering processes for promoting sustainability in projects

Hypothesis: The city should create low emission zones in built up areas

Hypothesis: Energy efficiency and renewable energies such as solar should be promoted in Castellón

Hypothesis: The optimisation of the global management of rainwater of Castellón has the potential to reduce the risks of flooding, the costs and the energy consumption of the drainage and pumping system			
<u>Context</u> Castellón´s latent risk of flooding requires improvements of its	Goals	Increase soil permeability in the urban area Increase retention capacity and management of rainwater in buildings and parks	

Hypothesis: Green thematic, NBS-based corridors could contribute to climate change mitigation and adaptation and to the creation of a green mentality, environmental awareness and promotion of tourism

Context Some corridors already listed in	Goals	<ul><li>Improve environmental awareness</li><li>Contribute climate change mitigation and adaptation</li></ul>
the General Plan could be redesigned. New ones can be planned and included in future projects. Corridors such as <i>Caminás</i> and <i>Puente del Río Seco</i> , for example, can be pilot projects.	Potential Elements	<ul> <li>Re-conceptualisation of planned green corridors</li> <li>Planning of additional corridors: Sports, Downtown, Via del Mar, Paseo de Morella, Ribalta, etc.</li> <li>Include innovative elements of NBS in Pheir design</li> </ul>

#### Hypothesis: The introduction of a sustainable solid waste management system for the preservation of the environment is essential

<u>Context</u> The current lack of sustainable management of solid wastein Castellón requires a redesign to better sensitise and enforce environmentally friendly behavior. Industry waste management needs closer regulation.	Goals	<ul> <li>Implement 3R policy: reduce, reuse and recycle</li> <li>Increase environmental awareness</li> <li>Reduce the environmental impact of solid waste</li> <li>Reduce water pollution</li> </ul>
	Potential elements	<ul> <li>Promote waste separation and return</li> <li>Regulate the production of containers and materials</li> <li>Restructuring the waste collection fee based on the "polluter-pays" principle</li> </ul>

Hypothesis: Better institutional conditions and road infrastructure could encourage a more intensive use of the public transport system and non-motorized means of transport

	<u>Context</u> Appropriate local conditions favor the use of bicycles and public transport. Inter-modality must be promoted and access be extended to unattended areas	Goals	<ul> <li>Improve conditions for non-motorised transport</li> <li>Improve connectivity</li> <li>Limit the use of private vehicles in central areas</li> <li>Organise cultural events change mobility culture</li> </ul>
		otential lements	<ul> <li>New, improved sidewalks and cycle paths</li> <li>Integrated urban mobility centers</li> <li>Implementation of the concept of superislands</li> </ul>



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Commission Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions



Workshop Summary: Castellón and cities like Mallorca are at high risk due to the natural phenome called "la gota fria" (Cold Drop) associated with heavy rainfall. In the past the city has been under high alert as a result and any schools were closed in turn. This clearly illustrated the importance of including NBS within the General Plan. The participants where much concern about the houses and buildings in the Marjalería who are built below water table level, representing a mayor risk of flooding for the inhabitants. Ideas like Flooding parks, SUDs, and NBS in general are taking into account to be included in the General Plan.

Workshop Summary: New bicycle lines are foreseen in the General Plan. The document is still open to modifications, which represents a great opportunity for including NBS. The idea is to do "small" modifications to the planned routes so that they follow a specific "theme" and connect infrastructures such as sports facilities or museums. The corridors also shall include NBS elements such shading trees, permeable pavements, etc. The Urban Planning department welcomes this idea and will suggest the modifications to the Department for its inclusion in the GP. If these corridors are hen included in the GP, their implementation will be then pursued. The intervention could be partly financed by the GP budget. Additional funding would need to be secured.

Workshop Summary: So far the municipality has not set this topic as a priority. The onsite process recognized this a one of the challenges that need to be tackled if a green mentality wants to be noted in the city. The whole SWM system needs to be rectured to make it environmental and financially sustainable. interventions can be done at the fiscal level, by a more "fair" tion system. Recycling can be promoted by introducing a nts" system and so called "Recycling points" in the city. The stry needs to be regulated but first actions easier to implement Id be to promote green activities such as recycling by reducing property tax (IBI) payed. The refund " waste" into value can be combined with the implementation of NBS. Points earnt can ranslated e.g. to finance tree planting.

Workshop Summary: Improving the integrated urban mobility was a mayor concern for the participants in the WS, what was supported by the coordinator of the General Plan. The implementation of NBS components such as tree planting for creating shade and cooling the air but also transforming the areas into more attractive and green ones, can be a good way to promote non-motorized transport in Castellon. A good start would be piloting the idea of super block or green island, with pedestrian streets and good cycling infrastructure with NBS. Public private partnerships are proposed, indeed, by the private sector who asked to be more involved in the development of NBS. They are willing to contribute their knowledge when the municipality considered it to be appropriate.



#### Inclusive Urban regeneration

- Wealth disparity of between the East and West of the city
- Redevelopment projects and provision of family gardens to help even out disparity
- Successful NBS implementation has led to rise in property prices
- 18 % social housing provided by the city

### **Organisation and Structure**

- Rather centralised decision making power
- Cross-departmental cooperation works well in several sustainability or smart city-related projects but is not formally institutionalised

### ICT and Data Governance

- Open data strategy in place
- Private companies often hesitant to share relevant data due to privacy issues

Green and Blue Infrastructure

city

flood risk areas)

enhanced

Croix des Gardes, the Islands and Basse Vallée

de la Siagne as protected green lungs of the

Dry valleys as special geological feature (high

resistant species has to be strengthened

Protection of marine ecosystems has to be

Focus on native, pollinator-friendly and drought

• Existing green blue infrastructure is well used

 Mapping of flooding zones and priority areas, as well as TIGRE risk management platform could be used to plan NBS

### Finance and procurement

- Additional funding needed for large scale projects and acquisition of strategically important land
- Cross-sectoral budget for energy efficiency and green growth measures in place
- National fund for risk mitigation activities exists which is sustained by insurance fees (Fond Barnier)
- Holistic cost-benefit analysis and new stakeholder engagement forms should be developed.

#### **Regulations and incentives**

- Building and zoning regulations pay special attention to flood risk and water retention capacity.
- Better regulation of public water use, soil guality and pollution could support NBS implementation and circular water structures
- Centralised policy system (almost all taxes) collected by the government) make it difficult for cities to issue incentives.

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#### Links with other sectors

- Biowaste composting is being enhanced and systematised in the coming years
- Cycling and walking infrastructure is being enhanced step by step
- Permeable pavements become clogged easily during heavy rainfalls (limited efficacy)
- Solar panels seen as opportunity to protect green roofs from intensive sunshine

#### **Municipal Strategy and Planning**

- Agenda 21 as long term vision and a related action plan for a sustainable and resilient citv
- PAPI strategy on local flood risk management
- Missing tools and criteria to assess and influence building and construction projects (no means to guide private developments)
- New urban plan (PLU) to be enacted in September 2019

#### Participation and Stakeholder Engagement

• Politique des Quartiers as platform to engage with citizens and local stakeholders at district level Many sustainability and NBS related events (e.g. week of the tree, nettoyons la nature, Climathon,...) Active use of social media and other means of communication that could feature NBS and raise awareness on ecosystem services • Citizen involvement as crucial means to gain

political support

#### 3.7. Cannes

#### 3.7.1. Municipal strategy and planning

The city of Cannes has created a long term vision and a related action plan for a sustainable and resilient city (Agenda 21). Many of these actions are explicitly linked to NBS-related activities (e.g. Action 8: Develop nature in the city and make it a vehicle for social cohesion, action 9: Develop agricultural and natural vocation of the *Basse Vallée de la Siagne*, action 30: Preserve the coastline of the effects of climate change, etc.). As concrete action, Cannes has for example recently developed an ecoquartier on an old industrial area (*Cannes Maria*) using an ecological architectural competition, which was well received.

The main planning document is the urban plan (PLU) of which the next version is being enacted in September 2019. There is thus the opportunity to introduce NBS relevant modifications and suggestions until March 2019. On a regional level, the SCOT ensures coherent planning. It includes green, blue and yellow (agriculture) corridors as part of the overarching strategy. Other relevant strategies include the climate plan of the city, which is starting in December 2018, as well as the PAPI strategy on flood risk (see "Risk Management").

In general, as the population is rather stable, densification efforts can free up urban spaces for new buffer zones and urban green. Further opportunities that may be used to promote NBS and climate resilient urban planning include existing thermographic pictures of the city which identify energy losses on buildings and suggest retrofit activities; an air cadaster which will be developed in 2019 to define potential locations for solar power (opportunity to include green roofs in the scope of the study).

Main challenges that have been identified were that the city does not have any tools (factors, checklists, etc.) in place to enforce sustainability or resilience criteria for land development or construction projects. Furthermore, there is no standardised way of assessing building proposals in terms of NBS and ecosystem services. Vast settlements activities in the past as well as ongoing privatisation of public land further complicate the planning and make it hard for the city to intervene. In this context, it was mentioned that a mentality shift from wanting more isolated, private spaces towards more shared and public spaces would be needed.

#### 3.7.2. Finance and procurement

In general, financing is not seen as a major barrier to NBS implementation. However, recently realised NBS projects have been rather cost intensive, such as the renovation of parts of the *Basse Vallée de la Siagne* which costed around €1 million and provides no direct return

on invest. The city also has the ambition to pay back debt and lots of renovation work is being carried out. Therefore some budget constraints apply and future (large-scale) NBS projects or municipal land acquisition activities might need additional funding.

In terms of municipal budgeting, the city has established a special crosssectoral budget for energy efficiency and green growth related activities within the project "*Territoire à Energie Positive pour la Croissance Verte*". This approach could be further extended to also involve NBS measures.

On a national level, first mechanisms exist to involve insurance companies in the financing of urban resilience projects: In terms of natural risk prevention, the Ministry of Ecology manages the *Fond Barnier* which is sustained through a certain percentage of the housing insurance fee and is used to financially support projects that mitigate risk (such as the PAPI). In a similar approach, a national fund exists that finances projects which target water availability or quality improvement. This fund is sustained by parts of the national water fees  $(3,25 \notin/m3)$ .

Perceived challenges include that, until now, there are no holistic costbenefit analysis and evaluation methods for ecosystem services in place (due to the complexity of the issue). However, seeing that the estimated cost of the October 2015 flood (~  $\in$  380 million) exceeded the yearly budget of the city, this might be a good option to explore in the future. Furthermore, national regulations do not favor PPPs which could constitute an important financing mechanism for NBS.

#### Focus Risk Management

After the disastrous October 2015 flood and in the light of Cannes being an international tourism hotspot (about 3 million visitors each year), the city has put strong efforts and emphasis in risk management measures. Specifically, the ICT-based TIGRE platform is developed to enable real time information and management of disasters. An educational document (DICRIM) has been published and distributed which describes relevant risks and gives safety instructions to the public. The PAPI strategy is being elaborated by the Agglomeration Cannes Pays Lérins which especially develops actions to manage flood risks, and the city offers personalised risk plans (PFMS) and professional assistance to local residents in high risk areas. In terms of marine submersion, the city has completed several projects, such as fixing the sand using geotextiles, which at the same time support sea vegetation and create a green underwater wall that prevents sand erosion and reduces the energy of the waves, or building dams. Furthermore, emergency simulations (e.g. Tsunami exercises) and public trainings are being organised. NBS to mitigate climate related challenges present natural ways to prevent and manage risk and could therefore be well-integrated in activities mentioned above.



#### 3.7.3. Regulations and incentives

There are no direct regulations and incentives in place which promote NBS introduction in building and construction projects. However, many (zoning) regulations target the issue of flood protection, as for example reduced building permits, obligatory flood risk studies and environmental impact assessments. On national level, the PPRI provides a regulatory framework which prescribes and supports the integration of flood risk in urban planning. The newest version is being enacted these months and is supportive for most of the city's NBS projects. As groundwater levels are very low in summer and there is the threat of contamination with sea water, it is not allowed to extract water during summer months (e.g. for car washing or filling of swimming pools), which constitutes an incentive to collect and reuse rain-, grey-, and wastewater. However, until now, there are no official rules on water (re)use in public space.

A strong legislative nature protection of the islands, the forest hills and the agricultural plains has been achieved. On a local level, regulations exist which, for example, prescribe 85% of green space to be kept in the area around the hills and at least 1 tree has to be planted in each 100 m2 in the peri-urban areas. These should be reinforced to support GBI introduction. Furthermore, enhanced regulations which ensure soil quality and integrity (also on private land) would be beneficial to avoid soil depletion and pollution issues such as those in the *Basse Vallée de la Siagne*. Additionally, the city faces issues with air quality and has experienced 7 alerts (exceeded EU thresholds) since 2015.



European This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 *Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions* 



Barriers which have been mentioned include the fact that existing regulations are rather complex and complicate efficient project work, heritage rules require new buildings to have tiled roofs which limits the opportunity to roof greening, and most taxes and fees are directly collected by the central government and redistributed to the cities (with a decreasing tendency) which make it difficult for municipalities to introduce incentive schemes (limited decision power and resources). However, the city of Cannes already provides incentives for solar panel installation on private houses and citizens are also allowed to sell the extra energy that is being produced.

#### 3.7.4. Organisation and structure

The city has been rather successful in interdisciplinary and interdepartmental cooperation. Even though not formally institutionalised, there are several projects and subjects on which the municipality is already working cross-sectoral, such as the Agenda 21 and related sustainability projects, as well as the projects smart city, handicap, and risk management. There are also EU and regional projects, such as the connected cycle-way from Greece to Spain, which increase crosssectoral interaction and might encourage the creation of new projects. Sustainability and resilience related issues are incorporated in municipal trainings and intersectoral working exchange is possible. The concept of NBS has been unknown prior to the participation in the UNaLab project and provides a good opportunity to further enhance the interdisciplinary working culture.

Challenges which are perceived in this regard are that the dynamics of the private sector (especially developers) is sometimes incompatible with existing organisational structures and plans of the municipality. Furthermore, departments such as environment, green spaces, etc. are not explicitly involved in urban planning projects and have little execution power.

It has been noted that in Cannes there is a rather centralised decision making power. Furthermore, political support and backing is crucial to realise NBS projects. There is a political six-year cycle which has to be respected in project planning.

#### **3.7.5. ICT and data governance**

The city of Cannes is following an open data strategy and is constantly working to improve data security and privacy. However, it has been a challenge that companies which are in charge of collecting important information are often not willing to share the data due to concerns regarding data protection and security issues. Therefore, information that could be used as an information source to make decisions or develop adaptation Current activities which could be further explored and used to support NBS introduction include the mapping of flooding areas and priority zones (as decision making baseline or awareness raising tools), the TIGRE risk management platform, and a local initiative for participatory mapping of cycling infrastructure, which could potentially be extended to include green spaces and ecosystem services.

#### 3.7.6. Participation and stakeholder engagement

The city of Cannes uses several formats to communicate with and engage their stakeholders and citizens. As an example, politique des quartiers provides a platform to enable citizen involvement and exchange in the different districts. The app Cannes Civique allows citizens to report problems (e.g. on roads). Moreover, the city organises and hosts several sustainability-related events, such as an action day "nettoyons la nature" where local enterprises support nature preservation, the participation in the Climathon on climate and sustainability related topics, the week of the tree where school kids are planting trees on the islands and hills, etc. Such initiatives and formats could be further developed and used to promote and place NBS as important topic. Local research and education organisations such as CPIE and CSIL have also stated interest in the uptake of this topic. Additionally, many local communication channels exist (active social media use, Cannes Soleil magazine, city website, etc.) where NBS and ecosystem services could be promoted, as well. Citizen awareness and engagement is seen as priority means to gain political support.

#### 3.7.7. Green and blue infrastructure

Cannes has given priority to protect strategic green spaces such as the *Croix des Gardes*, the islands and the *Basse Vallée de la Siagne*. As major achievement, the city has given the *Croix des Gardes* (a very exquisite and valuable hill site) to the *Conservatoire du Littoral*, a national nature protection agency, to prevent it from being sold to private developers. In this way it is protected from construction and constitutes the green lung of the city.

Furthermore, Cannes has an agricultural focus and history, and supports the setup of family and shared gardens (currently about 195 parcels) by building up and offering space for gardening to inhabitants that do not have a private garden. Unused and abandoned spaces are reserved to create more gardens in the PLU). However, due to the focus on low income families, there have been several oppositions and prejudices to the family gardens which have led to disputes, such as a court case in *Petit Juas*. The city has also initiated events such as joint olive harvests on

city orchards and promoting local agricultural practices. Additionally, it is experimenting with new forms or cultivation such as hydroponics and microalgae cultivation.

As a special geological feature, Cannes is built on about 50 dry valleys which have over the time been put underground (about 70 % on private land). Especially during heavy rainfalls these mark major flood risk areas. The valleys have to be kept clean to allow water to pass. Even though the city has taken stock of all underground valleys and rivers, there is, at the moment, no potential site for daylighting due to the dense urban fabric. Still, geological features and characteristics have to be better respected in urban planning. Furthermore, it has been mentioned that the current street design (profile) does not effectively facilitate rainfall runoff. Additionally, heavy rainfalls cause clogging of permeable surfaces, which are then no longer able to take up water (limited effectiveness).

In terms of biodiversity and green space management, Cannes has recently abandoned and prohibited the use of pesticides in the maintenance of public spaces. It has also set up several insect hotels and is dominantly planting flowering plants to support pollinators. As currently many foreign species are being used, attention has to be payed that native species (e.g. such as *Mimosa* and *Platanie*) are not put at risk. Urban greenery should also be better adapted to the local climate (long dry periods and seasonal heavy rainfalls).

Looking at the use of green infrastructure, Cannes has ambitions to become the "capital of outdoors sports". It has for example introduced outdoor sporting lanes and facilities (map and app with different "pistes") which are well received and actively used.

In terms of future opportunities, lots of private green exists which could be more holistically integrated and linked in green space planning; a challenge will be the protection of marine ecosystems (especially the *Posedonie*) and the coastline from excessive tourism and leisure activities (e.g. boats anchoring between the islands), pollution (e.g. plastics and cigarettes), and marine submersion.

#### 3.7.8. Inclusive urban development

In general, rent levels are rising in Cannes and prior implemented NBS projects have led to a rise in property prices. As an example, the renovation of the *Basse Vallée de la Siagne* has induced a 10 times increase of land prices –from formerly  $15 \notin/m2$  to  $150 \notin/m2$ . To avoid such similar trends, the city has now introduced laws which ensure that land prices will stay rather stable in certain district which will be renovated in future (e.g. *La Roubine*). Other challenges which the city is currently dealing with include a significant wealth disparity of between the East and West of the city. The city aims to help even out

this divide through requalifying work being done in the West such as the establishment of family gardens, to grant access to nature and healthy food. An aging population which should be tackled by the establishment of a new university which will attract younger people to the city, and by enhancing barrier free infrastructure. In terms of social housing, the national law prescribes that cities have to provide 25 % of social housing. In national comparison, Cannes is already doing quite well with 18 % accomplished. Further efforts are being taken to reach the given targets also because there is the threat of financial penalties or a loss in decision making power.

#### 3.7.9. Link to other sectors

The city is putting emphasis and implementing programs to reduce waste generation and increase awareness regarding waste management. Recycling points are installed and separation at source between recyclables and general waste is mandatory. Still, the enforcement is rather weak. From 2025 on it will be mandatory to collect compostable (organic) waste. Several composting pilots are already implemented in different schools and districts and similar projects could be replicated with residents. There is a need for fertile soils and compost (e.g. in *Basse Vallée de la Siagne*) and the introduction of a city-wide collection system in collaboration with the local waste handling facility can support future NBS projects in the city.

Regarding mobility, the city needs to implement measures to effectively decongest the city centre. The local transport department managing public transport is conducting a range of activities to promote the use of public transport, through for example, creating express lines, introducing electric buses, promoting carpooling, building park and rides, etc. Further actions should be taken to avoid increased congestion and air quality problems in the future and secure tourism. For example, seamless pedestrian and cycling transport needs to be allowed by a better connection of the different parts of the city centre. Additionally, public transport and especially the connectivity with nearby cities could to be improved. In the effort of liberating areas for the citizens and green spaces, the city is slowly increasing pedestrian streets. Complementary measures could be the implementation of last mile logistic (e.g. electric cargo bikes) in the updated version of the climate plan or multi-storey parking at city boundaries which free up space in the centre.

In terms of links to the local electricity system, the municipality identifies a big constraint when trying to implement water retention basins and permeable surfaces because the electrical system is installed underground. Solar panels in turn are seen as good additions to NBS as they could protect green roofs from excessive summer heat.

#### 3.7.10. Potential NBS sites

*La Basse Vallée de la Siagne:* Agricultural heart of the city to be preserved for local food production and water retention during the wet season. Use of treated freshwater for irrigation during dry season.

*La Roubine*: New redevelopment area with potential to become a NBS demonstration district. Parts of *La Frayère* river should be renatured and redirected so as to flow through this new area. Building integrated circular water systems, greening of industrial and high-rise buildings could be piloted.

La Bocca, La Bastide Rouge: Current redevelopment areas where some

NBS could be introduced and public spaces made more permeable (e.g. new parks and green spaces, green roofs & facades, permeable pavements)

*Petit Juas, La République, City Center, La Croisette*: Already built up area where small-scale and temporary NBS interventions could be introduced and existing green spaces should be linked. Step-wise renovation should be used as opportunity to introduce more green elements.

*La Croix des Gardes, îles de Lérins*: Nature Protection Areas which are being preserved as green lungs.





This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 **Topic:** SCC-2-2016-2017: Smart Cities and Communities Nature based solutions



Boulevard de la République ILES DE LÉRIN Île Sainte-Marguerite







Heavy rainfall event

Voting during the workshop

Site Visit: Basse Vallée de la Siagne







Shared Family Gardens

Cannes city center & tiled roof



#### 3.7.11. Project idea workshop

Over the course of the week, 22 project ideas were brought together and out of these nine project ideas were chosen to be pitched to the workshop group. Six of these were selected by the workshop participants to be further elaborated upon. Connected ideas in the area of renewable energy production and sustainable transport and logistics were also formulated and discussed, but are not included in the shortlist below.

Hypothesis: The opportunity should be seized to use renovation actions in La Bocca to turn it into an "eco-neighbourhood"

Hypothesis: A green certificate can motivate local companies and businesses to participate in risk management programs

Hypothesis: Use NBS to connect different parts of the city which are currently divided by big roads, would serve to promote non motorised transport

Hypothesis: To prevent water from entering and causing damage in urban areas, large water retention measures as flooding parks are needed at city boundaries and along major streets.

Hypothesis: The extension of the organic waste collection and treatment system could help to increase recycling rates and compost production for local green spaces and agriculture

Hypothesis: Energy generation from sewage systems can help Cannes to reduce the demand of fossil fuels and increase resilience

Hypothesis: Adapted regulations can promote the use and implementation of nature-based solutions

Hypothesis: *La Roubine* can be rehabilitated using NBS to make it a showcase district for resilience.

			an
ackground he former industry area will be ehabilitated in the coming years to ecome a mixed use district. It	Goals	<ul> <li>Show the potentials of integrating NBS in urban planning</li> <li>Renature and redirect parts of the <i>La Frayère</i> river to create a blue green park that runs through the district</li> </ul>	int sup the the
hould be home to the new creative conomy, first high-rise buildings nd could become a NBS demo site.	Potential elements	<ul> <li>New and natural river course park</li> <li>Green corridor from <i>Basse Vallée de la Siagne</i> down to the sea</li> <li>Green roofs on former industry buildings &amp; "green skyscrapers"</li> <li>Building-integrated circular water systems, renewable energy from sewage system and individual composting</li> <li>New and naturally sustained beach</li> </ul>	fea sta pro aw be up, the

Hypothesis: The *Basse Vallée de la Siagne* should become the agricultural heart of the city and keep it from flooding in the wet season.

			- 1
Background La Basse Vallée de la Siagne is the last remaining agricultural area in the city. Currently about 107 ha are used for agriculture and there are	Goals	<ul> <li>Maintain natural state of the area and reinforce water retention capacity</li> <li>Ensure water availability during dry periods</li> <li>Promote local agriculture and strengthen social cohesion</li> </ul>	
other 210 ha with good potential. Treated freshwater should be made available for irrigation.	Potential elements	<ul> <li>Extend family gardens</li> <li>Pedagogic farm</li> <li>Fruit orchards</li> <li>wetlands (phytoremediation)</li> <li>Redirect treated wastewater from ReUse project for permaculture</li> </ul>	f F C I

Hypothesis: The city needs to create successful green roof pilots to show their benefits and enable more widespread uptake in the future.

Background Until now tiled roofs are the preferred option in Cannes. To	Goals	Test and promote green roofs (special focus on rainwater retention, energetic insulation, biodiversity & aesthetics)	Th in vis
green roofs, demos should be installed on flat roofs. Potential sites include the airport, former industrial buildings, <i>Forville</i> market, schools, etc.	Potential elements	Setting up voluntary programmes to train and involve interested citizens and private building owners Use virtual reality to visualise different options Use thermographic pictures which detect energy losses Integrate green roofs and solar panels / renewable energy	of pr of a su m in

Hypothesis: Awareness and education programmes will sensitise local citizens, youth and private plot owners to flooding risks and possible adaptation measures and mobilise them to implement NBS Hypothesis: Introduction of a factor that considers ecosystem services as a new urban planning tool



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**Workshop Summary:** The core value is to enhance attractiveness and variety in Cannes through the creation of aesthetic, interesting, and open spaces which respect the environment and support local economy. The primary actors for this idea would be the mayor, the urban planning service, DDTM, local architects, the transport department and the agglomeration. Important preconditions are good planning (e.g. using GIS 3D models), and feasibility studies (taking into account airport proximity and TGV station project). A good financing option (e.g. H2020 SCC projects) has to be found, building regulations be adapted, and awareness campaigns, as well as a dialogue with the citizens is to be prepared. Overall, a project plan and structure has to be set up, a working team and responsible person be defined to push the idea.

Workshop Summary: Identified core values were green and leisure areas for families, storm water retention, biodiversity, perma-culture and local agricultural practices. Discussions evolved around the topics of how private land owners such as the Casino can be activated to support and achieve the vision; if land can be bought back; how treated irrigation water can be provided and its safety and quality be ensured; how to enable farmers to live on the land and requalify existing buildings; and how to increase political backing. Financing options that could cover the estimated €20 million investment, such as applying for project funds and subventions, pricing of water, and cooperating with private investors were evaluated. Next steps could include the development of a feasible vision for the pedagogic farm, negotiations with DDTM, water quality studies at the treatment plant.

**Workshop Summary:** Main value of this solution is an improvement for the environment, reduced pollution and heat islands, as well as oxygen production and reduced energy costs. The municipality should facilitate the implementation and incentivise private owners but also include architects (shared vision by public and private initiatives). Preconditions are the use of Mediterranean and adapted vegetation which maintain the provincial identity, focus on flat and unused roofs, and inclusion of new dispositions in the PLU and political support. As next steps a mapping of possible rooftops was identified. Financially, state subventions and private investments should be combined. The municipality has to decide on a few pilot showcases to then inform the citizen on their options and benefits.

## Hypothesis: public facilities should be redesigned to provide more public green and retain rainwater during heavy rainfalls

Background Public facilities such as school yards, sport fields, playgrounds, etc. would	Goals	<ul> <li>Creation of healthier and more attractive environments</li> <li>Support flood mitigation in urban areas</li> </ul>	in the city, improve life quality (attractive and healthy surroundings), educate children, and remove paving. Problems such as urban heat islands and a lack of native trees can be improved. The main stakeholders to activate are the mayor, different municipal
urban green (reducing heat, shading, etc.) and could be redesigned so as to serve as water retention spots in times of heavy rainfall.	Potential elements	<ul> <li>School yards, Kindergartens</li> <li>Playgrounds, recreation areas</li> <li>Hospital yards, public buildings</li> <li>Sport facilities such as soccer fields, running tracks, etc.</li> <li>Parking facilities</li> <li>NBS elements: Basins, green spaces, trees for shading, vegetation, permeable paving.</li> </ul>	departments, the agglomeration, and public facility operators, such as school rectors. The idea has to be integrated in all new design phases (e.g. via a checklist and a system to take positive externalities and ecosystem services into account), awareness has to be increased amongst politicians and citizens, and the right vegetation has to be chosen. As direct next steps it could be proposed to integrate NBS in the parking facilities of <i>la Bastide Rouge</i> and <i>La Bocca</i> .

Workshop Summary: This intervention could help to increase nature

Workshop Summary: Key element of this intervention is that TIGRE

Workshop Summary: Special elements and locations that have been

## Hypothesis: A pedagogical and user friendly version of the TIGRE software should be created

becreated			heromes accessible to all citizens of Cannes and can be used as
Background The TIGRE platform aims at bringing together all relevant (real-time)	Goals	Increase awareness regarding natural risk Prepare citizens for eventual crisis	pedagogic tool to better manage and develop a culture of risks. This project could be carried out by the municipality in cooperation with educational associations. universities (IMREDD) and also using
data for risk management. This tool should be further developed to be also used for training and awareness raising.	Potential elements	TIGRE app with training / gamification component / personalised diagnostics, messages Relevant information and data can be shown in public screens (E.g. bus stops) Data can be used as planning basis for NBS implementation	opportunities such as the <i>Climathon</i> . Important preconditions are the improvement of the database (citizen data) and incentives for citize to register and participate. First steps would be to create the application and pedagogic resources and to run an awarene campaign for enrolment.

## Hypothesis: Renovation or rehabilitation projects of public spaces in urban areas, should be taken as opportunity to introduce green and blue components

should be taken as opportunity	romitioudice green and blue components	mentioned include increasing the permeability of all pavements and
Background Most of the city is already built up and rather dense. Still, there are many renovations being planned in the coming years which should be taken as opportunity to introduce new NBS	<ul> <li>Systematically and gradually improve water sensitive urban design</li> <li>Link the glamourous image with green space</li> <li>Enhance green space connectivity and accessibility</li> </ul>	alleys, ecological continuity in <i>Petit Juas</i> , glamorous NBS for the city centre and the elimination of urban heat islands. Interventions should make the benefits of green elements visible to the citizens and the politicians. Discussed conditions and challenges were the use of Mediterranean plants and species (that fit the identity), how to avoid permeable pavements from clogging, how to better integrate green space in the PLU and how to get political support for NBS projects. Next steps could include sharing a NBS catalogue, development of an "NBS checklist" to be filled prior to construction, and asking designers to propose green and pervious alternatives.
	<ul> <li>Reintroduction of native species</li> <li>Increase of permeable paving and reduction of concrete</li> <li>Automatic irrigation systems</li> <li>green street furniture</li> <li>Pilot projects to improve visibility</li> </ul>	

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#### 3.8. Başakşehir

#### 3.8.1. Municipal strategy and planning

Başakşehir Municipality publishes a strategic plan every four years. Within the 2015-2019 plan, some of the stated targets include improving the amount of green space, creating a liveable, clean environment and planned modern city, infrastructure refurbishment, improving social integration and preventing elements that threaten the health of the environment. A report published every year, shows the achievements of previous year related with the targets of the strategic plan.

Beyond this, there are no plans related either to biodiversity, resilience, urban sprawl, sustainability and climate adaptation and mitigation on the district level. Climate change plans are managed on the metropolitan and national government levels. Spatial and demographic changes in the district are also largely defined by the larger scale plans of upper planning departments as well as the involved development companies. The coordination between strategic development on these levels and the activity on the district level is a significant challenge faced by Başakşehir. Improved coordination and more calculated emphasis on integrated multi-level planning would be an important first step towards an improved sustainable development of the district. Besides the municipal planning, further pilot projects could highlight the effectiveness and health benefits of NBS, backed by the local and diverse set of actors in both private and public sectors. Working closely together, such local stakeholders turned out to be highly interested in piloting new urban design solutions, depending on the prospective financial return.

#### 3.8.2. Finance and procurement

The main source of revenue for the municipality comes from government transfers, service fees and taxes collected from residents, industries and constructors. As the significant housing development in the district continues, the municipality generates income through issuing building licences. The municipality has also maintained ownership over a range of enterprises such as restaurants, sport complexes which can generate income, but also reflects a high degree of control over the associated infrastructure into which the NBS or other sustainability projects could be integrated.

The municipality does not apply sustainability criteria to municipal investments or other procurements processes. Ecosystem services are also not integrated into municipal accounting systems yet.

#### 3.8.3. Regulations and incentives

Başakşehir Municipality has limited authority to issue new regulations, and is highly dependent of upper levels government (metropolitan and national) in urban development related topics. Nevertheless, the municipality does have some capacity to add on minor conditions to building and land use regulations, which does provide some flexibility to encourage NBS uptake. Basaksehir does, for example have ambitious mandatory green space minimums in place (20m2 per capita, double the minimum required under national law). Furthermore, it is a possibility for the Municipality to work on a regulation idea to be proposed to the metropolitan level which then should be taken further to the ministry for approval as a regulation. Although this would be a long-term process, it could have wide-reaching implications in the Metropolitan Region. In this context, Başakşehir could be a front-runner municipality through policy entrepreneurship in the area of NBS through experimenting with and demonstrating regulatory instruments to promote NBS, which may be then taken up by higher government levels through policy diffusion.

The lack of concrete and consistent land-use planning between governance levels presents a significant challenge for the long term planning of the Municipality. The Department of Plans and Projects can add new articles to the 1/1000 scale implementation plans which are considered recommendations rather than being mandatory for the developers. However, developers can gain approval from higher government levels and not have to take into account Municipal conditions, should these be perceived as too strict. Nevertheless, green roofs, solar panels and grey water treatments systems in the new buildings are being considered by developers and have been implemented in some cases.

#### 3.8.4. Organisation and structure

In Başakşehir Municipality there is no specific department, actor, working group, or other cross-departmental body working on cross-sectoral topics such as smart city sustainability, or climate change adaptation. Cooperation between departments is conducted informally which is also the case regarding cooperation with surrounding municipalities. The Department of Support Services, however, plays an important role in facilitating cross departmental communication, but this mainly relates to solving internal problems within the municipality.

Although there is no formally established cross departmental strategy, there are regular meetings held between the head of departments and strategy development workshops each year that bring these actors together. Municipality wide process management system exists, however, it is not linked with the strategic goals and performance measurements. Besides internal communications, the large construction companies

municipality.

Başakşehir Living Lab represents an important platform for cooperation between departments, with research institutes and companies, as well as city inhabitants. It is the first in Turkey and has a potential to better cooperate with the municipal processes in order to foster stakeholder participation, innovation and marketing of NBS.

#### **3.8.5.** ICT and data governance

Data governance is prioritised on a higher level and there is a lack of integration between the municipality and higher levels of government. Currently, the municipality has a system working on e-municipal services and providing spatial data.

The municipality has a working social media strategy. Although residents are able to conduct some administrative procedures online and provide feedbacks, tools to utilise data for understanding the citizen's perspective and integrate them into the strategic plans could be improved.

Cooperation between departments and other municipal actors regarding data sharing and utilisation between departments and systematic datadriven monitoring of urban strategies and process could be improved.

There is also a degree of imbalance regarding data sharing with external stakeholders and other government levels. The municipality makes a large portion of data available to these stakeholders but has limited access to the data processed by external actors. For example, yearly projections of prospective extreme weather situations is done by metropolitan level authority ISKI, though it is not shared with the municipality yet.

#### 3.8.6. Participation and stakeholder engagement

The municipality conducts yearly citizen surveys and citizen feedback is received through a central call centre where citizens can report problems. There is however, limited integration of the citizen's perspective in urban development practices and user-oriented design of public spaces could be improved.

Cooperation between academic institutions regarding topics related to urban development is limited. Once again, the Başakşehir Living Lab has the potential to become a stronger link between research, the municipality and local citizens, fostering ideas that have been developed in already existing initiatives of the private sector and academia. Student hackathons and similar events show the tacit knowledge on participation processes as well as stakeholder involvement, that could be used to further enhance the





maintain an informal but rather clear relationship with the municipality, including a well-established link to different departments of the



### Key findings: Başakşehir

#### Green and Blue Infrastructure

- Green space perceived as valuable by politicians and citizens
- High green space per capita (20m2)
- Potential for improvements in green space accessibility. connectivity and quality
- Challenge of maintaining green space in the face of rapid urbanisation
- Awareness of flooding as a challenge on the metropolitan level: Water-sensitive urban design identified as a potential solution

### Finance and procurement

- Lack of clear financing strategy between the municipal departments besides the department of support services make financial arrangements in some cases
- The municipality owns enterprises that generate income (restaurant, sports complex)
- Financial support from metropolitan municipality in case of financial adequacy in the district
- Increasing population and new developments will generate more income for the municipality

### Inclusive Urban regeneration

#### High degree of social housing

- •Gated communities can support community development and cohesion within (potential for community driven projects)
- Potential risk of social, spatial and ecological disconnection between such communities

#### **Organisation and Structure**

- Regular meetings between head of departments to define goals and targets
- Occasional informal strategic development workshops between department leads
- Good relationship between departments, neighbouring municipalities and construction companies
- Lack of working groups in sustainability related issues and project-based cross departmental organisation
- Establishment of a Living-Lab to support entrepreneurial development and link municipality with external stakeholders

#### ICT and Data Governance

- Data governance is prioritised on a higher governance levels
- Lack of integration between the levels but municipality
- Underutilisation of data for understanding citizens perspective
- Lack of risk maps on the municipal level
- Good social media communication strategy
- Yearly projections of prospective extreme weather situations conducted on metropolitan level

#### **Regulations and incentives**

- Limited ability to implement new regulations on municipal level
- Planning recommendations (green roofs, solar) panels, grey water treatment in buildings) established
- Modified development plans based on recommendations successful in a few cases

# Engagement

- institutions

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#### Links with other sectors

- High car dependency
- Lacking transit oriented development
- Dense network of freeways limit green space connectivity
- Ambitions to increase uptake of renewable energies

#### Municipal Strategy and Planning

- Municipal strategic plan developed every four vears
- Linked internal performance management elements: limited reference to sustainability
- criteria
- Strategic planning lacks long term perspective and integration between different governance levels
- Lack of climate adaptation/mitigation plan on municipal level
- Metropolitan climate change (combined)
- mitigation and adaptation) plan in development

#### **Participation and Stakeholder**

- Yearly citizen surveys
- "Once-stop shop" call centre for citizen
- feedback and enquires
- Living lab as a potential platform to further
- support co-creation and citizen engagement
- Potential for improvement in cooperation
- between the municipality and academic

reach of the Living Lab and its role as connecting link between different stakeholder groups.

#### 3.8.7. Green and blue infrastructure

Green space is perceived as highly valuable by the politicians as well as citizens of Başakşehir. This is reflected in the current high green space per capita quota and the political ambitions to maintain and even increase this while pursuing rapid urbanisation plans. However, in many cases green and blue infrastructure is not well connected with each other and often not accessible to different transport modes such as walking or cycling. More emphasis could be placed on the quality of green spaces. More data about green space usage by citizens (as well as perceptions of green space) could also support targeted green space development to serve different functions and provide different ecosystem services (e.g. public green space, biodiversity, water retention, cooling, etc.). At this stage there is limited differentiation between different types of green and blue infrastructure (and their respective functions) which could also help target limited maintenance and regeneration resources.

The district is urbanising rapidly and that could provide a challenge for the municipality to maintain the existing green areas. NBS could be an important tool to achieve this through better integrating NBS is into built structures (such as green roofs, green walls, pocket parks etc.).

The city experiences a significant flooding event every 5-7 years, therefore, water sensitive urban design of river banks is on the agenda of metropolitan level authority, which could be a pilot for the municipality similar interventions elsewhere.

#### 3.8.8. Inclusive urban development

Başakşehir comprises many smaller communities coinciding with the large block apartment houses with attached facilities which create a room for social interaction within these smaller community units. Though these communities are somewhat disconnected from each other, they could be spaces of collective decision making through the definition of shared lifestyles and activities. The municipality also contains a high degree of social housing with a significant amount of low income accommodation. Improving the sense of place between sub-centres and gated communities, recreational green spaces and green belts have also been identified as connecting element that could spread across barriers and hence create a new architectural identity across existing gated communities. This is certainly an objective that could be built upon through NBS-related interventions.

#### **3.8.9.** Links to other sectors

Commuting practices within and through Başakşehir Municipality demonstrate a high degree of personal vehicle dependency. This presents a challenge for connected green infrastructure as the landscape is characterised by a high degree of land use devoted to transport infrastructure. The Municipality has limited control over transport infrastructure, as it is managed more explicitly on higher levels of government. Yet the district enjoys relatively high densities and there is high potential for more transit oriented urban development. Future interventions regarding soft mode promotion or public transport upgrades could be combined with NBS interventions to help the city address mobility related challenges while promoting green space connectivity, quantity and quality upgrades.

#### 3.8.10. Potential NBS sites

Potential NBS pilot sites

Sazlidere and streams: Sazlidere stream (2) and two other streams in the east and west are places where flood events have been regularly experienced in the past. According to the projections, similar events most probably will repeat on a regular basis (every 5-7 years). NBS could be a way to prevent hazard in the future through a water sensitive design approach and also provide recreational areas integrated with water elements.

Industrial area: Shown in red, the organised industrial area has very little green space integration. NBS could be utilised for improving air quality as the area is one of the biggest source of pollution in the district.

public space.







New housing development area: Shown in yellow, new development area with social housing projects would benefit from NBS by providing a healthier environment and create opportunities for social interaction in the



High urban density



Green pockets



Integrating recreation elements into green spaces



Green corridors



SIgnificant space occupation for transport infrastructure
## **3.8.11.** Project idea workshop

Over the course of the week, 10 project ideas were chosen to be pitched to the workshop group. Four of these were selected for future elaboration:

Hypothesis: Başakşehir should develop a PPGIS (Participatory planning GIS) approach to better understand how citizens value urban green space

Hypothesis: Başakşehir should run a campaign to identify the happiest places in the city through interactive maps, geo-fencing and responsive city elements

Hypothesis: The municipality should develop platforms for citizen participation

Hypothesis: The municipality should market NBS as a means to save money on maintenance and running costs of sites

Hypothesis: The municipality should build on the visions and targets developed as part of their strategy to include a more inclusive longer term approach

Hypothesis: Başakşehir should work on influencing regulatory bases by developing proposals to pass to upper levels

#### Hypothesis: Municipality should develop a comprehensive green infrastructure plan

## Background

Green elements are not implemented in the district with a strategic approach. Some green space has limited accessibility to pedestrians, and personal vehicles are usually necessary to reach to some large parks. There is limited emphasis on green space quality and there is limited differentiation between green space functions and types in green space design.

- SolutionSolutionBuilding well connected, accessible green infrastructureSolutionIncluding a variety of native species, ecological value ad
  - foster social cohesion / inclusion with different function target different users
  - Minimum quality standards of green spaces
  - · Green space design aligned with climate adaptation air
  - · Vision and the strategic plan of the municipality reflected green infrastructure plan

## Hypothesis: The city needs a cross departmental structure to manage topics such as sustainability smart city and/or resilience

Goal

#### **Background** There is no body in the municipality responsible for sustainability/resilience management. This position would be crucial to bring together the departments to work on these topics

- <u>•</u>• Integrate the activities of the departments to work of cross-sectoral topics
  - Create the link on the topic with other municipalities other levels of government.

## Hypothesis: NBS should be utilised to increase awareness of sustainability in schools and local communities

Background	als	•	Increase awareness of the topic (climate change,
The municipality has the goal of raising awareness	ğ		biodiversity, value of nature)
about sustainability issues; NBS is a topic that many		•	Increase stewardship and ownership over green
people can relate to by identifying their own			infrastructure
challenges and solutions through nature to solve		•	Improve community identity
them. Schools are small communities in which the			
concept can be operationalised			

## Hypothesis: The Living Lab should be boosted as a central multi-stakeholder platform to host co creation of NBS in Basaksehir

#### **Background**

The Basaksehir Living Lab is a unique and citizen oriented organisation that has a broad network linking public and private sectors. As There are several interest groups in Basaksehir that have an interest in NBS and their benefits, but do not have the resources or know-how to implement them on their own. Therefore, the living lab can become an platform for NBS-based interventions that are co-created and adapted to the local needs.

- Build up a community of practice around NBS through articulating the (private and public) benefits of NBS
  - Increased awareness of the topic: knowledge sharing
  - Integrate citizen perspective into urban development approaches.
  - Mobilise financing for NBS
  - Facilitate strong cooperation with local university that topics relevant to city planning.





e dded ns that ns ed in	<ul> <li>Potential Elements:</li> <li>The plan would requite contributions of ISKI, Metropolitan Municipality and other authorities</li> </ul>
<b>ity,</b> n these and	<ul> <li>Potential Elements:</li> <li>Covering risk assessment, climate change mitigation and adaptation, biodiversity management, etc.</li> <li>Support with the development of workshops to organise activities, sustainability/smart city strategies</li> <li>Link to the Living Lab – mobilise the local ecosystem to achieve municipal objectives</li> </ul>
	Potential Elements:
	<ul> <li>E.g. "Build your own rain gardens"</li> <li>Define your own challenges</li> <li>Co-creation workshops (collecting inputs for urban interventions)</li> <li>Providing tools, information and other resources</li> <li>Competitions between schools and building communities</li> </ul>
)-	<ul> <li>Potential Elements:</li> <li>An analysis of local stakeholders and their</li> </ul>
cover	<ul> <li>potential stake in developing pilots</li> <li>Production of a white paper that promotes NBS in local city development</li> <li>NBS related events at the living lab</li> <li>Public- Private financing: A public-private fond to pool local financial resources for potential NBS applications</li> <li>Local companies to sponsor competitions to solve their specific challenges through NBS</li> <li>Participatory events: green hackathons/ makeathons to develop maps and apps to better understand green and blue infrastructure in the city or gather ideas on NBS-applications for public spaces</li> </ul>

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## Section IV — Ambition setting



European This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Commission **Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions** 





The project team of Stavanger at the Ambition Workshop - 8 December 2017



The project team of Prague at the Ambition Workshop - 12 January 2018



The project team of Castellón at the Ambition Workshop - 14 February 2018



The project team of Cannes at the Ambition Workshop - 9 March 2018



The project team of Başakşehir at the Ambition Workshop - 13 April 2018

## **AMBITION SETTING**

## 4.1. Approach

The aim of this step is to set the ambitions for the follower cities on climate and water resilience and nature-based solutions. The ambition expresses what a city wants to achieve in the future. For this purpose the ambitions of the participating cities on climate and water resilience in general and nature-based solutions in particular are defined and refined in a process of co-creation with local stakeholders in the individual cities. Commitment to the ambition and future implementation plans is built and strengthened by involving local stakeholders — both internal stakeholders from relevant departments of the municipality and external stakeholders from relevant companies, organisations and knowledge institutes.

## 4.1.1. Ambition workshops

The strategic ambitions for climate resilience in general and nature-based solutions in particular are assessed in a series of workshops in each of the partner cities.

The ambition workshops consists of 3-day visits of TU/e to the follower cities. Several workshops with policy-makers and stakeholders are held during these visits to gain a deep understanding of the ambitions and specific contexts of the cities. The local stakeholders (companies, citizens, public and private organisations and knowledge institutes) are invited to participate in the workshops through the networks in the cities. Together, the participants interactively contribute to the strategic ambitions; see also the photos of the workshops. The result of the ambition workshop is a set of strategic ambitions for each follower city, reported in similar formats to enable cross-learning between the cities.

## 4.1.2. Joint ambition workshop

In a joint meeting in Eindhoven, the cities shared their ambitions and held in-depth discussions to understand the common and specific aspects of their ambitions. The aim of a joint ambition workshop is to enable cross-city learning and to identify and get to know the owners of specific expertise. In this way the cities gain a deeper understanding of each others ambitions, and can improve their own ambition with inspiration from others.

During this workshop the front-runner cities present their ambitions and respective ULL concepts so the follower cities can select the most relevant ULL to their specific ambitions and identify suitable buddies.

The 1-day joint ambition workshop finalises the activities of Step 1 (morning session) and prepares for Step 2 (afternoon), which is reported in Section IV.

Day 1	Day 2	Day 3	Morning
Interview with policy makers	Workshop with internal	Working session with project team to formulate final	Finalising Ste
	stakeholders	results	Afternoon
Workshop with strategy department	Workshop with external stakeholders	Preparing main content of concept report	Preparing for Step 2

Programme of the ambition workshops in the cities



Programme of the joint ambition v

## 4.1.3. How to read this chapter

This chapter starts with the results of the ambition setting activities for each of the follower cities. The results of the workshops are presented on the following pages. Three strategic ambitions are defined for each city, using the strategic ambitions that were extensively discussed and defined during the various sessions with the different stakeholders.

chapter.





<ul><li>Presentation of the cities ambitions</li><li>Each city presents its ambition for the focus areas</li></ul>
<ul> <li>Learning from each other's ambitions</li> <li>In-depth discussion on common and specific ambitions</li> <li>Selection of front-runner city / ULL for buddy system</li> </ul>
<ul><li>Presentation of the Drivers for Change</li><li>Sharing of results of Future Telling research</li></ul>
<ul> <li>Preparing for Vision Development</li> <li>Exploring the relevance of the Drivers for Change for the ambitions and preparing for the vision workshops</li> </ul>
tion workshop

The results of the joint ambition workshop are presented at the end of this



The ambition workshop in Stavanger was held from 6 to 8 December 2017. Pictures taken during the different sessions are shown below. The result of the workshop is shown on the next page.



Session with strategy department



Session with internal stakeholders

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Session with policy makers



Session with external stakeholders



Session with the UNaLab project team



Session with external stakeholders



## Stavanger 2050: Urban resilience through nature and knowledge

## A climate-resilient city

In 2050 Stavanger is resilient to flooding from the rising sea level and storm water. People value rainwater as a resource that increases the quality of life as attractive element for recreation and supports nature-based solutions that increase the value of their property. They experience no inconvenience from severe weather conditions because the city has created flood channels. The different adaptation measures applied by citizens and the municipality combine to make the city climate resilient.

## Nature as the structure of the city

In 2050 the people of Stavanger are healthy and active. Nature is integrated in the city and provides enjoyable green areas with water features and rich biodiversity. The areas are used by people of all ages to meet and play, in this way contributing to improved inclusive social structures. Green corridors connect all urban areas and stimulate walking and cycling. Urban areas feature buildings with green structures.

## Strategic ambitions from the sessions

- In 2050 Stavanger is resilient to flooding from the rising sea level and storm water. The city is a technology and knowledge hub on designing and implementing climate resilient solutions in an integral way to achieve multiple benefits. Strategy 3
- In 2050 rain water is no longer a problem, but a resource. It is used to increase the quality of living in the city, e.g. by using it as attractive element for recreation and resource of nature based solutions to increase value of property. Flood ways are realised to handle severe weather conditions. The different solutions together can handle the changed climate without problems. Internal stakeholders 3

#### Strategic ambitions from the sessions

- In 2050 the people in Stavanger are healthy and active because of nature being an integrated part of the city. People meet in natural areas, where water is integrated in green spaces and biodiversity is rich. The green corridors stimulate walking and cycling throughout the city. Internal stakeholders 2
- In 2050 Stavanger is a sustainable city covering economic, social and ecological aspects. Green and blue structures brought nature back in the city and have improved social and inclusive structures. An open water way connects Breiavatnet to the sea. External stakeholders 3
- In 2050 the city of Stavanger is a well-planned self-sustainable mixture of: 1). well connected urban areas with high apartment buildings close to public transport lines, 2). enjoyable green areas where people of all ages meet and enjoy outdoor activities, 3). lively city centres with facilities for shops and recreation. Policy 2
- In 2050 the people in Stavanger enjoy high quality and self-generating green and build areas, The areas full of green, blue and biodiversity (bees and fish) are jointly taken care off, enjoyed for playing and meeting, and utilised through farming. The buildings are included in the green structures, and the green is used as an energy source. Strategy 1



In 2050 the people of Stavanger enjoy the result of cohesive strategies to manage spaces, buildings and transport. There is synergy between separate plans and projects to actively utilise the co-benefits of all solutions, building on a deep understanding of the site, the risks and the effects of nature-based solutions (e.g. collecting rainwater to support the growth of trees that improve air quality). The city is compact, with accessible facilities, services and public transport within ten minutes walking or cycling, freeing up space for green infrastructure.

exported.

## Strategic ambitions from the sessions

- tourists. Policy makers 3
- makers 1
- minutes reach). Strategy 2

European

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## Utilising the co-benefits of NBS-solutions through cohesive strategies

Knowledge, new technologies and NBS solutions developed by (new) companies and the university are implemented in Stavanger and

• In 2050 Stavanger enjoys the result of integrated strategies to manage spaces, buildings and transport. Spaces and buildings use sustainable and green solutions. Transport is clean. There is synergy between separate plans and projects to achieve the higher goal of sustainability. The benefits of the total are higher than the separate projects. Internal stakeholders 1

• In 2050 the city of Stavanger has really implemented integrated solutions, building on a deep understanding of the site, the risks and the effects of nature based solutions on different goals, e.g. air quality, water buffering etc. Projects actively build on each other and cobenefits of solutions are utilised. External stakeholders 1

 In 2050 Stavanger is a compact city with accessible facilities and services in all neighbourhoods. People enjoy high levels of connectivity, that created a mode-shift to sustainable and active mobility. The environment in the city has more green and blue spaces that are freed up by new technologies (e.g. driverless cars) and is self-sufficient to facilitate food and energy production. Stavanger is a front-runner and exports new products, services and knowledge worldwide. External stakeholders 2

• In 2050 new technologies support a better preserved cultural heritage, both buildings and nature and additional value is added to create an appealing environment for citizens and

• In 2050 the city of Stavanger will (still) be the energy capital, now in green energy. Stavanger is the leading example of a city where people prefer walking and cycling. The whole city is designed to have daily facilities within 10 minutes reach. Mobility sharing is common, and new technologies from new companies and the university contribute to smart solutions. Policy

• In 2050 the people of Stavanger prefer to walk or bike in the city. The city is organised in a way that all daily services (e.g. schools, shops, entertainment) are situated nearby (10

# PRA HA PRA GUE PRA GA PRA G

the workshop is shown on the next page.



Session with policy makers from the city districts



Session with external stakeholders



Session with internal stakeholders



Session with internal stakeholders





Session with the UNaLab project team

The ambition workshop in Prague was held from 8 to 10 January 2018. Pictures taken during the different sessions are shown below. The result of



# Prague 2050: A liveable city in harmony with nature

## Green serving the city

In 2050 Prague has a high-quality green infrastructure, that is interconnected and provides multiple ecosystem services. People enjoy accessible green spaces that encourage walking and cycling throughout the city. The centre is enriched with urban green, respecting the city's heritage. The authentic cultural heritage and identity are turned into value and functionality, in which nature and small-scale agriculture are in harmony and serve people by offering local food, wine, fish, woodland and recreational facilities. The urban green – forest, parks, trees, green roofs and facades – contributes to climate resilience and a healthy micro-climate.

## Circular water management

In 2050 the government and people of Prague value water as an integral part of the city. The water bodies are used for both recreation and sustainable water management, and contribute to a high quality of living. The rivers, meandering creeks and ponds encourage people to enjoy their clean water. A local circular system retains rain- and waste water and makes it available for re use, e.g. to maintain urban green. The water bodies provide protection against flooding and drought by retaining rainwater.

## **Ecological governance**

In 2050 urban planning in Prague is a transparent, coherent and effective process. Politicians from the 57 boroughs and the metropolitan region, experts from different sectors and the public all collaborate to address complex challenges by integrating economic, social and ecological developments, e.g. by using nature-based solutions. People live their lives responsibly and contribute to a zero emission city by taking every opportunity in buildings and mobility to save energy and generate renewable energy. Prague is 'smart' in many ways, and is active in international cooperation.

## Strategic ambitions from the sessions

- In 2050 the people enjoy greener spaces that add functionality to the urban quality. A wellstructured & well-maintained green system is accessible for all people to enhance the social function and engage with history and nature. Strategy 1
- In 2050 a high quality green infrastructure is realised, consisting of interconnected green areas and for multi-functional use. The green infrastructure is accessible for people for different ecosystem services, e.g. cycling, food production, education, and is also part of the water management system. Internal stakeholders 2
- In 2050 the government thinks more green. Wherever it is possible green is implemented in the city centre: trees are planted in every street and fountains of every square. The river and the river banks are also green and provide an example of ecological thinking. They are open for people to access and enjoy. Policy local 2
- In 2050 the city is designed around the people (rather than traffic). Open information about current status and local habits of people is used to increase quality of life in the city. People enjoy a clean and safe environment. The city is green and provides shade and nice places to stay. External stakeholders 3
- In 2050 Prague is a city designed for people to use and enjoy. Extensive green areas stimulate people to walk and cycle. Transport by polluting cars and ships is reduced, providing good air quality. Energy use is reduced and all flat roofs are green. Policy 2.1
- In 2050 Prague is known for it's green and agricultural identity. The cultural heritage on both natural forest as well as agriculture is turned into value and functionality, e.g. natural ventilation, micro climate and recreation. Policy 3.1
- In 2050 the city of Prague adds value for citizens and tourists through it's authentic identity. City and economy, as well as nature and agriculture are in harmony and serving people, offering local food, wine and fish, using synergistic effects and distinguishing through identity. Policy 3.2

## Strategic ambitions from the sessions

- In 2050 the water and air are clean and tempting for recreation. Water is an integral part of public space and made open and accessible for people to use. Strategy 2
- In 2050 blue and green infrastructure combine functional and recreational functionality. A meandering river, accessible borders and new ponds allow people to recreate and enjoy near the city. At the same time solutions for flooding and water retention are integrated. Policy 2.2
- In 2050 the government and people value water as an integral part of the city. The rivers and water areas are used for recreation and water management. A local circular system retains rain- and waste water and makes it available for re-use. Priority is given to nature based solutions for water management. Internal stakeholders 3
- In 2050 the city is resilient to climate conditions. The sewage system is making good use of rain and waste water. The city and its buildings do not suffer from floods, benefiting from distributed systems to collect the water. External stakeholders 2
- In 2050 the people enjoy a high quality of living. Mobility is clean and affordable. The different areas of the city are well accessible for pedestrians and cyclists. Buildings are zero-emission with a really low consumption of electricity, due to measures such as green roofs and facades that also contribute to water retention. Policy local 1





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## Strategic ambitions from the sessions

- stakeholders 1
- mobility solutions. External stakeholders 1

- public transport. Policy 1.2
- Policy 1.3



• In 2050 the mature government is aware and able to implement nature based solutions. A transparent and coherent way of working in inter-sectoral cooperation enables the coordination on complex challenges. Politicians, experts and the public collaborate. Internal

In 2050 interdisciplinary and integrated planning and cooperation by all 57 borough governments and other stakeholders facilitates the sustainability goals of the city and region (e.g. climate adaptation, energy, waste, mobility). Strategy 3

In 2050 the people live their lives responsible. All opportunities are used to save energy or generate renewable energy. The city enjoys zero-emission due to nearly zero energy buildings (incl. historical buildings - where cultural heritage is respected also) and zero-emission

In 2050 Prague is a world-known good example, where economical value is connected to ecological value, and based on quality rather than quantity. Policy 3.3

 In 2050 Prague has implemented new technologies and developments to make the city resilient and safe for the people. Prague is 'smart' in many ways, such as public lighting, energy use of buildings, pollution and (the use of ) green areas. Policy 1.1

In 2050 Prague is active in international cooperation, such as the covenant of mayors and the Paris agreement, as involved part of the solution. Top priority is the transition from private to

In 2050 Prague has reduced its CO, footprint and raised awareness as a response to climate change. This is achieved through integrated economical, social and ecological developments.



The ambition workshop in Castellón was held from 12 to 14 February 2018. Pictures taken during the different sessions are shown below. The result of the workshop is shown on the next page.







Session with strategy department



Session with external stakeholders

Session with policy makers



Session with the UNaLab project team

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## Castellón 2050: A green city for all people to live

## A green and friendly city

In 2050 the people of Castellón enjoy their green city with a high quality living environment for everyone. Green corridors connect the different areas of the city and provide shaded places to walk and cycle. The riverbeds are used for recreational purposes and are integrated in a green ring around the city that also enables local agricultural use. All this contributes to a high air quality and its related benefits, pleasant climate and increased biodiversity.

## Holistic use of water

In 2050 Castellón is making the best possible use of water and natural resources. Zero waste is achieved through 100% re-use of waste water with actions on different scales at home, district and city levels, taking into account the different water-guality levels. The wetlands are transformed and a blue/green infrastructure is created, contributing to the environment through a circular economy. Water is managed wisely in the city taking care of all risks, such as heavy rain, drought and fire.

## A green mentality

In 2050 the people of Castellón act responsibly with regard to water, waste and natural resources. Everybody is involved, and has the knowledge to recognise the value of resources. This is the result of a strong educational programme that involves children, adults, administration, companies and professionals. Nature-based solutions are standard procedure in the municipality's policy making and city design. The city actively looks for the co benefits of solutions to address multiple challenges, such as water and heat management, air quality and waste recycling.

## Strategic ambitions from the sessions

- In 2050 the people enjoy the green and friendly city to walk and cycle. Urban areas are connected through shaded and green corridors, benches are situated everywhere and the air is clean. Pavement is absorbent and green. The city welcomes pedestrians and cyclists. Strategy 1
- In 2050 the people value the city for it's acoustic quality. Castellón is seen as the quiet city in between Valencia and Barcelona. Policy makers 3
- In 2050 the people enjoy a green network that connects the different areas of the city for traveling on foot, bike or clean vehicles. People use the green areas to walk and cycle or recreate in the shaded areas. The result is a reduction in emissions and maximum temperature in the city. The city is friendly to the people. People recognise the value of the green network. Internal stakeholders 1
- In 2050 Castellón is identified and recognised as a green city, with good air quality and all its related benefits. Policy makers 1
- In 2050 the city of has a green ring around the city and natural islands for agricultural use and planting crops. The soil and space is used wisely to increase biodiversity and promote a variety of local species that flourish in the climate. Innovative solutions are used for irrigation. The city is a showcase for other cities and attracts tourist with its green environment. Internal stakeholders 3
- In 2050 the river is daylighted and is an integral part of the city and lives of the people in the neighbourhoods. The riverbeds invite people to recreate, walk and cycle, and are used for vegetation. At the same time the river and created ponds can deal with heavy rain, provide a safe environment and water is re-used in a circular system. Strategy 2

## Strategic ambitions from the sessions

- In 2050 Castellón is making the best possible use of water and natural resources. People are involved and have the knowledge to recognise the value of reducing the consumption of water and waste water is re-used for 100%. There is a system for water management in buildings, irrigation and wetlands. There is also a system to connect fresh and sea water to mitigate risks related to water, e.g. heavy rains, draughts and fires. Internal stakeholders 2
- In 2050 water is managed in the city wisely, and zero-waste is achieved through 100% re-use. Actions are taken on different scales (e.g. in homes, districts and city level) to re-use water smartly, taking into account the different quality levels. A closed cycle involving drainage systems, leak-free transport systems and zero-carbon treatment is implemented. Also other waste is 100% re-used. Regulations are in place to support and enforce zero-waste behaviour. External stakeholders 2
- In 2050 the wetlands are transformed and a blue and green infrastructure is realised that contributes to the environment through a circular economy and closed waste cycles. At the same time, it contributes to the cultural and heritage of the city by improving quality of living all year round. Policy makers 2

## Strategic ambitions from the sessions

- them in their living environment. Strategy 3
- companies follow. External stakeholders 1



European

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• In 2050 nature based solutions are standard procedure in policy making and the city design: they are used in all possible areas, e.g. water management, heat management, air quality improvement and waste recycling. Also citizens have adopted a green mentality: they are aware of the benefits and value of nature based solutions and take ownership to implement

• In 2050 the people act responsible with regards to water and natural resources. All citizens and professionals are aware of the value of resources and use it as a valuable asset. It is a result of a strong educational programme that involves children, adults, administration, companies and professionals. The municipality is a leading example in sustainable procurement, and

• In 2050 is a zero-emission and zero-energy city. Nature based solutions and new technologies are part of a sustainable and renewable energy strategy. Innovative solutions are applied to achieve a higher efficiency. Natural resources, like geothermal energy, are combined with green areas to reduce energy consumption to coll and heat e.g. hospitals, schools and public buildings. Smart solutions utilise co-benefits of functionalities, e.g. innovative pavement solutions make cycling more attractive (e.g. by a 'cooling' effect) and at the same time generate and store energy. External stakeholders 3



The ambition workshop in Cannes was held from 7 to 9 March 2018. Pictures taken during the different sessions are shown below. The result of the workshop is shown on the next page.



Session with policy makers



Session with policy makers

11 12 2

Workshop with strategy department



Workshop with external stakeholders



Workshop with internal stakeholders



Session with the UNaLab project team



## Green and safe city

In 2050 green public spaces define Cannes as a green city, full of gardens and connected green areas for people to walk, cycle and enjoy outdoor activities. It is resilient to all natural and security threats such as coastal erosion and flooding. To reduce the impact of risks to an acceptable level, nature-based solutions are applied in various ways: in public spaces and buildings (e.g. permeable surfaces and green roofs), as natural ways to maintain the beaches, and in agricultural areas. People are aware of the risks of climate change, and implement nature-based solutions in their living environment. The TIGRE platform facilitates continuous innovation through an evidence-based working approach.

## Strategic ambitions from the sessions

- In 2050 the city of Cannes is a green and safe city, full of gardens. It is resilient to all natural and security threats, e.g. coastal erosion and flooding. Public spaces and buildings are designed to retain water, e.g. through permeable surfaces and green roofs. Inhabitants are aware how to live with challenges of the climate change and behave sustainable towards resources and waste. External stakeholders 1
- In 2050 green public spaces define Cannes. The people enjoy connected green places, that invite people to walk and cycle, and use for their pleasure. The green spaces, green roofs and private constructions contribute to better management of climate impact and to a healthy city with a high quality of life. Green areas and permeable surfaces contribute to water management. Internal stakeholders 2
- In 2050 the city and people are capable of living with risk. The impact of the risks 

   like floods and heat - is diminished to an acceptable level and people are aware how to adapt and have changed their behaviour. Strategy 3
- In 2050 Cannes is resilient to floods and marine submersion. Nature based solutions are implemented and tested and contribute to a nicer, greener and safer city for citizens and visitors. Policy 1.1
- In 2050 the beaches of Cannes are beautiful and large areas with green, that provide free sights on the city and the sea. They are very easily accessible for pedestrians and cyclists and the inland is well-connected. Natural means will maintain the sandy beaches and also provide easy processing of water out of the city. Internal stakeholders 3
- In 2050 TIGRE (Territoire Intelligent pour la Gestion de Risques Environnement) supports the adaptation to the future risks and challenges. The TIGRE platform facilitates continuous innovation through an evidence based way of working and is in that way flexible for new solutions. Policy 1.3

## Self-sufficient and circular water systems

In 2050 water management in Cannes ensures a completely self sufficient and circular system in which no water is wasted. Rainwater is retained where it falls in a permeable city. The wetlands in Basse Vallée de la Siagne retain rain- and waste water and make it available for re-use. Innovative techniques ensure high-quality clean water for drinking and organic farming. The system ensures the availability of sufficient water even during long periods of drought.

## Strategic ambitions from the sessions

- In 2050 no water is wasted. A circular water system secures all necessary use of water. In case of water scarcity the system balances the availability. Innovative techniques ensure the cleaning of water to the level of drinking water and water for use in organic farming. External stakeholders 3
- In 2050 Cannes produces more quality food to provide for all inhabitants young and old. Local production is a main asset of Cannes, promoted by restaurants and through tourists. Agriculture is biological and sustainable, based on a circular economy and closed water cycles. External stakeholders 2
- In 2050 the wetland in Basse Vallée de la Siagne is realised. Here rain and waste water is retained for re-use. Policy 1.2





In 2050 city planning and design turn environmental challenges into main assets of Cannes. Cultural and historical heritage are strengthened by nature and nature-based solutions. Proactive urban planning is based on a vision of the purpose, welfare and well-being of the area. La Republique has developed into an neighbourhood with high-quality facilities for families, and La Bocca is an economically vibrant neighbourhood based on creative industries attracting a diversity of people studying, living and working there. Both areas are climate-resilient through careful urban planning and the implementation of a mixture of technical and nature-based solutions.

## Strategic ambitions from the sessions

- creative activity. Strategy 1
- outdoor life. Policy 2.3
- regulations. Internal stakeholders 1



European

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## A new way of planning the city

• In 2050 Cannes is a global village where nature-based solutions respect the natural and historical heritage. Natural activities – like fishing and agriculture – are preserved, while at the same time a healthy economical system is build on the cultural strengths, such as arts and

• In 2050 new urban *politique* strengthens both natural and green spaces, as well as urban areas. All planning and developments do not only take climate risks into account, but also contribute to the high quality of the public space. Policy 2.2

• In 2050 the people and visitors of Cannes enjoy the built heritage, e.g. the old town, castles and monastery, enabled by good roads and boulevards where people can walk and enjoy

• In 2050 Cannes is well integrated in its environment. Environmental challenges have become the main assets for designing and constructing the city. This is realised through an integrated urban planning, based on evidence-based carbon footprints. Developers and municipality are pro-active in new building design and planning for sustainable mobility, enhanced by

 In 2050 new economies create value in Cannes. These particular models balance economical and ecological issues and create value in combination. La Republique is developed into an area where facilities create better life for families. La Bocca is a flourishing business and living district, enabling creative industries and mixed activities. Policy 2.1

• In 2050 Bocca is developed into a lively and economically vibrant area. A diversity of use and people, including student life, mixed housing and authentic commercial activities in the creative industries is realised. The area is climate resilient by the redesign of the urban plan, complemented with a mix of technical and nature-based solutions. Strategy 2



The ambition workshop in Başakşehir was held from 11 to 13 April 2018. Pictures taken during the different sessions are shown below. The result of the workshop is shown on the next page.





Workshop with policy makers

Workshop with internal stakeholders



Workshop with strategy department



Workshop with external stakeholders

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## Green and nature

In 2050 Basaksehir is a green city, in which people live in harmony with nature and enjoy green spaces, smell the fresh air and hear the sounds of nature. All living creatures are treated equally in their natural environment. The city is well-planned, with a balance between buildings and uninterrupted nature. All fast transport takes place underground. Every citizen is able to access public transport easily in an integrated system. Trees along paths, green river beds and connected green and blue areas make walking and cycling attractive options. People are environmentally aware and protect nature as their home.

## Strategic ambitions from the sessions

- In 2050 Basaksehir is a green city; a place where people (locals and tourists) come to enjoy the green spaces. The bicycle lanes along the river beds are used with e-bikes to cross the whole city. People are environmentally aware and respect the use of water, energy and other natural (re)sources. Başakşehir is a well-known and prestigious place through this and acts as a role model for Turkey and the world. Policy makers 1
- In 2050 the city is the greenest city and a nice green city for people to move around by foot and bike. All fast transport is realised underground. Every citizen is able to access public transport easily in an integrated transportation system. Each vehicle of the municipality carries an air quality sensor. A data analysis infrastructure and system to monitor air quality is realised. Strategy 1
- In 2050 Basaksehir is a green district where the public space is available for the people to enjoy a green environment with clean air. Traffic is underground, with public transport connecting all areas of the city. Trees on the side of the road and bicycle paths make cycling a real option. All vehicles are electrical and charging options is widely available. Internal stakeholders 1
- In 2050 Basaksehir is a city in harmony with nature. All living creatures are treated equally in their natural environment. People see green everywhere, harmonised with water. Nature is the house that they protect. External stakeholders 2

## Zero waste water

In 2050 not one drop of water is wasted in Basaksehir. All water is collected separately, recycled and used multiple times. The waste water from industrial areas is treated and available for re-use. Rainwater is collected, stored and used, e.g. for gardening. The people are aware of the value of water and use it wisely, supported by smart technology and knowledge based on data analysis. The government has a zero waste water policy, and actively protects water availability. There is an efficient and effective audit system with the authority to ensure that companies comply with the regulations.

In 2050 Basaksehir has a circular system with zero waste. The city is a leader in waste recycling with nature-based solutions. The people are aware of the value of waste, and separate it for collection. The municipality has a zero-waste policy, and a smart recycling infrastructure is available to capture the value of waste as a resource. Data on resource availability and demand is used to improve the system. The city is self-sufficient in energy from renewable sources, and people respect the use of water, energy and other natural (re)sources.

#### Strategic ambitions from the sessions

- In 2050 Basaksehir is the leading city in waste and water recycling with nature based solutions. Through a zero waste policy and by establishing all infrastructure and systems, all waste is recycled and value is created from waste. Also water is recycled and re-used. Policy makers 2
- In 2050 there is no waste in Başakşehir. Water and waste types are collected separately and recycled to create value. Strategy 2
- In 2050 all water in Başakşehir is re-used. The waste water of industrial areas is treated and available for re-use. There is an efficient and effective audit system with the authorisation to ensure companies comply with the regulations. Internal stakeholders 2
- In 2050 not one drop of water is wasted in Başakşehir. All water is recycled and used multiple times. The people are aware of the value of water and use it wisely, supported by smart technology and knowledge on water use (e.g. smart taps). The government has a zero waste water policy and actively protects water availability. Nobody and no animal or plant is dying or sick through a lack of clean water. External stakeholders 1

## Strategic ambitions from the sessions

- stakeholders 3
- technologies. External stakeholders 3



European



## **Circular and self-sufficient**

 In 2050 smart buildings in Basaksehir are self-sufficient. A complete use of solar power provides enough energy for e.g. street lighting, use in buildings and charging of cars. Nature based solutions are combined with smart technologies. Policy makers 3

 In 2050 Basaksehir will be an energy self-sufficient city through solar and wind and energy generated by waste. The city even exports energy. Strategy 3

• In 2050 Başakşehir has a circular system, which results in zero waste. The service in waste collection is of high quality and efficient. The people are aware of the value and separate their waste. The municipality has the capacity to recycle all different types of waste. Data on availability of resources from waste and demand is used to improve the system. Internal

• In 2050 the people of Başakşehir enjoy fresh air and clean water, they smell the freshness and hear the sound of water and enjoy being in the city. The city is well-planned with wellbalanced built areas and areas where nature is not interrupted. Sustainable energy sources are used and make the city self-sufficient on energy, through the use of innovative sustainable



Joint ambition workshop in Eindhoven



Stavanger presenting their strategic ambitions



Başakşehir presenting their strategic ambitions



Prague presenting their strategic ambitions



Eindhoven presenting their strategic ambitions and ULL concepts



Castellón presenting their strategic ambitions



Genova presenting their strategic ambitions and ULL concepts



Identifying common and specific elements in the strategic ambitions

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The joint ambition workshop was held on 29 May 2018 in Eindhoven (as side event of the Consortium Meeting). This page shows some pictures taken during the different sessions.



Cannes presenting their strategic ambitions



Tampere presenting their strategic ambitions and ULL concepts

## 4.7. Ambitions and ULL concepts of the front-runners

The front-runner cities presented their ambitions and nature-based solutions that will be implemented in their Urban Living Labs during the joint ambition workshop. A summary of their presentations was also captured in posters, as shown below.



Challenges and solutions to be implemented in the ULL of Eindhoven

European Commission

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Challenges and solutions to be implemented in the ULL of Genova



Challenges and solutions to be implemented in the ULL of Tampere

## 4.8. Common elements in the ambitions

During the joint ambition workshop the cities shared and discussed their strategic ambitions to learn from each other and gain a deeper understanding of the challenges each city faces.

or more cities only.

The ambitions were clustered into three common themes:

- Green
- Water
- Processes

The cities (followers, front-runners and observers) discussed the important challenges in their ambitions for these themes, and indicated the relevance for their own city. The results are shown on the following pages.

One of the elements of the discussion was to identify the challenges in the ambitions that are common to all cities, and those that are specific for one

## 4.8.1. Elements of the strategic ambitions related to green

#### Nature as the structure of the city



### Green serving the city

In 2050 Prague has a high-quality green infrastructure, that is interconnected and provides multiple ecosystem services. People enjoy accessible green spaces that encourage walking and cycling throughout the city. The centre is enriched with urban green, respecting the city's heritage. The authentic cultural heritage and identity are turned into value and functionality, in which nature and small-scale agriculture are in harmony and serve people by offering local food, wine, fish, woodland and recreational facilities. The urban green – forest, parks, trees, green roofs and façades – contributes to climate resilience and a healthy microclimate.



A green and friendly city

In 2050 the people of Castellón enjoy their green city with a high quality living environment for everyone. Green corridors connect the different areas of the city and provide shaded places to walk and cycle. The riverbeds are used for recreational purposes and are integrated in a green ring around the city that also enables local agricultural use. All this contributes to a high air quality and its related benefits, pleasant climate and increased biodiversity.



Green and safe city

CANNES

In 2050 green public spaces define Cannes as a green city, full of gardens and connected green areas for people to walk, cycle and enjoy outdoor activities. It is resilient to all natural and security threats such as coastal erosion and flooding. To reduce the impact of risks to an acceptable level, nature-based solutions are applied in various ways: in public spaces and buildings (e.g. permeable surfaces and green roofs), as natural ways to maintain the beaches, and in agricultural areas. People are aware of the risks of climate change, and implement nature-based solutions in their living environment. The TIGRE platform facilitates continuous innovation through an evidence-based working approach.



In 2050 Basaksehir is a green city, in which people live in harmony with nature and enjoy green spaces, smell the fresh air and hear the sounds of nature. All living creatures are treated equally in their natural environment. The city is well-planned, with a balance between buildings and uninterrupted nature. All fast transport takes place underground. Every citizen is able to access public transport easily in an integrated system. Trees along paths, green river beds and connected green and blue areas make walking and cycling attractive options. People are environmentally aware and protect nature as their home.



Challenges in the strategic ambitions related to 'Green' and their relevance for the partner cities

Lack of space for green areas or NBS

Lack of connection between green areas

Difficulty implementing NBS in the dense city centre

Distance to nature or between people and nature

Conditions for walking and cycling

Developing local agriculture could be a way of preserving green areas

Combine beauty and usefulness

Lack of / limited biodiversity

Lack of water to sustain green

Lack of management of green space (resulting in lack of accessibility and awareness)

Nature vs cultural heritage in historic city

Private green

Greening buildings

More green with less money for maintenance

Maintenance costs

Water quantity

Flexible green heritage sites



European



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## 4.8.2. Elements of the strategic ambitions related to water

### A climate resilient city



In 2050 Stavanger is resilient to flooding from the rising sea level and storm water. People value rainwater as a resource that increases the quality of life as attractive element for recreation and supports nature-based solutions that increase the value of their property. They experience no inconvenience from severe weather conditions because the city has created flood channels. The different adaptation measures applied by citizens and the municipality combine to make the city climate resilient.

## Self-sufficient and circular water systems

In 2050 water management in Cannes ensures a completely self sufficient and circular system in which no water is wasted. Rainwater is retained where it falls in a permeable city. The wetlands in Basse Vallée de la Siagne retain rain- and waste water and make it available for re-use. Innovative techniques ensure highquality clean water for drinking and organic farming. The system ensures the availability of sufficient water even during long periods of drought.

#### Circular water management

In 2050 the government and people of Prague value water as an integral part of the city. The water bodies are used for both recreation and sustainable water management, and contribute to a high quality of living. The rivers, meandering creeks and ponds encourage people to enjoy their clean water. A local circular system retains rain- and waste water and makes it available for re use, e.g. to maintain urban green. The water bodies provide protection against flooding and drought by retaining rainwater.

#### Holistic use of water

In 2050 Castellón is making the best possible use of water and natural resources. Zero waste is achieved through 100% re-use of waste water with actions on different scales at home, district and city levels, taking into account the different water-quality levels. The wetlands are transformed and a blue/ green infrastructure is created, contributing to the environment through a circular economy. Water is managed wisely in the city taking care of all risks, such as heavy rain, drought and fire.

### Zero waste water

In 2050 not one drop of water is wasted in Başakşehir. All water is collected separately, recycled and used multiple times. The waste water from industrial areas is treated and available for re-use. Rainwater is collected, stored and used, e.g. for gardening. The people are aware of the value of water and use it wisely, supported by smart technology and knowledge based on data analysis. The government has a zero waste water policy, and actively protects water availability. There is an efficient and effective audit system with the authority to ensure that companies comply with the regulations.

## CANNES COTE D'AZUR

and their relevance for the partner cities

Front

Eindhoven

Challenges in the strategic ambitions related to 'Water'

Sometime too much water, and sometimes too less water...

Revitalisation of creeks and rivers

Heavy rain falls – floods

Awareness of importance

Water quality

The draughts increase the risk of fire (forest)

Involve citizens in water management on private areas

Rising sea levels

Managing natural rain water

Re-use of waste water to prevent lack of water

Climate resilient buildings

Lack of permeability

Lack of areas for infiltration and storm water management

Finance the NBS solutions

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### 4.8.3. Elements of the strategic ambitions related to processes

## Utilising the co-benefits of NBSsolutions through cohesive strategies

In 2050 the people of Stavanger enjoy the result of cohesive strategies to manage spaces, buildings and transport. There is synergy between separate plans and projects to actively utilise the co-benefits of all solutions, building on a deep understanding of the site, the risks and the effects of nature-based solutions (e.g. collecting rainwater to support the growth of trees that improve air quality). The city is compact, with accessible facilities, services and public transport within ten minutes walking or cycling, freeing up space for green infrastructure.

Knowledge, new technologies and NBS solutions developed by (new) companies and the university are implemented in Stavanger and exported.

## **Ecological governance**

In 2050 urban planning in Prague is a transparent, coherent and effective process. Politicians from the 57 boroughs and the metropolitan region, experts from different sectors and the public all collaborate to address complex challenges by integrating economic, social and ecological developments, e.g. by using naturebased solutions. People live their lives responsibly and contribute to a zero emission city by taking every opportunity in buildings and mobility to save energy and generate renewable energy. Prague is 'smart' in many ways, and is active in international cooperation.

## A green mentality

In 2050 the people of Castellón act responsibly with regard to water, waste and natural resources. Everybody is involved, and has the knowledge to recognise the value of resources. This is the result of a strong educational programme that involves children, adults, administration, companies and professionals. Nature-based solutions are standard procedure in the municipality's policy making and city design. The city actively looks for the co benefits of solutions to address multiple challenges, such as water and heat management, air quality and waste recycling.



#### A new way of planning the city

Challenges in the strategic ambitions related to 'Processes' and their relevance for the partner cities

Front

In 2050 city planning and design turn environmental challenges into main assets of Cannes. Cultural and historical heritage are strengthened by nature and nature-based solutions. Proactive urban planning is based on a vision of the purpose, welfare and wellbeing of the area. La Republique has developed into an neighbourhood with high-quality facilities for families, and La Bocca is an economically vibrant neighbourhood based on creative industries attracting a diversity of people studying, living and working there. Both areas are climate-resilient through careful urban planning and the implementation of a mixture of technical and nature-based solutions.

## **Circular and self-sufficient**

In 2050 Başakşehir has a circular system with zero waste. The city is a leader in waste recycling with nature-based solutions. The people are aware of the value of waste, and separate it for collection. The municipality has a zero-waste policy, and a smart recycling infrastructure is available to capture the value of waste as a resource. Data on resource availability and demand is used to improve the system. The city is self-sufficient in energy from renewable sources, and people respect the use of water, energy and other natural (re)sources.





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## Section IV — Vision development



European This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Commission **Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions** 



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## VISION DEVELOPMENT

## 5.1. Approach

The aim of this step is to develop the visions on climate resilience for the follower cities. A vision is based on a long-term view — in this case we are focusing on 2050. Three main activities take place in this step:

- Visits to the Urban Living Labs, to inspire the follower cities by the visions and plans of the front-runner cities.
- Future Telling research and definition of Drivers for Change.
- Developing desired future scenarios in the city vision workshops.

## 5.1.1. Visits to front-runner city Urban Living Labs

In the Joint Ambition Workshop the follower cities gained a better understanding of cities with matching ambitions and solution spaces, and topics for further learning were exchanged. This allowed them to engage more deeply in the visit to the Eindhoven Urban Living Lab, which took place in the week of the Joint Ambition Workshop in Eindhoven. The follower cities identified the main inspiration points to consider in their own vision development.

## 5.1.2. Future Telling

Future Telling interviews were held with thought leaders on climate and water resilience to identify Drivers for Change that influence the future of climate resilience in general, as well as of nature-based solutions in particular. The Future Telling research method develops context-related possible future scenarios in a creative and imaginative way, and resulted in 5 Drivers for Change in climate resilient cities in 2050.

## 5.1.3. Vision workshops: developing desired future scenarios

The 5 Drivers for Change for climate- and water-resilient cities are prioritised by the follower cities on the basis of the relationship to their specific contexts and ambitions. Together with the ambitions of Step 1, and the inspiration from the front-runner cities, these are used to develop the desired future scenarios.

The desired future scenarios of the cities are created in a series of workshops held in each of the partner cities. These Vision Workshops consist of a 3-day programme in each city, and include sessions with policy-makers and stakeholders to develop a rich, contextual scenario for each city. Local stakeholders (companies, citizens, public and private organisations and knowledge institutes) are invited to take part in the workshops through the networks in the cities. The results of the Vision Workshops are reported in the same format for each city to facilitate cross-learning between the cities.

Three sessions are held. During the sessions, the participants interactively build a visualisation of the desired future scenario. See also the photos of the workshops. In the first session the outline of the vision and the desired future scenario is developed. The main stakeholders work with the set ambition and the selected Drivers for Change to understand their impact on the city in 2050. Together, the participants define the main elements of the vision. Then, in the second session, a broad spectrum of stakeholders are invited to enrich the desired future scenario by making specific additions. Based on the outlined vision, they carry out a further in-depth exploration of the main elements of the vision. In the third session, the project team translates the results into a description of the desired future scenario to complement the visualisation.

Day 1	Day 2	Day 3
• Exploring the Drivers for Change in relation to the future of the city	Enriching the desired future scenario • Exploring the future of the city and the main elements of the vision	Describing the desired future scenario
• Selecting the main elements of the vision	• Enriching the vision with specific additions	

Programme of the vision workshops in the cities

The result of the vision development step is a visualisation of the desired future scenario in an A0-format poster. This shows the visual together with a brief explanatory text. A common visual language is used to make sharing easier and to facilitate discussion among the cities on common and specific aspects of the visions.

## 5.1.4. Joint vision workshop

In a joint meeting in Başakşehir the cities present their desired future scenarios to each other, and hold in-depth discussions to understand the common and specific needs in their visions.

• To enable cross-city learning. The cities gain a deeper understanding of the vision development process, enabling them to improve their own vision with inspiration from others.

Morning	
Finalising Step 2	

Afternoon Preparing for Step 3

Programme of the joint vision workshop

for Step 3.

## 5.1.5. How to read this section

This section starts with the learnings of the visits to the Tampere and Eindhoven Urban Living Labs (this chapter). The Future Telling method and the resulting Drivers for Change are presented in Chapter 5. The desired future scenarios of the follower cities are presented in Chapter 6, together with the results of the joint vision workshop.





This joint vision workshop served two purposes:

• To describe the needs as input for the roadmapping step.

Presentation of the cities desired future scenario • Each city presents their vision for 2050 Learning from each other's visions • In-depth discussion on common and specific needs Presentation of the Roadmapping process • Sharing of the solutions available in the NBS Technical Handbook Identifying topics and experts for the interviews · Selecting topics for the roadmapping interviews and making a list of suggested experts using the networks of all partners

The joint vision workshop finalised the activities of Step 2 and prepared





the different sites.

Vuores

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As part of the program of the kick-off meetings held on 7 and 8 June 2017 in Tampere several visits were organised to the NBS solutions and plans in the Urban Living Labs in city. This page shows some pictures taken at

## 5.2. Visits to Urban Living Labs in Tampere

During the kick-off meeting in Genova (7 and 8 June 2017) visits were organised to the Urban Living Labs in Vuores and Hiedanranta.

Tampere is the third largest city in Finland and the largest inland centre in the Nordic countries. Tampere is home to 225 150 inhabitants, and close to half a million people live in the Tampere Region, which comprises Tampere and its neighbouring municipalities. Tampere is one of the three most rapidly developing regions in Finland. It is a centre for leading-edge technology, research, education, culture, sports and business.

It is estimated that waterfall in Finland will increase by 25% in the coming years due to climate change. A critical issue for Tampere is therefore flooding and storm water management. As both demonstration areas in Tampere are under construction to become dense urban areas, the rapid population growth will pose a significant challenge. Other challenges that the city is facing include air and water pollution and reduced biodiversity.

Tampere's main NBS demonstration site is Vuores. Vuores is a new greenfield district combining a proximity to nature, high-quality architecture, an ecological attitude, technological solutions, as well as small-town-like services. The first residents moved to Vuores in 2010 and there are currently 3000 inhabitants living in the district. Intensive construction is still ongoing and it is planned that Vuores will be completed by 2030, with residences for 13 000 people and 3000 to 5000 jobs.

Vuores consists of existing and developing residential blocks located around multifunctional parks. The heart of the Vuores nature-based storm water management system is the Central Park, where retention ponds, swales, wetlands, and streams retain and purify the water before leading them to lake Koipijärvi. The nature-based water management system starts already from plots, where e.g. green roofs, rain gardens, and rainwater harvesting serve both as water management as well as recreation. A biofilter is the first part of the UNaLab demonstrations in Vuores, and is built in Park Virolainen to treat storm waters from nearby residential blocks and streets. The biofilter is capable to decrease the nutrient and microbiological load in the water.

Innovative, co-created NBS systems demonstrated in Vuores will be scaled up and further developed in the brownfield area Hiedanranta, which is also situated in Tampere. Hiedanranta is a former industrial area slated for development into a dense city district for 25 000 inhabitants and more than 10 000 jobs. Currently, Hiedanranta is open for people to enjoy and organise cultural- and art events and other innovations.

The first UNaLab demonstration in Tampere and Hiedanranta is a greenhouse where researchers from Tampere University of Technology study microalgae growth in Nordic conditions.



European

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taken at the site.



Gavoglio Urban Park

As part of the program of the consortium meetings held on 21, 22 and 23 November 2017 in Genova a visit was organised to the NBS solutions and plans in the Urban Living Labs in city. This page shows some pictures



## 5.3. Visits to Urban Living Labs in Genova

Genova is the biggest city in the Liguria Region and is characterised by a narrow coastal zone with hills and steep mountains in the backcountry. Genova is the third largest city in Northern Italy in number of inhabitants, as the population amounts to 607 000 people. This number increases to 850 000 when considering the whole metropolitan area.

Genova is plagued by frequent flooding which has resulted in significant destruction in the past, primarily due to intense rainfall on a highly urbanised landscape. The city faces numerous environmental challenges relating to extreme weather conditions, water management issues, heat stress, and water and air pollution.

Nature-based solutions to key climate- and water-related challenges will be demonstrated in Genova's Lagaccio district, a central and densely populated district characterised by disorganised post-war urbanisation mainly formed by residential multi-storey buildings and derelict sites. The Lagaccio district occupies a core area of Genova, connecting the old port, the historic town centre and the 850-ha Peralto natural park with is historical architectural structures.

During the consortium meetings in Genova (21, 22 and 23 November 2017) visits were organised to the Lagaccio district.



Gavoglio Urban Park



Lagaccio river district



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Vestdijk



De Dommel at the Van Abbe Museum



Victoria Park



Victoria Park



Parklaan



't College

As part of the program of the consortium meetings held on 30 and 31 May 2018 in Eindhoven several visits were organised to the NBS solutions and plans in the Urban Living Labs in city. This page shows some pictures taken at the different sites.



De Dommel



Stadhuistoren

## 5.4. Visits to Urban Living Labs in Eindhoven

During the consortium meetings in Eindhoven (30 and 31 May 2018) visits were organised to the different areas of the city where Eindhoven has implemented or planned NBS solutions for climate and water resilience.

- 1. Victoriapark: redevelopment of former industrial site to residential area and daylighting the river gender in new park setting
- 2. Clausplein square on top of a parking garage, plans for extra green, but private partner does not want to contribute (anymore) financially
- 3. Fens-terrein: green added and given more, keeping parking function. Difficulty: green won't grow under trees
- 4. Kerkstraat: one of first projects with green and depaying; terrace space sacrificed, now cafés run better and would like the space back...
- 5. Waagstraat: pavement out, plants in, water storage; problem: stays too wet now but will also have dry phases: what plants can survive?
- 6. Wal: pavement out, plants in front of city office; limited space because of cables etc in the ground; vulnerable spot because of events (PSV, kingsday) on Stadhuisplein - planting seems to hold on!
- 7. Bilderdijklaan: a lot of pavement out, planting in could have been more, if space for cars and cycles was combined – but part of cycling route 'Slowlane'; also: temporary asphalt next to building site...
- 8. Stadhuistoren: major renovation for energy efficiency with circular approach and smart re-use of materials
- 9. Smalle Haven: added green on walls and 'ceiling'; Medina: hanging gardens; barber shop: entrepreneurs added extra green; took time to find good functions but now busy food market
- 10. Vestdijk: reducing car-traffic and adding more space for cyclists and pedestrians and green
- 11. Bicycle parking Effenaar: chances for pavement out, plants in not all space needed for bikes
- 12. Garden Effenaar: garden and 'pond', walking path on water still looking for the right function and form
- 13. Stationsweg and -plein: plans for reconstruction and daylighting Gender; difficulties in planning because of other projects close by: probably can't be done in timespan UNaLab? Stationsplein: plan for towers in green public space – new entrance to the city...
- 14. H. Boexstraat: tree rings: added green is positive, but no water can flow into the ring; also rings get hit by trucks delivering goods (temporary solution)
- 15.18 septemberplein one tree some wish there was more green, city urban designer thinks it's enough...

Further information will be shared through the UNaLab online buddy tool.



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## **FUTURE TELLING**

## 6.1. Future Telling research

The future is unpredictable and elusive. Recent changes in technology, ecology, economics and society have already led to significant changes.

The expectation is that the complexity that people and organisations experience will only increase further in the years ahead. A number of current Drivers for Change will lead to radical changes in the future. For example, new developments in information technology will create opportunities that we cannot imagine today. These will undoubtedly change our lives significantly, including the way we shop, travel, move, communicate and work. Another example is the increasing level of social connectivity, which will drastically affect the relationships between organisations and their strategies. Even today, disruptive developments in many areas are challenging us to redesign our world.

This constant process of change has also become more complex: developments are so rapid that the future is unpredictable, based on our knowledge and models of the past and present. Predictions based on analysis appear pointless. The new complexity is characterised by simultaneous developments with far-reaching effects. We need a new way to visualise the future, with all the opportunities and challenges that it will bring – an approach that is creative, imaginative and research-oriented. Even though we can't predict the future, we can create a range of possible context-related future scenarios. These desired scenarios will direct our decision-making, from short-term actions to long-term consequences.

In the UNaLab project, the Future Telling research method is used to develop possible, context-related future scenarios in a creative, imaginative way. This implies a structured method to map the expertise and ideas of the thought leaders. The process focuses on climate and water resilient cities, in particular using analysis to gain insight into the Drivers for Change for cities in 2050.

## 6.1.1. Thought leaders

Finding suitable Drivers for Change requires both broad and specialist views. The research involves 8 interviews with thought leaders holding different views on smart and sustainable energy in cities. A broad spectrum of experts with a visionary scope was chosen from knowledge institutes, companies, consultancies and profit or non profit organisations. Their expertise was both general on climate and water resilience, and specific on nature based solutions.

To overcome possible cultural bias, the experts were drawn from all over Europe, and even included thought leaders from the USA. These thought leaders are introduced on the following pages. For the interviews, the requested expertise of the thought leaders was not specifically their

future vision, but their knowledge of important influences in their own fields. The Future Telling method inspired them to use their knowledge to visualise future trends and to describe possible future scenarios in rich stories. In fact, the richness of those stories makes them fertile input for the UNaLab project.

The H2020 project Roadmaps for Energy (R4E) also included Future Telling research. Although the focus of the R4E project was on energy in the urban environment, the interviews also addressed quality of life in cities. Some thought leaders included nature and climate resilience in their future scenarios, these interviews are also included in this research.

The list of Thought Leaders and a short background can be found on the next pages.

## 6.1.2. Future Telling card set

The Future Telling method uses a set of 52 cards showing general future trends derived from an extensive research project by The Hague University of Applied Sciences. The cards are shown on the previous page. They are used to trigger ideas by the research participants, and to inspire them to tell rich stories about how they think these trends will influence the use of nature based solutions for climate and water resilience in future cities.

## 6.1.3. Structured interviews

The Future Telling card set is used in the interview. The interviewees are asked to identify relevant future trends and to tell stories about how they imagine these trends could develop.

The card set with a broad collection of general trends helps in the interviews with specialists by making them consider all the relevant directions (social, technological, economic, ecological, political and demographic), and at the same time to consider more distant future scenarios. The trends that are presented on the cards trigger their thinking, and inspires them to give rich descriptions of how they see the future developing in relation to climate and water resilience in cities in 2050.

The interviews contain three main questions:

1. Sort the 52 trends on the cards into three categories:

- Not relevant in the context of climate and water resilience in cities
- Already relevant now
- Relevant in the future
- 2. Take the selected cards in the category 'relevant in the future' and pick the 10 cards that in your opinion will have the greatest impact on cities in the context of climate and water resilience. (The interviewees can

## 6.1.4. Drivers for Change

A limited yet representative number of Drivers for Change are distilled from the large volume of expert material. In this phase, the data from the interviews is analysed by means of clustering, selecting and comparing the quotes by the thought leaders. The clustering is based on both commonalities and contradictions in the statements by the experts on the specific topics.

A Driver for Change needs to address the topic of a cluster, as well as to point in the directions that the future might take. So for each cluster, a short title and a description are given to capture the richness of that cluster. The quotes by the though leaders serve as an inspiration to paint richer stories of the possible new future scenarios.

The analysis led to five Drivers for Change for the future of climate and water resilient cities in 2050.

## 6.1.5. Prioritising drivers for change

In the joint ambition workshop the results of the Future Telling research was shared with all cities. The aim was for the cities to better understand the Drivers for Change and to prioritise those that are most relevant in relation to the cities ambition, and therefore are included in the further vision development.





also add missing trends which they regard as important.) 3. Tell stories about how you imagine these 10 trends will develop and what the future in cities will look like.

## 6.2. Thought Leaders

The thought leaders are selected for their expertise and visionary scope. The interviewees work as members of knowledge institutes, companies, consultancies and profit or non-profit organisations. We aim for a mix of expertises, varying from ecological, social, and human oriented to technology oriented.



Jeroen Aerts is director of the Institute for Environmental Studies (IVM), the oldest multidisciplinary environmental research institute in the Netherlands. IVM has a total of 55 Staff and PhD's divided over 3 departments. Within IVM, Jeroen is also head of the department 'Water and Climate Risk'. Jeroen has an established an internationally- recognized leading position in the field of water and climate risk management with 12 key publications in Nature, Science and PNAS. He has developed and applied a wide range of assessment and modelling methods to analyse water risk (flood/drought) and climate adaptation at scales from local to global. The methods include: hydrological modeling, insurance, catastrophe modeling, agent based modelling, scenario analysis, pathways, and optimization. On the basis of scientific results in the area of climate and flood risk modelling, Jeroen was awarded by the prestigious NWO-VICI grant (1.5 mln Euros) in 2014.



Michael Lake is the President and CEO of Leading Cities, a global non-profit with operations in 10 countries. Michael establishes and develops relationships with municipal governments, businesses and universities around the world, creating a global network of partner cities dedicated to implementing urban solutions that effectively address the shared challenges facing 21st-century cities.

Leading Cities is a global leader in Smart City solutions, city diplomacy and collaboration advancing sustainability and resilient city strategies and technologies. With its global network of world-class cities, Leading Cities has built bridges to share best practices, urban solutions and lessons learned among city leaders while breaking down barriers within cities by engaging each of the five sectors of the Quintuple-helix (Q-helix): Public, Private, Non-profit, Academia and Citizenry.



Malia Lazu has over two decades of experience establishing grassroots involvement in political advocacy and civic engagement, including a two-year fellowship at MIT. The passion and success of Malia's work has earned her a reputation as one of the most insightful and critical organizers of her generation, and caught the attention of MTV, Showtime, ABC-TV's Chronicle, Fox News, and print publications such as Newsweek, The Boston Globe, and Boston Magazine. In addition to her extensive work advocating for our youth, Malia has managed campaigns for numerous tastemakers including Grammy Award-winner and famed Civil-Rights Activist Harry Belafonte, American novelist Walter Mosley, and Peter Lewis, philanthropist and Democratic Party donor.

Transformative Culture Project harnesses the economic power of creative arts for youth and community development. They imagine a world in which artists and cultural creatives are celebrated and compensated for their role in imagining the future and connecting people to one another. At MIT Malia founded Urban Labs, helping companies activate their cultural competency to attract customers, influence product offering, and attract and retain talent in order to outperform their competitors.



Chris Luebkeman's interest in the built environment blossomed early, propelling him to pursue a multi-faceted education, beginning with engineering and culminating in a Doctorate in Architecture from ETH in Zurich, a city to which he remains deeply connected. Chris gained valuable experience as the protégé of esteemed Spanish Architect, Santiago Calatrava. But, subsequently he turned to his other love, education, by accepting teaching positions at several prestigious universities. In 1999, Chris joined Arup as the Co-Director for Research and Development. A couple of years later, he formed the Foresight, Innovation and Incubation team, which has evolved to its present form as Foresight + Research + Innovation.

While he refuses be categorized, Chris views himself as a generalist with a view of being "in league with the future". He has been described as the "Willy Wonka of the built environment, conjuring up dreams of a future where we can cure our ills through faith, physics and forethought".



Riccardo Marini was born in Pistoia, Tuscany, he is aware that this 'place' and its culture shaped a lot of who he is. As an architect who would define himself as a modernist, he is acutely aware of the destructive nature of architecture, which does not know where it belongs and who it is there to serve. Over the years he has observed the inability of professionals to actually listen and learn from past mistakes and this drives him to ensure that there is proper meaningful engagement and that people come first. Riccardo loves design and designing but is fascinated by what makes places work. He has come to a simple conclusion that places are a reflection of the culture of the people who created them. He has for many years endeavoured to show that the real value of place is far more profound than monetary value alone, but that the economic indicators which drive a lot of the current decision making can only be achieved and sustained if you create the genuine article: a place that makes people happy.

After working for many years as a senior city officer he worked as a director with Gehl architects in Copenhagen, he founded Marini Urbanismo in 2017.



José-Luis Muñoz-Bonet has a Masters Degree in Industrial Engineering, a Masters of Advanced Studies in Innovation Projects and more than 25 years of professional experience in environment, water and energy management, innovation and international cooperation. He has had executive responsibilities in companies such as IBM and public bodies such as the FCVRE based in Brussels. He is director of Climate KIC Spain, EIT Climate-KIC is a European knowledge and innovation community, working to accelerate the transition to a zero-carbon economy.



Corrado Ragucci is Chief Commissar of Genoa Local Police Department in charge for the Innovation Policies Office where he manages the main analytical programs in theme of Urban Security and Road Safety. During 2017 he was coordinator of the Climate Adaptation Partnership belonging to the Urban Agenda for the EU. Since 2015 he managed the Resilience WG of the Genoa Smart City Association and was in charge for Civil Protection Emergency Management of Genoa Municipality (2012-2015), while since the '90 he worked in the special unit of Local Police engaged in the fight against the environmental pollution crimes and Civil Defense. Graduated in Philosophy.

Telling research.



Joaquin Rodriguez, Ph.D specialised in the relations between society and technology; He works as researcher at the Foundation of the Autonomous University of Barcelona, and is also the local coordinator of the Leading Cities Network. Among his publications, the following are of particular significance: Migration und Integration in Europa (Migration and integration in Europe) and Europa, La civilización Ausente (the absent civilization)

He is also member of the ICRAC (International Committee for Robot Arms Control) and member of the Campaign "Stop killer robots".

His recent work on artificial intelligence and human intelligence are the main triggers to invite him to the Future Telling research.



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## Thoughtleaders of the Roadmaps for Energy (R4E) project

The following thought leaders interviewed for the R4E project included relevant future scenarios on nature and climate resilience. The relevant quotes from these interviews are also included in the description of the Drivers for Change (printed in *italic*).

- Tracey Burns, OECD, Paris, France
- - Netherlands

For a complete report of the Future Telling research in the R4E project we refer to: www.tue-lighthouse.nl/R4E.html.



• Mario Cucinella, MC Architects, Bologna, Italy

Gianfranco Franz, University Ferrara, Italy

• Rudolf Giffinger, Technical University Vienna, Austria

• Pieter van Wesemael, Eindhoven University of Technology,

Stefan Schurig, World Future Council, Hamburg, Germany

We would like to thank all participants for their contribution to the Future

## 6.3. Drivers for Change

The Future Telling interviews revealed a variety of future scenarios. To achieve water and climate resilience the thought leaders indicate that there are many transitions to be made: in the way decisions are made, in the way people are involved, in the way technology plays a role. A clustering of the quotes showed five recurring themes. We used the quotes related to these themes to describe five drivers for change:

- Cities as living organisms
- Leveraging natural value on micro and macro level
- Reinventing nature in the city
- Synergy in nature and augmented technology
- Tailored use of limited resources

The following pages give descriptions of the Drivers for Change stating the essence of the changes. These are supported by quotes from the thought leaders. The quotes in *italic* are taken from the interviews conducted for the R4E project.

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# Cities as living organisms

In 2050, cities adjust and transform to adapt themselves to changing conditions - like organisms living in harmony with their surroundings. Like all living organisms, future cities have the ability to recover from the effects and impacts of changes, such as climatic and weather conditions. The people benefit from the resilience of their cities, and they enjoy an environment in which urbanisation and nature go hand in hand. They also contribute to the resilience of the city. They care for nature, and respect its value. The public spaces provide a good atmosphere and help to build social cohesion and inclusion. The city is constantly adjusting, to optimally respond to environmental and social changes.



FT4. The city in the future will be more in harmony with its environment, that is very important. Which means that **cities will have to adjust and transform into a more organism-like organisation than an urban city which is apart from nature**. That is my main vision that cities become part of the living organism. In doing that it is important that gradually cities absorb and also adjust solutions that are also driven by nature.

FT4. In general, I think cities should become greener. More a living creature, so to say. I see a city as an organism that breathes. And an organism that lives, is more resilient, because it can more easily adapt itself. If you have a technical, concrete structure, it is robust and strong, but if you break the wall then it collapses. Whereas an organism you can punch it, it can have an impact, but most organisms also have some kind of resilience, so they can recover from, for instance, an impact. Future cities can also take impact and effects, but they also can recover themselves. Developments in buildings, energy efficient buildings for example, if the building is greener with plants around it... I mean, plants itself already adjust to temperature changes. So, if you incorporate plants and living organisms in your building, then the whole building also adjusts, right? That is how I view the whole city.

FT4. Urbanisation creates new possibilities. But if I look at the geology book of my son on high school, then urbanisation is always something bad. If we can change that, if cities can become really nice areas to live in, and not only seeing urbanisation as something bad, something that takes away nature, but maybe replace nature with some other living form, then maybe people become to be more enthusiastic and also will engage in this whole process. So, it is important to bring also a positive message, also for the generations to come.

FT1. We have people that come from a very privileged background, like me, that fly around the word and deliver solutions that are appropriate in their back garden, which

is where ample people live and there are lots of places where that solution is an actual insult. That is cultural imperialism at best, and it creates in part of the countries real fucked up situations. And that is compounded by this [picks up phone] technology. So, I go anywhere, I was somewhere recently where there was no electricity, in India, but they had mobile phones. And they were looking at Facebook. And I wouldn't want to deny that, but it creates this kind of different philosophies of thinking about your reality. And it creates tension. Not positive tension, but it can be negative tension. And that is because of the fact that we have boundaries and rules and if you come from a poor country you cannot come to my country because you take my jobs, or if your kids ... you now, it's all this craziness that has to do with control and a city is an interesting place. I had an interesting conversation at dinner last night, sitting with someone who is French and who lives in Paris and said: Paris is actually, when I think about it, a horrible place, because it is filled with Parisians. But when I came to live here I realised that Parisians are the minority. The ethnic mix is really brilliant, which makes Paris a good place. And I must say, I agree. I love New York. I spend there any time I can, because, apart from it that it is very expensive, but you walk down the street and you have everybody under the sun and it doesn't matter who you are. And I think the city of the future has to embrace that notion that public space is for everybody, is an equaliser and it has the right philosophy for us. Which has an impact on all the environmental conditions: noise, vibrations, pollution, etcetera.



# Leveraging natural value at micro and macro level

In 2050, there is a balance between cities and their surrounding natural and rural areas. Cities, especially in Europe, take careful decisions on their maximum size, in relation to affordable limits of natural resources and a high quality of life. At the same time, (technological) solutions enhance life and work in the city's surroundings, making the city an integral part of its landscape, in harmony with agriculture and nature. A holistic view of nature in and around the city ensures that all value and benefits are captured. There is a good understanding of how smaller and larger green and blue areas contribute to the micro and macro climate, and how the two influence and need each other. There is a deep respect for ecosystem services provided outside the city, such as maintaining nature and biodiversity outside the city. This results in more and better jobs for people in rural areas.



FT7. What is really important is water. Production of water supply is one of the key resources of the future. It limits everything. **The growth of the city is limited by it, how many people can live in a city**. Also, to organise it on a global scale. I see a link with solidarity. There are places where there is enough water, even too much water. And there are places where there is not enough water. This is key in the future: to share this key resource for life.

FT7. When I say solidarity, it means that there are places where there is too much water and they don't put a value on that water, because they have too much. But climate change is changing the regime of water that we had. For example, scarcity of water and draughts in the south of Europe means more floods in the North and Central Europe. If we have a good system to share the water, there is some scientific evidence that if we keep the humidity in the south, then we can create more water in the south. Because if there is more and more draught in the south, this means that the clouds are generated from evaporation here, but the winds will take it to the north and create showers in the north. It is a combination of effects. If we can have some of the water in the south, to create again the rain here, then we can avoid a flood in the north. But even in the north of Europe, when there is one, two or three weeks no rain, they have also scarcity of water: they are not prepared for that. Also, for the cities this is a big problem – probably it is one of the biggest problems of the future, next to energy.

FT7. For the future of our cities, we need to reduce the size of our cities. We need also to make more space for nature in the city. But also we need to create opportunities for people who live in rural areas. The technology now permits that. It is not the way to only have three big cities in a country where you concentrate all your people and all the things. The problem is that the environmental costs for people in our cities is very, very high. But the problem is that we don't keep enough income for the people that each day take care of nature in the rural areas. Only we pay for the product that they are selling, but we are not paying for all the good work that they

are doing, to keep CO2 emissions low, or maintain the forest or maintain biodiversity, or even the certification of many things. We don't pay for that. But we want that this continues. There are many things that we need to think about when we design cities.

FT7. In my point of view **there is a size that could be affordable for a city**. I cannot imagine having cities like Mexico-city with 12 million people to be sustainable. And it is not the way that people want to live, they may need to because there is no economical way. But **we need to create opportunities in other areas**. I give an example. My finance manager is coming to our office in Valencia only once a week. But she's working on a farm in the region of Castellón, she has internet and can work from there. Her man is taking care of the farm. These people have a very high level because of technology: they have internet, we are connected. Imagine that you have a much better life on the farm. If you speak to her, the quality of life is much higher. I see the future in such a way. We have good connections, and technology can help us in many ways. Cities can grow, but to an affordable limit.

FT7. **Each city should define the limit, because it depends on many conditions**. In some cases, a city is more of a metropolitan area: the city has maybe half a million inhabitants, but is connected to other cities in the area. It is only an administrative separation. I think in each city they should decide what should be more or less the limit for growing. They need to see the value of the things that they are having within the city or around the city. If you want to grow your city but you have a nice beautiful area, a rural area, that should be the limit. You should not grow on that.

FT7. I see also a change in the future of the rural areas. We have the technology to keep the people there, but we need to think how we create more income for different activities there. This is not for all the people, but I do not see that 70% of the people is going to live in the cities: this is too much. I don't think we can afford that. Even in countries as China and India they need to keep people in the rural areas. What

they are doing is not affordable, and the impact on climate affects all of us. Maybe in Europe we are more balanced, but we need to be careful with this.

FT4. This whole transformation of cities into a city that is a living organism, that is more resilient in general to climate change impacts and other impacts, this also may contribute to – perhaps maybe not in the city itself, but maybe in the neighbourhoods - to areas where you have agriculture. Agriculture that provides food to the city. So, I also see that the division that you have now between cities and agriculture, which is really harsh: this is the country side and this is the city. That will become more integrated. The city is a part of the landscape, as well as that agriculture is part of the landscape. And the two need each other. Nutrition is important, because food for the people is needed and comes from the land around the city. If you look at The Netherlands, the delta is in terms of economic output, the number 6 in the world of agricultural production. We can definitely feed ourselves. But there must be more of a notion on what kind of food we are producing. Is this the food that we need? And also: that we want to export. If you have a society which is more a green society, or in which people can also explore their own capabilities in terms of building their own house for example, then you will see, also, a change in demand of food. The type of food. You already see that happening, the demand for biological food is growing. I think that that direction will only increase. Which means that there is also another demand, on local products. So that is why I see the development of cities must also include agricultural areas. So it is not only on mass-producing food to feed people anymore, but that you connect the agriculture to the urban environment and create more awareness of people on what sort of food we are producing, what is the quality of the food, this kind of things. Until now, food is too much neglected.

FT1. We are organic forms and we got distracted. I think there are lots of solutions that are actually destructive and create issues for us collectively in the long term. I always say: **if you come up with a solution and it creates ten other problems than it** 

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is the wrong solution. I know it is mission impossible to meet up to all the requirements, but far too often I see professionals that think they have one problem, and try solving that one problem. They don't really realise that the problem may be a symptom of a series of other issues. You know the political cycle is the problem for this. The financial investment horizons will indicate that you need to get the solution to that problem. So, what I am engaged with as well is that I say with all due respect, you are telling us this, but we need to do some analysis in the most open ways, so that we can then have a conversation on is it this, or is it something over here that you actually control. So, whether it is morals or ethics, I'd like to think that there is people involved in the creation and the looking after the places where we live who take that seriously. And the decisions that we make, as far as possible, are beneficial. But far too often decisions serve narrow focusses. But those narrow focusses in time will, I think, create systemic **problems**. [...] We are incredibly simple organic forms. We have all this fancy stuff, but what really makes us happy or what makes us sad is very similar. You will always get a person who wants to live on a top of a mountain and not talk to anybody, but the vast majority of us like sharing, looking, being in places with other people. But the main difficulties are in the money: I am not appropriately dressed to be here or I am in the wrong place: why the wrong place? It is because we make those boundaries. Organic solutions are solutions that try to understand the full impact of what they do. Implicated in all of this is the notion that we have that everything is disposable, which I think is bizarre to say.

FT2. If we look back to the origin of this land, then the possibility that this land could again help trees to grow and to substrate water, that will need another 2000 year to get back to its origin. Knowing that this will take a long time, then this needs to become a concept of human life. There is also a change in the idea that you can just chose and take a land and built up homes of apartments. If we have in mind that **we have to respect the natural aspects of the land and the environment**, because it is also linked to our health. All that is already built must be given new value. Now we think it is possible to build everywhere, but if we keep in mind that land is important than we will limit urban area in restricted areas. We already think that it is possible for people to grow without limits, with exploitations of the land and the environment, but we have to think and tackle the problems, because **we cannot grow without limits**. It will become a big problem in the future, but already now we have to become conscious of the real problem.

FT2. We have to rethink our reproduction system. Also, there will have to be a big change in the concept of what a family is and the growth of families. **If we accept that we cannot make the urban area any bigger, then the value of what we have already built and realised changes**. It could also be possible that we have to have small flats. We have, in the area of families and born babies, already changed the mentality. If we think about 80 years ago, in Italy it was quite common that a family was composed by 12 people. Now big families are not normal any more.

FT4. In my own neighbourhood, for instance, IJburg, which is sort of a living lab. There are experiments with floating houses, there are experiments on energy, for instance now through urban heating. Which was the solution 15 years ago, because it was more efficient in energy use, but now they see we have to do it differently again. So, there are huge developments in 10-15 years' time already. So, maybe the cities can become energy factories, for the agricultural areas. Energy producers, instead of users.

FT21. Now coming to a more positive example: I think the future city will be some kind of a city that has redefined its relationship with its immediate hinterland. Due to the need of energy and resources the hinterland already sees this as a chance to re-cultivate its own regions. Energy will be produced from most surely entirely from renewable energy – by 2050 we will still be needing appliances like solar cells and wind turbines and geothermal facilities – and a big city will not be able to generate its own energy within the city borders. So the hinterland has a particular role to play: it will be delivering the city will its energy sources, water and so on.

*FT23.* Green infrastructure is very important: the territories need to be connected to the cities. The concept of cities is not anymore about boundaries, it is connected, and cities are much more interrelated. But what is the connection, what is green infrastructure. It is all about making the connection better and look at quality of life.

FT23. A social life, a good life is not easy to reach outside Europe. We work a lot in Africa, there it is difficult to have a social life. The point in the eastern metropolis, I do not see a good future in that. In the 90s we dreamt about mega-cities, a lot of architects wrote books about the mega-cities. I think it is a big fail. We left behind millions of people living in poverty. Forget the mega-city. So I think there are some changes in the vision about cities. And European cities are very good: The quality of space, the quality of cities, the culture, the economy, the social coherence, this is very good. Of course big cities give opportunities for jobs, for scaling, but European cities are big enough and have still a human scale.

FT21. There is no harm in emancipating ourselves from oil companies and from the energy generation companies and become our own energy generators, and so on. But it should **be in balance with our origin: with nature**. There are very different levels to start. If you discuss Lagos, or Beijing, there are certain constitutions that find this interesting. But the people that have been forced to leave their land behind and live in the city, but not having their rights as city dwellers – which is the case in China – for them this question of 'why' is not so important. This **question of happiness** is not so important, because for them it is pure survival. Of course there are certain trends in different areas, which can't be giving a general answer for the city.



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# Reinventing nature in the city

In 2050, designing cities for a high quality of life has reached a new level. We revalue our European heritage of designing cities on a human scale, with places that satisfy the wish for both enjoyment and beauty by benefiting fully from their local contexts. For example by providing a hilltop park with an attractive sunset view, or by creating a green riverside boulevard. The overall city planning is based on a holistic vision of a healthy and enjoyable living environments. Here, green spaces serve as 'lungs' and 'air conditioners', and water as 'arteries'. Natural solutions are used to offer people comfort - for example with trees providing shade in warm regions, and green areas with ponds to collect rainwater in wet regions. Urban spaces, squares and boulevards are combined with green and water to create pleasant places that are also resilient to extreme weather events. Green areas in each neighbourhood allow recreation in people's own surroundings, and connected green areas — such as gardens, urban forests and parks — make it easy for pedestrians and cyclists to move around the city. The transformation towards cities that embrace nature is driven by citizens themselves, who want to implement solutions they have enjoyed in other places.



FT1. To me human contact is critical to the shape of our cities in the future. Without that ... being able to see the future love of your life in the street, or going to a bar and just meeting somebody for biological exercise. That are all really important things to us. We still our scream and we think the answers aren't there, but the answers are in other people's eyes, I think, and part of that means that **the shape of the city will be actually totally very similar to the shape of a medieval settlement** or of a U-dome. It is not necessarily that we, northern European, will have all the answers, but if you look at any kind of even, just... maybe after Irony, the way we started to gather, for a variety of different reasons, and share, was all to do with how we develop. And being able to understand that our senses and our feelings are one. We are not massed by either clothing or technology. And that means that the **formal settlements, I think, will not be designed around the mechanics that are developed, but around our scale, the human scale.** 

FT1. What the settlements will look like? I don't think they will look like San Gimignano, or whatever, but I think they will have that kind of physical relationship. Climate resilience will mean that, because we are cleverer we will position those places for the right reasons. And one of the things that I find really fascinating is that when I go to ... most places that I go to, I can work out why we as a species call in nature. And I think those triggers will remain the same, like the fact that we don't want to live under water, unless someone invents something to be able to breath under water but still it will be a bit odd. We will to find places that satisfy pleasure, beauty, the things that we ... we used to build – well obviously not in the Netherlands – on a hill top, so that when somebody came to attack you, you could see them from a long distance. But there is really something nice in sitting on a hill top and looking at a sunset. So, some of the drivers that are related to human contact and being human will be relevant. It is not like 'because we can' and 'this piece of desert will never float' that we build a city there. It has to be more, more to it.

FT7. Water has to be seen as a key resource of the city, as something that has a very high value. Systems should use the water as much as possible. From rain, to sustainable drainage systems. Not only to deal with floods, but also, we can use the water. We need to gain back some of the technology and what our ancestors, like the Romans or the Arabs, were doing. They had systems to keep the rain water at home. Now we think that someone will bring us water, out of nothing. This is key, and it links to nature-based solutions. Because if we want to have nature in the city, we need to have water in the city. When we want a sustainable drainage system, this will change the way we plan the city: how we use the gardens, how we use the green areas of the city. It is not only for something beautiful, it is also a mission to keep the water and to clean the water in the city. It is a key resource of the ecosystem of the city.

FT8. I understand that complexity and uncertainty are now an inextricable part of our system. And this **complexity has led to a total lack of responsibility**. For individual citizens, politicians, there is always a way to be not responsible for an action or conclusion, because due to complexity it is easy to camouflage these things. And this exponential growth of complexity is going to lead to a kind of break out of the system. The system cannot achieve these levels of complexity. This will probably lead to a new structure, maybe a sort of anarchical, maybe some sort of **new medievalism**.

FT8. There is this theory about post-humanism and how people grow from humanistic condition into an new condition. [...] So we are already different, and we will be more different, and the big challenge is how we can make sure we will be better. In an ethical and human way. How we make sure that the city we design for the future will be a city where those new people want to live? One of the key points to me, and I am kind of technology deterministic in a way that I analyse reality and changes to understand technological loops, it is really important that we generate technological scenarios that can aggregate especially in moments where 2 tendencies, the **utopian and the dystopian** are so ... and people are so optimistic about a bright future and peaceful, where all

people with different races and religions live together. And there is this other tendency that we will end up in a sort of 'Mad Max' scenario. And both of them are possible, for me at least, and this is the challenge of our generation: we have to make so many decisions about [...] how we want people to regain power, to empower themselves, in order to lose these constraints, marked by the frameworks of today that protect the elite and people will have their own decisions and we have to make a strategy, **a city strategy to regain power and go steps further**. This democratic framework of the 19th century, that followed the communal framework of the 18th century, makes no sense anymore and we have to adapt to a technological framework for the 21th century but this makes the transition so incredibly difficult to make conclusions and to distract any patterns towards the future. We have to understand, there is a part of the world that is dying, a new one is arising, but we still cannot imagine how this new world will be.

FT1. I think that the cities we create, or we used to create, we lost our way. Somewhere, probably in the 1920s – 1940s or so, we totally lost our way in the drivers of our cities. They are not **the right drivers that deliver happiness, equality, the things that ultimately, we all know make a better society**. I am doing stuff in America and the growth of gated communities is exponential. That is crazy. [...] Whether it was in Italy, or Holland, people built walls around us because people that were different from you were dangerous and scary. And the level of civilisation we had meant that if I want something you had then I came and took it. We came to an ambient level of security where we don't need those walls. So, we got rid of the walls. And one of the things I am trying to say to them is: you're building walls, in a dysfunctional way, because you don't need to. And the people that market these things, work on fear, which is an incredible driver. And there is this kind of notion ... I had to be careful, because if you think that there is something scary and you don't, that doesn't mean your fear is not real. But the answer is: let's look at this, let's see what is the trigger of that. And gated communities are the inverse of a good city, I think. FT4. People are living longer. That reminds me on a very old project, I think already 15 years ago, where I was actually quite surprised, positively surprised, by a project in the Ruhr area in Germany, where a lot of industry has been abandoned, because the old mining industry was decreasing. But already at that time, 15 years ago, they were very much ahead in green cities. They were already investigating how to re-green the areas, also with green roofs and that sort of things. But they were also thinking about people living longer. So, how to make sure that elderly people, who are not very mobile, who don't drive a car maybe, how to make sure they can recreate in our cities? And for that we need green areas. And the population in cities will increase, and especially in western Europe the elderly people, living in cities will increase. So, they need green space to get around and to recreate.

FT7. Also, it is very important to connect the city to green areas, with all the territory. In the future of the cities you can walk through gardens, urban forests and other natural environment without going by car. Outside the city there is green area, and green networks connect with other areas. It is not like green islands in the city, but all connected. E.g. Valencia they decided many years ago not to put a highway in the old river bed of the Turia river. You can imagine that city would be able to grow more when they put a highway. But it was decided to make a big garden in the middle of the city. The city has not grown a lot, but that is OK, that is the limit. At that time, they put the limit of the city just there. I am living 25km from Valencia, but I can go walking or by bicycle through a natural park to my office. This old river bed connects the village all the way to the sea and it is beautiful. The river bed is also linked with other activities, like cultural activities because of the museums and sports activities. In Valencia we have good weather all the year, so people are outside all the year. This is the kind of cities that I see for the future. Each one should develop with what they have. I do not believe you can exactly copy the model, but you have to apply the concept on an individual level to make it suitable for the city. With its history, with its climate and also with other things. Using the opportunity they have.

FT7. Climate is going to change, and we already have in some cases radical phenomena, lot of rain, or snow where there was never snow, or a very hot summer in places where it was never so hot. This is very difficult for people. Most of the people, especially older people, suffer a lot from these changes. You can imagine in central Europe where they have houses that are not adapted for this very hot summers. It is very difficult for them. The construction of houses is different. In the south for example they build with cold materials to avoid the heat, e.g. ceramic or concrete. In the north they build with wood and use carpets. But in the summer that does not help when it is hot. For older people the easiest way to cope with heat is to buy an air-conditioning system for the house, but this is not the right way. I live in the south in an old house, more than 100 years old. I have no air-condition in my house but is not needed: it has the traditional way of maintaining the temperature. This means that you open the windows early in the morning to leave the fresh air in. Then you close the house and it keeps the temperature. This is very sustainable, and this was normal to design in the past. We want comfort, but this comfort requires a lot: we need to plan it for a long time. We need to adapt our houses, how we orientate them for the sun, for the wind, where we put houses or not, how big we make the buildings, how we plan the greenery around it. This is funny, in the past we came from rural areas and our grandparents were part of a very critical system. They had to reuse everything, and they were quite sustainable. They were close to nature, and they eat what they have in different seasons. They did not eat fruits that were grown in South Africa.

FT8. For me it is intimately related to this new complexity. Social initiatives and social movements in general, from feminism movement and ecological movements, etc. have to tend to limit the power of institutions and bring a more equal, more fair society. Which matches more participation, co-creation and a new form of democracy in our

total living. More science labs, more fun-labs, more places to put ideas into reality and co-create together and to better respond to the necessities of the community. We need to do this with the people much more involved in that. Also erasing the gap between the expert and the others, much more communal. I do not really believe in a strong role for government in this, I truly believe that government will only be the administration of the common world. I truly believe in a process of where naturalisation of natural resources, like water. They can play a role in legal matters and when people get married, but they cannot interfere with how people want to live their lives. People should be free make their own choices.

FT4. It depends indeed how you look at the world, at Europe or at the Netherlands. In the Netherlands for a long time the classical opposition between the city and the rural area doesn't exist. It is far more an urbanised region, and urbanised landscape. With the growing awareness of this capital which we inherited, and which is there, for instance I think one of the big, big advantages internationally, globally seen, one of the big values of the Netherlands, is this small scale, fine grained urban landscape with its historical layers, with its functional diversity, it its richness: a qualitative good place. The relaxed quality of life that lots of foreign people see in the Netherlands has a lot to do with the special quality of the place, which is that it is much more urbanised landscape, fusing all kinds of qualities, not replacing one for another. That is also why we, in the Netherlands, do not use the term metropolis for the cities, but we go for the notion of the metropolitan region. In its aggregation of functions, in its aggregation of social networks, of economies, it is able to compete with a metropolis, but it has a fundamentally different quality in terms of place and life. In the sense that there is much more balance between the green and the red, between the old and new, between the big scale and the small scale, etcetera.

FT23. The interesting phenomena of cities is the reaction of nature in cities. You are probably not Catholics, but – if you read Pope Francis papal encyclical, it starts with "the global eco reconciliation". It is fantastic. Because the ecology has a big consequence in social impact in agriculture and politics. And it is said by the Pope, who would have thought about this? There is not one politician thinking about these things. All the United Nations conferences, like Rio on sustainability had zero impact. Zero Impact. Agreement, zero impact. I think it is very interesting, this global eco reconciliation between the idea of urbanism – building buildings everywhere – and nature. Now is the time of reconciliation, because people want to live in cities together with nature, and not just buildings. So maybe smaller cities have now a great opportunity, because agriculture is inside the cities. If you take Bologna, if you go out here, within 10 minutes there are fields of wheat and everything, you can see in Forli fields of fruits. And people are now looking for more living in the city but with relation to nature. And you cannot do that in New York. They plant some trees. So there lies an opportunity to optimise the relation between buildings and nature, and that may help with our energy problems and social problems. Maybe it is as simple as that. We should not make it more complicated. It can be this simple. Mostly simple things are still difficult to do.

FT8. I believe that by 2050 we are redesigning urban spaces for more peaceful living. I do think that regardless about how we think about national boundaries or local boundaries, regardless about how technology is improving our day to day life and the access to energy and food and etcetera, I think that at the end of the day humans are animals. That there is something that we deeply need, that is met by green space, that is met by quiet sound and birds dripping, there is this very intangible effect that that kind of peacefulness has on peoples well-being, physical and mental. This is not even so much in the future, this is already in the thinking of our urban spaces today, it is really understanding this need that people have for green and for active clean places without pollution that they can actually just be at peace and I can imagine that the more

cities grow, the more people are inhabiting them, that will only increase their ability to just smell the flowers for a little while. And I think that some people might propose technological solutions to that, and maybe that is totally possible, I do not know enough about virtual environments, but – being someone who comes from the country side – the importance of actually the real thing will grow. I mean if we just look at Paris. Paris is a very old city, with very old architecture and infrastructure. And so it does have some very nice parks. But they are either on the edges of the city or in the more affluent parts. And in the poorer parts of the town, it is not only not green, but also dirtier. And all of the proposals that the new mayor are putting forward – and this is an extension from the last 10 years of policies – are about creating pedestrian spaces, lowering vehicle traffic, trying to create new green spaces, to take the pollution out of the air. So right now, in Paris at least, even though it is the most beautiful city in the world, there is really a real policy push to make concrete changes at increase the amount of green space that people have at their disposal. Which honestly, from my perspective, is hugely impressive because it is such a dense city and everybody has an interest and there is so much opposition. For instance when they closed the left river bank there was such an outcry. But they anyway did it and now it is such a success that they are also thinking of doing it also for the other bank. For me, because the left bank worked, even with the major opposition, I really believe that now after the coming election, it will be impossible to open that bank again for traffic. It has had a major impact and people are so happy about it. People come there from all over the city. So for me, I could say that is a small scale, but for a city such as Paris, that actually represents a major change in the landscape. And I do think that once people become used to it, it is impossible to take that away again. It is amazing how that is used and adopted by the people. It is a real success.

*FT1.15.* One aspect that could drive the process is a stronger protection of nature. One does not realise that immediately, but e.g. the Canary Islands were lucky that an oil company did not find oil, and only after that decided that they should protect the area. This should be the other way round. E.g. Austria is now against fracking, because it is a risk for the landscape and for the future. If landscape protection in any form becomes more important, it will reduce the potential for the traditional, non-renewable resources and increase the price of it. What we could experience last year when the US started with fracking the oil prices went down and even coal production has become important again. This has hampered the further growth of renewable energy. E.g. Austria embarked on wind energy really heavily. Now the growth is slowing down. Some people claim that it has reduced the diversity of birds. There have been environmental assessments, and hopefully it is not bad for the birds.



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# Synergy in nature and augmented technology

In 2050, nature and technology go hand in hand. Technology is used to collect data and monitor nature. This leads to a deep understanding of the factors influencing the health of nature and nature-based solutions. This knowledge allows nature to flourish in and around the city - for example with organic food production augmented by hightech to optimise resources and make cities self-sufficient. In this way science provides new solutions, together with evidence of the impact of the solutions implemented in the city. Data enables fact-based decision-making and building the overall economic case, including any expected downside risks. In this way technology supports better designs, and helps to gain acceptance of the solutions by citizens. Ethics and morality are safeguarded by ensuring people are always in control, and are free to take their own decisions.



FT5. Even in my lifetime, how short it may be: when I was 16 and you looked inside an automobile engine, you could see everything, you could understand how it worked. Same for an airplane: you could look at it and you kind of understood it. Now if you open up the hood of a car, there is a plastic shield on it so you're not even supposed to look at it. There is a wired plug-in, so the computer tells you. This is profound challenge for society as a whole. People have always lived intimately with the technology of the time. In the medieval days you slept in your clothes, or you had your ploughs right next to you, your animals underneath you. That was the technology of the time. Now I sleep with my phone next to the bed. We do not live more intimately with technology, but our perception of the volume and the pervasiveness of technology is much more profound in how it is all around us now: it is our perception of it. I think that is even scarier, because in 2050 we're going to take a pill that is going to tell us what is going in our body. [...] All the impacts: the question is more about the unintended consequences. There again, every technology has unintended consequences. From a nature-based solution stand point this is maybe where resilience comes in. The more we understand about nature, how natural solutions work, when we know how trees talk to each other over time, we never knew that, we didn't know that before. So, as we understand more and more about nature-based solutions you can bring that into the way we design and execute. That is about data and understanding, so to me a lot of the technology is on data gathering and understanding how it flows, the ebbs and the flows, not only in our bodies, but also in the social interactions and the buildings, the infrastructure, the energy etc. When we understand more, we'll see patterns that are revealed in the same way that we understand nature. Patterns get revealed which were in front of us, but we never saw. Then we can emulate them to our benefit more and more.

FT5. Algae are not going to replace everything, but I do believe that farming practices are going to go through another revolution. **There will be more data-based practice**. Farmers are amazing, they understand their land, but their practices are not

always good for they land, because the repeat what has been done over years and years, because it is easy and they do not want to change. I would like to hope and believe - I believe in farming, I believe in Europe being able to feed itself - support and helping farmers in their transition to more modern, carbon capturing, nitrogen, phosphorous reduction and reduction in artificial fertilizers that are based on carbon, on oil. We need more intensive food production, but more organically, more naturally, so that we can feed ourselves. I think this is an area, when looking forward, that cities can play a big role in. In that, I would argue that most cities don't know where their carbohydrates or proteins even come from. So I think we first need to understand where things come from, so that we can support. We have to map the flow of protein, carbohydrates, rice, wheat, and how that is changing. I think we need to understand that better, and we should be encouraging more organic food production. Organic food production, supported by technology. We cannot go back to using mules and horses, but we need to feed a lot a people. So we need to push for organic and technology, bringing those two together into intensive organic food production. That is the key. It is to right for the north and right for the south. There is no single solution. We need to be careful with water. Carbon capturing, not carbon spending. When we have some alternative production, such as fake meat or algae, the answer is yes we need to use it. But not to replace: the answer is 'and' looking at what is appropriate, and augment rather than replace.

FT7. **Technology is a key element for nature-based solutions**. Not only for water: but for all key resources. For example, we can use technology to optimise the amount of water that we bring to gardens. There has been a very interesting research of the Polytechnic University of Madrid, where they have identified that when you have agriculture with scarcity of water (which is normal in Spain), and you give only the water that is needed – and no more than that – even when there is not a lot of humidity. If you bring water by flooding this is only once every month, then there is a big period of time when there is a draught. The CO2 emissions that brings this kind of agriculture is

lower, than with a lot of humidity. This changes the model. Technology can help in this. In some cases where they have a lot of water they are not taking care about how much water is used, and maybe they use too much. And technology can enable the control of resources. I see a combination of technologies with nature. We can use nature in our buildings and cities, but with technology we can discover new opportunities, that may even be changing through the day. Depending on the level of ventilation you have, or the level of humidity you can change things through e.g. automatic regulation. Linking technology with nature-based solutions will be a key element.

FT3. If we don't come back to facts than we are going to drive ourselves onto a dark pad. I think access to data. If you look at the number of connected devices and the data that is being produced on a daily basis. All of that is value, data is the new oil. I don't think we are ... well just like oil actually. When oil was first started to be used, it was used in very few things. And then it grew over time to be massive. **Right now we use data in a more limited way and as we make the processing of data, the collection of data easier and more economical, it will in fact drive more decision making and those decisions will have a profound effect on the daily lives of individuals**. Cities in particular, primarily because that is going to be the largest repositories of data, largest creators of data and therefore the largest populations who will be effected by the decisions that those data drives.

FT4. How to facilitate this all? This needs another type of government, I think. A governance where citizens have more to say and where the government is a facilitator. I think that is really, really important. Again if you look at my neighbourhood, IJburg, there you have old school housing projects, with housing blocks and the same kind of houses everywhere. And you have another island where people could buy a piece of land and they could do whatever they want. This generated quite nice architecture and also many people who really want to do something about sustainability. The government also took risk in this pilot. And now in the third pilot it will be all about free building. I think

that will be the way to go. To facilitate more that kind of experiments. **Experiments** we need, because we need more evidence and more experience and more ideas of becoming more sustainable. Living labs are a good way to do this. Because people will act, if either they get a financial incentive, or when your neighbour is doing something and you see that it is a success. If you have really credible examples, like for instance a guy that has created a really green house, and you know what it costed 20.000 more in investments than a normal house and he saves on energy bill each year 600 euros, that works. People see it, they see the numbers and then they will do it themselves as well. You need examples.

FT3. Those who actually able to glean knowledge from a huge mishmash of data are going to be invaluable, I think. To the extent that this has an impact to cities, it is **putting individuals, but also organisations and communities, in a position of power**. Depending on the data that they have access to and control and their ability to make use and extract value from that. Whether we are talking about the trash route optimisation or simple things like commute times and how we can better organise and plan those, or ... I don't know there are so many things I don't know which ones to choose ... just even how we get food for instance, **it is a whole different ball game when you add data to the decision-making process**. Data in terms of inventory control for your local grocery, that can order the food you are looking for because it is Wednesday and they know that Wednesday is pasta night, you now that type of thing. But also, data about the food we consume, and choices we make as consumers, like how it is produced and where.

FT5. For me there are three aspects that are fundamental. The first aspect is that citizens have to believe that something is happening. Because if citizens don't believe that something is happening they are not going to want to change, because change is very terrifying and very scary for most people and for some people it is very exciting. That typically depends upon your social position and age. For those that have money, change can be exciting. For those that don't, they are scared for the future. So, especially in the European context, we have to look at what the citizens believe is happening to them. That is part of the story that we're telling them. We have to base it on science, because fortunately even still today – even though it is becoming less so – most European citizens still believe in science and listen to science-based conversations and targets. So, I think that based on science we can talk about climate change and then the impact that these changes will potentially have on the city. That leaves the groundwork. And then we can talk about 'so what'. We have to lay out the implications. So, what does this mean? Especially looking at nature-based solutions, nature is survival of the fittest and what does that mean? Or is it an ecosystem, and what does that mean? So, we have to define clearly and articulate what we are meaning with nature-based systems. Because when you say it, it creates an image in my mind, and my mind may not be the same than you have. Therefore we have to use examples of what naturebased solutions have been, could be and will be. Then I think the next critical factor is citizens acceptance of solutions. And that depends on culture. Europe is a wonderful collection of many, many cultures and subcultures. So, some solutions will be clear and easy in some area, and others not. Up in the North or the South are two different worlds. Therefore, again, we got to be very careful on how we articulate what the solutions are, so they are not immediately out of hand rejected, because it is only good for the southerners or only for the northerners relevant. Because as soon as the citizen feels any modicum of irrelevance they dismiss everything. That comes across everywhere in the world.

FT5. **New ethical and legal dilemmas are going to be really huge**. Especially with autonomous vehicles, drones. What is privacy when I can have a camera reading someone's lips through a window – you can already do this now. It is going to really ethically difficult. What happens when a DNA slice goes wrong: you're actually introducing cancer into somebody's body rather than cure it. It will happen, so it is going

to be really challenging. A software glitch can have major impact. Nature doesn't tell us anything about that.

FT5. Robots and intelligent systems are not going to replace nurses etc, but they will be pervasive in society. It is already happening and will continue to happen. Artificial intelligence and machine learning is about pattern recognition. It is about understanding. **The more data we have, we can turn that into knowledge, that we can turn into understanding**. Once we have the understanding, the machine can learn what that is, and begin to tell us what's going on. I think we will see more robots in society. On construction sites, in hospitals, places where we have repetitive tasks, dangerous or difficult tasks. We'll see more robots and more robot assists. It is very interesting in construction where we are already beginning to see digital fabrication coming in. **sometimes it is augmenting what people can do, sometimes it is replacing**. Quality can go up. It is an interesting challenge, opening up new opportunities. I go back and forth between being exited and being terrified.

FT5. Anything that can be automated will be. Anything that is inconvenient will change. We just don't know what yet. E.g. monitoring: already now we are able to monitor moisture, predictive park plans. You can monitor growth, you can use satellite images to assess canopy health. **Technology is already helping us understanding health of nature better. We can get more precise and adapt.** Some plants may not be doing so well, we may need to switch something. We can adapt.

FT7. The issue of information and the ethical issues of technology and of information we have to take care about. The control of the citizens by the public bodies is something that we need to be aware about. If not, we are losing part of our independence, and part of our freedom. In some cases it is good, because we improve security or safety, but in other cases we see that it becomes a very easy way to control everything we are doing in our lives. The technology should have a very strong legal framework that defines what could be done and what couldn't be done. If not, I foresee a reaction of society. Society will say: 'I do not want more control'. So, it should be a combination of the implementation of new technology and new systems with leaving freedom with people, so that they can take their own decisions on what they want.

FT4. We just published **research that proofs that re-greening the city lowers the heat islands**. It is less hot. And we all know that the heat in the city is bad for the elderly people, and then more people will die. We know that. So yes, we can proof it. And then you also know that it should pay off: if you plant more trees people will not die and you will have a return on investment. We, as scientist, should provide the evidence, that investing in a tree or in a green garden or a green roof, that it pays off. So you have the experiments to show people examples and create awareness, and we as scientists should put a number on it. That is our role. And now already we know that every Euro you invest in green roof, pays off with three Euros backwards. So, a cost-benefit-rate of 1 to 3, which is quite high. And you can do that for other things as well. For solar panels. About 5 years ago you had a return on investment of 10 or 12 years' time. Now it is only 8 years. And then people can make a decision, that is exactly what we need now.

*FT21.* The ecopolis idea comes from the analysis that the origin of the city – the polis – has been very much dependent on the immediate environment, the agricultural goods that have been produced for this little polis. This is why we called it the agropolis, which was the ancient idea of a city. Now when you look at cities, most of them are 100% dependent on the combustion of fossil fuels: in the cars, in the energy, the materials that we use for our buildings – every thing is designed around the combustion of fossil fuels. They create the space for cars, rather than for pedestrians or people – loosing human scale. So we call that the metropolis. In the ecopolis we aim not to go back to the agropolis completely, but **make use of the findings and the technology that we developed in the last 150 years**. There are different sectors: we have the energy sector,

European Commissi

European This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 *Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions*  the transport sector, the water sector, the food sector, the incorporate energy materials. We try to see this as the basis in which we have to design the different concepts that help to use the resources efficiently, to do this in a rather environmental friendly way. In these different technological sectors it has to be implemented. But in order to achieve the different changes in the sectors, you have process targets, or process fields of action, which is the governance sector and the communications sector: to tell the story, to explain to people why you have to be involved in the change. And you have the local economy: if you can't make the economic case, you probably should try again. Without an economic case you will not have any success with the measure. On top of that you should reach this idea of the regenerative city, which of course than is a long way to reach. It has to be determined; it has to be measured to get concrete steps to reach this ecopolis. From a certain time on you have to design from this concept.



# Tailored use of limited resources

In 2050, small-scale local manufacturing and services provide a secure supply of products and services tailored to individual needs. Short supply chains can easily be upscaled and downscaled as needed, contributing to resilience.

People actively participate in decision-making on the use of scarce resources and measures to make the city climate-resilient. This results in an awareness of the value of (natural) resources such as water, wind and sun, with people using these wisely. All flows to, from and within the city are monitored to understand the need for these resources and their availability. Circular systems are implemented to ensure zero waste of materials, energy and water. Companies provide expertise and create incentives for people to invest in nature based solutions for climate and water resilience.



FT5. Many trends can have an impact on resilience. The top one: there is more room for small local services. Re-localisation is the biggest challenge for Europe: how do we re-localise supply chains? Jared Diamond talks in his books about the lessons we take out of collapse: **societies fail when supply chains become too long**. Right now, our supply chain, in many situations, are too long. The wonderful thing about Europe is that **we have the capability to reduce our supply chain dependency tremendously**. It is not isolationism, but it is trying to say what we can do in Europe to have more small scale local services that are tailored to the individual needs. That means that we understand those needs. Individuals have needs and wants. The needs have to be satisfied otherwise you have very unhappy citizens. Their wants or desires are the things that if you tickle them they make you happy. So, **we're looking at small scale local services, tailored to wants**. There is a general trend for mass-customisation and personalisation, which is going to be really important.

FT5. With resilience you need redundancy. Optimisation is the process of eliminating redundancy, where we need redundancy in order to be resilient. Nature is extremely redundant, extremely resilient because there is so much redundancy in ecosystems. And this is the other part where local, small scale manufacturing has benefits: you can scale up if something happens, and scale back.

FT5. We need carbon for food stuff etc., so it is stupid to burn it. We shouldn't be burning it. What is interesting is if water becomes the next 'oil'? This was talked about 20 years ago, and we will talk about it again very soon. Cape Town today is 87 days away of running out of water. When we look at the draught in California, the draughts in Spain, it becomes clear that we have to deal with water as a hugely important issue towards 2050. Garbage, waste and circular economy force to look at the circularity and resource efficiency within the country, across borders as well as within each city. This is where mapping the resource demands of the city, to get a data driven, data rich understanding of the resource demands of every city neighbourhood becomes vital for us to be able to map Europe as whole and understand how it functions. Cities are artificial boundaries, but it is a convenient focal point for dialogue. But citizens, food, resources move in between, so it is a political boundary, not a natural boundary. The lesson from nature is to focus on the ecosystem. The key is with data we can understand the city and the ecosystem they represent and what the levers are. And then you can see what happens when the system gets disrupted or changed. Then you can actually begin to model it.

FT3. We are seeing the rapid urbanisation around the world, but we are at a stage right now where urbanisation is helping us identify and see more clearly the challenges, and I think that the real impact of this is that the challenges, well as they say, **necessity is the mother of all invention**. So, I think these challenges will become the necessity that ultimately invent new solutions that drastically change the quality of life. That is the case, not so much because we choose, but because we must. [...] In terms of climate and water. By 2050 I don't think water will yet be the challenge that it can be beyond 2050 in terms of access to usable water. And in climate it is kind of the same thing. I don't think by 2050 we are going to feel the full effect of climate change. So, I think those are going to be a little but ore further off. By that time, they will be more into the fore-front of people's minds than it is today, but it won't be so directly felt. I think it is the direct feeling, like taking a two-hour commute every day which once was 15 minutes, that is going to be the driver of change.

FT3. People are looking for more meaningful contributions to society and spend some time and energy and what not, not just thinking about it, but creating and whatever... that is when we really see tremendous impact in terms of solutions to problems that are felt by the average person. Again, I cannot even start imagining what solutions that could be, the sky is the limit. And I think it will be driven by people who ... we talk a lot about millennials already, who have a sense about them. It will be interesting to see how that transforms itself into action over time, once they are in

positions of power and they can effect change. I'll tie it back to the earlier example of participatory budgeting. 'Leading cities' introduced this concept to Boston, based on what Lisbon had done. Lisbon developed a traditional participatory budgeting process. Boston took the idea and created something quite different that they call it the youth budget. So, money is set aside from the budget of the city that is empowering young people to run the process. They run, they design the process, they chose what projects will be implemented. That is an example where on the one city the city recognised the opportunity to engage young people and number 2 it is training young people to think differently. And it is interesting to see what projects they have selected, for instance they selected iPads for students, but they couldn't afford to give every student an ipad, so they had to choose which schools got it. And so, they voted against their own self-interests to advent somebody else. This seed is now planted; these kids will never forget that. It will forever change their vision and understanding of their role in government. That they can be an active participant, and not just government, but in society. And that the decisions they make impact others. So that is a start and I have no idea where that might g0.

FT4. Companies can also play a big role in this. Companies have research and development departments, but they are also about profit. I can understand that. But companies like insurance companies, they are very much interested in lowering risk, also from climate change. They can also play a big role in awareness. If you look at an insurance for theft, for example, then you see all the campaigns. Put another lock on your door, keep on the light when you go on a holiday. That works. People now know what to do when they go on holidays. But you can do the same for climate extremes, right, so what can you yourself do about climate extremes? Green roofs, or less pavement in your garden. And insurance companies can play a big role in that, because of their expertise in **creating incentives and awareness**. Through campaigns, but also through, if you have a premium and if you have a second lock you get a discount on your premium. You can do

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the same in the creation of green spaces in your garden. These kinds of things.

FT1. People who can afford it; will buy organic. Europe is bio. What does that really mean? Everything is biological, unless it is mixed with petrol chemicals. But it is about understanding the importance of the things that we chose to be. I think now it is about the importance of the negative things. It is the weight stuff that is just killing us, but would have that waste stuff still be in the future? That Woody Allen movie 'The Sleeper' where you smoke your chocolate and he is having a plea on the concerns of middle class America in the 70s. We will discover that actually something tasting good does something good to your brain. If we do what we are designed to do, and that is walk everywhere, and the shape of the city will facilitate that, then you may be able to eat a bit more of that. Then again, excess in any way, can be harmful. So, but understanding the nutrition content, discovering things that are natural, that are good for us, will help wellbeing. I would like to think that part of the impact will be that like in Martin Major's 'knowing things in hydroponics', that the new city will use all the resources that we have. I like the fact that you walk past a building and there is fantastic fruit which is good because it is full of something that helps prevent cancer, you'll be able actually to take it and eat it and there is no charge.

FT4. Abundance of energy and clean water exists, so that means that all the things that we need are available in nature. It sounds a little bit vague, but I think it is true. So, we have energy, we have the sun, we have wind, we have the materials in our own area. Some things we may have to import, but most of the things we need to sustain ourselves is already here. Especially here in the Netherlands, we have wind, we have sun, we have a lot of agricultural areas, so in fact, everything we need for living is already here. The question is more, how do we organise it in a way so that we can live happily and sustainable, right? Sustainable is the key here: we shouldn't use more than we have. In order to do that we need a two-way approach. We need the recognition by people that this is necessary. This needs an increase in awareness. But the message has, until now, always been a negative message, like the earth is disappearing and this is partly true, but it doesn't really trigger people. A lot of people think 'oh my god, the earth, and what can I do about it?' And that brings me back to local room for local services. If you want to... the most important thing is to give people the feeling that they can do something themselves. If individual people have the feeling 'yes, I can do something myself', then you can mobilise a lot of people and then things will change. And there the government and also big companies can play a role.

FT6. Today, a real worldwide polluting is around energy. Yes, recycling, we need to do all that, but the very ideas of how we get along, of how we turn lights on, of how we are able to live our everyday lives, is now depending on fossil fuels. For me, going back to natural resources means like, maybe not like worshipping the water and seeing the water as a god, but seeing it as important. This really is why the indigenous people of every land used to see water as a god. As we move our dependency on this one type of energy, the way I see government really playing a role, is again getting out of the way and then getting in the way when it is important. This is like thinking about relationships: whether they are macro, societal relationships, it is about the timing of knowing when to say and do what. [...] So, rather than oppressing indigenous people, we should be learning from them and growing up in Hawaii, the first 6 years in public schools (you know general schools for the poor people), is about being a Hawaiian. So, learning how Hawaii people lived, you learn their stories and their culture. That allows people from Hawaii to understand their background and secondly how to respect the water and the rain. So, that is a role for government: education, but also incentivising to sustainable investment and entrepreneurship, or work force development. Like: 'we are going to help you people to create your own place, keeping the river clean and generating energy, and your own future.

the line, the line will go further, but we also have to imagine that it can be influenced by climate change. The difficulty is to think of how this line can be influenced and if it can be influenced in some way. Because the climate change is a problem, but also gives opportunities to change. Also, we have to rethink this line and the elements that compose it, because the impact of climate change can be enormous. The climate change could influence the mentality in a very big way, also according the notion and the concept we have of the environment right now. Now we have a notion of exploitation of the environment, in 20 years it could be possible that our vision of the environment could totally modify, due to the climate change problems and the influence on our mentality of the environment. In the next 20 years the heat wave is foreseen as a very big problem and that will have a big impact on our thinking. In the daily lives of people, the outdoor works could be a problem due to heat waves. This kind of problems could influence the cities and the idea and the realisation that it is not good to consider the environment as a field to exploit and use for our daily lives, but as a field that can mitigate the climate problems, such as heat waves. No more land to use for building, but land that help citizens in a better environment. So, a total shift in the mentality of the importance and use of land.

FT4. That is one important aspect and another is urban farming, urban guerrilla, area also examples of increasing awareness of the possibility to do more local and not depending on the global networks and markets. Although I think it has a tendency of becoming too romantic. I don't think it is going to replace completely. You can do much more local, but at the same time you also have the global system. But talking about space: temporarily, flexibility, trying to achieve a certain amount of autarkic *life systems.* It is a mixture. Everything you need for your daily life. From sustainability and energy perspective, that also means that where we now, for instance for garbage or waste water have now very complex and huge, often national and even international. *Garbage is transported all over Europe. Probably you will see that it becomes more* local, even on a neighbourhood level. Trying to do more local; harvesting energy, but also dealing with re-purifying water and things like that. So I see the flipping over from central systems to decentralised system, from institutionalised governance to cocreation and bottom up.

FT22. Our buildings will in the future for sure be more intelligent and more green. For instance I live in an ancient house of 200 year old, which was a very bad house for the past generation. Now it is very good, with a good level of saving resources, like water and energy. One of the problems is that we need more and more space, and we live in comfortable houses, with many  $m^2$ . And we consume. The problem is that a sustainable city is a very compact city, but our culture is that we expect more comfort, so the growth is going in the other direction. This is everywhere the same in Europe. Because of our incomes, we improve our quality of life, by living in the countryside in the green. The big challenge in Europe is how to stop this consumer waste. We cannot enlarge cities anymore. This is a challenge, both in economic measures, since the building sector is one of the most important economic sectors in all of our countries. We have to reshape and rebuild the buildings sector from the structure to the renewal of systems.

FT2. If I imagine the future, I have a line in mind. I can put all these elements on



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## Cities as living organisms

In 2050, cities adjust and transform to adapt themselves to changing conditions - like organisms living in harmony with their surroundings. Like all living organisms, future cities have the ability to recover from the effects and impacts of changes, such as climatic and weather conditions. The people benefit from the resilience of their cities, and they enjoy an environment in which urbanisation and nature go hand in hand. They also contribute to the resilience of the city. They care for nature, and respect its value. The public spaces provide a good atmosphere and help to build social cohesion and inclusion. The city is constantly adjusting, to optimally respond to environmental and social changes.



## Synergy in nature and augmented technology

In 2050, nature and technology go hand in hand. Technology is used to collect data and monitor nature. This leads to a deep understanding of the factors influencing the health of nature and nature-based solutions. This knowledge allows nature to flourish in and around the city - for example with organic food production augmented by high tech to optimise resources and make cities self-sufficient. In this way science provide new solutions, together with evidence of the impact of the solutions implemented in the city. Data enables fact-based decision-making and building the overall economic case, including any expected downside risks. In this way technology supports better designs, and helps to gain acceptance of the solutions by citizens. Ethics and morality are safeguarded by ensuring people are always in control, and are free to take their nown decisions.



## Leveraging natural value at micro and macro level

In 2050, there is a balance between cities and their surrounding natural and rural areas. Cities, especially in Europe, take careful decisions on their maximum size, in relation to affordable limits of natural resources and a high quality of life. At the same time, (technological) solutions enhance life and work in the city's surroundings, making the city an integral part of its landscape, in harmony with agriculture and nature. A holistic view of nature in and around the city ensures that all value and benefits are captured. There is a good understanding of how smaller and larger green and blue areas contribute to the micro and macro climate, and how the two influence and need each other. There is a deep respect for ecosystem services provided outside the city, such as maintaining nature and biodiversity outside the city. This results in more and better jobs for people in rural areas.



## Reinventing nature in the city

In 2050, designing cities for a high quality of life has reached a new level. We revalue our European heritage of designing cities on a human scale, with places that satisfy the wish for both enjoyment and beauty by benefiting fully from their local contexts. For example by providing a hilltop park with an attractive sunset view, or by creating a green riverside boulevard. The overall city planning is based on a holistic vision of a healthy and enjoyable living environments. Here, green spaces serve as 'lungs' and 'air conditioners', and water as 'arteries'. Natural solutions are used to offer people comfort - for example with trees providing shade in warm regions, and green areas with ponds to collect rainwater in wet regions. Urban spaces, squares and boulevards are combined with green and water to create pleasant places that are also resilient to extreme weather events. Green areas in each neighbourhood allow recreation in people's own surroundings, and connected green areas — such as gardens, urban forests and parks — make it easy for pedestrians and cyclists to move around the city. The transformation towards cities that embrace nature is driven by citizens themselves, who want to implement solutions they have enjoyed in other places.



### Tailored use of limited resources

n 2050, small-scale local manufacturing and services provide a secure supply of products and services tailored to individual needs. Short supply chains can easily be upscaled and downscaled as needed, contributing to resilience.

eople actively participate in decision-making on the use of scarce resources and leasures to make the city climate-resilient. This results in an awareness of the value f (natural) resources such as water, wind and sun, with people using these wisely. Il flows to, from and within the city are monitored to understand the need for nese resources and their availability. Circular systems are implemented to ensure ero waste of materials, energy and water. Companies provide expertise and create iccentives for people to invest in nature based solutions for climate and water essilience.





### 6.4. Prioritising the Drivers for Change

During the joint ambition workshop in Eindhoven (May 2018) the follower cities prioritised the Drivers for Change according to the relevance for their strategic ambitions. The table below shows the results (1 = highest priority, - = not relevant).

Priorities in Drivers for Change for the follower cities





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#### Tailored use of limited resources











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## 7. Desired Future Scenarios

### 7.1. Vision workshops

The purpose of the vision workshops is to develop desired future scenarios for the follower cities. The 5 Drivers for Change for climate and water resilient cities were prioritised by the follower cities on the basis of the relation to their specific contexts and ambitions. Together with the strategic ambitions, and the inspiration from the front-runner cities, these are used to develop the desired future scenarios.

The desired future scenarios of the cities are created in a series of workshops held in each of the partner cities. These Vision Workshops consist of a 2-day programme in each city, and include sessions with policy-makers and stakeholders to develop a rich, contextual scenario for the city. Local stakeholders (companies, citizens, public and private organisations and knowledge institutes) are invited to take part in the workshops through the networks in the cities. The participants interactively build a visualisation of the desired future scenario. See also the pictures of the workshops.



The result of the vision development step is a visualisation of the desired future scenario in an A0-format poster. The poster shows the visual together with a brief explanatory text. A common visual language is used to make sharing easier and to facilitate discussion among the cities on

common and specific aspects of the visions.









First session of the vision workshop in Stavanger

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#### 7.2. Vision Stavanger

The vision workshop took place on 13 and 14 June 2018. In the first session the strategic ambitions and the selected drivers for change were used in a brainstorm to explore what the drivers for change specifically mean for the city and which elements of the brainstorm should be included in the desired future scenario for 2050. A rough sketch of the main structure and some key elements for the desired future scenario were created. In the second session results of the first session were presented and the key elements were further explored with a large group of internal and external stakeholders. The participants discussed how the key elements should be envisioned and enriched the vision.

#### 7.2.1. Selected Drivers for Change

The city of Stavanger selected 3 Drivers for Change:

- Cities as living organisms
- Reinventing nature in the city
- Leveraging natural value at micro and macro level

#### 7.2.2. Results of the first session

The first session resulted in the sketch shown on the right. In this sketch the main theme that came out of the brainstorm and discussions is visualised:

#### 'Water and green as the veins of Stavanger, with knowledge flowing through the veins'

Furthermore, five key elements were selected to further explore in the second session:

- Mapping the green potential of the city
- Resilient to flooding
- Place making for green and blue
- Mindset for flexibility
- Storm water as a resource •

## WATER & GREEN AS THE VEINS OF STAVANGER

WITH KNOWLEDGE FLOWING THROUGH THE VEINS









#### 7.2.3. Results of the second session

In the second session groups of internal and external stakeholders further explored the desired future scenario for Stavanger in 2050 on the basis of the five key elements. The groups presented their discussions and jointly the ideas were captured in sketches to define what it should look like in the vision.

These pages show the outcome of de stories and sketches of the brainstorms in the groups. The results of the first and second session are used in the final visualisation of the desired future scenario for Stavanger 2050.



#### 1. Mapping the green potential of the city

The overall vision is to have more nature in town: more trees, more green, more grass etc. It is important that people accept this, and do not look at it as 'unused' land. By involving citizens we could discuss the changes, and make them more aware, e.g. bird or bee counting.

Houses and buildings can have a 'environment certificate'. We do have energy certificates now, but we do not have it for gardens or surroundings, e.g. describing if is natural or paved, how much biodiversity is there. Providing certificates could help to do the mapping and it creates incentives to take action to improve the label.

We could learn from Melbourne, where all trees have an e-mail address. We could get insight in how the trees do, where nature is etc.

Most of this can be done today, but the challenge is to create the right mindset in 2050, it is not the end-goal for 2050, but we need to start now. E.g. by involving schools and kids as part of an education programme.

We should build on the knowledge from our cultural heritage of farmers and fisherman, and make sure the knowledge is captured.

Mapping of green is a tool to get information, but the goal is to put value on green. In 2050 people should recognise the value of green, we should have ways to document it (e.g. connected to the certificate), and we should understand the monetary and economic value of green, e.g. there is money in greening your restaurant terrace. For that we need to use facts on measuring the impact of green.



### 2. Resilient to flooding

We should build to be able to deal with rising sea levels and living with water. We could build floating houses on water, live in boats, or built on stilts like the raditional houses near the sea. When building with basements, it should be done in a way that they can take the water.

We need to prepare for higher sea levels, up to 3 meters, with normal sea level rise of about 70 cm and spring tides of 2 meters.

We could build much more on the water, not to use more green areas on land, but use the water surface for other use, e.g. floating green houses.

Much of Stavanger is high enough and can take flooding, but some precious areas need to be protected. How will we do that? Can we keep the shoreline empty from building and use the space differently, e.g. as a park?

We should make an analysis of flooding and decide where it is a problem, and where it is not. We have to create scenarios and understand what may happen and then think of solutions to deal with it. We need multidisciplinary and visionary solution finding - with a range of options for different areas in the city.



#### 3. Place making for green and blue

Towards 2050 we consider that some decisions are taken already, such as creating links between the lakes. We focus on how we can make the city more liveable and create more nature.

We need to create a good identity for Stavanger: what can the city offer, which ecosystem services, what is the basic cultural heritage and story? We need to make sure that we keep our own identity, with our own climatic conditions.

We should map all waterways to create a new structure, and involve citizens and businesses in the transformation and taking care of areas. We foresee urbanisation while the infrastructure is being transformed: we will 'eat' from the streets because there are less cars and more routes for bikes and pedestrians.

We aim to get insight in where the most important meeting places are and create green and water features, involving artists for concepts of placemaking. We need to create new stories, using history and creating different places on different spots.

In 2050 this could result in small pocket parks that are connected, like a string of pearls. There are vibrant places for all kinds of groups, with pocket parks that have ponds, streams or contain small agricultural areas and restaurants that use the locally grown food etc.



#### 4. Mindset for flexibility

We tend to look at the future from our experience now, but there will be fundamental changes: buildings will be clean, transport is electrified, emissions will be lower. We run into the trap of seeing climate change as a soft change: a little more rain here or there. But it may also be quite dramatic, extreme. E.g. we may get draughts. We talk about storm water ponds, but the rain beds may be brown and empty.

Society has the responsibility to take accountability. Using the cities ecosystems to develop a mindset for flexibility. We need a neutral party to research what works and what does not work. You need facts and data to make change happen.

Also we need a structure which makes it easier for people to take part in developing their own environment. In 2050 the system of democracy and planning is adapted to have more involvement of citizens and use the knowledge of everybody. The municipality is needed as a facilitator for these processes.

Design for adaptability involves a culture change!



In 2050 all actors have an acceptance of the natural pathways of the water. Water has found its way always, so we have to accept that and take it into consideration. On new developments and existing areas we envision that we go back to nature, e.g. using green roofs instead of tiles, and use grass roads instead of asphalt – using permeable surfaces. Like the sponge city concept of China, that recharges ground water with permeable surfaces.

valuable.

Landscape structures, roads and installations are put in place such that we can deal with extreme rains. We will see different shapes of roads (V-shaped) or swales, and lawns that create invisible pathways for water. We need to make sure we can deal with a lot of water.

We use water as a resource in all kinds of ways: recreational (e.g. using buffer zones for run off water to create small lakes), electricity generation (with dynamo's) or installations that contain the water for further use (growing of plants, agriculture etc.), retaining water to increase biodiversity (with plants thriving in wet conditions), or we use water for aesthetic purposes (e.g. water fountains).

We should use the water where it falls, and not just transport it away. What can you do on each spot with that place to make it keep the water and use it. We should accept water and look at the combinations wherever possible. Like lego: what is the situation, I have these bricks, what can I build?







We expect that streams are opened, but only when it is natural and





Second session of the vision workshop

#### PAGE 126 OF 162



#### Desired future scenario

In 2050 Stavanger is resilient to flooding from the rising sea level and storm water. Nature is integrated in the city and water is valued as a positive element. In the vision this is visualised by water and green as the veins of Stavanger.

The 'green and blue' structures are connected and function well to deliver a wide range of benefits for citizens, such as healthy living, well being and biodiversity.

In 2050 the social fabric of Stavanger enables a holistic approach to climate resilience, with the inclusion of all the knowledge in the region used for the same purpose: creating a resilient and livable city through nature-based solutions. Knowledge flows freely through the veins of the city, and is shared and further developed through citizen involvement and co-creation. This allows for new solutions to the future challenges of Stavanger.



Key elements of the desired future scenario:

#### Storm water and nature as a resource

The lakes in the city are connected through a green and blue infrastructure. This ensures resilience to flooding and at the same time creates all sorts of co-benefits for citizens. Nature is a key element in the city, and this nature is highly valued.

All actors accept the natural water pathways. Streams are opened where it is natural and valuable to do so. New developments, roads and installations can deal with extreme rainfall. Densified areas are carefully positioned and feature buildings with green structures. Different shapes of roads (v-shaped) or swales and lawns create invisible water pathways.

Water is used - directly where it falls - for different purposes, e.g. recreation in buffer zones (small lakes and occasionally canoeing), generating electricity in water dynamos, use for agriculture or watering plants, or for aesthetic purposes such as fountains.

#### **Resilience to flooding**

The city is resilient to sea level rise through nature based solutions. Different areas have different solutions.

The people of Stavanger have learnt to live with water and not to fight it. Waterproof buildings are 'happy with wet feet' and smartly designed, e.g. with electrical systems positioned above the rising sea level and using sustainable materials. Floating houses or houses built on stilts can resist temporary flooding. In this way the water surface is used and green areas are protected.

#### Knowledge and living

The general mindset is flexible and people are able to live with change and make sustainable decisions for the future and for society at large.

People have knowledge of the actual value of natural elements and value nature. The knowledge from the cultural heritage of farming and fisheries is captured. Facts and data to support that knowledge stem from living labs, in which we have experimented and learnt the (unforeseen) effects, benefits and impact of nature-based solutions. This has eventually led to knowledge of the monetary and economic value of green and water.





#### **Co-creation**

- Society has found new ways of organising itself, nurturing co creation, involvement of all citizens and bottom-up initiatives. The general mindset is: 'what can we do?'.
- Climate resilience is a joint effort, shared by companies, NGOs, start-ups and citizens. Awareness and knowledge are gained by using everybody's expertise and experience.
- People are actively participating in mapping the potential, e.g. engaged citizens map their living environment and the potential for green façades and roofs in their neighbourhood. Small 'pocket parks' are created as a string of pleasant places for
- all kinds of groups. Insights into biodiversity are gathered through collective actions such as counting bees, bumblebees and birds. Schools and children contribute as part of their educational programme.





First session of the vision workshop in Prague

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### 7.3. Vision Prague

The vision workshop took place on 22 and 23 August 2018. In the first session the strategic ambitions and the selected drivers for change were used in a brainstorm to explore what the drivers for change specifically mean for the city and which elements of the brainstorm should be included in the desired future scenario for 2050. A rough sketch of the main structure and some key elements for the desired future scenario were created. In the second session results of the first session were presented and the key elements were further explored with a large group of internal and external stakeholders. The participants discussed how the key elements should be envisioned and enriched the vision.

#### 7.3.1. Selected Drivers for Change

The city of Prague selected 3 Drivers for Change:

- 4. Cities as living organisms
- 5. Reinventing nature in the city
- 6. Leveraging natural value at micro and macro level

#### 7.3.2. Results of the first session

The first session resulted in the sketch shown on the right. In this sketch the main theme that came out of the brainstorm and discussions is visualised:

#### 'Integration of nature in the city to achieve climate resilience and flexibility using a smart combination of technology and nature based solutions'

Furthermore, four key elements were selected to further explore in the second session:

- City and surroundings
- Neighbourhood
- Street
- Smart planning and design







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#### 7.3.3. Results of the second session

In the second session groups of internal and external stakeholders further explored the desired future scenario for Prague in 2050 on the basis of the four key elements. The groups presented their discussions and jointly the ideas were captured in sketches to define what it should look like in the vision.

These pages show the outcome of de stories and sketches of the brainstorms in the groups. The results of the first and second session are used in the final visualisation of the desired future scenario for Prague 2050.



#### 1. City and surroundings

Water and management of the water:

- Nature based management of the river before it comes to Prague: now we have structures to keep water away, but we want to give water the space it needs, and implement nature based solution for flood- and draught protection, we need the water more close for irrigation.
- Smaller creeks are now not accessible for people: we want to enhance the project 'creeks for life'. In 2050 the city should own the land around the creeks to be able to use them and the green around them better: for recreation, but also for biomass or agriculture.
- The river and creeks could be used for zero-emission transportation.

Land management for different purposes, including agriculture:

- We prefer to use the available land in a better way, and there is quite a lot of land where we can have pastures, parks and smaller farms.
- Using land for food production is just one of the purposes. But we see a mix and have all elements in the area interlinked and accessible by public transport and bikes, e.g. through interlinked shaded paths.
- Forrest areas are sustainably managed and used, so that they are multifunctional: recreation, wood production, water retention, etc. And there are accessible wild nature areas, for eduction purposes

Surroundings of Prague, including shopping centres and logistic areas:

• We would like to see more green, e.g. making it mandatory for project development to include e.g. green roofs etc. Or stimulate nature based solutions through loans or subsidies



#### 2. Neighbourhood

Our ideas may only be feasible in 2120. Raising awareness and education is key, and it may take five generations to achieve the cultural change.

Involve the public and local people and habitants in the design and implementation of blue and green in the infrastructures. We need to the developers to be enlightened, so they adopt sustainable development processes (no corruption). More focus on quality rather than quantity. It also requires enforcement of the current regulations and laws.

The local parks are part of the neighbourhood and multifunctional: rain water retention, micro-climate improvement, recycle organic waste, as well as education and recreation. The vegetation structure is a linked system of different parts: parks and smaller green structures that spread like a web across neighbourhoods. The areas are used by kids to play.

Buildings are energy efficient with green walls and green roofs. The buildings also accommodate more community and sharing possibilities. The production of waste is decreased and the remaining waste is recycled. Organic waste is used as compost. Permeable surfaces retain rainwater, and we re-use rainwater for the irrigation of the green spaces.

Transport, we need reduce the number of cars in the city to as less as possible (probably none), e.g. with underground parking (for cars and bikes). Then there is more place for green in the street. By integrating more urban farming we need less logistics traffic.

We need the right balance in private-, public- and semi-public spaces, so people feel ownership of their surroundings, and increase diversity in use.

NEIGHBOURHOOD 2120



#### 3. Street

The street is the human scale level where different things come together:

#### Mobility:

The city is closing the centre for cars, and the streets are changed to pedestrian only areas. Not only in the city centre, but also in other areas - so they become vibrant pedestrian/bike areas that connect the whole city. Nearly every street will have good facilities for biking, as it will be a much more common way of transportation. There will be different modes of individual transport, like mono-bikes, hoverboards.

#### Street structure:

Developers will take another approach to the buildings, with better connections between interior and exterior. Gardens will be better accessible, but also easy entry for shops, bars or restaurants or other facilities on the ground floor can be connected to outside terraces. Shade is important in the summer, when it is really hot

#### Design:

Roofs are green, and flat roofs are accessible for people. Permeable surfaces, and semi-permeable surfaces (even asphalt) allow water to go through, and we use other materials to reflect heat so the heat island effect is reduced.

#### Urban green:

Try to cultivate trees that can survive the circumstances in the city and that have a good canopy height. When we privatise public space a bit more, we can use it to grow small crops and for urban farming. Special

green walls help to diminish the air pollution. Bio swales in the streets that combine the retention of water with good walkability.

#### Utilities:

We would like to see more street furniture in the future: e.g. benches facing each other to enrich social interaction between people and recycle bins rather than waste bins. People can put their own furniture in the semi-public area when they are willing to share its use with others. Spaces for people to use for different purposes in a circular system, e.g. places where people can leave their used furniture so it becomes a permanent flee market, or places where people can leave excess food for others to use.



We need some kind of clear local stewardship and responsibility for overall aspects of place, parks or landscapes. This could be a local organisation, that has clear and shared responsibility to overcome the division we have now (organisations now take only care about one aspect). We need to have some coordination role, and people who connect the level of systems with local people, who can facilitate the communication between bigger projects (e.g. revitalisation of the creeks) and people and help them include other aspects in the project. This role includes engaging people to be more active, involve volunteers to share knowledge, to collect data and understand what it takes to be responsible for the whole area, including green and keeping it clean.

Communication is important, because there are a lot of stakeholders: residents, traffic organisations, different organisations responsible for river creeks, for waste management, for health, for safety, for sewage etc.

new way of working.

To be adaptive to the site, each project needs to be different, and we need responsive projects, with multidisciplinary teams, that take broader agreed goals into account and work towards a shared vision. We need different legislation, less restrictive and more open to enable a local solution. We need to involve other people, and this requires an more flexible mindset to accept different views and integrate different perspectives. This also means that people need more time to participate in the projects, e.g. as volunteers.







It is also important to attract new, skilled people to be involved in this





Second session of the vision workshop in Prague

#### PAGE 132 OF 162

### PRA GUE PRA GUE PRA GA PRA GA

#### Desired future scenario

In 2050 Prague has a high-quality green infrastructure that is interconnected and provides multiple ecosystem services. Water is valued as an integral part of the city, used for both recreation and sustainable water management.

Prague is in symbiosis with nature, contributing to a high quality of living. Through a smart combination of technology and nature-based solutions, the city is flexible to adapt to the climate and changing circumstances. This is shown at all scales and levels in the city. In the visual this is indicated at 3 levels: the street, the neighbourhoods and the relationship with the surroundings. Smart planning & design are applied at all levels, to adapt to local circumstances and to allow flexibility over time and use.



Key elements of the desired future scenario:

#### A city in symbiosis with its natural landscape

In 2050 Prague is in harmony with its surroundings. The meandering rivers, creeks and ponds are accessible and persuade people to enjoy their clean water. A local circular system retains rain- and waste water and makes it available for re-use. The water bodies provide protection against flooding and drought by retaining and providing space for rainwater. The available land is smartly managed, using it for agriculture, parks and 'wild nature'. There is a smart choice for different, small-scale crop production, to protect the soil and enhance biodiversity. The people of Prague enjoy the local food.

#### Neighbourhoods enriching the lives of people

In 2050 neighbourhoods in Prague are enjoyable areas to live, work, eat, shop, relax and learn - with green and blue infrastructure in public spaces that suit the local needs and possibilities. The local people and residents are involved in the design and implementation of green and blue. People feel ownership of their surroundings and there is a balance between private, public and semi-public areas. Local parks are multifunctional: rainwater retention, micro-climate improvement and recycling organic waste, as well as education and recreation. The vegetation structure is a linked system of different parts: parks and smaller green structures that spread like a web across neighbourhoods. Buildings are energy efficient, with green walls and roofs.

#### **Comfortable streets**

In 2050 the streets are of high quality and designed around people. Trees in the streets provide shade for people to enjoy being outside and reduce the heat island effect. Underground, space is created for the roots of trees and a smart water retention system for re-use of water on the spot. The streets are pleasant places to stay and meet, and indoor and outdoor spaces are connected at street level. Gardens, shops, bars, restaurants and other facilities on the ground floor are easily accessible and connected to outdoor terraces and gardens. This provides a good environment for walking and cycling. Flat and green roofs are also accessible for people.



European This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions



#### Co-created spatial planning and spaces

In 2050 urban planning in Prague is a transparent, coherent and effective process. 'Local stewards' have responsibility for overall aspects of places, parks and landscapes.

To be adaptive to the site, each project is different, and managed by local multidisciplinary teams that take broader agreed goals into account and work towards a shared vision. Supported by clear legislation, these local initiatives are open to enable local solutions.

In 2050 the people are involved and skilled to co-create, handle different views and integrate different perspectives. People feel responsible, and volunteer to participate in the creation, development and maintenance of their own living environment.





First session of the vision workshop in Castellón

#### PAGE 134 OF 162

#### 7.4. Vision Castellón

The vision workshop took place on 19 and 20 September 2018. In the first session the strategic ambitions and the selected drivers for change were used in a brainstorm to explore what the drivers for change specifically mean for the city and which elements of the brainstorm should be included in the desired future scenario for 2050. A rough sketch of the main structure and some key elements for the desired future scenario were created. In the second session results of the first session were presented and the key elements were further explored with a large group of internal and external stakeholders. The participants discussed how the key elements should be envisioned and enriched the vision.

#### 7.4.1. Selected Drivers for Change

The city of Castellón selected 4 Drivers for Change:

- 1. Reinventing nature in the city
- 2. Tailored use of limited resources
- 3. Leveraging natural value at micro and macro level
- 4. Cities as living organisms

#### 7.4.2. Results of the first session

The first session resulted in the sketch shown on the right. In this sketch the main theme that came out of the brainstorm and discussions is visualised:

#### 'A green city - well connected to the sea'

Furthermore, four key elements were selected to further explore in the second session:

- Water
- Green & connected areas
- Education & awareness
- Industrial areas

### CASTELLÓN 2050











#### 7.4.3. Results of the second session

In the second session groups of internal and external stakeholders further explored the desired future scenario for Castellón in 2050 on the basis of the four key elements. The groups presented their discussions and jointly the ideas were captured in sketches to define what it should look like in the vision.

These pages show the outcome of de stories and sketches of the brainstorms in the groups. The results of the first and second session are used in the final visualisation of the desired future scenario for Castellón 2050.



#### 1. Water

In 2050 the river is filled with rain water and purified waste water from the city. We aim for systems to be able to treat water at home. In some cities there is a separation of water flows, this may be an option too.

Sustainable urban drainage systems (SUDS) are applied in Castellón, to deal with flash floods during heavy rains. Instead of letting it flow to the sea, the water is collected e.g. to store it in parks and for infiltration. New materials based on ceramics are applied, e.g. artificial soil that allows better infiltration, or artificial lakes to store water.

The waste water treatment plant – a big consumer of energy – runs on renewable energy and is part of a circular system: biogas is used as energy source and the biological residue as fertiliser.

A smart network of sensors is covering the city, so that we have a good overview of the water, temperature etc. It monitors the availability of water of different qualities and matches it with need for water for different uses, e.g. for cleaning streets, irrigation of trees in parks, agriculture, or as drinking water. A good insight is needed in contamination of ground water by different actors e.g. the use of fertilisers by agriculture.

Castellón is surrounded by many small villages, which are not able to treat their own water. We have to look for a more holistic strategy for water management in the region. Some areas provide very good water quality, e.g. in the wetlands. The wetlands could be redeveloped to a lake area, similar to Parc Albufera near Valencia.



#### 2. Green & connected areas

In 2050 the city is transformed from concrete, cement and tiles into green areas. This green help against pollution and reduces the carbon footprint. Streets and squares are designed with trees to provide shadow: making walking more attractive, even in summer. Because of the nice green environment (next to the already good weather), people spend much more time outside.

Castellón is only 2 km from the see, and in 2050 green streets and green avenues make it attractive for people to walk or cycle towards the sea (instead of driving there by private car). It will require some work to redevelop the wetlands into an attractive area connecting the city and sea.

The streets in Castellon are small, and there is not enough space for all the traffic. In 2050 there are more one-way streets to free up space for cyclists and a pedestrian only area in the city centre. All the neighbourhoods are connected with cycle lanes to the city centre.

The river banks are redeveloped, and have spaces for children to play and green paths for pedestrian and cyclists. The river has become a lively area of the city.

To promote an eco-life, the amount of urban gardens is increased. Around the city the brown fields and abandoned areas from former construction sites are redeveloped into urban gardens. Each community or neighbourhood has its own urban garden, which is open for public and is used for food production for the residents.





#### 3. Education & awareness

In 2050 schools have empowered teachers. Teachers are respected and are important persons in the community. They have skills in ecology and other relevant topics. So children will be able to know e.g. the actual energy consumption in their room and they know how to reduce it. Children can win awards by being energy efficient. They learn these skills in schools. Schools will also provide ecological meals, using local produce. Children learn how to grow the plants in their school garden, and how to prepare it well. The school system is the basis of the city.

The citizens in Castellón have a forest, where each new born gets one tree. We take care of this tree and the forest, that grows around the city. People visit their own tree, and know how much CO<sub>2</sub> is used by their tree.

The people have the skills in energy efficiency. Elderly people are playing with grand children and they learn from each other about energy efficiency. People have a good work=life balance. Citizens have the skills to empower themselves in energy generation. They install e.g. their own solar panels, so they are not dependent on big companies. We have a big 'super-Erasmus programme' to exchange knowledge with other cities, so every year young people come to the city and the citizens of Castellón get exposed to new possibilities and become more open-minded.

In 2050 we have standardised nature based solutions. There are experts on nature based solutions, that help in the transition, so new constructions and urban developments use nature based solutions. Companies also take care of sustainability, through educated workers. All public buildings have monitoring systems and data is open. We have green policies and a local board of sustainability, and we also know how we can guide towards a sustainable city. The board is a mix of politicians, experts, people from companies and citizens from different neighbourhoods. Together they develop the knowledge on what is possible in the domain of water, energy, etc.

Water re-use in Spain is not always easy, because treated water is more expensive than taking it from the well. Even though the water quality of treated water is often better, it is difficult to change the habits. We need to change the perception and mind-set on the quality of treated water, so by 2050 it is completely accepted to drink and use treated water.

#### 4. Industrial areas

The ceramics industry is a heavy user of water – over 90% of the total use. The rest of the water consumption is urban. In 2050 there is a district where waste water is treated and stored, and that has the capacity to supply for industry and urban use. Water is provided at different quality levels, and there is a reliable inspection system to guarantee the quality levels. This also allows the sharing of water between different industrial users. The treated water is no longer flowing to the sea, but reused.

The waste of the (ceramic) industry is classified - e.g. through an ecopassport - so it can also be re-used as raw material. Some materials are of high quality at affordable prices, and are used in e.g. in road surfaces, construction or furniture. It requires legislation and an open mindset, both in government as well as in the industry.

Castellón is well situated for renewable energy production. There is high potential for thermal energy (with guaranteed availability for district heating and cooling), which can be complemented with solar, wind and biomass. Based on a good map the best suitable choices are made for renewable energy.

Industrial areas are transformed into green areas, with shaded bicycle paths (e.g. for commuting) and running tracks (e.g. for lunch time exercise). The green helps to reduce the contamination of soil and cleans the air. People spend long time in industrial areas for work, so having clean, green areas would give them benefits. Companies can also help by applying green roofs to improve the environmental quality.









Second session of the vision workshop in Castellon

#### PAGE 138 OF 162



# Castellón 2050: A green city for all people to live

#### Desired future scenario

In 2050 Castellón is making the best possible use of water and natural resources. Zero waste is achieved through 100% re-use of waste water with actions on different scales at home, district and city levels, taking into account the different quality levels of water. The people of Castellón enjoy their green city, well connected to the sea. Green corridors that connect the different areas of the city provide a high quality living environment for everyone. A zone around the city with nature-based solutions creates a pleasant surrounding, with local agriculture, developed wetlands and 'green' industrial areas.

In 2050 the people of Castellón act responsibly with regard to water, waste and natural resources. Applying nature-based solutions is standard procedure in the municipality's policy-making and city design. Everybody is involved in the planning and design of their living environments, and has the knowledge to recognise the impact on the quality of their life.

Key elements of the desired future scenario:

#### Zero-waste water cycle

A holistic strategy for water management in the region realises a zero-waste water cycle. The river, filled with rainwater and purified waste water, is the centrepiece. Systems for water storage (e.g. during heavy rainfall), treatment and re-use at different levels (e.g. home, district, city) are applied, and the water quality is monitored to stimulate circularity for different applications. The wetlands are a lake district, where recreation, water retention and agriculture go hand in hand.



#### Green connections through the city

The people of Castellón enjoy their green city with a comfortable living environment for everyone. The green contributes to a high air quality and a pleasant climate.

People spend a lot of time outdoors in shaded streets and squares. They enjoy walking or cycling towards the sea on paths through attractive wetlands or along local agricultural sites, where people can pick their own food. The riverbanks provide spaces for children to play and green paths for pedestrians and cyclists. The river has become a lively area of the city.

#### Education in sustainability... the starting point

The awareness and knowledge of the people of Castellón is high, as a result of a strong educational programme that involves children, adults, administration, companies and professionals. People adopt sustainable behaviour, supported by new technologies that gather data and increase knowledge on the impact of nature-based solutions on climate and water resilience. A local board of sustainability is a mix of politicians, experts, people from companies and citizens from different neighbourhoods, who together develop the knowledge of what is possible in the areas of water, energy and resources.





#### 'Green' industrial areas

Industrial areas are small 'eco-cities', where companies together create circular solutions for water, waste and renewable energy. A reliable water system monitors the different quality levels and stimulates re-use for the right purposes. An eco-passport for waste enables the re-use of materials. Renewable energy solutions, such as thermal energy, solar, wind and biomass, are jointly implemented. Industrial areas are green areas, with shaded bicycle paths for commuting and running tracks for lunchtime activities. Green roofs and facades provide a comfortable space for happy and vital employees.





First session of the vision workshop in Cannes

#### PAGE 140 OF 162

#### 7.5. Vision Cannes

The vision workshop took place on 11 and 12 July 2018. In the first session the strategic ambitions and the selected drivers for change were used in a brainstorm to explore what the drivers for change specifically mean for the city and which elements of the brainstorm should be included in the desired future scenario for 2050. A rough sketch of the main structure and some key elements for the desired future scenario were created. In the second session results of the first session were presented and the key elements were further explored with a large group of internal and external stakeholders. The participants discussed how the key elements should be envisioned and enriched the vision.

#### 7.5.1. Selected Drivers for Change

The city of Cannes selected 4 Drivers for Change:

- 1. Reinventing nature in the city
- 2. Tailored use of limited resources
- 3. Cities as living organisms
- 4. Leveraging natural value at micro and macro level

#### 7.5.2. Results of the first session

The first session resulted in the sketch shown on the right. In this sketch the main theme that came out of the brainstorm and discussions is visualised:

#### 'Nature based solutions make Cannes climate resilient in both the dry season and extreme storm events.'

Furthermore, four key elements were selected to further explore in the second session:

- Urban areas
- Mountains
- Coast
- Empowering people









#### 7.5.3. Results of the second session

In the second session groups of internal and external stakeholders further explored the desired future scenario for Cannes in 2050 on the basis of the four key elements. The groups presented their discussions and jointly the ideas were captured in sketches to define what it should look like in the vision.

These pages show the outcome of de stories and sketches of the brainstorms in the groups. The results of the first and second session are used in the final visualisation of the desired future scenario for Cannes 2050.



#### 1. Urban areas

Urban areas in Cannes can become much greener if we reduce car traffic. We can build multilevel car parks and use the space that becomes available for green. By creating a logistics basis outside the city and deliver goods delivery by and small (clean) trucks, we can improve the air quality in the city too. We also see an opportunity for multi-use buildings or districts, e.g. that have flats, factories and shops close to each other, so we have less traffic and less cars.

Densification of the city will be needed to allow green in an urbanised landscape. We see an opportunity to create a more level skyline in neighbourhoods, where we now have multiple storey buildings and single storey buildings together. By replacing the single storey buildings with multiple storey, we keep space for green parks in neighbourhoods. Also multilevel factories and storage facilities can free up space for green and water.

In 2050 we have more space for green and green corridors, This will increase biodiversity, because we can have different vegetation, animals, birds and bees. If we want to grow more vegetables and fruit, also in urban gardens, we will need bees and beehives in the city. We would like to see green balconies and roofs where vegetables and fruits are growing. We may need special soil for the plants to ensure a minimum water usage.

Grean areas should be able to absorb rain water, but for very heavy rains we will still need additional measures.

Side note: if you want shadow in 2050 you need to plant the trees now!



#### 2. Mountains

The ambition is to in mountains.

In 2050 agriculture should be implemented everywhere, in Basse Vallée de la Siagne, but also in the city in buildings or community gardens. Multilayer buildings should include shops, living and agriculture on the roof and floors dedicated to agriculture. In residential areas people share gardens, and use part of it for farming. Even in the very high end residential areas people may share their garden with their neighbours for agriculture. It would be great if we could realise this in e.g. La Californie. We would like to see more mixed neighbourhoods with shared gardens.

We see an opportunity for agriculture on the hills to raise awareness and for education. This could be a showroom to show how we can do such agriculture in our climate. We need all people to understand this and to take action themselves. We can put people in contact with each other, so people offering produce can give it to a cooperative or sell it on street markets.

Agriculture can also benefit from a storm water retention field, e.g. in Basse Vallée de la Siagne.

Agriculture across the city is important to cultivate the land and to make the soil more valuable. Everything is enhanced and becoming richer with green and biodiversity.

The ambition is to increase agriculture in general and especially on the





#### 3. Coast

In 2050 we have found nature based solutions to prevent coastal erosion during storms: e.g. by decreasing the violence of the waves to protect the coast during storms, and by having roads that are resistant to storm water. Ideally the solutions also enable energy harvesting from the waves.

The coast is attractive for tourists in dry season, there is more green that provides shade for activities, e.g. running, walking and cycling.

Cannes has a powerful fishing fleet, and this is preserved as a vibrant industry.

In 2050 the sea is clean, and cruise ships no longer pollute the sea and the air. Like in Marseilles we implement solutions to ensure polluting ships can not stay close to the coast (but use small clean boats to go ashore), but ideally the fleet is changed into ecological cruise ships.

#### 4. Empowering people

Education and organisations are in place to limit risks and to limit waste.

For risk the idea is to prevent and manage risks. In 2050 we can better predict. We also do simulation with citizens teams so they can deal with a crisis as a result of extreme weather events. The idea is that public services can manage in normal situations, but in case of extreme events voluntary teams help citizens that are affected.

To limit waste we also need education but also technical solutions. Data solutions, smart grids, open data and visualisation of data to make waste of water, electricity and waste more visible. Direct visibility of waste and consumption will help people to become aware and change their behaviour. Education can also help to reduce waste. Gardening lessons, learning how to repair, how to limit waste, teaching about local and seasonal foods, how to run vegetable gardens in the schools and involve people in gardens where you can pick directly vegetables (even when you have to pay for it) to educate them in a pleasant way.

We also need a logistical structure (places and organisations) to make it very easy for people to reuse waste. Places to bring your waste, places to share things, places to rent, places to store, places to distribute. These places could be small shops, storage areas, or workshops where you can repair, reshape or upgrade things or reuse the raw materials (e.g. hotels that are renovating offer their used furniture and materials). The system enables physical and virtual exchange of things, e.g. furniture or food. In 2050 it is normal to avoid waste, it is an exception to produce waste. This will create new jobs.

In 2050 the behaviour of people is changed: now we always want to wear t-shirts, even in cold weather. We should dress to the weather, and not use excessive energy to heat offices or homes in the winter, or cool them in the summer. We are the city of paradoxes, with very rich and very poor people. This is challenging. Also elderly people have habits that are hard to change: we need to educate retired people as well.

In 2050 we are much more aware of our behaviour: we re-use water to clean the roads, we collect compost from houses, we have installed dry fountains (with circular water) and with buttons to not waste water continuously.

Note: Cannes is a special city with a glamorous image. It is important that the solutions we choose fit with the identity of the city.









Second session of the vision workshop in Cannes

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# Cannes 2050: A green, safe and pleasant city

#### Desired future scenario

In 2050 Cannes is resilient to all natural and security threats, such as coastal erosion and flooding from extreme weather events. Nature based solutions provide a green, safe and pleasant city, both in the dry season (visualised on the left side of the picture) and severe storm events (visualised on the right).

Cannes is a green city, full of gardens and connected green spaces for people to walk, cycle and enjoy outdoor activities, contributing to the glamorous identity of Cannes.

Urban and surrounding areas are connected through agricultural areas, community gardens and a circular water system. This enables self-sufficiency in food supply. The wetlands in Basse Vallée de la Siagne retains rain- and waste water and make it available for re use.

Empowered people are the key to risk prevention, supported by the risk centre and TIGRE platform, facilitating continuous innovation through an evidence-based working approach.

Key elements of the desired future scenario:

#### Greening the city

In 2050 Cannes is a green city, where the green spaces are connected and accessible to people for multi-purpose use. The green solutions deal with extended periods of dry weather and heavy rainfall. Green roofs and permeable surfaces retain water, and provide shade and pleasant areas for people to enjoy.

Every house collects storm water for re-use in toilets and gardens. Smart water retention systems regulate the use of water, and buffers anticipate rainfall and usage patterns.

Densification is well-planned, based on a vision of the purpose, welfare and well-being of the area. La Republique has developed into an neighbourhood with high-quality facilities for families, and La Bocca is an economically vibrant neighbourhood based on creative industries attracting a diversity of people for studying, living and working.



#### Developing local agriculture

In 2050 the city is self-sufficient through local agriculture and water management. Water from the waste-water treatment system is brought upstream and re-used for agriculture. No water is wasted. The green areas, like the wetland in Basse Vallée de la Siagne, retain water on the spot. Smart retention systems manage water in both the dry season and times of storm.

Agricultural areas in the surrounding villages and on the mountains are connected. Connected community gardens are shared for the benefit of everybody. In Basse Vallée de la Siagne and in the city, multilayer buildings combine shops and living areas, as well as roof gardens and floors dedicated to agriculture.

Agriculture is everywhere in the city, and is explicitly used for education on food and water waste. People make responsible choices and create their own resilient neighbourhoods.

#### Coastal resilience to storm waves

In 2050 the coast is resilient to storm waves. Nature-based solutions reduce the violence of the waves to protect the coast during storms. The coastal road and local restaurants are resistant to storm water flooding. Energy is harvested from the waves.

The coast is attractive for tourists. The green and trees provide shade, and people enjoy spending time there. Walking and cycling opportunities invite people to be active and healthy. In 2050 the sea is clean, and the local fishing industry is flourishing. Eco-cruise ships no longer pollute the sea and the air, and clean solutions are used to bring people ashore.



#### Empowering people to prevent risk and waste

In 2050 the people of Cannes are aware of risks and the value of resources. The risk management system supports simulation and exercises for risk situations, and facilitates citizen initiatives in times of disasters. Citizens and municipality together reduce the impact of events.

Education is key to the awareness of no waste in water and food. School restaurants use local products and do not tolerate waste. Vegetable gardens are situated in and near the schools.

Waste is made visible through data and smart grid solutions, and people learn to repair, upgrade, share and re-use all types of products. Places are created for rental, storage and distribution, supported by a logistics structure (places and organisations) to make it very easy for people to re-use waste. These are open to citizens and local companies that can create new jobs.





First session of the vision workshop in Başakşehir

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#### 7.6. Vision Başakşehir

The vision workshop took place on 17 and 18 October 2018. In the first session the strategic ambitions and the selected drivers for change were used in a brainstorm to explore what the drivers for change specifically mean for the city and which elements of the brainstorm should be included in the desired future scenario for 2050. A rough sketch of the main structure and some key elements for the desired future scenario were created. In the second session results of the first session were presented and the key elements were further explored with a large group of internal and external stakeholders. The participants discussed how the key elements should be envisioned and enriched the vision.

#### 7.6.1. Selected Drivers for Change

The city of Başakşehir selected 4 Drivers for Change:

- 1. Synergy in nature and augmented technology
- 2. Reinventing nature in the city
- 3. Leveraging natural value at micro and macro level
- 4. Tailored use of limited resources

#### 7.6.2. Results of the first session

The first session resulted in the sketch shown on the right. In this sketch the main theme that came out of the brainstorm and discussions is visualised:

#### 'A green and sustainable city'

Furthermore, three key elements were selected to further explore in the second session:

- Awareness and behaviour
- Parks and water areas
- Clean and sustainable industrial areas









#### 7.6.3. Results of the second session

In the second session groups of internal and external stakeholders further explored the desired future scenario for Başakşehir in 2050 on the basis of the three key elements. The groups presented their discussions and jointly the ideas were captured in sketches to define what it should look like in the vision.

These pages show the outcome of de stories and sketches of the brainstorms in the groups. The results of the first and second session are used in the final visualisation of the desired future scenario for Başakşehir 2050.



#### 1. Awareness and behaviour

By 2050 the programs to create awareness on the environment have gained results. To increase awareness short films are created under the social responsibility project. Everybody – not only children – can watch the films any time. We also include specific scenarios into the story-lines of popular serial television programmes, e.g. when somebody throws a cigarette on the floor, there is somebody else saying something about it.

Also environmental awareness is part of school curricula from primary school onwards. Using animations children are taught in class about the importance of a clean environment.

The management of the housing estates will have a clear responsibility. It will be mandatory to do something about the environment, and there will be audits to ensure compliance.

The waste collection and separation bins will have designs to create awareness and stimulate sustainable behaviour. For example, a bin that is designed like a fish and that makes sound when you throw something in, will motivate people to keep their environment clean.

There is also a role for the government. The government should provide tax incentives for environmentally friendly products. E.g. if you buy an energy saving light bulb, the tax is lower. This also creates an incentive for the manufacturers of products. Nowadays we already have rules and regulations, but by 2050 we have a much stronger enforcement process. Auditing teams should be able to give penalties and the rules should become more strict.

Municipalities play an important role, but ensuring that investment for sustainability are part of the permits for new developments, but also for all districts in the future. Also incentives motivate companies to use solar energy and water treatment systems.

Awareness is further created by pop-up parks where children can enjoy educational games and learn from the teachers that travel with the parks while playing. Also general public awareness on sustainability is strengthened through connecting activity parks to energy generation, e.g. the bicycles in the parks are connected to the lighting system. The municipality closes roads on certain days, so these roads become available for cycling and people can experience the emission-free fresh air.

Awareness on the value or resources is created by implementing deposit systems, e.g. machines that provide a refund for packaging material.

Marketing messages of awareness.

Marketing messages on tv and in open spaces further support the creation



#### 2. Parks and water areas

To make the city greener we have to start from city planning. We believe we have to create a new concept, where we have open communities instead of the closed sites with fences we have now. By 2050 we have a shared park between the buildings in each housing unit. Between the units we have bigger parks that combine functionalities: e.g. a green park, with shops and a mosque. There will be only one main road, and only small roads to connect the housing units. People will have very easy access to parks nearby and there will be more parks and green spaces available. Shops and other facilities are always within 10 minutes walking distance.

By 2050 we aim for more green spaces per square meter in the city. Now 40% of the area must be free of constructions, and we want to increase it to 50% – where the extra 10% is only to be used for green. This will increase the costs of the apartments, but the quality of life will be higher in these areas.

By 2050 we also have less high buildings, and buildings that make better use of the landscape. We have a lot of valleys and inclinations and we should make better use of it. For example, we use the top of the inclinations as green areas, and we build lower house on and in the slope. These houses can have terraces and greenery. Also like in the Ottoman Empire we can build lower houses with internal areas where green can be planted by the residents. This can also be used as vegetable gardens.

Now we have still 40% of empty space in the municipality of Başakşehir, and we can use this space to implement these plans. Also when we

redevelop areas - like the poorer areas, we can do it according to this concept.

We also make smart use of wind energy. E.g. the Olympic Stadium area is a very windy area – wind turbines can be build there to use the energy for construction of the new developments in that area, such as the new channel that provides a parallel channel to the Bosporus to connect the Black Sea with the Marmara.

By 2050 there will be regulations for all housing complexes, so each buildings collects its own grey and rain water. When we put this into the regulations the investments are done by the developers for the benefit of the residents.

#### 3. Clean and sustainable industrial areas

By 2050 we have a resource management department – either in the municipality or as a separate organisation. This department provides advice to help to use resources better or utilise sustainable resources and provides incentives for companies.

Now we have over 30 different industrial sites, of which most are mixed (painters, car repair ships, food manufacturing etc.). By creating more specialised districts wit will be easier to make shared investment for energy generation or -saving and reduce costs. By having a good overview of the need for resources more circular systems are created. The resource manager can play a role in matching supply and demand.

By 2050 all rain water falling in the district is collected and stored for use in production processes or as cooling water. Each area has a rainwater tank to use water at a cheaper price.

Sustainability is increased in various ways. Roofs and walls are fitted with solar panels to produce electricity. Bicycle roads are provided for people to reach the shops in a sustainable way. More green areas are created and a museum shows products that are made from recycled materials. Shared burning facilities enable energy production from non-reusable waste.

Nowadays the process to penalise companies that do not follow the regulations is slow due to much bureaucracy. By 2050 the resource manager has the authority to penalise companies directly.











Second session of the vision workshop in Başakşehir

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#### Desired future scenario

In 2050 Başakşehir is a green and sustainable city, where people live in harmony with nature and enjoy green spaces, smell the fresh air and hear the sounds of nature. The city is well-planned with a balance between buildings and uninterrupted nature.

People enjoy the trees along paths, green river beds and water areas, which invite walking and cycling. People are environmentally aware and protect nature as their home.

The city is leading in waste recycling with nature-based solutions, resulting in zero waste. Water is valued and not one drop is wasted. The city is self-sufficient in energy from renewable sources, and people respect the use of water, energy and other natural (re)sources.



Key elements of the desired future scenario:

#### Sustainable awareness and behaviour

In 2050 the people of Başakşehir respect natural sources and act responsibly in the use and re-use of water, waste and energy. Through an educational programme, children know the value of resources from an early age, and understand the positive effects of nature and a clean environments on their daily lives and health. Houses are designed with solutions to support sustainable behaviour and include, for instance, separation bins for waste collection and filtering taps for drinking water.

#### Accessible green and water areas

The city planning concept guarantees shared accessibility to green spaces within walking distance of people's homes. Houses are built using the slopes and integrating green areas, accessible for people to enjoy or use for urban farming. Parks and 'wild nature' are always nearby. They contain water retention ponds, and offer people the necessary space for recreation and sports.

#### Clean and sustainable industrial areas

matching supply and demand.





Nature-based solutions contribute to shared services for circular systems in industrial areas. A 'resource management board' provides incentives and advice to companies to use less resources or to use natural resources. By coordinating companies' needs, they can together create more circular systems. The resource manager can play a role in

All water (rainwater, industrial waste and chemically polluted water) is collected and treated in the area and re-used for industrial purposes. Industrial waste management is used to optimise re-use and recycling as well as maximising the use of renewable energy, e.g. by solar panels on the roofs of industrial buildings.















The joint vision workshop was held on 27 November 2018 in Başakşehir (as side event of the Consortium Meeting). This page shows some pictures taken during the different sessions.





#### 7.7. Shared themes

During the joint vision workshop in Başakşehir a poster exhibition was organised where each follower cities presented their:

- current state overview: the result of the System Analysis
- desired future scenario: the result of the Vision Development

In a plenary session each city gave a brief presentation of the results, which was followed by a 'Q&A' session where all participants could ask questions to gain a deep understanding. After the plenary session participants walked around and had informal discussions to gain deeper understanding of each others results and challenges. They also identified the potential for knowledge exchange between the cities, by indicating what they could 'bring' and what they would like to learn.

Green factor	How to implement the green factor A green/blue factor
Daylighting	How to keep daylighting on the agenda (complexity and takes a long time)? Collaboration in river daylighting
Citizen participation	What are the benefits for citizens to be engaged in the NBS process? The willingness of citizens to participate in planning processes How to manage comfortable streets and neighbourhoods with the population? More 'honest' and effective methods for participation Social media communication strategy?
Support tools	Tools to support NBS roll out Legal and regulatory instruments Innovative procurement schemes
Education	Linking NBS projects to environmental education
Cross-departments	Engage cross-departmental networks & collaboration Communication between administration and stakeholders Organising opposition
Sweet mobility	Improving non-motorized mobility: bicycle lanes and green networks
Infrastructure	Solutions for and experience with underground infrastructure
Circularity	Circular systems for water, waste, resources
Industry	How to involve industries to be clean and sustainable To involve industries, one must understand economic benefits of NBS Monitoring and measuring effects

The shared themes that were discussed are shown in the table below.

#### 7.8. Intervention areas

The next step in the approach is Roadmapping. For this purpose roadmap workshops will be held in each city. The aim of the roadmap workshop is to come to a roadmap and coherent project portfolio. To come to relevant projects for each city, we will work on specific challenges in each city.

Based on the desired future scenario for 2050 and the results of the system analysis, NBS interventions and Governance interventions are defined as a starting point in the roadmap workshop.

#### 7.8.1. NBS interventions

An NBS intervention is a proposition to address a climate challenge at a specific location. Each city identified relevant topics by phrasing questions related to specific challenges: "Which NBS can ...[challenge] in [area]"

The NBS interventions are prioritized by the city representative during the joint ambition workshop.

#### Başakşehir

- 1. Which NBS will improve smart space accessibility and usability and water management in a residential area (t.b.d.)?
- 2. Which NBS will enable circular systems for water and waste in an industrial area (t.b.d.)?
- 3. Which NBS can be used to address flooding and at the same time improve the quality of public spaces around Sazlidere and other streams?
- 4. Which NBS can create awareness and foster sustainable behaviour in schools and housing communities?

#### Cannes

- 1. Which NBS will enable La Roubine to become a resilient and green ecoquartier & showcase for NBS and improve green and blue space quality and accessibility along the Frayère river?
- 2. Which NBS can enable water retention during heavy rainfalls and availability of clean water for use in agriculture in Basse Vallée de la Siagne?
- 3. Which NBS will contribute to quality of the public space and smart water retention systems to buffer for dry periods in Petit Juas, la Republique and La Bocca?
- 4. Which NBS can enable water retention while keeping the glamorous

identity of the city centre? 5. Which NBS will protect the coast from storm waves and create attractive shady areas for activities of people?

#### Castellón

- agriculture?
- 3. Which NBS will improve social cohesion and local food production in the Green agricultural ring around the city centre?
- 4. Which NBS will enable circular systems for water and waste and create comfortable space for active and vital employees in the industrial areas of Serrallo Polygon and Ciudad del Transporte?

#### Prague

- liveability of the historical setting?
- retention systems?
- Prague inhabitants?
- flooding and draughts?

#### Stavanger



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions



1. Which NBS will enable water retention, during heavy rainfall and circular water systems for purified waste water, in the wetlands and the river and make the place attractive for recreation and useful for

2. Which NBS can improve air quality and reduce heat stress, so people enjoy walking and cycling through the city (Ermitas, Puente rio seco, city centre, avd. del Mar, Paseo Morella, Parque Ribalta)?

1. Which NBS can create comfortable streets in the historical city centre, with shade and water retention systems, that enhance the quality and

2. Which NBS can create comfortable, resilient and functioning parks and green spaces in the wider city centre with healthy trees, high biodiversity and recreation qualities?

3. Which NBS can create comfortable spaces in block structure neighbourhoods of the wider city centre, with shade and water

4. Which NBS can create resilient open landscape in the outskirts of the built areas of Prague, with productive and sustainable agriculture, clean water bodies and accessible riverine and forested areas for

5. Which NBS around the creeks and rivers will protect the city from

1. Which NBS can introduce nature (water & green) in the city center to create healthy green spaces for people and enhance biodiversity, while at the same time prevent the city centre from water overflow.

2. Which NBS can improve social cohesion and green space accessibility

# **ROADMAPPING – NATURE-BASED SOLUTIONS FOR CLIMATE & WATER RESILIENCE**



in residential areas such as Hillevåg, and at the same time provide increased biodiversity and water management opportunities?

- 3. Which NBS can prevent storm water flooding from recreational areas and farm land upstream of residential areas, such as Sørmarka, Tastaveden, while at the same time increase nature and biodiversity as a co-benefit.
- 4. Which NBS can reduce storm water inflow into combined sewer systems with low capacity and potential overflows to the sea, in the [xxx] area?
- 5. Which NBS will prevent the city centre from sea level rise?

#### 7.8.2. Governance interventions

A Governance intervention addresses what needs to change in the governance processes to support and enhance NBS implementation. Each city identified relevant topics by phrasing questions as a "How to …"

#### Başakşehir

- How to create a green mentality?
- How to encourage construction companies to integrate NBS into their projects?
- How to integrate sustainability/smart city/ resilience perspectives into the municipal organization?
- How to better understand the wishes/perspectives of the citizens to support urban development?
- How to better understand and enhance the different types and functions of green and blue space?
- How to better utilize the Living Lab as a platform between municipal departments, companies research and citizens to foster better interdisciplinary innovation around NBS?
- How to better integrate the data, strategies and plans from different governance levels (metro and national) into urban planning?

#### Cannes

- How to create a green mentality?
- How to find sustainable financing for implementing NBS in the city?
- How to make sure that NBS are directly integrated in urban planning?
- How to develop the use of TIGRE in planning NBS and educate citizen on natural risks?
- How to create and enhance the knowledge base about NBS functionality in Mediterranean regions?

#### Castellón

- Which educational activities related with NBS measures will improve their implementation in the city?
- How to create a green mentality?
- How to improve procurement processes to make them NBS friendly?
- How to find sustainable financing for implementing NBS in the city?
- · How to facilitate cross-departmental collaboration for NBS?

#### Prague

- How to inform, educate and engage politicians and public in climate challenges and NBS?
- How to facilitate multi-level, cross-departmental communication and participation in NBS projects?
- How to steer the uptake of NBS through regulations and incentives?
- How to increase participation of other disciplines like engineers, architects or farmers in NBS?
- How to implement tools for NBS in public and private sectors?

#### Stavanger

- How to make sure that NBS is specifically included in municipal planning?
- How to support experimentation as a means to promote and test NBS and facilitate co-creation?
- In which way can we increase participation of private sector in NBS creation?
- How can we include ecosystem services and natural values into the accounting systems?
- How can we increase awareness and engagement of citizens in NBS?
- · How to facilitate cross-departmental collaboration for NBS?

#### 7.9. Next steps: replication framework & roadmapping

As last step in the joint vision workshop the roadmapping process was explained. In this step all relevant deliverables of the UNaLab project will be integrated in the replication framework and used by the follower cities to develop their roadmap towards climate and water resilience. How the various deliverables will be used was shown on a poster - see also opposite page.

The results of these steps will be reported in deliverable D6.7.



European This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Commission Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions



#### 8. **CONTRIBUTIONS**

We would like to thank all participants in the processes, meetings and workshops for their contribution in developing the visions for the follower cities.

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•	Pedro Romero	Civicons (construction company)	Romain Grillot	Projects and Buildings, the city of Cannes	Emre Bingöl
•	Juan Carlos Sanchis	Head of environmental department, Muncipality of Castellón	• Fabien Laganne	Information Systems (DSIT), Agglomération Cannes Pays de Lérins	• Taner Bingöl
•	Sara Sanchis	Project Engineer, BECSA (construction company)	Claude Leneiger	Green Space Department, the city of Cannes	<ul><li>Serkan Çelik</li><li>Elif Dükkanci</li></ul>
٠	Rafael Simó	Councilor of City development,	Aurélien Lerov	DSIT ??	
		Municipality of Castellón,	Franck Liange	Waste management, Agglomération Cannes Pays de Lérins	<ul><li>Haci Dursun Agac</li><li>Fatih Erol</li></ul>
٠	Ana Sos	Technical architect, Municipality of	Francoise Loques	Researcher CSIL Association	
•	Rafael Tarín	SECOT (association of retired people who	<ul> <li>Frédéric Marandon</li> </ul>	Transport, Agglomération Cannes Pays de Lérins	<ul><li>Gülten Ertuğral</li><li>Mustafa Gülçek</li></ul>
٠	Paco Vea	BECSA (Construction Company)	Thierry Migoule     Thereas Overage	General Director, the City of Cannes	• Kazim Gülüm
			Inomas Onzon	the City of Cannes	
8.	1.4. Cannes - 5-9 Novem	ber 2018	Carole Ory	Electricity Services, ENEDIS	Sebahatdin Kayas
•	Benoît Agassant	Environmental Department, the city of Cannes	• Xavier Péraldi	Green Space Department, the city of	<ul><li>Aykut Koçak</li><li>Abdullatif Kurt</li></ul>
•	Luc Aribaud	Researcher, CSIL Association	• Marie Agnès Portero	Agriculture Waste Environment	Ramazan Oruç
٠	Dominique Aude-Lasset	Deputy General Technical Services, the City of Cannes	Maria Davarra	Agglomération Cannes Pays de Lérins	Emre Öztürk
•	Stéphane Becker	Projects and Buildings, the city of Cannes	Iviarie Pourreyron	and Environment the city of Cannes	Serhat Öztürk
•	Christophe Biche	Roads and Infrastructure, the City of	Frédéric Poydenot	Education, CPIE Association	• Seda Özdemir



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 *Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions* 



Education, CPIE Association Deputy Mayor of Risk, the City of Cannes City Planning Agriculture – SCOT, Cannes Lérins Circulation, highways, the City of Cannes International Relations, the city of Cannes Waste management, Agglomération Cannes Pays de Lérins Formerly elected Sustainable Development, the City of Cannes SICASIL (water & flooding), Agglomération Cannes Pays de Lérins

#### r - 5-9 November 2018

# Adell Business Manager, Emlak Yönetim - Toki Public Housing Administration Deputy Major, Başakşehir Municipality Director, Department of Zoning and Urbanism Director, Department of Health Services Deputy Major, Başakşehir Municipality Director, Department of Planning and Projects Director, Department of Sanitation Environmental Protection Manager, İBB Metropolitan Chef of Environmental Control, İOSB Director, Environment and Waste Management Director, Department of Parks and Recreation Board Member, İOSB Aktif Çevre Deputy Major, Başakşehir Municipality Strategic Planning Manager İSKİ İstanbul Water and Sewerage Director, Department of Technical Works Department of Planning and Projects

Environmental Protection Manager, İBB

	Metropolitan	Ingerid Pegg	Water and sanitary department	
Taceddin Özcan	Director, Department of Parks and Recreation	Kari Raustein	Leader of the political body for urban planning	• Jiří Karnecki
Ahmet Pehlivan	Director, Department of Licence and	Harald Røstvik	University Stavanger	Mária Kazmuková
	Controls	Arne Sæbø	Nibio	~
Mehmet Tan	Project Coordinator, Makro İnşaat	Elin Scanche	Grønn by	<ul> <li>Štěpán Kyjovský</li> </ul>
		Gerd Seehuus	Triangulum	
8.2. Participants in th	e Ambition Workshops	Anne Skare	Section for urban planning	Iereza Libova
		Leidulf Skjørestad	Department for urban development and	
8.2.1. Stavanger - 6-8 Dece	mber 2017		environment	Eliška K. Lorencov
Jane Nilsen Aalhus	Department for the environment	Anne Merethe Skogland	Rambøll	
Hilde Blokkum	Parks department	Torgeir Esig Sørensen	Department of parks and roads	Miloslav Mikulčík
Gunnar Crawford	Stavanger smart city	<ul> <li>Kjersti Tau Strand</li> </ul>	Asplan Viak	
Anine Drageset	NTNU	Simon Tamminga	Architect, municipal planning	<ul> <li>Tereza Myšková</li> </ul>
• Elke den Ouden	TU/e LightHouse	Ellen Figved Thoresen	Section for road and transportation planning	
• Per Fretheim	Architect, MAD	Bengt Tovslid	Bergknapp AS	<ul> <li>Ondrej Mirovský</li> </ul>
• Jarle Furre	Department of water and sanitation	Rianne Valkenburg	TU/e LightHouse	Hana Pernioová
• Tom Hawxwell	Fraunhofer IAO	Tor Brynjar Welander	Section for municipal planning	X D1 ( 1 (
Frode Heigre	Department of parks and roads			Jana Plaminkova
Felicitas Heimann	Section head parks, parks and roads	8.2.2. Prague - 8-10 Janua	ry 2018	
	department	<ul> <li>Eliška Bradová</li> </ul>	IPR Prague - Director of City Planning	Radek Reina
• Katrine D. Henriksen	Leva / Urban sjofrent		Department	in in the second s
• Kristen Høyer-Mathiasen	Member of the political body for city environment and development	Karel Brezina	Povodí Vltavy, Water management State Enterprise	• Jan Richtr
Bjørn Zimmer Jacobsen	Section head, water and sanitary department	<ul> <li>Lenka Burgerová</li> </ul>	Prague 7 District - Councillor	Kristýna Schwarzo
Linn Jensen	Stavanger smart city	Martin Churavý	City of Prague - Department of the Mayor's Office	Ivana Síbrtová
Hugo Kind	Department of civil protection and emergy	• Elke den Ouden	TU/e LightHouse	
Signa & Kyandal	City of Stavanger	<ul> <li>Tomáš Drdácký</li> </ul>	Prague Troja District - Deputy of the mayor	• Karel Slansky
<ul><li>Laila Løthe</li></ul>	Architect with the municipalities own	Adam Emmer	Czech Globe - Department of the Social Dimension of Global Change	
	building department	<ul> <li>Růžena Fišáková</li> </ul>	Prague Watermanagement Company (PVS)	Lubor Smejtek
• Aina Hovden Lunde	Natural resources manager, department of	<ul> <li>Miroslav Havránek</li> </ul>	Charles University Environment centre	
• Kjartan Alexander Lunde	Member of the political body for urban	David Hora	SZKT (Czech landscape and horticulture association) - arborist	Marie Smetana
<ul> <li>Firik Mannsåker</li> </ul>	GIS expert section for geodata	Magdalena Hubená	City of Prague Project Manager Project	<ul> <li>Štěpán Špoula</li> </ul>
Per Møller-Pedersen	Storm-Aqua		Preparation and Implementaion Unit	
Trygve Petter Nilsen	Head of road section, park and road department	Tomáš Lapáček	IPR Prague - Director of Strategy and Politics	<ul><li> Petr Suska</li><li> Tomáš Trubačík</li></ul>
• Mari L. Nordheim	Department of urban planning	• Jaromír Kačer	City of Prague - Department of water	

	management - civil engineer
	City of Prague - Head of the greenery department
ová	City of Prague - Coordinator of the Adaptation Strategy of the City of Prague
κý	City of Prague - Director of the Department of Environmental Protection
	City of Prague - Department of Environmental Protection - Air protection specialist
ncová	Czech Globe - Department of the Social Dimension of Global Change
lčík	Operator ICT - project manager of department Smart Prague OICT
á	CENIA - Czech Environmental Information Agency
٢ý	Prague 7 District - Deputy of the mayor
á	CENIA - Czech Environmental Information Agency
vá	City of Prague - Councilors for Infrastructure, Technical Equipment and the Environment
	Prague Zbraslav District - Deputy of the mayor
	IPR Prague - Public Space Office - Landscape architect
arzová	Operator ICT
	City of Prague - Head of the state administration of monument care
	IPR Prague - Infrastructure and Landscape Section: Head of the Technical Infrastructure Office
	City of Prague - Department of Nature and Landscape Protection - Nature and Landscape Protection Specialist
	IPR Prague - Metropolitan Plan Office - specialist for nature and landscape
	IPR Prague - Public Space Office - landscape architect
	Fraunhofer IAO
k	Šance pro budovy (Chances for Buildings) - analyst for economical building

•	Monika Uhlenbruch	IPR Prague - Project Manager, Office of Management and Projects	•	Dominique Aude-Lasset	Ville de Cannes (Deputy General Director)	7 Jahre Detiil Courds
•	Rianne Valkenburg	TU/e LightHouse	•	Michele Baudiy	Ville de Cannes (Preiset)	Zenia Betui Gauds     Hegen Pagri Gül
•	Lukáš Vacek	City of Prague - Assistant to the City	•	Richard Colson	Ville de Cannes (Furone)	<ul> <li>Hasali Dasli Uui</li> <li>Vasin Kartoğlu</li> </ul>
		Councilor of Prague for Territorial	•	Filke Den Ouden	TIL/e LightHouse	Sebabatdin Kayas
		Development and Territorial Planning	•	Laurence Estimbre	Communauté d'agglomération Cannes pays	Avkut Kocak
•	Matěj Michalk Žaloudek	City of Prague - Assistant to the City			de Lérins (Water - Flooding)	Abdullatif Kurt
		Councilor of Prague for Territorial Development and Territorial Planning	•	Christophe Fiorentino	Ville de Cannes (Deputy Mayor Urban Planning)	<ul> <li>Selen Kus</li> <li>Ömer Onur</li> </ul>
0		• • • • •	•	Romain Grillot	Ville de Cannes	Taceddin Özcan
8.	2.3. Castellón - 12-14 Fel	bruary 2018	•	Magalie Thabuis	Ville de Cannes (International Relations	Hüsevin Özdemir
•	Alicia Andreu				Office)	
•	Cristobal Badenes	Municipality of Castellon	•	Philippe Marie	Ville de Cannes	Seda Özdemir
•	Mireia Ballester	BECSA	•	Thierry Migoule	Ville de Cannes (General Director)	
•	Ines Beltran	Municipality of Castellón	•	Sophie Mok	Fraunhofer IAO	Sinan Özkorkmaz
•	Juan Antonio Bertolin	Espattec	•	Thomas Onzon	Ville de Cannes (Directeur Général des	
•	Fernando Calduch	Municipality of Castellon			Services Techniques)	İrem Reis
•	Irina Celades	Institutio de Tecnologia Ceramica	•	Xavier Peraldi	Ville de Cannes (Green Space)	Claudius Schaufler
•	Sergio Chiva	University of Castellon	•	Marie-Agnès Portero	Communauté d'agglomération Cannes pays	Mehmet Tan
•	Javier Climent	Facsa		Maria Dourreyron	Ville de Cannes (Deputy Mayor	Recep Ali Topçu
•	Elke den Ouden	I U/e LightHouse	Ţ	Marie I ourregion	Environment)	Nihat Toprak
•	Iomas Fabregat	Municipality of Castellon	•	Claire-Anne Reix	Ville de Cannes (Deputy Mayor Risk)	Rianne Valkenburg
•	Luis Gargori	Municipality of Castellon	•	Noemie Samson	Communauté d'agglomération Cannes pays	Fırat Vatan
•	Elena Gil	Municipality of Castellon			de Lérins	
•	Consuelo Leal	Municipality of Castellon	•	Pascal Teisseire	Ville de Cannes (Circulation)	
•	Kaul Martinez	Ensurbation LAO	•	Rianne Valkenburg	TU/e LightHouse	8.2.6. Joint Ambition
•	Mariellisa Padilla	Fraunnoier IAO	•	Elodie Zavattero	Communauté d'agglomération Cannes pays	• Hilde Blokkum
•	Alicia Pallales	Espanec Municipality of Castallán			de Lérins (Water - Flooding)	Sivia Campailla
•	Kusa Paluo	Municipality of Castellón				Margherita Cioffi
•	Juan Carlos Sancins	Municipality of Castellón	8	.2.5. Başakşehir - 11-13 A	pril 2018	Anna Jole Corsi
•	Raidel Sillo Salicilo	TLU2 LightHouse	•	Ali Alper	Başakşehir Municipality (Parks&Gardens)	• Elke den Ouden
•	Carmon Vilanova	Nunicipality of Castallán	•	Enda Balcı	Başakşehir Municipality (Parks&Gardens)	Luis Gargori
•	Elona Zuriaga	Faces	•	Serkan Çelik	Başakşehir Municipality (Vice Mayor)	Abdolrasoul Habit
•	Liena Zunaga	T acsa	•	Soner Dedeoğlu	Basaksehir Municipality	• Iom Hawxwell
0		2010	•	Elke den Ouden	TU/e LightHouse	• Gijs Hoogmoet
ð.	2.4. Cannes - /-9 March	2010	•	Elif Dükkancı	Başakşehir Municipality (Planning &	Heidi Jonansson
•	Denon Agassant	Environment)		<b>a</b> –	Project Mgr)	Sami Kazi
•	Johara Amarouche	Ville de Cannes (Urban Planning)	•	Sencer Ertaş	Evreka (Customer Relations)	Jonanna Kuusisto     Chariaga I
	sonuru / murouono		•	Gülten Ertuğral	Istanbul Organized Industry District	<ul> <li>Unarissa Leung</li> </ul>



European This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Commission **Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions** 



	(Permissions)
S	Başakşehir Municipality
	Başakşehir Municipality (Vice Mayor)
	Başakşehir Municipality (Mayor)
	Başakşehir Municipality (Vice Mayor)
	Aktif Isı (Environment Mgr)
	Başakşehir Municipality (Vice Mayor)
	Fraunhofer IAO
	Başakşehir Living Lab
	Başakşehir Municipality (Recycling Chief)
	İstanbul Technical University (President
	Consultant)
	İstanbul Metropolitan Municipality
	(Environment Protection Chief)
	Istanbul Organized Industry District (Permissions)
	Aktif Isı (Environment Mgr)
r	Fraunhofer IAO
	Makro Insaat Tic. A.S. Mimar
	Adell (Chairman)
	Başakşehir Municipality (Building Control)
g	TU/e LightHouse
	Başakşehir Municipality (Permissions Chief)

#### oition Workshop - Eindhoven 29 May 2018

	City of Stavanger
	City of Genova
	Rina Consulting
	City of Genova
	TU/e LightHouse
	City of Castellon
bipour	Luleå University of Technology
	Fraunhofer IAO
	City of Eindhoven
	ERRIN
	VTT
	VTT
	Hong Kong Polytechnic University

Tereza Libová	City of Prague	Elzbieta Lekve	Geodata department	
Max Alberto Lopez	University of Aveiro	Mari Lode Nordheim	Department of urban planning	Marie Pourreyron
Emesta Maciulyte	Fraunhofer IAO	Elke den Ouden	TU/e LightHouse	
<ul><li>Delia Mitcan</li><li>Sophie Mok</li></ul>	City of Eindhoven Fraunhofer IAO	Bjørn Zimmer Jacobsen	Section head, water and sanitary department	Claire-Anne Reix
Ömer Onur	Başakşehir Living Lab	• Eli Nessa	Urban Sjøfront	Florence Richard
Thomas Onzon	City of Cannes	Per Møller-Pedersen	Storm-Aqua	• Jan Jaap Rietjens
Marielisa Padilla	Fraunhofer IAO	Ingerid Pegg	Water and sanitary department	Magalie Thabuis
Marta de los Rios	ENoLL	Claus Sigurd Petersen	Parks department	
Peter Roebeling	University of Aveiro	Per Magne Pedersen	Stavanger Utvikling KF	• Rianne Valkenburg
Maarit Särkilahti	City of Tampere	• Jan Jaap Rietjens	Splinter	Elodie Zavattero
Stepan Spoula	IPR Prague	Siv Merethe Berge Røsland	GMC eiendom	
Monika Uhlenbruch	IPR Prague	Harald Røstvik	University Stavanger	
Ines Vaittinen	ENoLL	Anne Merethe Skogland	Rambøll	8.3.3. Prague - 22 ai
Rianne Valkenburg	TU/e LightHouse	Lise M Storås	Urban planning department	Daniela Blažejová
Mariangeles Viqueira Gab	arain UBATEC	Kjersti Tau Strand	Asplan Viak	Jaroslava Cechuro
Mayke van Dinter	City of Eindhoven	Simon Tamminga	Architect, municipal planning	• Elke den Ouden
Yuhong Wang	Hong Kong Polytechnic University	Rianne Valkenburg	TU/e LightHouse	Adam Emmer
Laura Wendling     Spele Zeleker	VTT	Siri Warland	Landscape architect, Norwegian Public Road administration	• Zdeněk Ent
<ul><li>Speia Zarokai</li><li>Sonia Zarino</li></ul>	City of Genova	• Falk Weihs	Landscape architect, Norwegian Public Road administration	<ul><li>Matěj Gloser</li><li>Jaromír Hainc</li></ul>

## 8.3. Participants in the Vision Workshops

### 8.3.1. Stavanger - 13 and 14 June 2018 2018

Tina Aksnes	Urban planning department	Johanna Anarouette Ville de Cannes	
Daniela Apolinario	Parks department	Jerôme Briot     Buildings	
Christin Berg	Urban planning department	Magali Canolle Cliani     Relations with the	inhabitants
Hilde Blokkum	Parks department	Valérie Capon     Urban planning	
<ul> <li>Ingrid Eileraas</li> </ul>	Urban planning department	Philippe Carassou-Maillan     Communauté d'ag	glomération
<ul> <li>Ingrid Gaukstad</li> </ul>	Urban planning department	Cannes Pays de L	érins
Kristin Gustavsen	Stavanger Sentrum AS	Richard Colson     Ville de Cannes (I	Europe)
Felicitas Heimann	Section head parks, parks and roads	Romain Grillot     Buildings	
	department	Elke Den Ouden     TU/e LightHouse	
Katrine Dam Henrik	sen Leva	Yann-Vari Lécuyer Deputy General D	irector
• Linn Jensen	Stavanger smart city	Claude Leininger Green spaces	
<ul> <li>Hugo Kind</li> </ul>	Department of civil protection and	Frédéric Marandon     Public transport	
	emergy preparedness	Thomas Onzon     Ville de Cannes (I	Directeur Général
<ul> <li>Signe s. Kvandal</li> </ul>	Water and sanitation department		

8.3	8.3.2. Cannes - 11 and 12 July 2018				
•	Benoît Agassant	Ville de Cannes (Direction Hygiène Santé Environment)			
•	Johanna Anarouette	Ville de Cannes			
•	Jerôme Briot	Buildings			
•	Magali Canolle Cliani	Relations with the inhabitants			
•	Valérie Capon	Urban planning			
•	Philippe Carassou-Maillan	Communauté d'agglomération Cannes Pays de Lérins			
•	Richard Colson	Ville de Cannes (Europe)			
•	Romain Grillot	Buildings			
•	Elke Den Ouden	TU/e LightHouse			
•	Yann-Vari Lécuyer	Deputy General Director			
•	Claude Leininger	Green spaces			
•	Frédéric Marandon	Public transport			

		des Services Techniques)				
٠	Marie Pourreyron	Ville de Cannes (Deputy Mayor				
		Environment)				
	Claire-Anne Reiv	Ville de Cannes (Deputy Mayor Risk)				
	Eloropeo Dichard	Urban planning				
	In Ion Pictions	Splinter				
•	Jali Jaap Kletjelis	Ville de Connes (International Balations				
•	Magane Thabuis	Office)				
٠	Rianne Valkenburg	TU/e LightHouse				
•	Elodie Zavattero	Communauté d'agglomération Cannes pays de Lérins (Water - Flooding)				
8.3.3. Prague - 22 and 23 August 2018						
•	Daniela Blažejová	INCIEN				
٠	Jaroslava Čechurová	City of Prague				
•	Elke den Ouden	TU/e LightHouse				
•	Adam Emmer	Czech Globe - Department of the Social				
		Dimension of Global Change				
٠	Zdeněk Ent	IPR Prague				
•	Matěj Gloser	Ministry of regional development				
٠	Jaromír Hainc	IPR Prague				
•	Tereza Horejšsová	Povodí Vltavy				
•	Magdalena Hubená	City of Prague, Project Manager, Project Preparation and Implemenation Unit				
٠	Ivan Jacko	City of Prague				
•	Eva Jeníkova	Czech landscape and horticulture association				
•	Jiří Karnecki	City of Prague - Head of the greenery department				
•	Rozálie Kašparová	IPR Prague				
•	Mária Kazmuková	City of Prague - Coordinator of the Adaptation Strategy of the City of Prague				
•	Štěpán Kyjovský	City of Prague - Director of the Department of Environmental Protection				
•	Robert Leníček	Czech Green Building Council				
•	Tereza Líbová	City of Prague - Department of Environ-				
		mental Protection - Air protection specialist				
•	Eliška K. Lorencová	Czech Globe - Department of the Social Dimension of Global Change				

Barbora Opltová	Prague District - Libuš	Serkan Çelik	Başakşehir Municipality	Tom Hawxwell	
• Jan Richtr	IPR Prague - Public Space Office -	Muammer Çınar	Başakşehir Municipality	Magdalena Huben	
	Landscape architect	Soner Dedeoğlu	Başakşehir Municipality	Heidi Johansson	
<ul> <li>Jan Jaap Rietjens</li> </ul>	Splinter	Elke Den Ouden	TU/e LightHouse	Sami Kazi	
Hana Rosypalová	Prague Watermanagement company	Elif Dükkancı	Başakşehir Municipality	Pierre Kil	
<ul> <li>Tomáš Sehnal</li> </ul>	IPR Prague	Hasan Basri Gül	Başakşehir Municipality	Salla Leppänen	
<ul> <li>Štěpán Špoula</li> </ul>	IPR Prague - Public Space Office -	Mustafa Gülcek	Halkalı Kağıt	Ernesta Maciulyte	
	landscape architect	Kazım Gülüm	Başakşehir Municipality	Tommaso Martin	
Klára Sutlovičová	Glopolis, o.p.s.	Ömer Karabayraktar	Başakşehir Municipality	Sophie Mok	
Rianne Valkenburg	TU/e LightHouse	Yasin Kartoğlu	Başakşehir Municipality	Mari Lode Norhei	
<ul> <li>Anežka Váňová</li> <li>Václava Vlčková</li> <li>Vojtěch Vosecký</li> <li>Monika Uhlenbruch</li> </ul>	Prague District 13 CENIA - Czech Environmental Information Agency Institute of circular economy IPR Prague - Project Manager, Office of Management and Projects	<ul> <li>Sebahatdin Kayas</li> <li>Pelin Kıvrıkoğlu</li> <li>Abdullatif Kurt</li> </ul>	İOSB – İkitelli Organised Industry District Mgmt Office İstanbul Metropolitan Municipality Environment Conservation Specialist Basaksehir Municipality	<ul> <li>Ömer Onur</li> <li>Luuk Postmes</li> <li>Jan Richtr</li> <li>Maarit Särkilahti</li> <li>Anna Ståhlbröst</li> </ul>	
8.3.4. Castellón - 18 and	19 September 2018	<ul><li>Ahmet Melik</li><li>Ömer Onur</li></ul>	Başakşehir Municipality Başakşehir Living Lab	<ul> <li>Ryan Titley</li> <li>Monika Uhlenbrug</li> </ul>	
Alicia Andreu	ITC Instituto de Tecnologic Cerámica	Taceddin Özcan	Başakşehir Municipality	Ines valuinen     Dionno Vollkonbur	
Ines Beltran	Municipality of Castellón	<ul> <li>Sinan Özkorkmaz</li> </ul>	ÍOSB – Íkitelli Organised Industry	Kianne varkenburg     Mayles Van Dinter	
Juan Antonio Bertolin	Espaitec Science Park		District Mgmt Office	Mayke van Dinter	
• Elke den Ouden	TU/e LightHouse	<ul> <li>Serhat Öztürk</li> </ul>	Başakşehir Municipality	Spela Zalokar	
Luis Gargori	Municipality of Castellón	Ahmet Pehlivan	Başakşehir Municipality	• Sonia Zanno	
• Elena Gil	Municipality of Castellón	İrem Reis	Aktif Çevre		
<ul> <li>Josep Nebot</li> </ul>	Heliotec	<ul> <li>Jan Jaap Rietjens</li> </ul>	Splinter		

• Mehmet Tan

Bekir Temel

• Gülten Yücel

٠

•

٠

Tayyip Tanrıkulu

Rianne Valkenburg

#### 8.3.5. Başakşehir - 17 and 18 October 2018

Başakşehir Municipality • Hacı Dursun Ağaç Başakşehir Municipality • Emre Aydın • Uğur Aydın Halkalı Kağıt • Emre Bingöl • Zehra B.Çavuş

UJI

Civicons

Splinter

BECSA

Facsa

TU/e LightHouse

Başakşehir Municipality Başakşehir Municipality

Municipality of Castellón

8.3.6. Joint Vision Workshop - Başakşehir 27 November 2018

Makro İnşaat

Başakşehir Municipality

Başakşehir Municipality

İOSB - İkitelli Organised Industry

TU/e LightHouse

District Mgmt Office

• I	Hilde Blokkum	City of Stavanger
• 5	Silvia Campailla	Comune di Genova
• H	Elke Den Ouden	TU/e LightHouse
• §	Shahryar Ershad Sarabi	TU/e
• I	Luis Gargori	Municipality of Castellón (Spain)
• /	Abdolrasoul Habibipour	Luleå University of Technology

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- nter

European Commission

Aina Macias

Alicia Pallarés

• Jan Jaap Rietjens

• Rianne Valkenburg

• Elena Zuriaga Aguoti

• Sara Sanchis

Pedro Romero Pavia

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions



	Fraunhofer IAO
ná	City of Prague
	ERRIN
	VTT
	OpenRemote / InnoHub BV
	City of Tampere
2	Fraunhofer IAO
	M3S
	Fraunhofer IAO
im	Stavanger Kommune
	Başakşehir Living Lab
	Municipality of Eindhoven
	IPR Prague
	City of Tampere
	Luleå University of Technology
	ERRIN
ch	IPR Prague
	ENoLL
g	TU/e LightHouse
r	Municipality of Eindhoven
	ENoLL
	Comune di Genova



